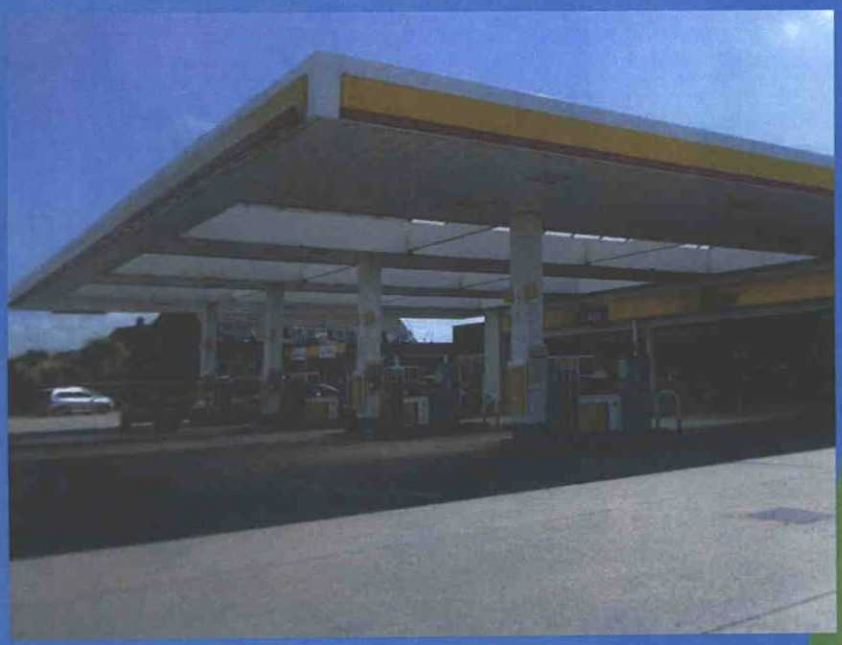
AECOM

# ENVIRONMENTAL VERIFICATION REPORT

## Shell Shoreham Airport



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Prepared for

Shell Oil Products UK Ltd


ADUR & WORTHING
PLANNING SERVICES

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# EXECUTIVE SUMMARY

AECOM Infrastructure and Environment UK Limited (AECOM) was requested by Shell Oil Products UK Ltd (Shell) to provide environmental support during redevelopment of Shell Shoreham Airport, 145 Brighton Road, Shoreham-By-Sea, West Sussex, BN43 5LD. This report has been collated to support Shell with its environmental asset management activities.

### *Redevelopment Activities*

The redevelopment was conducted under a Town Planning consent granted on 23 December 2015 by Adur District Council (ref: AWDM/1562/15). The works comprised the removal and replacement of existing underground storage tanks (USTs), forecourt canopy, fuel islands, fuel lines, interceptor, off-set fills, tank vents, site drainage/services, carwash and jet wash and site hardstanding.

### *Scope of Work*

The AECOM scope of work during the redevelopment activities included decommissioning of all on-site monitoring wells, verification sampling of the sidewalls and bases of the excavations and advancement of a soil bore to obtain soil verification samples where there were infrastructure constraints. A total of thirty (36) soil samples were collected and analysed as part of the validation works.

In total approximately 1,892 tonnes of material was excavated and disposed of as inert and non-hazardous material and a further 38 tonnes was disposed of as hazardous material. Resultant excavations were backfilled with approximately 1,175 tonnes of imported quarried material (excluding poured concrete and tarmac volumes).

### *Conclusions*

A Stage 2 risk assessment was performed on the analytical data collected during the redevelopment works which represented material remaining in-situ to assess potential risks to human health (on-site workers, off-site workers and off-site residents) and controlled waters (Widewater Lagoon located 150m south west, River Adur (tributary) located approximately 125m north east of the site and the English Channel located 250m south of the site). The principal conclusions were as follows:

- Potential risks to the controlled waters receptors were considered to be acceptable.
- Potential risks to the controlled human health receptors were considered to be acceptable.

The site is considered suitable for on-going oil use.

### *Planning Conditions*

This Environmental Verification Report has been written to discharge Environmental Planning Condition 5 outlined in Section 1 below. It should be noted that the site is under the Fairbanks' ibank service which collects data in real-time directly from the electronic tank gauge and the point of sale. This data includes any active gauge alarms, the start and end time of each transaction, the volume dispensed and the corresponding change in tank stock level. The data is polled every 15 minutes and relayed via broadband to Fairbanks' secure severs. This level of monitoring addresses the planning requirement for 'long term monitoring and maintenance'.

Planning Condition 6 was a reactive condition for which there was no cause to be implemented.

# 1. INTRODUCTION

AECOM Infrastructure and Environment UK Limited (AECOM) was requested by Shell UK Oil Products Ltd. (Shell) to provide environmental support during the redevelopment of Shell Shoreham Airport, located at Shell Shoreham Airport, 145 Brighton Road, Shoreham-By-Sea, West Sussex, BN43 5LD.

The redevelopment works at the site were managed by Shell's Engineering Construction PMC (Artelia) on behalf of Shell, and comprised the removal and replacement of existing underground storage tanks (USTs), forecourt canopy, fuel islands, fuel lines, interceptor, off-set fills, tank vents, site drainage/services, and site hardstanding. The site programme commenced on 22 August 2016 and was completed on 10 February 2017.

The Town Planning application (ref: AWDM/1562/15) for the redevelopment was submitted by Artelia and was granted consent for the redevelopment on 23 December 2015 by Adur District Council. The environmental planning conditions below were attached to the planning permission. Planning Condition 4 was discharged prior to commencement of the construction programme with the submission of the Phase 1, Phase 2 and ESP to Town Planning. This report has been prepared to support discharge of Condition 5. Planning Condition 6 was a reactive condition for which there was no cause to be implemented. Copies of the full planning permission are provided in **Appendix A**.

4. *No development approved by this planning permission shall take place until a remediation strategy that includes the following components to deal with the risks associated with contamination of the site shall each be submitted to and approved in writing, by the LPA:*

   *a) A preliminary risk assessment which has identified:*

   - *all previous uses*
   - *potential contaminants associated with those uses*
   - *a conceptual model of the site indicating sources, pathways and receptors*
   - *potentially unacceptable risks arising from contamination at the site.*

   *b) A site investigation scheme, based on (1) to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off site.*

   *c) The results of the site investigation and detailed risk assessment referred to in (2) and, based on these, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken.*

   *d) A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in the remediation strategy in (3) are complete and identifying and requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action.*

5. *"Within 3 months of first use of the replacement infrastructure hereby permitted a verification report demonstrating completion of works set out in the approved remediation strategy and the effectiveness of the remediation shall be submitted to and approved, in writing, by the LPA. The report shall include results of sampling and monitoring carried out in accordance with the approved verification plan to demonstrate that the site remediation criteria have been met. It shall include and plan (a 'long-term monitoring and maintenance plan') for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action, as identified in the verification plan. The long term monitoring and maintenance plan shall be implemented as approved",*

6. *"If, during development, contamination not previously identified is found to be present at the site then no further development (unless otherwise agreed in writing with the LPA) shall be carried out until the developer has submitted a remediation strategy to the LPA detailing how this unsuspected contamination shall be dealt with and obtained written approval from the LPA. The remediation strategy shall be implemented as approved".*

This Environmental Verification Report has been completed in accordance with AECOM Environmental Strategy Plan (ESP) (Ref: GB-12038413-20160324-REM-Shoreham Airport ESP).

## 1.1 Objectives

The objectives of the verification report detailed herein were as follows:

- Obtain validation data to allow for assessment of material left in-situ; and to advise that residual impact, if present, does not represent a significant risk to identified receptors.
- Advise on soil removal, if required.
- Demonstrate completion of the works, as set out in the AECOM ESP.
- To satisfy Condition 5 of the Planning Conditions in order to achieve Planning Approval for the redevelopment of the site.

## 1.2 Scope of Work

The scope of work for this verification report included:

- Decommissioning of all existing monitoring wells on-site.
- Collection, field screening, and chemical analysis of soil verification samples from the base and sides of excavations, and from imported fill material, to characterise the material left in-situ.
- Subject to field screening results, removal of significantly hydrocarbon-impacted soils in association with infrastructure removal.
- Advancement of a soil bore to obtain soil verification samples where there are infrastructure constraints.
- If required, risk assessment of material left in-situ that could not be safely or practically removed.
- Verification reporting including assessment of risks to controlled waters and human health receptors associated with materials left in-situ and collation of waste transfer and backfill certification documents.

## 1.3 Sustainability

In implementing the scope of works outlined above, AECOM made the following considerations of sustainability:

- Waste was field screened, analysed, and segregated to reduce requirement for soil treatment.
- Field work was staffed from local AECOM office to reduce travel impact.

# 2. BACKGROUND INFORMATION

## 2.1 Site Identification Details

| Table A – Site Information | |
|---|---|
| Site Name | Shell Shoreham Airport |
| GSAP ID Number | 12038413 |
| Site Address | The site is located at 145 Brighton Road, Shoreham-By-Sea, West Sussex, BN43 5LD (**Figure 1**). |
| Grid Reference (easting and northing) | 520730 (E),104610 (N) |
| Reported Site Area | Approximately 3,600 square metres ($m^2$) |
| Land Use Zoning | Freehold. AECOM understands that the site is owned by Shell. |
| Surrounding Land Use | North: The site is immediately bound by Brighton Road running north east to south west. Open fields are beyond.<br>South: Residential flats and commercial properties are located 10m from the southern site boundary, with further residential properties beyond.<br>East: Residential properties are located approximately 5m from the eastern site boundary with residential dwellings and commercial properties beyond.<br>West: The site is immediately bounded by The Saltings road with car parking and a Public House (30m) beyond. Residential housing and flats are located beyond. |

## 2.2 Environmental Setting

| Table B – Environmental Setting | |
|---|---|
| Topography | The site is located at an approximate elevation of 3m Above Ordnance Datum (AOD).<br>The topography of the surrounding area generally slopes down towards the coast to the south. |
| Surface Water Features and Abstractions | The nearest surface water feature is an unnamed drain located approximately 122m north east of the site. Widewater Lagoon is located approximately 150m south west of the site, and the River Adur (tributary) is located approximately 1.25m north east of the site which flows in an easterly direction toward the River Adur located approximately 0.8 kilometre (km) to the north east. The River Adur flows south of the site. English Channel at a point approximately 1.7km east of site. The English Channel is located approximately 250m south of the site.<br>There are no reported surface water abstractions located within 1km of the site. |

**Table B – Environmental Setting**

| | | | |
|---|---|---|---|
| Geology | Available British Geological Survey (BGS) geological maps indicate that the superficial deposits beneath the site comprise Storm Beach Deposits (gravel) or Tidal Flat Deposits (Clay, Silt, Sand and Gravel) overlying bedrock of the Newhaven Chalk Formation. Alluvium (Clay, Silty, Peaty, Sandy) are reported immediately to the north of the site.<br>Based on the geology encountered during intrusive investigation activities conducted by URS Infrastructure and Environment UK Limited (URS) in 2014 (Ref 3) the site is underlain by the following geological sequence: | | |
| | Unit | Description | Maximum Depth to Top of Unit (m) | Maximum Thickness (m) |
| | Topsoil OR Made Ground | Topsoil: Dark brown, silty sand with frequent twigs, wood detritus and roots.<br>Made Ground: Concrete / Asphalt | Surface | 0.26 |
| | Made Ground | Brown / off-white slightly clayey, sandy gravel. Gravel is flint, brick, chalk and bits of glass. | 0.26 | 1.41 |
| | Made Ground | Dark brown, sandy gravelly silt. Gravel is chalk and brick. Only encountered in MW105. (Reworked Alluvium). | 1.05 | 1.5 |
| | Alluvium | Soft to medium firm, brown sandy CLAY. Occasionally gravelly. Gravel is flint. | 2.55 | 1.2 |
| | Storm Beach Deposits | Observed as: GRAVEL, sandy GRAVEL. SAND and GRAVEL, gravelly SAND, or SAND. All gravel was flint. | 2.8 | >3.7 |
| | Hydrogeology | The Environment Agency (EA) classifies the superficial deposits (Tidal Flat Deposits and Alluvium) as Secondary Undifferentiated Aquifers, the Storm Beach Deposits as a Secondary A Aquifer and the Newhaven Chalk Formation as a Principal Aquifer. The depth of the Newhaven Chalk | | |

| Table B – Environmental Setting | |
|---|---|
| | Formation was not proved during the UPS Phase 2 investigation undertaken in 2014. |
| Groundwater Abstractions and SPZs | One groundwater abstraction is reported to be located within 2km of the site. The abstraction is licensed by Mr Mark Fowler for the abstraction of water for Horticulture and nurseries: animal watering and general use and is located 1.447km west of the site.<br>The site is not located within an Environment Agency (EA) defined source protection zone (SPZ). |
| Depth to Groundwater | The average depth to groundwater measured at the site during the AECOM June 2016 groundwater monitoring event ranged from 2.30m below ground level (bgl) to 3.33m bgl. Groundwater elevations ranged from -0.31m AOD to 0.88m AOD. |
| Tidal Influence | Tests to determine the influence of the tide on groundwater beneath the site were undertaken by UPS from 1 October to 3 October 2014 on three (3) monitoring wells (MW103, MW106 and MW108). These tests proved that groundwater underlying the site was influenced by the tide. The fluctuations observed in groundwater appear to show approximately 12 hours for a full tidal cycle (low tide to low tide). The tidal range observed on site in MW103 was 0.964m, in MW106 was 0.768m and in MW108 was 0.847m.<br>These tests were conducted during a neap tide, with a sea tidal range observed at Shoreham of 3 – 4 metres. An observation of the sea tidal times and the groundwater on site shows that there is a lag of approximately a quarter of a tidal cycle before the tides impact at the Site. During spring tides, the observed sea tidal range is between 6 – 7 metres; it is unknown how this will affect the groundwater underlying the site. |
| Inferred Groundwater Flow | Groundwater flow directions at the site are tidally influenced. The testing completed in October 2014 showed the following pattern, as shown in the potentiometric surface plots presented in **Figure 4a – 4d**: |

| Tidal Scenario | Date | Time | Gradient | Direction | Comments |
|---|---|---|---|---|---|
| Hide Tide (apex on site) | 07/10/2014 | 18:52 | 0.005 | NE | Likely being recharged by sea which is pushing groundwater to north |
| Mid tide – Falling | 07/10/2014 | 22:05 | 0.003 | E | Possibly swinging back towards sea |
| Low Tide (nadir on site) | 02/10/2014 | 02:17 | 0.001 | W | Gradient too flat to reliably determine flow direction. |
| Mid Tide – Rising | 02/10/2014 | 05:30 | 0.006 | NNE | Direction and gradient consistent with recharge from sea to the south. |

Based on the above it is likely that the dominant groundwater flow direction is north-east to east, towards the River Adur, but that there is variation over the tidal cycle. Given the variation in direction and gradient a representative value for each has not been determined, however the River Adur is considered to be the primary receptor for groundwater flow, which is estuarine north east of the site.

| Table B – Environmental Setting | |
|---|---|
| Potential Vapour Receptors | USEPA Guidance (Ref. 1) has been used to determine potential vapour intrusion receptors that require assessment. The site shop has been assessed primarily as a vapour receptor for potential acute risks, however chronic risks to site workers have also been considered.<br>The following factors are present at the site which preclude the use of the USEPA Guidance for assessing vapour intrusion risks:<br>• Drainage from the car wash.<br>• Made Ground – mostly haredstanding between petrol station and adjacent residential and commercial properties.<br>The following vapour intrusion receptors have therefore been identified:<br>• Off-site workers in commercial properties 10m to the south and 30m to the west.<br>• Residents of properties 5m from the eastern and 10m from southern site boundaries. |

## 2.3 Environmental Setting

| Table C – Previous Site Investigation and/or Remedial Works | |
|---|---|
| Date | Summary |
| **2014** | **URS, Phase 1 Site Investigation, Ref: RA6370356-001, dated July 2014 (Report Ref 2)** |
| | As part of this report, a desk study, site walkover and survey of underground and above ground features and services on site was carried out. A number of potential pollutant linkages were identified in the preliminary conceptual model. |

| Table C – Previous Site Investigation and/or Remedial Works | |
|---|---|
| **2014** | **<u>UR5, Phase 2 Comprehensive Site Assessment, Ref: R4637035-002, dated November 2014 (Report Ref. 3)</u>**<br>Eight (8) groundwater monitoring wells (MW101 to MW108) and three (3) vapour monitoring wells (VP101 to VP103) were installed to a maximum depth of 6.0m bgl. Soil, groundwater, potable water, and soil vapour samples were collected and an assessment of potential risks to controlled waters and human health receptors conducted.<br>Groundwater was encountered in all eight (8) monitoring wells at an average depth of 3.19m bgl at low tide. Tidal fluctuations were observed in groundwater and appeared to show approximately 12 hours for a full tidal cycle (low tide to low tide). During rising tide and high tide, the groundwater flow direction is inferred to the north to north east towards the River Adur. The tidal range observed on site ranged from 0.77m to 0.95m. Light non-aqueous phase liquid (LANPL) was not identified in any of the wells.<br>The principal conclusions of the Comprehensive Environmental Site Assessment (ESA) are summarised below:<br>• Concentrations of chemicals of potential concern (COPC) were not detected above human health Continued Petroleum Use (CPU) generic acceptance criteria (GAC) or human health Ground Floor Flat GAC in soil and groundwater samples collected from the site.<br>• Concentrations of COPC were not detected above UK Drinking Water Standards in sample of potable water collected from the site.<br>• Concentrations of total petroleum hydrocarbons (TPH), polyaromatic hydrocarbons (PAH) compounds and metals were reported above the controlled water (CW) GAC in mostly made ground soil samples collected at the site and occasional unaturated natural soil samples. These COPC were not reported in exceas of the GAC in groundwater samples collected across the site. Considering the underlying geology and low leaching potential it is considered that COPC in soils do not represent an unacceptable risk to controlled waters. |

| Table C – Previous Site Investigation and/or Remedial Works | |
|---|---|
| **2016** | **AECOM Environmental Strategy Plan, Ref GB-12038413-20160324-REM-ESP, dated March 2016 (Report Ref. 4)**<br>An Environmental Remedial Strategy Plan (ESP) was prepared to support the environmental aspects of the planning process for a proposed site redevelopment. The following strategy was proposed in order to control the potential risks to site workers during the redevelopment phase; to improve the overall environmental condition of the site; and to allow for the assessment of material left in-situ:<br>• Undertake an additional groundwater and vapour monitoring event.<br>• Well decommissioning.<br>• Removal of existing underground fuel storage tanks (USTs) and associated infrastructure as far as is safe and practicable to do so.<br>• Removal of significantly hydrocarbon impacted soils (if required) to the extent practicable.<br>• Collection, field analysis, and chemical analysis of soil verification sample from the bases and sides of excavations and from imported fill material, to characterise the material left in-situ.<br>• As required, risk assessment of material left in-situ that cannot be safely or practically removed.<br>• Verification reporting. |
| **2016** | **AECOM Factual Groundwater and Vapour Monitoring Event Report, Ref GB-12038413-20160816-MonO1-FGVME, dated August 2016 (Report Ref. 5)**<br>Groundwater and soil vapour samples were collected and an assessment of potential risks to controlled waters and human health receptors undertaken from eight (8) groundwater monitoring wells (MW101 to MW108) and three (3) vapour monitoring wells (VP101 to VP103). Groundwater was encountered within all of the eight (8) existing monitoring wells at depths ranging between 2.3m bgl (MW108) to 5.6m bgl (MW104). Corresponding groundwater elevations ranged from -0.37m AOD to 0.88m AOD.<br>Visual and olfactory evidence of COPC were not noted during purging any of the monitoring wells. Measurable thicknesses of light non-aqueous phase liquid (LNAPL) was not encountered in any of the monitoring wells on site. |

# 3. FUEL INFRASTRUCTURE

## 3.1 Summary of Site Equipment Pre- and Post-Redevelopment

The following information regarding fuel infrastructure prior to site redevelopment was obtained from the URS Phase 1 and Comprehensive Site Investigation Reports (Report Ref. 2 & 3) and the information regarding fuel infrastructure post redevelopment was obtained from Shell drawing 12038413-GENWK-16.

**Table D – Site Equipment and Infrastructure Pre- and Post- Redevelopment (2016)**

| Site Features | Pre-Redevelopment | Post-Redevelopment |
|---|---|---|
| **Site age** | Information obtained from the URS Phase 1 Investigation Report (Report Ref. 2) indicates the earliest recorded use of the site as a petrol filling station to be 1963. | Knock down rebuild in 2016 as detailed in this report. No evidence of the detailed decommissioned tanks in the Petroleum Officer report was identified during the construction works. |
| **Known prior redevelopment on the site** | Information provided by Petroleum Officer indicated that eight (8) tanks were present on site before 1989 (date of installation is unknown). Six (6) tanks/vessels were decommissioned (filled with concrete) and five new single tank/vessels were installed in approximately 1989. Decommissioned tanks are believed to be located below the actual forecourt area. It is thought that these tanks were never removed from the site. The site underwent a re-build in 1997/1998 which included the replacement of the two oldest tanks (pre-1989 tanks that were still in operation at that time) by two (2) new double skinned tanks comprising three (3) compartments.<br>In approximately 2004 the site car wash was replaced along with new dispensers and consoles installed. | |
| **Number of fuel islands and pumps (Cars and HGVs)** | Cars: Four (4) fuel islands (eight (8) dispensers).<br>HGVs: None | Cars: Four (4) fuel islands (eight (8) dispensers).<br>HGVs: None |
| **Gauge System** | Veeder Root TLS-350R | Veeder Root TLS-350R |
| **LPG on the site** | No | No |
| **Number of above ground tanks, capacity and contents** | None | None |
| **Number of active underground tanks / compartments** | Five (5) single walled steel underground tanks with a total of seven (7) compartments located to the south west of the fuel dispensing area. | Two (2) double-skinned underground tanks with a total of four (4) compartments, located to the south west of the fuel dispensing area. |

**Table D – Site Equipment and Infrastructure Pre- and Post- Redevelopment (2018)**

| Site Features | Pre-Redevelopment | Post-Redevelopment |
|---|---|---|
| **Number of abandoned underground tanks on-site** | Based on information provided by the Petroleum Officer six (6) underground storage tanks (USTs) were decommissioned and filled with concrete in approximately 1989, it is thought that these tanks remain on site. These tanks would be located underneath the actual forecourt. During the site walkover no visual evidence of abandoned tanks were noted. | None – Potential abandoned tanks were searched for during the redevelopment works but no evidence was found. |
| **Underground tanks installation strata** | Superficial Storm Beach Gravel deposits | Superficial Storm Beach Gravel deposits |
| **Number of off-set fill points** | Eight (8) above ground off-set fill points were identified close to the western edge of the site forecourt area. | Four (4) above ground off-set fill points located at the same location as the previous off-set fills. |
| **Overfill protection** | Unknown. | OPW overfill prevention valves and high level alarm connected to gauges |
| **Pipework system** | Suction | UPP dual contained pressure lines, all other pipework UPP lined single skin. |
| **Tank manholes** | All tank access chambers were plastic lined. | All tank access chambers are plastic lined. |
| **Site interceptor** | The site was identified to have a petrol superceptor near the western site boundary. Also, two (2) two stage interceptors were identified onsite, one for the canwash and another one for the site drainage adjacent to the sites south eastern boundary. Lastly, a one stage interceptor (silt trap) was identified adjacent to the car wash. | One new Class-1 petrol interceptor to replace the previous main interceptor. Other interceptors for the canwash and drainage were service cleaned and silt removed. |
| **Interceptor drainage** | All interceptors located on site drained to the storm water sewer that runs to the south west. | All interceptors located on site will drain to the storm water sewer that runs to the south west. |
| **Soakaway on the site** | Three (3) soakaways have been identified on site, on the south boundary of the site. | Soakaways will remain, with one new soakaway (rebuilding old one) located next to the interceptor. |
| **Car wash** | Located in the eastern part of the site | Existing car wash replaced with new. |
| **Jetwash** | Located in the eastern part of the site, next to the car wash. | Old jetwash to be retained, serviced and cleaned. |

**Table D – Site Equipment and Infrastructure Pre- and Post- Redevelopment (2016)**

| Site Features | Pre-Redevelopment | Post-Redevelopment |
|---|---|---|
| | According to the PO report and information obtained from the site manager, there have been no accidental releases on site.<br>Tank and Line testing were successfully passed in March 2013. | |
| **Known accidental release on-site or wet stock variance** | It should be noted that Shell UK Retail uses a specialist third party wet stock management contractor to monitor wet stock volumes across its company owned network which allows rapid identification, within very small tolerances, of discrepancies between fuel volumes and sales. According to this data, there is no evidence of any ongoing release of product to ground. | None |

## 3.2 Tank Summary

### 3.2.1 Prior to Redevelopment

**Table E – Summary of On-site Fuel Tank \ Compartments**

| Tank number or ID | Tank 1 | Tank 2 | Tank 3 |
|---|---|---|---|
| Compartment number or ID | Compartment 1 | Compartment 2 | Compartment 4 |
| Tank type | Single Walled Steel | Single Walled Steel | Single Walled Steel |
| Tank size (litres) | 35,055 | 17,195 | 12,949 |
| Product stored | Unleaded | V Power Unleaded | Diesel |
| Status | Active | Active | Active |
| Date of installation | 1998 | 1998 | Assumed to be 1989 when site was re-developed |
| Removal date or abandonment date | Not Applicable | Not Applicable | Not Applicable |
| Relative level (RL) of tank base | Assumed to be 4.5m bgl | Assumed to be 4.5m bgl | Assumed to be 4.5m bgl |

| Tank number or ID | Tank 3 | Tank 4 | Tank 4 | Tank 5 |
|---|---|---|---|---|
| Compartment number or ID | Compartment 5 | Compartment 6 | Compartment 7 | Compartment 8 |
| Tank type | Single Walled Steel | Single Walled Steel | Single Walled Steel | Single Walled Steel |
| Tank size (litres) | 12,949 | 12,949 | 12,949 | 17,385 |
| Product stored | Diesel | V Power Unleaded | Diesel | V Power Diesel |
| Status | Active | Active | Active | Active |
| Date of installation | Assumed to be 1989 when site was re-developed | Assumed to be 1989 when site was re-developed | Assumed to be 1989 when site was re-developed | Assumed to be 1989 when site was re-developed |
| Removal date or abandonment date | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| Relative level (RL) of tank base | Assumed to be 4.5m bgl | Assumed to be 4.5m bgl | Assumed to be 4.5m bgl | Assumed to be 4.5m bgl |

### 3.2.2 Tank Summary – Post-Redevelopment

The following information has been obtained from Shell drawing Shoreham Airport 12038413 -T-FCT-16 PIPE Rev A.

**Table F – Summary of On-site Fuel Tank / Compartments**

| Tank number or ID | Tank 1 | Tank 2 | Tank 2 |
|---|---|---|---|
| Compartment number or ID | Compartment 1 | Compartment 2 | Compartment 3 | Compartment 4 |
| Tank type | Double Walled Steel | Single Walled Steel | Single Walled Steel | Single Walled Steel |
| Tank size (litres) | 35,000 | 20,000 | 35,000 | 20,000 |
| Product stored | Diesel | V Power Diesel | Unleaded | V Power Unleaded |
| Status | Active | Active | Active | Active |
| Date of installation | 2016 | 2016 | 2016 | 2016 |
| Removal date or abandonment date | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| Relative level (RL) of tank base | Assumed to be 4.5m bgl | Assumed to be 4.5m bgl | Assumed to be 4.5m bgl | Assumed to be 4.5m bgl |

## 3.3 Site Redevelopment Works

As part of the redevelopment works a total of five (5) tanks (with a total of eight (8) compartments), which were operational prior to the redevelopment works, were removed from the site. Redevelopment works also included removal of the existing forecourt canopy, fuel islands, fuel lines, interceptor, off-set fills, tank vents, car wash, one soakaway, and some site drainage/services. A plan of the site prior to redevelopment is presented as Figure 2.

Following completion of the site redevelopment, the site comprises a refurbished shop, a new canopy, two (2) new USTs (with a total of four (4) compartments) and vents, above ground off-set fill points, a new forecourt interceptor, four (4) new pump islands and new fuel lines, new soakaway, car wash and site drainage / services. A plan of the site post-site redevelopment is presented as Figure 3.

# 4. FIELD WORK

## 4.1 Summary of Field Work

**Table 6 – Summary of Field Work**

| | |
|---|---|
| Site Activities | The site was closed on 22 August 2016 and re-opened 10 February 2017; during this period site redevelopment works were undertaken by Shell, under management of their Principal Management Contractor, Ahelia Group (Ahelia). The contractor Williams Southern Ltd was contracted directly by Ahelia to undertake the redevelopment works.<br>During site closure AECOM conducted environmental activities including well decommissioning, trial pitting, verification sampling, and remedial excavation. Photographs taken during the AECOM field activities are presented in **Appendix B**. |
| Dates of Field Work | AECOM field works were carried out on the following dates: |

| Date | Activity |
|---|---|
| 24/08/16 - 26/08/16 | Decommissioning of eight (8) groundwater monitoring wells and three (3) vapour monitoring wells. |
| 16/09/16 | Verification sampling of new interceptor location and old/new tank farm excavation (EXA) |
| 20/9/16 | Sampling of imported backfill. |
| 27/09/16 | Verification sampling of pump islands and respective fuel lines |
| 04/10/16 | Verification sampling of old/new tank farm excavation (EXA). |
| 11/10/16 - 13/10/16 | Verification sampling of old/new tank farm excavation (EXA). |
| 25/10/16 | Verification sampling during removal of fuel lines. |
| 13/12/16 | Oversight of drilling operation whilst verification sampling from soil bore. |

| | |
|---|---|
| Health and Safety Arrangements \ Procedures Undertaken working with Ahelia | In advance of the site works, AECOM prepared a site-specific health and safety plan. All fieldwork was conducted by a holder of an SPA contractor's safety passport, and fieldwork was conducted in accordance with Shell's safety procedures and requirements.<br>All of the excavation works were undertaken by Williams Southern Ltd supervised by the Williams Southern Site Manager or Foreman, under permits issued to Williams Southern by Ahelia. The AECOM engineer observed the works being undertaken. As the works progressed, the AECOM engineer liaised with Ahelia and Williams Southern to coordinate the validation sampling with the site infrastructure removal works. |

**Table G – Summary of Field Work**

| Monitoring Well Decommissioning | Prior to commencing site redevelopment, eight (8) groundwater monitoring wells (MW101 to MW108) and three vapour wells (VP101 to VP103) were decommissioned to prevent the creation of preferential pathways for the potential migration of chemicals of potential concern (COPC) during or following completion of the redevelopment works. **Figure 2** shows the location of the decommissioned monitoring wells.<br>Decommissioning was completed by Geotechnical Engineering Ltd., under the supervision of an AECOM engineer. Groundwater monitoring wells were decommissioned by pumping bentonite grout into the boreholes to ground level using a tremie pipe. Vapour monitoring wells were decommissioned by pulling the pipe and filling with bentonite pellets to ground level. Details of well decommissioning are as follows: | | | |
|---|---|---|---|---|
| Borehole ID | Depth to Product (m bgl) | Depth to Base (m bgl) | Depth to Groundwater (m bgl) | Approximate Volume of Grout (Litres) |
| MW101 | -- | 5.3 | 3.01 | 80 |
| MW102 | -- | 4.84 | 3.02 | 80 |
| MW103 | -- | 5.13 | 3.17 | 150 |
| MW104 | -- | 4.82 | 3.07 | 180 |
| MW105 | -- | 5.01 | 3.15 | 200 |
| MW106 | -- | 5.5 | 3.14 | 60 |
| MW107 | -- | 5.46 | 3.24 | 200 |
| MW108 | -- | 4.44 | 3.18 | 50 |
| VP101 | -- | 0.75 | -- | pulled pipe - bentonite pellets |
| VP102 | -- | 0.71 | -- | pulled pipe - bentonite pellets |
| VP103 | -- | 0.77 | -- | pulled pipe - bentonite pellets |

| Table G – Summary of Field Work | | |
|---|---|---|
| Excavation Location Rationale | A total of one (1) excavation (EXA) was completed by Williams Southern Ltd to remove the existing site infrastructure (tank /arm, superceptor and soakaway) into which the new tank /arm, superceptor and soakaway were placed. Sheet piling was used to prevent water ingress into the excavation.<br>The excavation was advanced to 5.3m bgl around the tank /arm area to remove existing tanks and replace with two new 52,000L tanks. The north-eastern area of the excavation was advanced to 4m to install a new superceptor and the north-western area advanced to 3m bgl to replace the existing soakaway.<br>The excavation location is presented on **Figure 5**. | |
| | **Excavation** | **Details** |
| | EXA | Five (5) operational USTs with eight (8) compartments (T1 – T8) were removed and verification samples collected from the resultant excavation between 16 September and 25 October 2016.<br>One (1) site superceptor was removed and verification samples collected from the resultant excavation on 16 September 2016. |
| | Pump Islands and Fuel Lines | Four (4) dispenser islands and associated fuel lines were removed. Verification samples were collected from the resultant excavation on 27 September and 25 October 2016. |
| Soil Bores | Due to the tank /arm proximity to the road (The Saltings) and to the site shop, some of the concrete cradle was left in the ground due to ground stability/geotechnical reasons. To validate the south western corner of the tank /arm excavation (EXA) and to confirm the presence/absence of impacted material, one (1) soil bore was advanced (BH201) on 13 December 2016, by Geotechnical Engineering Ltd using a Commando 205 drill rig, utilising dynamic and flight auger drilling techniques under the supervision of an AECOM engineer.<br>The soil bore log is presented in **Appendix C**. The soil bore and remaining tank /arm cradle location are presented on **Figure 5**. | |
| Waste Removal | Approximately 1,928 tonnes of excavated material was removed from site which comprised: 927 tonnes of inert waste \ non-hazardous waste and 38 tonnes of hazardous waste sent to Havant Waste Transfer Station, Hampshire and 882 tonnes of hardcore which was sent to Robins of Herstmonceux, Pycecombe. Waste transfer notes are presented in **Appendix D.** | |
| Waste Water Disposal | A total of 81 tonnes of aqueous liquid waste of oily waste water was removed from the site in tankers and taken to L I S North Western Limited, Merseyside. Waste transfer notes are presented in **Appendix D.** | |

| Table G – Summary of Field Work | | |
|---|---|---|
| Imported Material | A total of 525 tonnes of Pea Shingle and 650 tonnes of Type 1 were imported to the site from Pyecombe Quarry East Sussex (these volumes do not take into account poured concrete or tarmac) for use in backfilling excavations. Import material certificates from the suppliers are presented in **Appendix F**. | |
| | One (1) sample of the imported fill material (BACKFILL) was collected by AECOM and submitted to the laboratory for chemical analysis. Copies of the laboratory analytical reports are presented in **Appendix F**. | |
| Field Screening and Verification Sampling | Soil samples were collected from the sidewalls and base of each excavation and from the soil bore for logging and screening for the presence of volatile organic vapour. Based on visual and olfactory evidence, selected samples were submitted to the laboratory for chemical analysis. A total of thirty-five (35) soil verification samples were collected and analysed to evaluate the soil conditions in the locations described below. Of these, all thirty-five (35) soil verification samples represent in-situ soil conditions remaining following excavation activities. Validation samples were collected in accordance with the Technical Method Statement SG30. Sample locations are indicated on **Figure 5**. | |
| | Soil sample descriptions and field observations are presented in the following sections. Analytical results are presented in **Tables 1** and **2**. Copies of the laboratory analytical reports are presented in **Appendix E**. | |
| | **Sample Locations** | **Number of Samples Collected** |
| | Operational tank farm (T1 – T8) and new tank farm excavation (EXA) | 21 (EXA1 – EXA18 and EXA22 – EXA24) |
| | Interceptor excavation (EXA) | 3 (EXA19 – EXA21) |
| | Soil Bore | 2 (BH201) |
| | Dispenser islands and fuel lines | 9 (FL01-FL05 and P01-P04) |

## 4.2 Field Screening Results / Observations

### 4.2.1 Infrastructure Excavations

Verification samples were collected from the sidewalls and bases of the excavations to remove and replace the site infrastructure. It should be noted that verification samples could not be collected along the western wall of the operational tank excavation (EXA) due to close proximity with the adjacent road requiring the tank cradle to remain in-situ. Soil analytical results from the soil bore (BH201) have therefore been used in the assessment of potential risks to human health and controlled waters in this area of the site.

Estimated excavation extents and verification sample locations are presented on **Figure 5**. A summary of field observations of verification samples are presented in **Table H** below:

**Table H – Verification Sample Field Observations**

| Sample ID | Depth (m bgl) | Max. PID (ppm) | Location | Sample Description | Visual and Olfactory Observations |
|---|---|---|---|---|---|
| EXA01 | 1.7 | 4.7 | Tank 1 wall south west corner | Soft to firm, orange brown, slightly gravelly CLAY | Dry, no staining, no odour |
| EXA02 | 1.7 | 95.7 | Tank 1 wall - Middle of southern tank farm excavation | Soft to firm, orange brown, slightly gravelly CLAY | Black staining, hydrocarbon odour, Dry |
| EXA03 | 1.7 | 20.6 | Tank 1 wall - South east corner of tank closest to shop | Soft to firm, orange brown, slightly gravelly CLAY | Dry |
| EXA04 | 4.0 | 52.6 | Tank 1 base side nearest road (west) | Soft, light grey brown gravelly CLAY. Gravel is f-c, sr-r of mixed natural lithologies | Wet, no staining, no odour |
| EXA05 | 4.0 | 56 | Tank 1 base side nearest shop (east) | Soft, light grey brown gravelly CLAY. Gravel is f-c, sr-r of mixed natural lithologies | Wet, no staining, no odour |
| EXA06 | 1.9 | <0.1 | North east wall of removed tank 2. North east wall of new tank farm | Brown sandy clayey gravel. Gravel is fine to medium, subangular to subrounded flint, natural stone and brick. Sand is fine to medium (MG) | Dry, no staining, no odour |

| Table H – Verification Sample Field Observations | | | | | |
|---|---|---|---|---|---|
| Sample ID | Depth (m bgl) | Max. PID (ppm) | Location | Sample Description | Visual and Olfactory Observations |
| EXA07 | 4.5 | <0.1 | Tank farm base beneath tank 3 | Red brown/grey medium density, fine to coarse, subangular GRAVEL. Very minor content of fine sand and silt and clay (loam) | Wet, no staining, no odour |
| EXA08 | 4.5 | <0.1 | Tank farm base beneath tank 2 | GRAVEL of mudstone and other natural stone with frequent fine angular shells | Wet, no staining, no odour |
| EXA09 | 4.5 | <0.1 | New tank farm base | GRAVEL of mudstone and other natural stone with frequent fine angular shells | Wet, no staining, no odour |
| EXA10 | 4.5 | <0.1 | New tank farm base | GRAVEL of mudstone and other natural stone with frequent fine angular shells | Wet, no staining, no odour |
| EXA11 | 2.2 | 13.8 | North east wall of removed tank 4. North east wall of new tank farm | Brown sandy clayey gravel. Gravel is medium, subangular to subrounded flint, natural chalk brick with infrequent chalk fragments. Sand is fine to medium (MG) | Fuel lines at 0.8m bgl. Slight hydrocarbon odour |
| EXA12 | 2.2 | <0.1 | North east wall of removed tanks 8. North east wall of new interceptor | Brown sandy clayey gravel. Gravel is medium, subangular to subrounded flint, natural stone and brick with infrequent chalk fragments. Sand is fine to medium (MG) | Dry, no staining, no odour |
| EXA13 | 4.5 | <0.1 | Base of new interceptor location | GRAVEL of mudstone and other natural stone with frequent fine angular shells | Wet, no staining, no odour |

**Table H – Verification Sample Field Observations**

| Sample ID | Depth (m bgl) | Max. PID (ppm) | Location | Sample Description | Visual and Olfactory Observations |
|---|---|---|---|---|---|
| EXA14 | 4.5 | <0.1 | Tank farm base beneath tank 8 | GRAVEL of mudstone and other natural stone with frequent fine angular shells | Wet, no staining, no odour |
| EXA15 | 4.5 | <0.1 | Tank farm base beneath tank 6 | GRAVEL of mudstone and other natural stone with frequent fine angular shells | Wet, no staining, no odour |
| EXA16 | 4.0 | 3.6 | Tank 7 base adjacent to interceptor in north west corner of site | Light yellow brown clayey gravelly SAND. Gravel is fine to coarse, subrounded to rounded of mixed lithology | Wet, no staining, no odour |
| EXA17 | 1.5 | 2.3 | Tank 7 wall north west corner | Black brown slightly clayey gravelly SAND. | Black looks organic, dry, no staining, no odour |
| EXA18 | 1.4 | 10.6 | North wall of removed tank 8. | Brown sandy clayey gravel. Gravel is medium, subangular to subrounded flint, natural stone and brick with infrequent chalk fragments. Sand is fine to medium (MG) | Hydrocarbon odour, Dry |
| EXA19 | 2.5 | 23.1 | Wall of interceptor to west. | Light, yellow brown slightly clayey, sandy GRAVEL. Gravel is f-c, subrounded to rounded of natural stone | Black staining, wet |
| EXA20 | 3.5 | 4.1 | Interceptor base | Light, yellowish brown sandy GRAVEL | Wet, no staining, no odour |
| EXA21 | 2.5 | 1.6 | Wall of interceptor to east. | Light, yellow brown slightly clayey, sandy GRAVEL. Gravel is f-c, subrounded to rounded of natural stone | Black staining, damp |

Table H – Verification Sample Field Observations

| Sample ID | Depth (m bgl) | Max. PID (ppm) | Location | Sample Description | Visual and Olfactory Observations |
|---|---|---|---|---|---|
| EXA22 | 4.5 | <0.1 | Tank farm base beneath tank 5 | GRAVEL of mudstone and other natural stone with frequent fine angular shells | Wet, no staining, no odour |
| EXA23 | 4.5 | <0.1 | Tank farm base beneath tank 4 | GRAVEL of mudstone and other natural stone with frequent fine angular shells | Wet, no staining, no odour |
| EXA24 | 2.1 | 27.5 | North east wall of removed tank 6. | Brown sandy clayey gravel. Gravel is medium, subangular to subrounded flint, natural stone and brick with infrequent chalk fragments. Sand is fine to medium (MG) | Hydrocarbon odour, Dry |
| FL01 | 0.5 | <0.1 | Fuel line between P1 and tank farm - West | Flint, brown clay with frequent fine to coarse, subangular gravel of unknown natural stone (MG). | No staining, no odour |
| FL02 | 0.5 | <0.1 | Fuel line between P1 and tank farm - East | Dense, white/brown slightly clayey gravel. Gravel is fine to coarse, subangular chalk and unknown natural stone (MG) | No staining, no odour |
| FL03 | 0.6 | 0.1 | Fuel line between P1&2 | Light brown grey, clayey chalk (MG) | Dry, no staining, no odour |
| FL04 | 0.6 | 60 | Fuel line between P2&3 | Dark brown clayey sandy gravel (MG) | Dry, no staining, no odour |
| FL05 | 0.6 | 5.4 | Trench where fuel line might be | Dark brown clayey sandy gravel (MG) | Dry, no staining, no odour |
| P101 | 0.8 | 0.8 | Pump Island 1 | Brown, clayey gravelly sand (MG) | Dry, no staining, no odour |
| P102 | 0.6 | 0.7 | Pump Island 2 | Grey brown, sandy clay and brick fragments (MG) | Dry, no staining, no odour |

**Table H – Verification Sample Field Observations**

| Sample ID | Depth (m bgl) | Max. PID (ppm) | Location | Sample Description | Visual and Olfactory Observations |
|---|---|---|---|---|---|
| P103 | 0.6 | 2 | Pump island 3 | Brown sandy clay (MG) | Dry, no staining, no odour |
| P104 | 0.6 | 2.4 | Pump island 4 | Dark brown, sandy clay (MG) | Dry, no staining, no odour |
| Groundwater Observations | | | | Groundwater was observed to ingress slowly into the excavations at approximately 3.0m bgl. | |
| Light non-aqueous phase liquid (LNAPL) | | | | LNAPL was not observed during the verification sampling activities. | |

Notes:
MG – Made Ground

### 4.2.2 Soil Bores

One (1) soil bore was drilled to the west of the existing tank farm and new tank farm excavation in order to validate the excavation. Side wall samples could not be collected due to the tank cradle remaining in-situ due to geotechnical reasons. The soil bore location is presented on **Figure 5** and the soil bore log is presented in **Appendix C**. A summary of field observations of soil bore samples are presented in **Table I** below:

**Table I – Delineation Trial Pit Sample Field Observations**

| Sample ID | Depth (m bgl) | Max. PID (ppm) | Location | Sample Description | Visual and Olfactory Observations |
|---|---|---|---|---|---|
| BH201 | 2.5 | <0.1 | West of the tank farm (excavation A) between The Saltings and the retained tank cradle | Soft, light grey with orange mottling, sandy CLAY. Sand is fine | Dry, no staining, no odour |
| BH201 | 5.0 | <0.1 | | Multicoloured, slightly sandy, GRAVEL. Gravel is coarse, angular shells. Sand is coarse | Wet, no staining, no odour |
| Groundwater Observations | | | | Groundwater was observed standing in the borehole at 2.72m bgl. | |
| LNAPL | | | | LNAPL was not observed during the verification sampling activities. | |

## 4.3 Analytical Schedules & QA/QC

| Table 1 – Analytical Information | | |
|---|---|---|
| Analytical Laboratory | Soil samples were analysed by ALS Environmental (previously known as Alcontrol Laboratories of Chester). The results are discussed in **Section 5** and presented in **Tables 1 and 2**. Copies of the Chain of Custodies (COCs) and laboratory certificates are presented in **Appendix E**. | |
| Analytical Schedule | The following schedule of analysis was completed, excluding QA/QC samples. The COPC in bold are those identified by Shell as potential risk drivers from retail petroleum sites. The results and analytical methodology are presented in **Appendix E**. | |
| | **Analysis** | **Number of Soil Samples** |
| | Total Petroleum Hydrocarbons (TPH) Health risk fractions including **C8-C12** | 36 |
| | **Benzene, Toluene, Ethylbenzene, Xylenes** (BTEX) compounds | 36 |
| | **Fuel Oxygenates** (methyl tertiary butyl ether (MTBE), tert-butyl ethyl ether (ETBE), di-isopropyl ether (DIPE), tert butanol (TBA), tert-amyl methyl ether (TAME), Ethanol) | 36 |
| | Polycyclic Aromatic Hydrocarbons (PAH) 16 Speciated including **naphthalene** | 36 |
| | **2-methylnaphthalene** | 2 |
| | **n-hexane** | 2 |
| | Total Organic Carbon (TOC) | 4 |
| | Asbestos | 6 |
| | Asbestos Quantification | 1 |
| **Laboratory quality control sampling** | The analytical data have been reviewed for quality assurance and control purposes (QA/QC), the results of which are presented in **Appendix F**.<br>• Laboratory holding times for soil samples did not exceed the seven screening period for any COPC.<br>• The surrogate data were reported within acceptable limits.<br>• The laboratory blanks were within acceptable limits.<br>In general, the data are considered appropriate for reporting. | |

| Table 1 – Analytical Information | |
|---|---|
| **Waste Classification** | All material proposed for off-site disposal must be given a proper description and waste classification in accordance with the Environmental Protection (Duty of Care) Regulations 1991, and Hazardous Waste (England and Wales) Regulations 2011.<br>To determine the likely waste classification of the soils beneath the site, the chemical analysis results for soil samples were assessed using the staged process set out in Interpretation of the definition and classification of hazardous waste, Environment Agency, Technical Guidance WM3 (First Edition). Waste Acceptance Criteria (WAC) results alongside the WM3 waste classification were used to determine the appropriate route for the disposal of the soil cuttings generated by the intrusive investigation. |
| The waste transfer note for the waste generated during the investigation is presented in **Appendix D**. | |

# 5. HUMAN HEALTH STAGE 2 GENERIC QUANTITATIVE RISK ASSESSMENT

## 5.1 Methodology

The methodology adopted in this report is primarily based upon the UK Defra and EA "best practice" in regard to the assessment of contaminated land. The approach taken reflects that promoted in CLR11 (Ref 6) and R&D Publication 66 (Ref 7) and the supporting guidance referenced within them. Soil data has been screened against generic assessment criteria (GAC) protective of potential human health receptors.

The derivation of the GACs for organic compounds includes an element of receptor identification and vapour pathway assessment. The vapour pathways assume a distance of 0.5m, 0.65m and 1m from the source to the receptor respectively for soil vapour, soil and groundwater.

Notwithstanding the adopted methodology, for the assessment of potential receptors for petroleum vapour intrusion, assessment has also been completed in line with more recent guidance from the USEPA (USEPA, 2015. Ref 1). Where receptors are Petroleum Vapour Intrusion (PVI) screened in for further assessment, the GAC are appropriate. Where receptors are PVI screened out, the contribution to risk from the vapour pathways assessed by the GAC can be disregarded.

The site shop has been included within the assessment, although it is recognised that risks to petrol filling station workers from petroleum products are controlled primarily through health and safety systems.

## 5.2 Generic Assessment Criteria (GAC) Human Health

The Stage 2 Generic Assessment Criteria (GAC) for soil was derived using the LQM/CIEH S4UL methodology, protective of:

- Off-site residents (residential flats are located 5m from the eastern and 10m from southern site boundary) using a high density residential (HDR) end use scenario.
- On-site workers (including Shell shop staff and site users) using a continued petroleum use (CPU) end use scenario. The CPU GAC is also considered protective of commercial workers in properties 10m from southern site boundary.

Assumptions within the derivation of the GAC and their applicability to the site are set out in Table K. Comparison of soil analytical results to Stage 2 GAC is provided in **Table 1** and GAC exceedances are summarised in Table L.

**Table K – Assumptions within the GAC and applicability to the site**

| Active Pathway | GAC | Assumption | Applicability at site | Likely to over or under simulate risks |
|---|---|---|---|---|
| Soil gas vapour intrusion into buildings | High Density Residential | Only vapour pathways are viable. No exposure to soils via direct contact pathways including dermal contact and dust inhalationIngestion as the receptor is off-site | Neighbouring flats are off site so direct contact and ingestion pathway not active | GAC are applicable to offsite flats |
| | CPU | Only vapour pathways are viable. No exposure to soils via direct contact pathways including dermal contact and dust inhalationIngestion as the site is fully covered in hardstanding/building footprint and/or managed landscape | The site surface is covered in 95% hardstanding | GAC applicable to site shop. |
| | All land uses - Soil and groundwater | 0.58% total organic carbon (TOC) | Representative site TOC value for strata through which vapours pass is 1.6 % TOC (Made Ground) | GAC may overestimate risks due to higher TOC. |
| | | Soil separating the source and the receptor is physically similar to the CLEA Sand soil type. | Site soils typically comprise sandy gravelly silt (Made Ground) overlying sandy clay (Alluvium) | GAC may overestimate risks due to fines content of site soils |
| Model basil asoil jaoxa sluglap AEA CLL lle | All land uses - Soil and vapour | Vertical distance between soil source and receptor for vapour pathways is approximately 0.5m and receptor building directly overlies source | Soils impacted above GAC present from 0.45m bgl | GAC are applicable |
| | All land uses - Groundwater | Vertical distance between source and receptor for vapour pathways is approximately 1.0m and receptor building directly overlies source | No impacted water observed. Groundwater approximately 3.0m bgl. | GAC may overestimate risks |
| Model Parameters | All land uses - Vapour | 'Soil vapour to indoor air' factor for volatile compounds set to zero | Soil vapour data previously collected from wells with top of screen at 0.5m bgl. | GAC are applicable |
| | All land uses -Soil, groundwater and vapour | For volatile compounds it is assumed that vapour ingress is via a 2mm crack between concrete floor slab and walls. | Site shop likely to have a ground bearing slab. Off-site houses likely to have suspended wooden floors. | GAC applicable for site shop, but may underestimate risks to adjacent off-site houses. |
| | CPU - Soil, groundwater and vapour | Building size set to 14m x 6.5m x 2.4m high representative of a small site shop | Site shop is approximately the size of that used to derive GAC. | GAC are applicable |

Based on assumptions listed above and site characteristics, it is considered CPU and HDR GAC are applicable to the site, however certain pathways may be overestimate risks at this site.

## 5.3 Generic Assessment Criteria (GAC) Controlled Waters

The risk based methodology adopted in this report is primarily based upon the UK Defra and EA "best practice" in regard to the assessment of contaminated land. The approach taken reflects that promoted in CLR11 (Ref 6) and R&D Publication 66 (Ref 7) and the supporting guidance referenced within them.

Analytical results for soil samples recovered are tabulated in **Table 2** and have been compared against Stage 2 Generic Assessment Criteria (GAC), protective of:

- Surface water (Widewater Lagoon located 150m south west, River Adur (tributary) is located approximately 125m north east of the site and the English Channel located 250m south of the site).

The AECOM controlled waters soil GAC were derived assuming that unsaturated soils beneath the site typically contained 1% TOC. Other assumptions used in the derivation of AECOM controlled waters GAC were 30% total porosity, 7.5% water filled porosity, and 1.86g/cm3 bulk density. The TOC of 1% is considered appropriate to derive GAC based on leaching of COPC from the unsaturated zone. The average TOC measured in unsaturated soil samples collected by AECOM was 1.4% which is more than that used in the derivation of the GAC. Consequently, the controlled waters soil GAC may over estimate risks, and organic COPC which exceed the soil GAC by a factor of 1.4 or less are unlikely to represent an unacceptable risk.

### 5.3.1 Environmental Quality Standards (EQS)

For assessment of surface water, GAC have been based upon UK Environmental Quality Standards (EQS) for marine water, and also EQS from SEPA WAT-SG-53 and PNEC derived for EU REACH registration dossiers/chemical safety reports (via the Fuel Ether REACH Consortium FERC).

Groundwater within the Storm Beach Deposits Secondary A Aquifer flows in a predominately north-easterly to easterly direction towards a tributary of the estuarine River Adur, which in turn flows into the English Channel approximately 1.7 km east of the site. Due to tidal variation in groundwater flow direction, there may also be a component of flow towards the English Channel. Therefore selected GAC are based upon coastal Environmental Quality Standards (EQS).

Table 1 – GAC and TPH Hazard Index Exceedances

| Receptor Type | Scenario Origin | Benzene \ TPH Aromatic $C_6$-$C_7$ | TEX \ TPH Aromatic $C_7$-$C_{10}$ | Other Aromatic TPH | Aliphatic TPH | MTBE | Other Oxygenates | n-hexane | TPH Hazard Index | Other VOCs (vapour) | Naphthalene | Benzo(g)hylene | Other PAHs (incl. 2-methyl naphthalene) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Human Health | GPU | × | × | × | × | × | × | × | × | n/a | √ | √ | √ |
| | HDR | × | × | × | × | × | × | × | × | n/a | × | × | × |
| Controlled Waters | Coastal EQS | √ | √ | √ | × | × | × | × | n/a | n/a | √ | √ | √ |

Notes: √ = Measured in exceedance of GAC
× = Not measured in excess of GAC
n/a = not applicable

## 5.4 Discussion of Key Exceedances

### 5.4.1 Human Health - HDR

Exceedances of the human health HDR GAC were not identified. Potential risks to off-site residents from on-site concentrations of COPC are therefore considered acceptable.

### 5.4.2 Human Health – CPU

Exceedances of the human health CPU GAC were not identified. Potential risks to on-site workers, site users and off-site workers from on-site concentrations of COPC are therefore considered acceptable.

### 5.4.3 Human Health – Asbestos in Soil

Asbestos was detected and quantified within made ground at one location; PI01 (chrysotile). Once quantified, chrysotile at PI01 was reported at <0.001% (below laboratory detection limit). Asbestos was tested for at five other locations but not identified. Risks to visiting contractors excavating the ground have therefore not been further assessed.

### 5.4.4 Controlled Waters - DWS

The following COPC exceeded controlled waters EQS Marine GAC:

- Benzene TPH (C5-C7 Aromatic) in soil samples collected from 4 samples from EXA with a maximum reported concentration of 0.029mg/kg exceeding the conservative GAC of 0.0058mg/kg by a factor of 4.9.
- Toluene, ethylbenzene and xylene in up to 6 soil samples collected from EXA and 1 sample collected beneath Pump Island 1 (PI01).
- PAHs (including naphthalene and benzo(a)pyrene) in soil samples collected from EXA, Fuel Lines and Pump Islands.

While exceedances of the EQS marine GAC have been simulated from concentrations of COPC in soil samples collected at the site, pre-construction groundwater monitoring in June 2016 found all COPC in groundwater samples to be below the Laboratory MDL. This indicates that the leaching potential is limited at the site and theoretical risks identified in soil are considered unlikely to pose a risk to controlled water receptors.

Based on previous groundwater monitoring undertaken in October 2014 and July 2016 (discussed in **Section 2.2 Table B** above) the site is known to be tidally influenced but likely that the dominant groundwater flow direction is north-east to east, towards the River Adur. Based on a north-east groundwater flow direction, monitoring wells, MW106, MW107 and MW108 provide good coverage of groundwater conditions down gradient of the on-site fuel infrastructure. COPC in these wells were all reported below the laboratory MDL indicating that risks to controlled waters are acceptable.

## 5.5 Summary

Potentially unacceptable risks to human health or controlled water receptors at the site have not been identified and have not been discussed further.

# 6. CONCEPTUAL SITE MODEL

The Conceptual Site Model (CSM) presented here is based on the information provided in the historical reports prepared for the site, on observations made during the AECOM validation works, and on the subsequent AECOM generic quantitative risk assessments.

## 6.1 Potential Sources

The site is an active petrol filling station, and as such there is the potential of COPC to be present from accidental releases to ground from infrastructure. The validation works have indicated that the COPC listed in **Section 5** are present in the areas of the site which were investigated.

These potential sources have been assessed in **Tables N** and **O** below.

## 6.2 Potential Pathways, and Receptors

The potential pathways and receptors identified for assessment at Stage 2 are listed in **Tables N and O** below.

## 6.3 Review of Potential Source-Pathway-Receptor Linkages

The following pollutant linkages were evaluated at Stage 2 given continued oil use. These are also detailed on **Figure 6**.

| Table M – Human Health CSM | | | |
|---|---|---|---|
| Source | Pathway | Receptor | Likelihood of pollutant linkage Present Risk |
| Impacted soils \ groundwater | Lateral and vertical vapour migration and subsequent inhalation. | On-site shop staff, visiting staff and general public. | Unlikely: Based on Stage 2 assessment. |
| | | Off-site workers in commercial properties 10m from southern site boundary. | |
| | | Residents of properties 5m from the eastern and 10m from southern boundary of site. | Unlikely: Based on Stage 2 assessment. |
| | Particulate - Ingestion, inhalation, dermal contact with soil particulates. | Visiting on-site contractors excavating ground. | **Possible*** |
| | Permeation – Migration of hydrocarbon substances through plastic potable water supply pipes. | On-site shop staff (ingestion of drinking water on-site). | Unlikely: COPC were reported at concentrations below the drinking water standards in potable water samples recovered from the shop. |

* Potential risks to visiting contractors undertaking intrusive works should be managed by appropriate PPE, risk assessment and method statements. Risks to visiting contractors excavating the ground were therefore not assessed within the scope of the DQRA.

| Table N – Controlled Waters CSM | | | |
|---|---|---|---|
| Source | Pathway | Receptor | Likelihood of pollutant Linkage Presenting an Unacceptable Risk |
| Impacted soils /groundwater. | • Partitioning between soil and pore water.<br>• Leaching of impacted soils into groundwater.<br>• Lateral migration of impacted groundwater. | Surface water (Widewater Lagoon located 150m south west, River Adur (tributary) is located approximately 125m north east of the site and the English Channel located 250m south of the site). | Unlikely: Based on Stage 2 assessment and previous GME |
| | | Storm Beach Deposits Secondary A Aquifer | Unlikely: Based on Stage 2 assessment and previous GME |

# 7. CONCLUSIONS

The site is an active retail petroleum site that has undergone redevelopment under a planning consent granted by Adur District Council (ref: AWDM/1562/15) on 23 December 2015. The AECOM scope of work during the redevelopment activities included decommissioning of all on-site monitoring wells, verification sampling of the sidewalls and bases of the excavations and advancement of a soil bore to obtain soil verification samples where there were infrastructure constraints. A total of thirty (36) soil samples were collected and analysed as part of the validation works.

The site is underlain by superficial deposits of Storm Beach Deposits (Secondary A Aquifer) and Tidal Flat Deposits (Secondary Undifferentiated Aquifers) overlying bedrock of the Newhaven Chalk Formation (Principal Aquifer). Alluvium deposits (Secondary Undifferentiated Aquifers) are reported immediately to the north of the site. The average depth to groundwater measured at the site during the AECOM July 2016 groundwater monitoring event ranged from 2.30m below ground level (bgl) to 3.33m bgl. Groundwater is tidally influenced but considered that the dominant groundwater flow direction is north-east to east, towards the River Adur.

In total approximately 1,892 tonnes of material was excavated and disposed of as Inert and Non-Hazardous material and a further 38 tonnes was disposed of as hazardous material. Resultant excavations were backfilled with approximately 1,175 tonnes of imported quarried material (excluding poured concrete and tarmac volumes).

A Stage 2 risk assessment was performed on the analytical data collected during the redevelopment works which represented material remaining in-situ to assess potential risks to human health (on-site workers, off-site workers and off-site residents) and controlled waters (Widewater Lagoon located 150m south west, River Adur (tributary) located approximately 125m north east of the site and the English Channel located 250m south of the site). The principal conclusions were as follows:

- Potential risks to the controlled waters receptors were considered to be acceptable.
- Concentrations of COPC measured at the site were considered unlikely to represent an unacceptable risk to human health receptors.

The site is considered suitable for on-going oil use.

# 8. REFERENCES

Ref. 1 USEPA. Technical Guide For Addressing Petroleum Vapor Intrusion At Leaking Underground Storage Tank Sites. EPA 510-R-15-001. June 2015

Ref. 2 URS, Phase 1 Site investigation, Ref: R46370356-001, Final; July 2014

Ref. 3 URS, Phase 2 Comprehensive Site Assessment, Ref: R46370356-002, Final; November 2014

Ref. 4 AECOM Environmental Strategy Plan, Ref GB-12038413-20160324-REM-ESP, Final; March 2016

Ref. 5 AECOM Factual Groundwater and Vapour Monitoring Event Report, Ref GB-12038413-20160816-Mon01-FGVME, Final; August 2016

Ref. 6 CLR11, Model Procedures for the Management of Land Contamination

Ref. 7 Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D Publication 66: 2008 (Volume 1), NHBC and the Environment Agency 2008.

Ref. 8 USEPA. OSWER Technical Guide For Assessing And Mitigating The Vapor Intrusion Pathway From Subsurface Vapor Sources To Indoor Air, Office of Solid Waste and Emergency Response, June 2015

Ref. 9 LQM/CIEH S4UL methodology

Ref. 10 British Standard Institute. Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. BS8485:2015. June 2015.

## TABLES

**Table 1 – Soil verification samples screened against Human Health CPU and HDR GAC**

**Table 2 - Soil verification samples screened against Controlled Waters Marine EQS GAC**

AECOM

Table 1
Analytical Results
GESS 5010
Shell UK Oil Products Ltd.

| Location | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Depth (m) | | | | | | | | | | | | | | | | | | | | | | | | |
| Date | | | | | | | | | | | | | | | | | | | | | | | | |
| Lab Report Number | | | | | | | | | | | | | | | | | | | | | | | | |
| Monitoring Zone | | | | | | | | | | | | | | | | | | | | | | | | |
| Matrix_Description | | | | | | | | | | | | | | | | | | | | | | | | |
| Units | | | | | | | | | | | | | | | | | | | | | | | | |
| BTEX | | | | | | | | | | | | | | | | | | | | | | | | |
| Benzene | mg/kg | 0.005 | 5.6 | $Sat_{ss}$ | $B1_{ss}$ | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 |
| Toluene | mg/kg | 0.005 | 2.1 | $Sat_{ss}$ | $T2_{ss}$ | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 |
| Ethylbenzene | mg/kg | 0.005 | 4.0 | $Sat_{ss}$ | $E3_{ss}$ | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 | <0.005 | 0.005 |
| Xylene (m & p) | mg/kg | 0.01 | | | | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 |
| Xylene (o) | mg/kg | 0.01 | 2.1 | $Sat_{ss}$ | $T1_{ss}$ | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 |
| Xylene Total | mg/kg | 0.01 | 23 | $Sat_{ss}$ | $S2_{ss}$ | 0 | 0 | 0 | 0 | 0.0220 | 0 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0 | 0 | 0 |
| Oxygenates | | | | | | | | | | | | | | | | | | | | | | | | |
| Diisopropyl Ether | mg/kg | 0.001 | 38 | $Sat_{ss}$ | $I_{ss}2$ | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 |
| Ethyl Tert Butyl Ether | mg/kg | 0.001 | 270 | $Sat_{ss}$ | $I_{ss}4$ | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 | <0.001 | 0.001 |
| Methyl Tert Butyl Ether | mg/kg | 0.01 | 220 | $Sat_{ss}$ | $I_{ss}5$ | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 |
| Tert Amyl Methyl Ether | mg/kg | 0.01 | 17 | $Sat_{ss}$ | $I_{ss}6$ | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 |
| Tert Butyl Alcohol | mg/kg | 0.01 | 2,100 | $Sat_{ss}$ | $I_{ss}30$ | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 | <0.01 | 0.01 |
| Ethanol | mg/kg | 0.02 | | | | 0.02 | <0.02 | 0.02 | <0.02 | 0.02 | <0.02 | 0.02 | <0.02 | 0.02 | <0.02 | 0.02 | <0.02 | 0.02 | <0.02 | 0.02 | <0.02 | 0.02 | <0.02 | 0.02 |
| n-Hexane | mg/kg | 0.01 | 33 | $Sat_{ss}$ | $I_{ss}8$ | 0.01 | <0.01 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| PAH | | | | | | | | | | | | | | | | | | | | | | | | |
| Acenaphthene | mg/kg | 0.005 | 280 | $Sat_{ss}$ | $Sat_{ss}$ | 0.005 | <0.005 | 0.005 | 0.0810 | 0.005 | 0.0215 | 0.005 | 0.0191 | 0.005 | 0.0100 | 0.005 | 0.0330 | 0.005 | 0.0179 | 0.005 | 0.0158 | 0.005 | 0.0125 | 0.005 |
| Acenaphthylene | mg/kg | 0.005 | 210 | $Sat_{ss}$ | $Sat_{ss}$ | 0.005 | <0.005 | 0.005 | 1.0 | 0.005 | 0.0617 | 0.005 | 0.0217 | 0.005 | 0.0220 | 0.005 | 0.0600 | 0.005 | 0.0218 | 0.005 | 0.0158 | 0.005 | 0.0125 | 0.005 |
| Anthracene | mg/kg | 0.005 | 210 | $Sat_{ss}$ | $Sat_{ss}$ | 0.005 | <0.005 | 0.005 | 0.0117 | 0.005 | 0.0260 | 0.005 | 0.0217 | 0.005 | 0.0107 | 0.005 | 0.0330 | 0.005 | 0.0218 | 0.005 | 0.0158 | 0.005 | 0.0125 | 0.005 |
| Benzo(a)anthracene | mg/kg | 0.005 | 210 | $Sat_{ss}$ | $Sat_{ss}$ | 0.005 | <0.005 | 0.005 | 0.0634 | 0.005 | 0.0356 | 0.005 | 0.0216 | 0.005 | 0.0136 | 0.005 | 0.0330 | 0.005 | 0.0218 | 0.005 | 0.0158 | 0.005 | 0.0125 | 0.005 |
| Benzo(a)pyrene | mg/kg | 0.005 | 210 | $Sat_{ss}$ | $Sat_{ss}$ | 0.005 | <0.005 | 0.005 | 0.0888 | 0.005 | 0.0534 | 0.005 | 0.0307 | 0.005 | 0.0104 | 0.005 | 0.0330 | 0.005 | 0.0218 | 0.005 | 0.0158 | 0.005 | 0.0125 | 0.005 |
| Benzo(b)fluoranthene | mg/kg | 0.005 | 210 | $Sat_{ss}$ | $Sat_{ss}$ | 0.005 | <0.005 | 0.005 | 0.0804 | 0.005 | 0.0380 | 0.005 | 0.0217 | 0.005 | 0.0124 | 0.005 | 0.0330 | 0.005 | 0.0218 | 0.005 | 0.0158 | 0.005 | 0.0125 | 0.005 |
| Benzo(g,h,i)perylene | mg/kg | 0.005 | 210 | $Sat_{ss}$ | $Sat_{ss}$ | 0.005 | <0.005 | 0.005 | 0.0522 | 0.005 | 0.0322 | 0.005 | 0.0217 | 0.005 | 0.0124 | 0.005 | 0.0330 | 0.005 | 0.0218 | 0.005 | 0.0158 | 0.005 | 0.0125 | 0.005 |
| Benzo(k)fluoranthene | mg/kg | 0.005 | 210 | $Sat_{ss}$ | $Sat_{ss}$ | 0.005 | <0.005 | 0.005 | 0.0188 | 0.005 | 0.0114 | 0.005 | 0.0217 | 0.005 | 0.0124 | 0.005 | 0.0330 | 0.005 | 0.0218 | 0.005 | 0.0158 | 0.005 | 0.0125 | 0.005 |
| Chrysene | mg/kg | 0.01 | 210 | $Sat_{ss}$ | $Sat_{ss}$ | 0.01 | <0.01 | 0.01 | 0.0586 | 0.01 | 0.0316 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| Dibenz(a,h)anthracene | mg/kg | 0.005 | 210 | $Sat_{ss}$ | $Sat_{ss}$ | 0.005 | <0.005 | 0.005 | 0.0187 | 0.005 | 0.0113 | 0.005 | 0.0217 | 0.005 | 0.0124 | 0.005 | 0.0330 | 0.005 | 0.0218 | 0.005 | 0.0158 | 0.005 | 0.0125 | 0.005 |
| Fluoranthene | mg/kg | 0.01 | 210 | $Sat_{ss}$ | $Sat_{ss}$ | 0.01 | <0.01 | 0.01 | 0.0444 | 0.01 | 0.0268 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| Fluorene | mg/kg | 0.01 | 210 | $Sat_{ss}$ | $Sat_{ss}$ | 0.01 | <0.01 | 0.01 | 0.0204 | 0.01 | 0.0120 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.01 | 210 | $Sat_{ss}$ | $Sat_{ss}$ | 0.01 | <0.01 | 0.01 | 0.0303 | 0.01 | 0.0179 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| Naphthalene | mg/kg | 0.005 | 28.0 | $Sat_{ss}$ | $Sat_{ss}$ | 0.005 | <0.005 | 0.005 | 0.0686 | 0.005 | 0.0530 | 0.005 | 0.0217 | 0.005 | 0.0124 | 0.005 | 0.0330 | 0.005 | 0.0218 | 0.005 | 0.0158 | 0.005 | 0.0125 | 0.005 |
| Phenanthrene | mg/kg | 0.01 | 210 | $Sat_{ss}$ | $Sat_{ss}$ | 0.01 | <0.01 | 0.01 | 0.0552 | 0.01 | 0.0212 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| Pyrene | mg/kg | 0.01 | 210 | $Sat_{ss}$ | $Sat_{ss}$ | 0.01 | <0.01 | 0.01 | 0.0212 | 0.01 | 0.0127 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| PAHs (sum of 4) | mg/kg | | | | | 0 | 0 | 0 | 0.0188 | 0.01 | 0.0143 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| PAH 16 Total | mg/kg | 0.177 | | | | 0.177 | <0.177 | 0.177 | 0.0884 | 0.177 | 0.0429 | 0.177 | 0.0217 | 0.177 | 0.0124 | 0.177 | 0.0330 | 0.177 | 0.0218 | 0.177 | 0.0158 | 0.177 | 0.0125 | 0.177 |
| Benzo(g,h,i)perylene + Indeno(1,2,3-cd)pyrene | mg/kg | | | | | 0 | 0 | 0 | 0.0866 | 0.0999 | 0.0683 | 0.0999 | 0.0217 | 0.0999 | 0.0124 | 0.0999 | 0.0330 | 0.0999 | 0.0218 | 0.0999 | 0.0158 | 0.0999 | 0.0125 | 0.0999 |
| TPH | | | | | | | | | | | | | | | | | | | | | | | | |
| EC5-EC7 Aromatics | mg/kg | 0.01 | $Sat_{ss}$ | $T30_{ss}$ | | 0.01 | <0.01 | 0.01 | 0.0556 | 0.01 | 0.0204 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| EC7-EC8 Aromatics | mg/kg | 0.01 | $Sat_{ss}$ | $Sat_{ss}$ | | 0.01 | <0.01 | 0.01 | 0.0556 | 0.01 | 0.0204 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| EC8-EC10 Aromatics | mg/kg | 0.01 | 300 | $Sat_{ss}$ | $T8_{ss}$ | 0.01 | <0.01 | 0.01 | 0.0556 | 0.01 | 0.0204 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| EC10-EC12 Aromatics | mg/kg | 0.01 | $Sat_{ss}$ | $T00_{ss}$ | | 0.01 | <0.01 | 0.01 | 0.0556 | 0.01 | 0.0204 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| EC12-EC16 Aromatics | mg/kg | 0.01 | $Sat_{ss}$ | $Sat_{ss}$ | | 0.01 | <0.01 | 0.01 | 0.0556 | 0.01 | 0.0204 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| EC16-EC18 Aromatics | mg/kg | 0.01 | $Sat_{ss}$ | $Sat_{ss}$ | | 0.01 | <0.01 | 0.01 | 0.0556 | 0.01 | 0.0204 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| EC18-EC21 Aromatics | mg/kg | 0.01 | $Sat_{ss}$ | $Sat_{ss}$ | | 0.01 | <0.01 | 0.01 | 0.0556 | 0.01 | 0.0204 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| EC21-EC35 Aromatics | mg/kg | 0.01 | $Sat_{ss}$ | $Sat_{ss}$ | | 0.01 | <0.01 | 0.01 | 0.0556 | 0.01 | 0.0204 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| EC5-EC8 Aliphatics | mg/kg | 0.01 | $Sat_{ss}$ | $S0_{ss}$ | | 0.01 | <0.01 | 0.01 | 0.0556 | 0.01 | 0.0204 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| EC8-EC10 Aliphatics | mg/kg | 0.01 | $Sat_{ss}$ | $Sat_{ss}$ | | 0.01 | <0.01 | 0.01 | 0.0556 | 0.01 | 0.0204 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| EC10-EC12 Aliphatics | mg/kg | 0.01 | $Sat_{ss}$ | $Sat_{ss}$ | | 0.01 | <0.01 | 0.01 | 0.0556 | 0.01 | 0.0204 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| EC12-EC16 Aliphatics | mg/kg | 0.01 | $Sat_{ss}$ | $Sat_{ss}$ | | 0.01 | <0.01 | 0.01 | 0.0556 | 0.01 | 0.0204 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| EC16-EC18 Aliphatics | mg/kg | 0.01 | $Sat_{ss}$ | $Sat_{ss}$ | | 0.01 | <0.01 | 0.01 | 0.0556 | 0.01 | 0.0204 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| EC18-EC21 Aliphatics | mg/kg | 0.01 | $Sat_{ss}$ | $Sat_{ss}$ | | 0.01 | <0.01 | 0.01 | 0.0556 | 0.01 | 0.0204 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| EC21-EC35 Aliphatics | mg/kg | 0.01 | $Sat_{ss}$ | $Sat_{ss}$ | | 0.01 | <0.01 | 0.01 | 0.0556 | 0.01 | 0.0204 | 0.01 | 0.0217 | 0.01 | 0.0124 | 0.01 | 0.0330 | 0.01 | 0.0218 | 0.01 | 0.0158 | 0.01 | 0.0125 | 0.01 |
| TPH Range 5 HI - Human Health CPH | - | | | | | - | - | - | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0217 | 0.0000 | 0.0124 | 0.0000 | 0.0330 | 0.0000 | 0.0218 | 0.0000 | 0.0158 | 0.0000 | 0.0125 | 0.0000 |
| TPH Range 5 HI - Human Health HDR | - | | | | | - | - | - | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0217 | 0.0000 | 0.0124 | 0.0000 | 0.0330 | 0.0000 | 0.0218 | 0.0000 | 0.0158 | 0.0000 | 0.0125 | 0.0000 |
| SVOC | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | mg/kg | 0.1 | 340 | $Sat_{ss}$ | $Bt_{ss}$ | 0.1 | <0.1 | 0.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Asphaltene | | | | | | | | | | | | | | | | | | | | | | | | |
| Amosite Asbestos | - | | | | | - | - | - | - | - | - | - | - | 0 | - | - | - | - | - | - | - | - | - | - |
| Chrysotile Asbestos | - | | | | | - | - | - | - | - | - | - | - | 0 | - | - | - | - | - | - | - | - | - | - |
| Crocidolite Asbestos | - | | | | | - | - | - | - | - | - | - | - | 0 | - | - | - | - | - | - | - | - | - | - |
| Tiprone Actinolite | - | | | | | - | - | - | - | - | - | - | - | 0 | - | - | - | - | - | - | - | - | - | - |
| Tiprone Anthophyllite | - | | | | | - | - | - | - | - | - | - | - | 0 | - | - | - | - | - | - | - | - | - | - |
| Tiprone Tremolite | - | | | | | - | - | - | - | - | - | - | - | 0 | - | - | - | - | - | - | - | - | - | - |
| Non-Asbestos Fibre | - | | | | | - | - | - | - | - | - | - | - | 0 | - | - | - | - | - | - | - | - | - | - |
| Asbestos Quantification - PCM Evaluation | ag | 0.001 | | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Asbestos Quantification - Total - ag | ag | 0.001 | | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Additional Asbestos Components (Using TM048) | - | | | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Asbestos Qualitative Quantification | ag | 0.001 | | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Misc | | | | | | | | | | | | | | | | | | | | | | | | |
| Fraction Organic Carbon | - | 0.0002 | | | | 0.0002 | 0.0004 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Moisture | ag | | | | | | | | | | | | | | | | | | | | | | | |

Comments
#1 Derived GAC for petrol filling stations

**Comments**

#1 Derived CAC for petrol filling stations

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | |
| **Location** | | | | | EXA13 | EXA14 | EXA15 | EXA16 | EXA17 | EXA18 | EXA19 | EXA20 | EXA21 | EXA22 | EXA23 |
| **Average Depth (m)** | | | | | 2 | 2 | 2 | 5 | 4 | 1 | 2 | 2 | 3 | 2 | 2 |
| **Date** | | | | | 17/10/2022 | 17/10/2022 | 17/10/2022 | 19/09/2022 | 19/09/2022 | 04/10/2022 | 19/09/2022 | 19/09/2022 | 19/09/2022 | 19/09/2022 | 19/09/2022 |
| **Lab Report Number** | | | | | 801586 | 801586 | 801586 | 801586 | 801586 | 795586 | 801586 | 801586 | 801586 | 801586 | 801586 |
| **Monitoring Zone** | | | | | Tank Farm | Tank Farm | Tank Farm | Tank Farm | Tank Farm | Tank Farm | Tank Farm | Interceptor | Interceptor | Interceptor | Tank Farm |
| **Matrix Description** | | | | | Storm Beach Deposits | Storm Beach Deposits | Storm Beach Deposits | Storm Beach Deposits | Storm Beach Deposits | Made Ground | Storm Beach Deposits | Storm Beach Deposits | Storm Beach Deposits | Storm Beach Deposits | Storm Beach Deposits |
| **BTEX** | | | | | | | | | | | | | | | |
| Benzene | mg/kg | 0.001 | $SAL_{TP}$ | $TIC_{TP}$ | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> |
| Toluene | mg/kg | 0.001 | $SAL_{TP}$ | $SSO_{TP}$ | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> |
| Ethylbenzene | mg/kg | 0.002 | $SAL_{TP}$ | $OS_{TP}$ | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> |
| Xylene (m & p) | mg/kg | 1.0 | | | | | | | | | | | | | |
| Xylene (o) | mg/kg | 1.0 | $SAL_{TP}$ | $TA_{TP}$ | 1.0> | 1.0> | 1.0> | 1.0> | 1.0> | 1.0> | 1.0> | 1.0> | 1.0> | 1.0> | 1.0> |
| Xylene Total | mg/kg | | | $TOT_{TP}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Oxygenates** | | | | | | | | | | | | | | | |
| Diisopropyl Ether | mg/kg | 0.001 | $SAL_{TP}$ | $DE_{TP}$ | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> |
| Ethyl Tert Butyl Ether | mg/kg | 0.001 | $SAL_{TP}$ | $ETBE_{TP}$ | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> |
| Methyl Tert Butyl Ether | mg/kg | 0.001 | $SAL_{TP}$ | $MTBE_{TP}$ | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> |
| Tert Amyl Methyl Ether | mg/kg | 0.001 | $SAL_{TP}$ | $TAME_{TP}$ | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> | 0.00> |
| Tert Butyl Alcohol | mg/kg | 0.01 | $SAL_{TP}$ | $TBA_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| Ethanol | mg/kg | 0.05 | | | | | | | | | | | | | |
| n-Hexane | mg/kg | 0.01 | $SAL_{TP}$ | $HEX_{TP}$ | - | - | - | - | - | - | - | - | - | - | - |
| **PAH** | | | | | | | | | | | | | | | |
| Acenaphthene | mg/kg | 0.002 | $SAL_{TP}$ | $ACE_{TP}$ | 0.002> | 0.002> | 0.002> | 0.004> | 0.004> | 0.012> | 0.002> | 0.002> | 0.002> | 0.002> | 0.002> |
| Acenaphthylene | mg/kg | 0.010 | $SAL_{TP}$ | $ACY_{TP}$ | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> | 0.026> | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> |
| Anthracene | mg/kg | 0.010 | $SAL_{TP}$ | $ANT_{TP}$ | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> | 0.026> | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> |
| Benzo(a)anthracene | mg/kg | 0.010 | $SAL_{TP}$ | $BAA_{TP}$ | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> | 0.026> | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> |
| Benzo(a)pyrene | mg/kg | 0.010 | $SAL_{TP}$ | $BAP_{TP}$ | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> | 0.026> | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> |
| Benzo(b)fluoranthene | mg/kg | 0.010 | $SAL_{TP}$ | $BBF_{TP}$ | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> | 0.026> | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> |
| Benzo(ghi)perylene | mg/kg | 0.050 | $SAL_{TP}$ | $BGHI_{TP}$ | 0.050> | 0.050> | 0.050> | 0.050> | 0.050> | 0.050> | 0.050> | 0.050> | 0.050> | 0.050> | 0.050> |
| Benzo(k)fluoranthene | mg/kg | 0.010 | $SAL_{TP}$ | $BKF_{TP}$ | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> | 0.026> | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> |
| Chrysene | mg/kg | 0.01 | $SAL_{TP}$ | $CHR_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.03> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| Dibenz(a,h)anthracene | mg/kg | 0.050 | $SAL_{TP}$ | $DBA_{TP}$ | 0.050> | 0.050> | 0.050> | 0.050> | 0.050> | 0.050> | 0.050> | 0.050> | 0.050> | 0.050> | 0.050> |
| Fluoranthene | mg/kg | 0.010 | $SAL_{TP}$ | $FAN_{TP}$ | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> | 0.026> | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> |
| Fluorene | mg/kg | 0.01 | $SAL_{TP}$ | $FLU_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.03> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.010 | $SAL_{TP}$ | $IDP_{TP}$ | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> | 0.026> | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> |
| Naphthalene | mg/kg | 0.005 | $SAL_{TP}$ | $NAP_{TP}$ | 0.005> | 0.005> | 0.005> | 0.005> | 0.005> | 0.013> | 0.005> | 0.005> | 0.005> | 0.005> | 0.005> |
| Phenanthrene | mg/kg | 0.010 | $SAL_{TP}$ | $PHE_{TP}$ | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> | 0.026> | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> |
| Pyrene | mg/kg | 0.010 | $SAL_{TP}$ | $PYR_{TP}$ | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> | 0.026> | 0.010> | 0.010> | 0.010> | 0.010> | 0.010> |
| PAHs (sum of 4) | mg/kg | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Benzo(b,k)fluoranthene | mg/kg | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PAH 16 Total | mg/kg | 0.111 | | | <0.111 | <0.111 | <0.111 | 0.581 | 8.11 | 8.91 | 2.42 | 2.21 | 1.882 | 0 | 0 |
| Benzo(g,h,i)perylene + Indeno(1,2,3-cd)pyrene | mg/kg | | | | 0 | 0 | 0 | 1.681 | 5.4 | 5.12 | 3.16 | 3.81 | 1.81 | 0 | 0 |
| **TPH** | | | | | | | | | | | | | | | |
| >EC2-EC7 Aromatics | mg/kg | 0.01 | $SAL_{TP}$ | $TOT_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| >EC7-EC8 Aromatics | mg/kg | 0.01 | $SAL_{TP}$ | $OSE_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| >EC8-EC10 Aromatics | mg/kg | 0.01 | $SAL_{TP}$ | $TOT_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| >EC10-EC12 Aromatics | mg/kg | 0.01 | $SAL_{TP}$ | $OOT_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| >EC12-EC16 Aromatics | mg/kg | 0.01 | $SAL_{TP}$ | $SAT_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| >EC16-EC21 Aromatics | mg/kg | 0.01 | $SAL_{TP}$ | $SAT_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| >EC21-EC32 Aromatics | mg/kg | 0.01 | $SAL_{TP}$ | $SAT_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| >C2-C3 Aliphatics | mg/kg | 0.01 | $SAL_{TP}$ | $OS_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| >C3-C8 Aliphatics | mg/kg | 0.01 | $SAL_{TP}$ | $AA_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| >C8-C10 Aliphatics | mg/kg | 0.01 | $SAL_{TP}$ | $TT_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| >C10-C12 Aliphatics | mg/kg | 0.01 | $SAL_{TP}$ | $SAL_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| >C12-C16 Aliphatics | mg/kg | 0.01 | $SAL_{TP}$ | $SAL_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| >C16-C21 Aliphatics | mg/kg | 0.01 | $SAL_{TP}$ | $SAL_{TP}$ | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> | 0.01> |
| >C21-C32 Aliphatics | mg/kg | 0.01 | $SAL_{TP}$ | $SAL_{TP}$ | 0.01> | 0.01> | 0.01> | 2.41 | 2.08 | 0.07 | 1.12 | 0.38 | 0.81 | 0.01 | 0.01 |
| >C16-C32 Aliphatics | mg/kg | | $SAL_{TP}$ | $SAL_{TP}$ | 0 | 0 | 0 | 1.81 | 1.14 | 0.101 | 1.12 | 1.14 | 1.12 | 0.01 | 0.01 |
| >C32-C44 Aliphatics | mg/kg | 0.01 | $SAL_{TP}$ | $SAL_{TP}$ | 0.01> | 0.01> | 0.01> | 1.41 | 2.81 | 1.81 | 0.22 | 0.22 | 0.22 | 0.01 | 0.01 |
| **SVOC** | | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | mg/kg | 0.01 | $SAL_{TP}$ | $NAP_{TP}$ | - | - | - | - | - | - | - | - | - | - | - |
| **Asbestos** | | | | | | | | | | | | | | | |
| Amosite Asbestos | - | | | | - | - | - | - | - | - | - | - | - | - | - |
| Chrysotile Asbestos | - | | | | - | - | - | - | - | - | - | - | - | - | - |
| Crocidolite Asbestos | - | | | | - | - | - | - | - | - | - | - | - | - | - |
| Fibrous Actinolite | - | | | | - | - | - | - | - | - | - | - | - | - | - |
| Fibrous Anthophyllite | - | | | | - | - | - | - | - | - | - | - | - | - | - |
| Fibrous Tremolite | - | | | | - | - | - | - | - | - | - | - | - | - | - |
| Non-Asbestos Fibre | - | | | | - | - | - | - | - | - | - | - | - | - | - |
| Asbestos Quantification - PCM Evaluation | % | 0.001 | | | - | - | - | - | - | - | - | - | - | - | - |
| Asbestos Quantification - Total - % | % | 0.001 | | | - | - | - | - | - | - | - | - | - | - | - |
| Additional Asbestos Components (Using TM048) | - | | | | - | - | - | - | - | - | - | - | - | - | - |
| Asbestos Qualitative Quantification | % | 0.001 | | | - | - | - | - | - | - | - | - | - | - | - |
| **Misc** | | | | | | | | | | | | | | | |
| Fraction Organic Carbon | - | 0.0005 | | | - | - | - | - | - | - | - | - | - | - | - |
| Moisture | % | | | | 8 | 17 | 13 | 12 | 10 | 18.1 | 18.9 | 12.1 | 14.2 | 14.4 | 6.3 |

| | Units | Limit notified by client | Exceedance - CAC 2015 | Risk Based Land Use | Matrix |
|---|---|---|---|---|---|
| Benzene | mg/kg | 0.001 | | $SAL_{TP}$ | Soil |
| Toluene | mg/kg | 0.001 | | $SAL_{TP}$ | Soil |
| Ethylbenzene | mg/kg | 0.002 | | $SAL_{TP}$ | Soil |
| Xylene (m & p) | mg/kg | 0.001 | | | Soil |
| Xylene (o) | mg/kg | 0.001 | | $SAL_{TP}$ | Soil |
| Xylene Total | mg/kg | | | | Soil |
| Diisopropyl Ether | mg/kg | 0.001 | | $SAL_{TP}$ | Soil |
| Ethyl Tert Butyl Ether | mg/kg | 0.001 | | $SAL_{TP}$ | Soil |
| Methyl Tert Butyl Ether | mg/kg | 0.001 | | $SAL_{TP}$ | Soil |
| Tert Amyl Methyl Ether | mg/kg | 0.001 | | $SAL_{TP}$ | Soil |
| Tert Butyl Alcohol | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| Ethanol | mg/kg | 0.05 | | | Soil |
| n-Hexane | mg/kg | 0.001 | | $SAL_{TP}$ | Soil |
| Acenaphthene | mg/kg | 0.002 | | $SAL_{TP}$ | Soil |
| Acenaphthylene | mg/kg | 0.010 | | $SAL_{TP}$ | Soil |
| Anthracene | mg/kg | 0.010 | | $SAL_{TP}$ | Soil |
| Benzo(a)anthracene | mg/kg | 0.010 | | $SAL_{TP}$ | Soil |
| Benzo(a)pyrene | mg/kg | 0.010 | | $SAL_{TP}$ | Soil |
| Benzo(b)fluoranthene | mg/kg | 0.010 | | $SAL_{TP}$ | Soil |
| Benzo(ghi)perylene | mg/kg | 0.050 | | $SAL_{TP}$ | Soil |
| Benzo(k)fluoranthene | mg/kg | 0.010 | | $SAL_{TP}$ | Soil |
| Chrysene | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| Dibenz(a,h)anthracene | mg/kg | 0.050 | | $SAL_{TP}$ | Soil |
| Fluoranthene | mg/kg | 0.010 | | $SAL_{TP}$ | Soil |
| Fluorene | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.010 | | $SAL_{TP}$ | Soil |
| Naphthalene | mg/kg | 0.005 | | $SAL_{TP}$ | Soil |
| Phenanthrene | mg/kg | 0.010 | | $SAL_{TP}$ | Soil |
| Pyrene | mg/kg | 0.010 | | $SAL_{TP}$ | Soil |
| PAHs (sum of 4) | mg/kg | | | | Soil |
| Benzo(b,k)fluoranthene | mg/kg | | | | Soil |
| PAH 16 Total | mg/kg | 0.111 | | | Soil |
| Benzo(g,h,i)perylene + Indeno(1,2,3-cd)pyrene | mg/kg | | | | Soil |
| >EC2-EC7 Aromatics | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| >EC7-EC8 Aromatics | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| >EC8-EC10 Aromatics | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| >EC10-EC12 Aromatics | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| >EC12-EC16 Aromatics | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| >EC16-EC21 Aromatics | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| >EC21-EC32 Aromatics | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| >C2-C3 Aliphatics | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| >C3-C8 Aliphatics | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| >C8-C10 Aliphatics | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| >C10-C12 Aliphatics | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| >C12-C16 Aliphatics | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| >C16-C21 Aliphatics | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| >C21-C32 Aliphatics | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| >C16-C32 Aliphatics | mg/kg | | | $SAL_{TP}$ | Soil |
| >C32-C44 Aliphatics | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| 2-Methylnaphthalene | mg/kg | 0.01 | | $SAL_{TP}$ | Soil |
| Amosite Asbestos | - | | | | Soil |
| Chrysotile Asbestos | - | | | | Soil |
| Crocidolite Asbestos | - | | | | Soil |
| Fibrous Actinolite | - | | | | Soil |
| Fibrous Anthophyllite | - | | | | Soil |
| Fibrous Tremolite | - | | | | Soil |
| Non-Asbestos Fibre | - | | | | Soil |
| Asbestos Quantification - PCM Evaluation | % | 0.001 | | | Soil |
| Asbestos Quantification - Total - % | % | 0.001 | | | Soil |
| Additional Asbestos Components (Using TM048) | - | | | | Soil |
| Asbestos Qualitative Quantification | % | 0.001 | | | Soil |
| Fraction Organic Carbon | - | 0.0005 | | | Soil |
| Moisture | % | | | | Soil |

**Table 1**
**Analytical Results**
**GE22 5010**
**Shell UK Oil Products Ltd.**

Table 1
Analytical Results
GE22 5010
Shell UK Oil Products Ltd.

| Location | | | | | | EXA54 | EL01 | EL02 | EL03 | EL04 | EL05 | EL06 | EL07 | EL08 | EL09 | EL10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Depth (m) | | | | | | 1.5 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Date | | | | | | 04/10/2012 | 12/10/2012 | 12/10/2012 | 12/10/2012 | 12/10/2012 | 12/10/2012 | 12/10/2012 | 12/10/2012 | 12/10/2012 | 12/10/2012 | 12/10/2012 |
| Lab Report Number | | | | | | 385861 | 385862 | 385863 | 385864 | 385865 | 385866 | 385867 | 385868 | 385869 | 385870 | 385871 |
| Monitoring Zone | | | | | | Tank Farm | Fuel Line | Fuel Line | Fuel Line | Fuel Line | Fuel Line | Pump Island | Pump Island | Pump Island | Pump Island | Pump Island |
| Matrix_Description | | | | | | Made Ground | Made Ground | Made Ground | Made Ground | Made Ground | Made Ground | Made Ground | Made Ground | Made Ground | Made Ground | Made Ground |
| **BTEX** | | | | | | | | | | | | | | | | |
| Benzene | mg/kg | 0.005 | $S_{ai}$ | $S_{ai}$ | $B_{ai}$ | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Toluene | mg/kg | 0.005 | $S_{ai}$ | $S_{ai}$ | $T_{ai}$ | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Ethylbenzene | mg/kg | 0.005 | $S_{ai}$ | $S_{ai}$ | $E_{ai}$ | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Xylene (m & p) | mg/kg | 0.01 | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Xylene (o) | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $X_{ai}$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Xylene Total | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Oxygenates** | | | | | | | | | | | | | | | | |
| Diisopropyl Ether | mg/kg | 0.005 | $S_{ai}$ | $S_{ai}$ | $I_{ai}$ | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Ethyl Tert Butyl Ether | mg/kg | 0.005 | $S_{ai}$ | $S_{ai}$ | $E_{ai}$ | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Methyl Tert Butyl Ether | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $M_{ai}$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tert Amyl Methyl Ether | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $T_{ai}$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tert Butyl Alcohol | mg/kg | 0.005 | $S_{ai}$ | $S_{ai}$ | $T_{ai}$ | <0.005 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ethanol | mg/kg | 0.05 | | | | <0.05 | <0.1 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| n-Hexane | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $H_{ai}$ | - | - | - | - | - | - | - | - | - | - | - |
| **PAH** | | | | | | | | | | | | | | | | |
| Acenaphthene | mg/kg | 0.005 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.09 | <0.005 | 0.012 | 0.014 | 0.09 | 0.016 | 0.012 | 0.008 | 0.008 | 0.008 | 0.048 |
| Acenaphthylene | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.021 | <0.01 | 0.014 | 0.023 | 0.085 | 0.085 | 0.108 | 0.022 | 0.022 | 0.022 | 0.021 |
| Anthracene | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.063 | <0.01 | 0.021 | 0.08 | 0.08 | 0.128 | 0.127 | 0.028 | 0.028 | 0.028 | 0.024 |
| Benzo(a)anthracene | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.21 | 0.012 | 0.048 | 0.08 | 0.2 | 0.08 | 0.134 | 0.034 | 0.034 | 0.034 | 0.021 |
| Benzo(a)pyrene | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.2 | 0.013 | 0.052 | 0.08 | 0.2 | 0.08 | 0.134 | 0.034 | 0.034 | 0.034 | 0.021 |
| Benzo(b)fluoranthene | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.27 | 0.013 | 0.052 | 0.08 | 0.2 | 0.08 | 0.134 | 0.034 | 0.034 | 0.034 | 0.021 |
| Benzo(d)fluoranthene | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.15 | 0.012 | 0.048 | 0.08 | 0.2 | 0.08 | 0.134 | 0.034 | 0.034 | 0.034 | 0.021 |
| Benzo(e)pyrene | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.2 | 0.012 | 0.048 | 0.08 | 0.2 | 0.08 | 0.134 | 0.034 | 0.034 | 0.034 | 0.021 |
| Benzo(g,h,i)perylene | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.2 | 0.012 | 0.048 | 0.08 | 0.2 | 0.08 | 0.134 | 0.034 | 0.034 | 0.034 | 0.021 |
| Benzo(k)fluoranthene | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.08 | 0.012 | 0.048 | 0.08 | 0.2 | 0.08 | 0.134 | 0.034 | 0.034 | 0.034 | 0.021 |
| Chrysene | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.17 | 0.012 | 0.048 | 0.08 | 0.2 | 0.08 | 0.134 | 0.034 | 0.034 | 0.034 | 0.021 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.04 | 0.05 | 0.07 | 0.08 | 0.2 | 0.08 | 0.134 | 0.034 | 0.034 | 0.034 | 0.021 |
| Fluoranthene | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.37 | 0.012 | 0.048 | 0.08 | 0.2 | 0.08 | 0.134 | 0.034 | 0.034 | 0.034 | 0.021 |
| Fluorene | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.015 | 0.01 | 0.032 | 0.04 | 0.1 | 0.04 | 0.067 | 0.017 | 0.017 | 0.017 | 0.011 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.1 | 0.005 | 0.02 | 0.04 | 0.1 | 0.04 | 0.067 | 0.017 | 0.017 | 0.017 | 0.011 |
| Naphthalene | mg/kg | 0.005 | $S_{ai}$ | $S_{ai}$ | $N_{ai}$ | 0.01 | 0.005 | 0.02 | 0.04 | 0.1 | 0.04 | 0.067 | 0.017 | 0.017 | 0.017 | 0.011 |
| Phenanthrene | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.16 | 0.01 | 0.036 | 0.06 | 0.1 | 0.06 | 0.101 | 0.025 | 0.025 | 0.025 | 0.016 |
| Pyrene | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.25 | 0.01 | 0.036 | 0.06 | 0.2 | 0.06 | 0.101 | 0.025 | 0.025 | 0.025 | 0.016 |
| PAHs (sum of 4) | mg/kg | | | | | 0.61 | 0.04 | 0.14 | 0.24 | 0.61 | 0.24 | 0.404 | 0.102 | 0.102 | 0.102 | 0.064 |
| Benzo(b,k)fluoranthene | mg/kg | | | | | 0.36 | 0.02 | 0.07 | 0.12 | 0.3 | 0.12 | 0.202 | 0.051 | 0.051 | 0.051 | 0.032 |
| PAH 16 Total | mg/kg | 0.111 | | | | 2.5 | 0.14 | 0.48 | 0.78 | 2.3 | 0.78 | 1.314 | 0.331 | 0.331 | 0.331 | 0.208 |
| Benzo(g,h,i)perylene + Indeno(1,2,3-cd)pyrene | mg/kg | | | | | 2.5 | 0.13 | 0.46 | 0.78 | 2.3 | 0.78 | 1.314 | 0.331 | 0.331 | 0.331 | 0.208 |
| **TPH** | | | | | | | | | | | | | | | | |
| >EC5-EC7 Aromatics | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $T_{EC7}$ | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >EC7-EC8 Aromatics | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $T_{EC8}$ | 0.017 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >EC8-EC10 Aromatics | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $T_{EC10}$ | 0.11 | <0.01 | 0.02 | 0.03 | 0.08 | 0.03 | 0.05 | <0.01 | <0.01 | <0.01 | <0.01 |
| >EC10-EC12 Aromatics | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $T_{EC12}$ | 0.069 | <0.01 | 0.03 | 0.05 | 0.17 | 0.05 | 0.08 | <0.01 | <0.01 | <0.01 | <0.01 |
| >EC12-EC16 Aromatics | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $T_{EC16}$ | 0.4 | <0.01 | 0.06 | 0.09 | 0.17 | 0.09 | 0.14 | 0.03 | 0.03 | 0.03 | 0.02 |
| >EC16-EC21 Aromatics | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $T_{EC21}$ | 0.9 | 0.02 | 0.14 | 0.25 | 0.68 | 0.25 | 0.38 | 0.09 | 0.09 | 0.09 | 0.06 |
| >EC21-EC35 Aromatics | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $T_{EC35}$ | 1.2 | 0.04 | 0.27 | 0.47 | 1.3 | 0.47 | 0.72 | 0.17 | 0.17 | 0.17 | 0.11 |
| >EC5-EC35 Aromatics | mg/kg | 0.01 | $S_{ai}$ | $S_{ai}$ | $T_{EC35}$ | 2.1 | 0.08 | 0.48 | 0.83 | 2.3 | 0.83 | 1.278 | 0.302 | 0.302 | 0.302 | 0.195 |
| **Misc** | | | | | | | | | | | | | | | | |
| Fraction Organic Carbon | - | 0.0005 | | | | - | - | - | - | 0.0110 | - | 0.0052 | - | - | - | 0.0013 |
| Moisture | % | | | | | - | - | - | - | - | - | - | - | - | - | - |
| Aspeatos Gravimetric Quantification | % | 100 | | | | - | - | - | - | - | - | 0.052 | - | - | - | - |
| Additional Aspeatos Components (Using TMOAB) | - | | | | | - | - | - | - | - | - | 1 | - | - | - | - |
| Aspeatos Quantification - Total - % | % | 100 | | | | - | - | - | - | - | - | 0.052 | - | - | - | - |
| Aspeatos Quantification - PCM Evaluation | % | 100 | | | | - | - | - | - | - | - | 100>0 | - | - | - | - |
| Non-Aspeatos Fibre | - | | | | | 0 | - | - | - | - | - | 0 | - | - | - | 0 |
| Fibrone Tremolite | - | | | | | 0 | - | - | - | - | - | 0 | - | - | - | 0 |
| Fibrone Anthrophyllite | - | | | | | 0 | - | - | - | - | - | 0 | - | - | - | 0 |
| Fibrone Actinolite | - | | | | | 0 | - | - | - | - | - | 0 | - | - | - | 0 |
| Crocidolite Aspeatos | - | | | | | 0 | - | - | - | - | - | 0 | - | - | - | 0 |
| Chrysolite Aspeatos | - | | | | | 0 | - | - | - | - | - | 1 | - | - | - | 0 |
| Amosite Aspeatos | - | | | | | 0 | - | - | - | - | - | 0 | - | - | - | 0 |
| **Aspeatos** | | | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | mg/kg | 0.1 | $S_{ai}$ | $N_{ai}$ | | - | - | - | - | - | - | - | - | - | - | - |
| **SVOC** | | | | | | | | | | | | | | | | |
| TPH Stage 2 HI - Human Health HDR | - | | | | | 0.045 | 0.003 | 0.018 | 0.008 | 0.111 | 0.022 | 0.052 | 0.008 | 0.003 | 0.003 | 0.224 |
| TPH Stage 2 HI - Human Health CPU | - | | | | | 0.005 | 0.0005 | 0.001 | 0.001 | 0.008 | 0.002 | 0.001 | 0.001 | 0.0005 | 0.0005 | 0.003 |
| >C32-C44 Aliphatics | mg/kg | 1.0 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.9 | 1.3 | 1>0 | 1>0 | 2.3 | 2.8 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 |
| >C21-C32 Aliphatics | mg/kg | 1.0 | | | | 3.86 | 0.01 | 2.3 | 1.8 | 5.3 | 1.1 | 2.1 | 1>0 | 1>0 | 1>0 | 1>0 |
| >C16-C32 Aliphatics | mg/kg | | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 1.63 | 0.11 | 2.52 | 2.4 | 6.44 | 1.5 | 3.05 | 0.81 | 0.38 | 0.38 | 0.25 |
| >C16-C21 Aliphatics | mg/kg | 1.0 | | | | 1.25 | 0.08 | 0.45 | 0.55 | 0.88 | 0.45 | 0.74 | 0.16 | 0.08 | 0.08 | 0.05 |
| >C15-C16 Aliphatics | mg/kg | 1.0 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.25 | 1>0 | 0.06 | 0.04 | 0.09 | 0.04 | 0.07 | 1>0 | 1>0 | 1>0 | 1>0 |
| >C10-C12 Aliphatics | mg/kg | 1.0 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.061 | 1>0 | 1>0 | 1>0 | 0.044 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 |
| >C8-C10 Aliphatics | mg/kg | 1.0 | $S_{ai}$ | $S_{ai}$ | $T_{ai}$ | 0.22 | 1>0 | 1>0 | 1>0 | 0.08 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 |
| >C6-C8 Aliphatics | mg/kg | 1.0 | $S_{ai}$ | $S_{ai}$ | $P_{ai}$ | 0.14 | 1>0 | 1>0 | 1>0 | 0.06 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 |
| >C5-C6 Aliphatics | mg/kg | 1.0 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.16 | 1>0 | 1>0 | 1>0 | 0.06 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 |
| >EC21-EC35 Aromatics | mg/kg | 1.0 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 1.2 | 0.1 | 0.4 | 0.7 | 1.8 | 0.7 | 1.08 | 0.25 | 0.25 | 0.25 | 0.16 |
| >EC16-EC21 Aromatics | mg/kg | 1.0 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.9 | 0.08 | 0.25 | 0.4 | 0.8 | 0.4 | 0.68 | 0.16 | 0.16 | 0.16 | 0.11 |
| >EC12-EC16 Aromatics | mg/kg | 1.0 | $S_{ai}$ | $S_{ai}$ | $S_{ai}$ | 0.4 | 1>0 | 0.06 | 0.09 | 0.17 | 0.09 | 0.14 | 0.03 | 0.03 | 0.03 | 0.02 |
| >EC10-EC12 Aromatics | mg/kg | 1.0 | $S_{ai}$ | $S_{ai}$ | $T_{EC12}$ | 0.069 | 1>0 | 0.03 | 0.05 | 0.17 | 0.05 | 0.08 | 1>0 | 1>0 | 1>0 | 1>0 |
| >EC8-EC10 Aromatics | mg/kg | 1.0 | $S_{ai}$ | $S_{ai}$ | $T_{EC10}$ | 0.11 | 1>0 | 0.02 | 0.03 | 0.08 | 0.03 | 0.05 | 1>0 | 1>0 | 1>0 | 1>0 |
| >EC7-EC8 Aromatics | mg/kg | 1.0 | $S_{ai}$ | $S_{ai}$ | $T_{EC8}$ | 0.017 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 |
| >EC5-EC7 Aromatics | mg/kg | 1.0 | $S_{ai}$ | $S_{ai}$ | $T_{EC7}$ | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 | 1>0 |
| **TPH** | | | | | | | | | | | | | | | | |
| Benzo(d,j)fluorene + Indeno(1,2,3-cd)pyrene | mg/kg | | | | | 2.5 | 0.13 | 0.46 | 0.78 | 2.3 | 0.78 | 1.314 | 0.331 | 0.331 | 0.331 | 0.208 |

| | Units | Limit Detection Method | Deviation from GAC - Commercial Use | High GAC - Residential Use | | Location | Average Depth (m) | Date | Lab Report Number | Monitoring Zone | Matrix_Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Comments** | | | | | | | | | | | |
| #1 Derived GAC for petrol filling stations | | | | | | | | | | | |

**Comments:**

#1 Derived GAC for petrol filling stations

| Location | Average Depth (m) | Date | Lab Report Number | Monitoring Zone | Matrix_Description | BTEX | Benzene | Toluene | Ethylbenzene | Xylene (m & p) | Xylene (o) | Xylene_Total | Oxygenates | Diisopropyl Ether | Ethyl Tert Butyl Ether | Methyl Tert Butyl Ether | Tert Amyl Methyl Ether | Tert Butyl Alcohol | Ethanol | n-Hexane | PAH | Acenaphthene | Acenaphthylene | Anthracene | Benzo(a)anthracene | Benzo(a)pyrene | Benzo(b)fluoranthene | Benzo(d,r,i)perylene | Benzo(k)fluoranthene | Chrysene | Dibenz(a,h)anthracene | Fluoranthene | Fluorene | Indeno(1,2,3-c,d)pyrene | Naphthalene | Phenanthrene | Pyrene | PAH2 (sum of 4) | Benzo(b,k)fluoranthene | PAH 16 Total | Benzo(g,h,i)perylene + Indeno(1,2,3-cd)pyrene | TPH | >EC2-EC7 Aromatics | >EC7-EC8 Aromatics | >EC8-EC10 Aromatics | >EC10-EC12 Aromatics | >EC12-EC16 Aromatics | >EC16-EC21 Aromatics | >EC21-EC35 Aromatics | >C2-C3 Aliphatics | >C3-C4 Aliphatics | >C4-C6 Aliphatics | >C6-C8 Aliphatics | >C8-C10 Aliphatics | >C10-C12 Aliphatics | >C12-C16 Aliphatics | >C16-C21 Aliphatics | >C21-C35 Aliphatics | >C35-C44 Aliphatics | TPH Grade 5 HI - Human Health CPH | TPH Grade 5 HI - Human Health HDR | SVOC | 2-Methylnaphthalene | Aspeaze | Amoxile Aspeaze | Chrysolite Aspeaze | Crocidolite Aspeaze | Fibrous Actinolite | Fibrous Anthophyllite | Fibrous Tremolite | Non-Aspeaze Fibre | Aspeaze Gravimetric Quantification | Additional Aspeaze Components (Using TMDR) | Aspeaze Quantification - Total - % | Aspeaze Quantification - PCM Evaluation | % | Fraction Organic Carbon | Moisture |
|---|---|---

**Comments**

#1 MED Endsulphates 2012 -EOS
#2 SEPA_EOS MAT-2C-23 2014
#3 PNEC derived for EU REACH registration dossier

| | | |

Table 5
Analytical Results
GE22 5010
Shell UK Oil Products Ltd.

| Location | EXA14 | EXA15 | EXA16 | EXA17 | EXA18 | EXA19 | EXA20 | EXA21 | EXA22 | EXA23 | EXA24 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Depth (m) | 4.2 | 4.2 | 4 | 5 | 4.4 | 5.2 | 3.2 | 3.2 | 4.2 | 4.2 | 1.2 |
| Date | 13/10/2022 | 13/10/2022 | 13/10/2022 | 13/10/2022 | 13/10/2022 | 13/10/2022 | 13/10/2022 | 13/10/2022 | 13/10/2022 | 13/10/2022 | 04/10/2022 |
| Lab Report Number | 601586 | 601586 | 601586 | 601586 | 601586 | 601586 | 601586 | 601586 | 601586 | 601586 | 601586 |
| Monitoring Zone | Tank Farm | Tank Farm | Tank Farm | Tank Farm | Tank Farm | Tank Farm | Interceptor | Interceptor | Interceptor | Tank Farm | Tank Farm |
| Matrix Description | Storm Beach Deposits | Storm Beach Deposits | Storm Beach Deposits | Storm Beach Deposits | Storm Beach Deposits | Made Ground | Storm Beach Deposits | Storm Beach Deposits | Storm Beach Deposits | Storm Beach Deposits | Made Ground |
| Sample Depth (m) | 0.20 - 1.00 (Mixed) | 0.20 - 1.00 (Mixed) | 0.20 - 1.00 (Mixed) | 0.20 - 1.00 (Mixed) | 0.20 - 1.00 (Mixed) | 0.20 - 1.00 (Mixed) | 0.20 - 1.00 (Mixed) | 0.20 - 1.00 (Mixed) | 0.20 - 1.00 (Mixed) | 0.20 - 1.00 (Mixed) | 0.20 - 1.00 (Mixed) |
| Free Liquid Present | - | - | - | - | - | - | - | - | - | - | - |
| Asbestos Identification | - | - | - | - | - | - | - | - | - | - | - |
| Asbestos Quantification - Total - % | - | - | - | - | - | - | - | - | - | - | - |
| Asbestos Quantification - PCM Evaluation | - | - | - | - | - | - | - | - | - | - | - |
| Non-Asbestos Fibre | - | - | - | - | - | - | - | - | - | - | - |
| Fibrous Tremolite | - | - | - | - | - | - | - | - | - | - | - |
| Fibrous Anthophyllite | - | - | - | - | - | - | - | - | - | - | - |
| Fibrous Actinolite | - | - | - | - | - | - | - | - | - | - | - |
| Crocidolite Asbestos | - | - | - | - | - | - | - | - | - | - | - |
| Chrysotile Asbestos | - | - | - | - | - | - | - | - | - | - | - |
| Amosite Asbestos | - | - | - | - | - | - | - | - | - | - | - |
| **Asbestos** | | | | | | | | | | | |
| Bis(2-chloroisopropyl) ether | mg/kg | 1.0 | - | - | - | - | - | - | - | - | - |
| 2-Methylnaphthalene | mg/kg | 1.0 | - | - | - | - | - | - | - | - | - |
| **SVOC** | | | | | | | | | | | |
| >C32-C44 Aliphatics | mg/kg | 1.0 | <1.0 | <1.0 | 1.4 | 1.8 | 27.3 | 65 | 11 | 8.1 | 60.8 |
| >C21-C32 Aliphatics | mg/kg | 1.0 | <1.0 | <1.0 | 2.4 | 6.01 | 81.1 | 8.87 | 201 | 17.3 | 3.86 |
| >C16-C32 Aliphatics | mg/kg | | 0 | 0 | 1.8 | 7.81 | 81.1 | 5.14 | 6.88 | 1.0> | 1.63 |
| >C16-C21 Aliphatics | mg/kg | 1.0 | <1.0 | <1.0 | 2.11 | 5.4 | 16 | 4.52 | 1.89 | 1.0> | 1.85 |
| >C15-C16 Aliphatics | mg/kg | 1.0 | <1.0 | <1.0 | 2.3 | 7.2 | 98.1 | 18.5 | 4.25 | 1.0> | 25.3 |
| >C10-C12 Aliphatics | mg/kg | 1.0 | <1.0 | <1.0 | 4.81 | 10.1 | 107.0 | 3.5 | 15.5 | 1.0> | 15.4.0 |
| >C8-C10 Aliphatics | mg/kg | 1.0 | <1.0 | <1.0 | 12.0 | 4.01 | 25.0 | 3.5 | 81.1 | 1.0> | 25.1 |
| >C6-C8 Aliphatics | mg/kg | 1.0 | <1.0 | <1.0 | 6.1 | 6.1.0 | 6.1.0 | 8.2.4 | 6.1.3 | 1.0> | 1.0.0 |
| >C5-C6 Aliphatics | mg/kg | 1.0 | <1.0 | <1.0 | 1.0> | 6.4.0 | 1.2.0 | 8.8.1 | 6.1.3 | 1.0> | 1.0.0 |
| >EC21-EC35 Aromatics | mg/kg | 1.0 | <1.0 | <1.0 | 4.58 | 6.23 | 20.1 | 2.12 | 1.84 | 1.0> | 1.0.0 |
| >EC16-EC21 Aromatics | mg/kg | 1.0 | <1.0 | <1.0 | 2.1.3 | 4.2.1 | 08.1 | 5.12 | 8.0.4 | 1.0> | 6.88 |
| >EC12-EC16 Aromatics | mg/kg | 1.0 | <1.0 | <1.0 | 2.2 | 08.4 | 5.62 | 3.8 | 5.1.6 | 1.0> | 1.0.4 |
| >EC10-EC12 Aromatics | mg/kg | 1.0 | <1.0 | <1.0 | 6.2.0 | 08.6 | 6.1.1 | 8.1.7 | 5.1.6 | 1.0> | 1.0.0 |
| >EC8-EC10 Aromatics | mg/kg | 1.0 | <1.0 | <1.0 | 6.2.0 | 08.1 | 6.1.0 | 8.2.1 | 1.0.1 | 1.0> | 1.0.0 |
| >EC7-EC8 Aromatics | mg/kg | 1.0 | <1.0 | <1.0 | 2.88.0 | 08.1 | 6.1.0 | 8.2.1 | 1.0.1 | 1.0> | 1.0.0 |
| >EC5-EC7 Aromatics | mg/kg | 1.0 | <1.0 | <1.0 | 1.0> | 1.0> | 1.0> | 1.5.0 | 1.0.1 | 1.0> | 1.0.0 |
| **TPH** | | | | | | | | | | | |
| Benzo(g,h,i)perylene + Indeno(1,2,3-cd)pyrene | mg/kg | | 0 | 0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| PAH 16 Total | mg/kg | 1.0 | <1.0 | 1.83.0 | 1.4.1 | 1.1 | 4.81 | 2.4.2 | 1.2.1 | 1.0> | 1.0.0 |
| Benzo(b)fluoranthene | mg/kg | | 0 | 0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Benzo(a)anthracene | mg/kg | | 0 | 0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Benzo(k)fluoranthene | mg/kg | | 0 | 0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Benzo(g,h,i)perylene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Benzo(a)pyrene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Chrysene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Benzo(a)anthracene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Benzo(b)fluoranthene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Benzo(k)fluoranthene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Benzo(g,h,i)perylene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Dibenz(a,h)anthracene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Benzo(a)pyrene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Acenaphthylene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Acenaphthene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Fluorene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Phenanthrene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Anthracene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Fluoranthene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Pyrene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Naphthalene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Phenanthrene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Acenaphthene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Fluorene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Anthracene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Fluoranthene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Pyrene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Naphthalene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Phenanthrene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Benzo(d)fluoranthene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Benzo(a)pyrene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Benzo(b)fluoranthene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Benzo(k)fluoranthene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Benzo(g,h,i)perylene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Dibenz(a,h)anthracene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| Benzo(a)pyrene | mg/kg | 1.0 | <1.0 | <1.0 | 1.83.1 | 4.5 | 5.12 | 3.16 | 2.88.1 | 0 | 2.5 |
| **BTEX** | | | | | | | | | | | |
| Benzene | mg/kg | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | 0.036 | 0.112 | <0.001 | <0.001 | <0.001 |
| Toluene | mg/kg | 0.001 | <0.001 | <0.001 | <0.001 | 0.11 | 0.22 | 0.25 | <0.001 | <0.001 | <0.001 |
| Ethylbenzene | mg/kg | 0.001 | <0.001 | <0.001 | <0.001 | 0.034 | 0.05 | 0.08 | <0.001 | <0.001 | <0.001 |
| Xylene (m & p) | mg/kg | 1.0 | <1.0 | <1.0 | <1.0 | 2.1 | 1.4 | 1.8 | <1.0 | <1.0 | <1.0 |
| Xylene (o) | mg/kg | 1.0 | <1.0 | <1.0 | <1.0 | 0.71 | 0.83 | 0.92 | <1.0 | <1.0 | <1.0 |
| Xylene Total | mg/kg | | 0 | 0 | 0 | 2.81 | 2.24 | 2.72 | 0 | 0 | 0 |
| **Oxygenates** | | | | | | | | | | | |
| Diisopropyl Ether | mg/kg | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Ethyl Tert Butyl Ether | mg/kg | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Methyl Tert Butyl Ether | mg/kg | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tert Amyl Methyl Ether | mg/kg | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Tert Butyl Alcohol | mg/kg | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ethanol | mg/kg | 0.05 | <0.05 | <0.05 | <0.05 | 0.24 | 0.17 | 0.18 | 0.07 | <0.05 | <0.05 |
| n-Hexane | mg/kg | 0.01 | - | - | - | - | - | - | - | - | - |
| **PAH** | | | | | | | | | | | |
| Acenaphthylene | mg/kg | 0.008 | <0.008 | <0.008 | 0.03 | 0.18 | 0.07 | 0.08 | 0.02 | <0.008 | <0.008 |
| Acenaphthene | mg/kg | 0.010 | <0.010 | <0.010 | 0.11 | 0.47 | 0.23 | 0.11 | 0.04 | <0.010 | <0.010 |
| Fluorene | mg/kg | 0.010 | <0.010 | <0.010 | 0.11 | 0.47 | 0.23 | 0.11 | 0.04 | <0.010 | <0.010 |
| Phenanthrene | mg/kg | 0.010 | <0.010 | <0.010 | 0.45 | 2.03 | 0.91 | 0.45 | 0.17 | <0.010 | <0.010 |
| Anthracene | mg/kg | 0.010 | <0.010 | <0.010 | 0.11 | 0.47 | 0.23 | 0.11 | 0.04 | <0.010 | <0.010 |
| Fluoranthene | mg/kg | 0.010 | <0.010 | <0.010 | 0.45 | 2.03 | 0.91 | 0.45 | 0.17 | <0.010 | <0.010 |
| Pyrene | mg/kg | 0.010 | <0.010 | <0.010 | 0.45 | 2.03 | 0.91 | 0.45 | 0.17 | <0.010 | <0.010 |
| Benzo(a)anthracene | mg/kg | 0.010 | <0.010 | <0.010 | 0.11 | 0.47 | 0.23 | 0.11 | 0.04 | <0.010 | <0.010 |
| Chrysene | mg/kg | 0.010 | <0.010 | <0.010 | 0.11 | 0.47 | 0.23 | 0.11 | 0.04 | <0.010 | <0.010 |
| Benzo(b)fluoranthene | mg/kg | 0.010 | <0.010 | <0.010 | 0.11 | 0.47 | 0.23 | 0.11 | 0.04 | <0.010 | <0.010 |
| Benzo(k)fluoranthene | mg/kg | 0.010 | <0.010 | <0.010 | 0.11 | 0.47 | 0.23 | 0.11 | 0.04 | <0.010 | <0.010 |
| Benzo(a)pyrene | mg/kg | 0.010 | <0.010 | <0.010 | 0.11 | 0.47 | 0.23 | 0.11 | 0.04 | <0.010 | <0.010 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.010 | <0.010 | <0.010 | 0.11 | 0.47 | 0.23 | 0.11 | 0.04 | <0.010 | <0.010 |
| Dibenz(a,h)anthracene | mg/kg | 0.010 | <0.010 | <0.010 | 0.11 | 0.47 | 0.23 | 0.11 | 0.04 | <0.010 | <0.010 |
| Benzo(g,h,i)perylene | mg/kg | 0.010 | <0.010 | <0.010 | 0.11 | 0.47 | 0.23 | 0.11 | 0.04 | <0.010 | <0.010 |
| **Misc** | | | | | | | | | | | |
| Fraction Organic Carbon | - | 0.0005 | - | - | - | - | - | - | - | - | - |
| Moisture | % | | - | - | - | - | - | - | - | - | - |

**Comments**
#1 MCERTS Analytical Suite: 5010 -EOS
#2 SEPA_EOS MAT-SC-23 5014
#3 TNEC derived for EU REACH registration dossiers

AECOM

#3 VNEC derived for EU REACH registration dossiers
#5 SEA_EOS MAT-SC-23 5014
#7 WEP EnglandWales: 5012 -EOS
**Comments**

Table 5
CE22_5010
Analytical Results
Shell UK Oil Products Ltd.

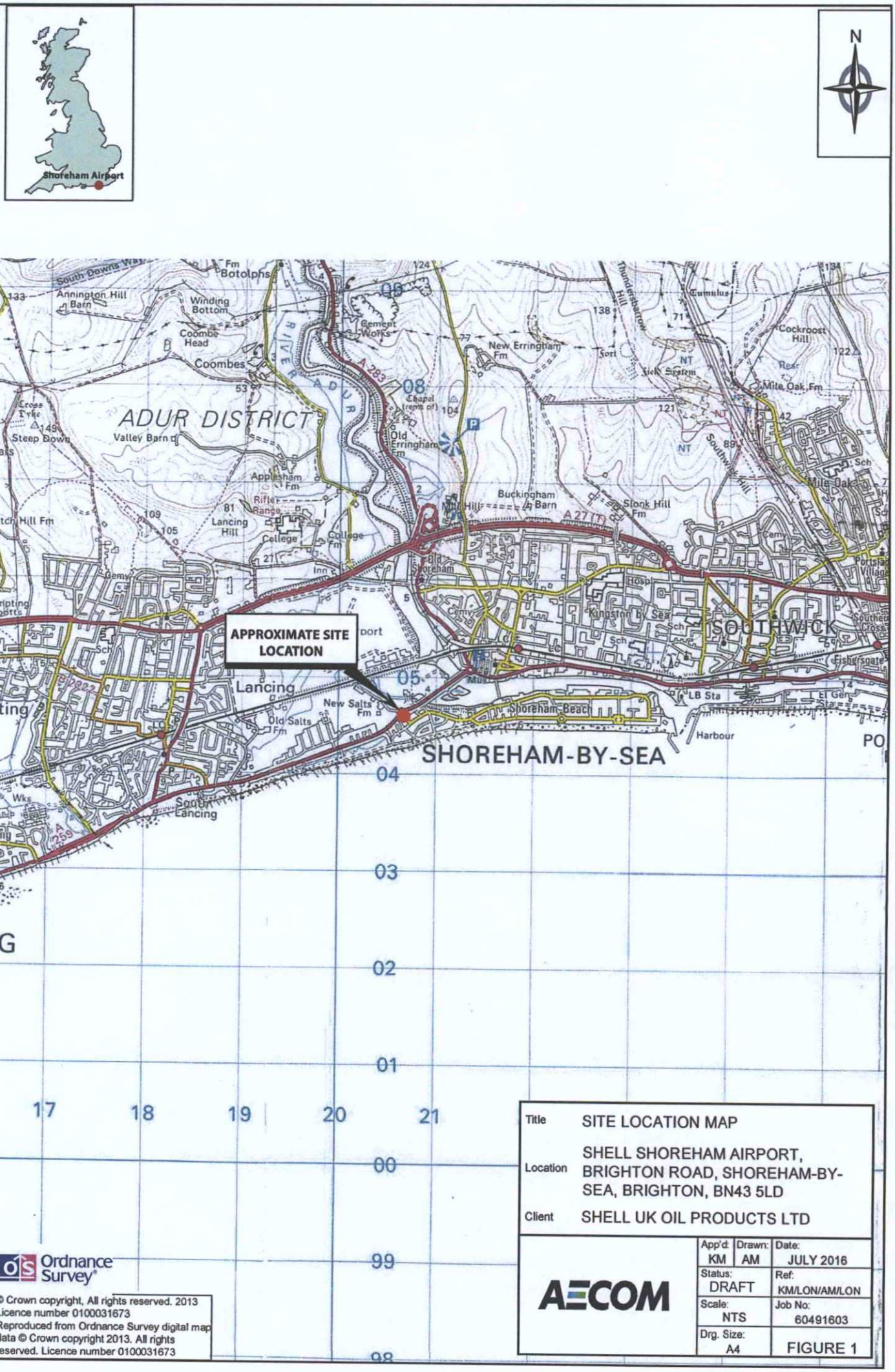
| | | |

**Table 5**
**Analytical Results**
**GE22 5010**
**Shell UK Oil Products Ltd.**

| Location | Concentration | Detect | Concentration | Detect | Concentration | Concentration | Deviation | Exceedances | (Detects Only) |
|---|---|---|---|---|---|---|---|---|---|
| Average Depth (m) | Minimum | Minimum | Maximum | Maximum | Average | Median | Standard | Guideline | Exceedances |
| Date | | | | | | | | Number of | Number of Guideline |
| Lab Report Number | | | | | | | | | |
| Monitoring Zone | | | | | | | | | |
| Matrix_Description | Concentration | Detect | Concentration | Detect | Concentration | Concentration | Deviation | Exceedances | (Detects Only) |
| SDG (AWI/IE) - (Jetsea) | | | | | | | | Number of | Number of Guideline |
| SOP Ref - (Jetsea) | | | | | | | | Guideline | Exceedances |
| WC - CAC - | | | | | | | | | |
| Primary Detection Limit | | | | | | | | | |
| Units | | | | | | | | | |
| **BTEX** | | | | | | | | | |
| Benzene | mg/kg | 0.005 | 0.0028 [1] | 0.005 | 0.0052 | 0.0052 | 0.0052 | 0 | 0 |
| Toluene | mg/kg | 0.005 | 0.122 [1] | 0.005 | 0.0032 | 0.0032 | 0.0032 | 0 | 0 |
| Ethylbenzene | mg/kg | 0.005 | 0.0092 [2] | 0.005 | 0.0044 | 0.0044 | 0.0044 | 0 | 0 |
| Xylene (m & p) | mg/kg | 0.01 | | 0.01 | 0.03 | 0.03 | 0.03 | 0 | 0 |
| Xylene (o) | mg/kg | 0.01 | | 0.01 | 0.033 | 0.033 | 0.033 | 0 | 0 |
| Xylene Total | mg/kg | | 0.1311 [2] | 0.01 | 0.025 | 0.025 | 0.025 | 1 | 1 |
| **Oxygenates** | | | | | | | | | |
| Diisopropyl Ether | mg/kg | 0.01 | 0.0088 [3] | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 0 |
| Ethyl Tert Butyl Ether | mg/kg | 0.01 | 0.0088 [3] | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 0 |
| Methyl Tert Butyl Ether | mg/kg | 0.01 | 0.0033 [3] | 0.01 | 0.0045 | 0.0045 | 0.0045 | 0 | 0 |
| Tert Amyl Methyl Ether | mg/kg | 0.01 | 0.0113 [3] | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 0 |
| Tert Butyl Alcohol | mg/kg | 0.01 | 0.0283 [3] | 0.01 | 0.01 | 0.01 | 0.01 | 0 | 0 |
| Ethanol | mg/kg | 0.02 | | 0.02 | 0.03 | 0.03 | 0.03 | 0 | 0 |
| n-Hexane | mg/kg | 0.01 | | 0.01 | 0.01 | 0.01 | 0.005 | 0 | 0 |
| **PAH** | | | | | | | | | |
| Acenaphthene | mg/kg | 0.005 | | 0.005 | 0.0012 | 0.0012 | 0.0012 | 0 | 0 |
| Acenaphthylene | mg/kg | 0.01 | | 0.01 | 0.0052 | 0.0052 | 0.0052 | 0 | 0 |
| Anthracene | mg/kg | 0.01 | 0.0026 [3] | 0.01 | 0.0082 | 0.0082 | 0.0082 | 0 | 0 |
| Benzo(a)anthracene | mg/kg | 0.01 | | 0.01 | 0.0126 | 0.0126 | 0.0126 | 0 | 0 |
| Benzo(a)pyrene | mg/kg | 0.01 | 0.00095 [3] | 0.01 | 0.0052 | 0.0052 | 0.0052 | 0 | 0 |
| Benzo(b)fluoranthene | mg/kg | 0.01 | 0.0019 [3] | 0.01 | 0.0052 | 0.0052 | 0.0052 | 0 | 0 |
| Benzo(b,j,k)fluoranthene | mg/kg | 0.01 | 0.0042 [3] | 0.01 | 0.0052 | 0.0052 | 0.0052 | 0 | 0 |
| Benzo(g,h,i)perylene | mg/kg | 0.01 | 0.0026 [3] | 0.01 | 0.0052 | 0.0052 | 0.0052 | 0 | 0 |
| Benzo(k)fluoranthene | mg/kg | 0.01 | 0.0014 [3] | 0.01 | 0.0052 | 0.0052 | 0.0052 | 0 | 0 |
| Chrysene | mg/kg | 0.01 | | 0.01 | 0.0126 | 0.0126 | 0.0126 | 0 | 0 |
| Dibenz(a,h)anthracene | mg/kg | 0.01 | 0.0023 [3] | 0.01 | 0.0052 | 0.0052 | 0.0052 | 0 | 0 |
| Fluoranthene | mg/kg | 0.01 | 0.0011 [3] | 0.01 | 0.0126 | 0.0126 | 0.0126 | 0 | 0 |
| Fluorene | mg/kg | 0.01 | | 0.01 | 0.0126 | 0.0126 | 0.0126 | 0 | 0 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.01 | 0.0018 [3] | 0.01 | 0.0052 | 0.0052 | 0.0052 | 0 | 0 |
| Naphthalene | mg/kg | 0.01 | 0.003 [3] | 0.01 | 0.0126 | 0.0126 | 0.0126 | 0 | 0 |
| Phenanthrene | mg/kg | 0.01 | | 0.01 | 0.0126 | 0.0126 | 0.0126 | 0 | 0 |
| Pyrene | mg/kg | 0.01 | | 0.01 | 0.0126 | 0.0126 | 0.0126 | 0 | 0 |
| PAHs (sum of 4) | mg/kg | | | | 0 | 0 | 0 | 0 | 0 |
| Benzo(b,k)fluoranthene | mg/kg | | | | 0 | 0 | 0 | 0 | 0 |
| PAH 16 Total | mg/kg | 0.01 | 0.117 [3] | | <0.117 | 0.0436 | 0.0436 | 0 | 0 |
| Benzo(g,h,i)perylene + Indeno(1,2,3-cd)pyrene | mg/kg | | | | 0 | 0.0436 | 0.0436 | 0 | 0 |
| **TPH** | | | | | | | | | |
| >EC5-EC7 Aromatics | mg/kg | 0.01 | 0.0028 [3] | 0.01 | 0.0103 | 0.0448 | 0.0448 | 0.0005 | 32 | 8 |
| >EC7-EC8 Aromatics | mg/kg | 0.01 | 0.223 [3] | 0.01 | 0.0110 | 0.14 | 0.14 | 0.002 | 5 | 5 |
| >EC8-EC10 Aromatics | mg/kg | 0.01 | | 0.01 | 0.0120 | 0.12 | 0.12 | 0.0247 | 0.8 | 0 |
| >EC10-EC12 Aromatics | mg/kg | 0.01 | | 0.01 | 0.0110 | 0.53 | 0.53 | 0.0170 | 0.1 | 0 |
| >EC12-EC16 Aromatics | mg/kg | 0.01 | | 0.01 | 0.0106 | 0.52 | 0.52 | 0.24 | 0.1 | 0 |
| >EC16-EC21 Aromatics | mg/kg | 0.01 | | 0.01 | 0.0113 | 0.81 | 0.81 | 0.34 | 0.1 | 0 |
| >EC21-EC32 Aromatics | mg/kg | 0.1 | | 0.1 | 0.12 | 0.12 | 0.12 | 0.03 | 0.1 | 0 |
| >C2-C8 Aliphatics | mg/kg | 0.01 | | 0.01 | 0.0110 | 0.14 | 0.14 | 0.002 | 0.1 | 0 |
| >C8-C8 Aliphatics | mg/kg | 0.01 | | 0.01 | 0.0110 | 0.15 | 0.15 | 0.041 | 0.1 | 0 |
| >C8-C10 Aliphatics | mg/kg | 0.01 | | 0.01 | 0.0112 | 0.22 | 0.22 | 0.0804 | 0.1 | 0 |
| >C10-C12 Aliphatics | mg/kg | 0.01 | | 0.01 | 0.0114 | 0.50 | 0.50 | 0.118 | 0.1 | 0 |
| >C12-C16 Aliphatics | mg/kg | 0.01 | | 0.01 | 0.0124 | 0.81 | 0.81 | 0.288 | 0.2 | 0 |
| >C16-C21 Aliphatics | mg/kg | 0.01 | | 0.01 | 0.0138 | 0.54 | 0.54 | 0.52 | 0.2 | 0 |
| >C16-C35 Aliphatics | mg/kg | | | 0.01 | 0.0134 | 0.54 | 0.54 | 0.52 | 0.2 | 0 |
| >C21-C35 Aliphatics | mg/kg | 0.01 | | 0.01 | 0.0124 | 0.51 | 0.51 | 0.38 | 0.2 | 0 |
| >C32-C44 Aliphatics | mg/kg | 0.01 | | 0.01 | 0.0116 | 0.55 | 0.55 | 0.17 | 0.1 | 0 |
| **SVOC** | | | | | | | | | |
| 5-Methylnaphthalene | mg/kg | 0.01 | | 0.01 | 0.01 | 0.01 | 0.05 | 0 | 0 |
| Bis(2-chloroisopropyl) ether | mg/kg | 0.01 | | 0.01 | 0.01 | 0.01 | 0.05 | 0 | 0 |
| **Asbestos** | | | | | | | | | |
| Amosite Asbestos | - | | | 0 | ND | 0 | ND | 0 | 0 | 0 |
| Chrysotile Asbestos | - | | | 0 | ND | 0 | ND | 0 | 0 | 0 |
| Crocidolite Asbestos | - | | | 0 | ND | 0 | ND | 0 | 0 | 0 |
| Tremolite Asbestos | - | | | 0 | ND | 0 | ND | 0.5 | 0 | 0 |
| Actinolite Asbestos | - | | | 0 | ND | 0 | ND | 0 | 0 | 0 |
| Anthophyllite Asbestos | - | | | 0 | ND | 0 | ND | 0 | 0 | 0 |
| Amosite Asbestos | - | | | 0 | ND | 0 | ND | 0 | 0 | 0 |
| Non-Asbestos Fibre | - | | | 0 | ND | 0 | ND | 0 | 0 | 0 |
| Asbestos Quantification - PCM Equivalent | % | 0.001 | | <100 | ND | <100 | ND | | 0 | 0 |
| Asbestos Quantification - Total - % | % | 0.001 | | <0.0251 | 0.0251 | 0.0251 | 0.0251 | | 0 | 0 |
| Additional Asbestos Components (Using TM048) | - | | | ↑ | ↑ | ↑ | ↑ | | 0 | 0 |
| Asbestos Gravimetric Quantification | % | 0.001 | | 0.0251 | 0.0251 | 0.0251 | 0.0251 | | 0 | 0 |
| **Misc** | | | | | | | | | | |
| Fraction Organic Carbon | - | 0.0005 | | 0.00255 | 0.00255 | 0.0113 | 0.0113 | 0.00681 | 0.00402 | 0.00268 | 0 | 0 |
| Moisture | % | | | n.a. | n.a. | 30 | 30 | n.a. | 17 | 8.6 | 0 | 0 |

**Comments**
#1 WHO Englishwhite 2012 -EQS
#2 SEPA_EQS MAT-SG-23 2014
#3 PNEC derived for EU REACH registration dossier

## FIGURES




| | |
|---|---|
| Title | SITE LOCATION MAP |
| Location | SHELL SHOREHAM AIRPORT, BRIGHTON ROAD, SHOREHAM-BY-SEA, BRIGHTON, BN43 5LD |
| Client | SHELL UK OIL PRODUCTS LTD |

| App'd: | Drawn: | Date: |
|---|---|---|
| KM | AM | JULY 2016 |
| Status: DRAFT | | Ref: KM/LON/AM/LON |
| Scale: NTS | | Job No: 60491603 |
| Drg. Size: A4 | | FIGURE 1 |

AECOM

Ordnance Survey®

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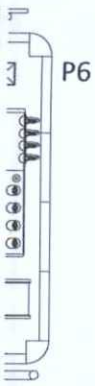
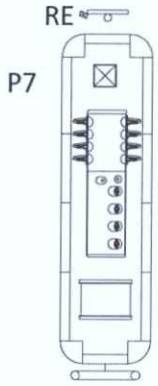
Figure 2 - Site Features plan pre-redevelopment
SHELL UK OIL PRODUCTS LIMITED
SHELL SHORTHAM AIRPORT,
BRIGHTON ROAD, SHOREHAM-BY-SEA, BN43 5GD
AECOM
CONSULTING ENGINEERS
FINAL
Retained Monitoring Wells
Abandoned Monitoring Wells
Groundwater Monitoring Wells
EXISTING BOREHOLE LOCATION
TANK
SCALE
BUILDING
KEY
MW104
MW103
MW102
MW101
MW105
MW106
MW107
MW108
MW109
VP103
VP102
VP101
SCALE 1:250
0
5
10
15
20
METRES
FORMER BRIGHTON ROAD




OUTLINE OF NEW FORECOURT CANOPY

CANOPY
Remove existing canopy and associated features and replace with new forecourt canopy.

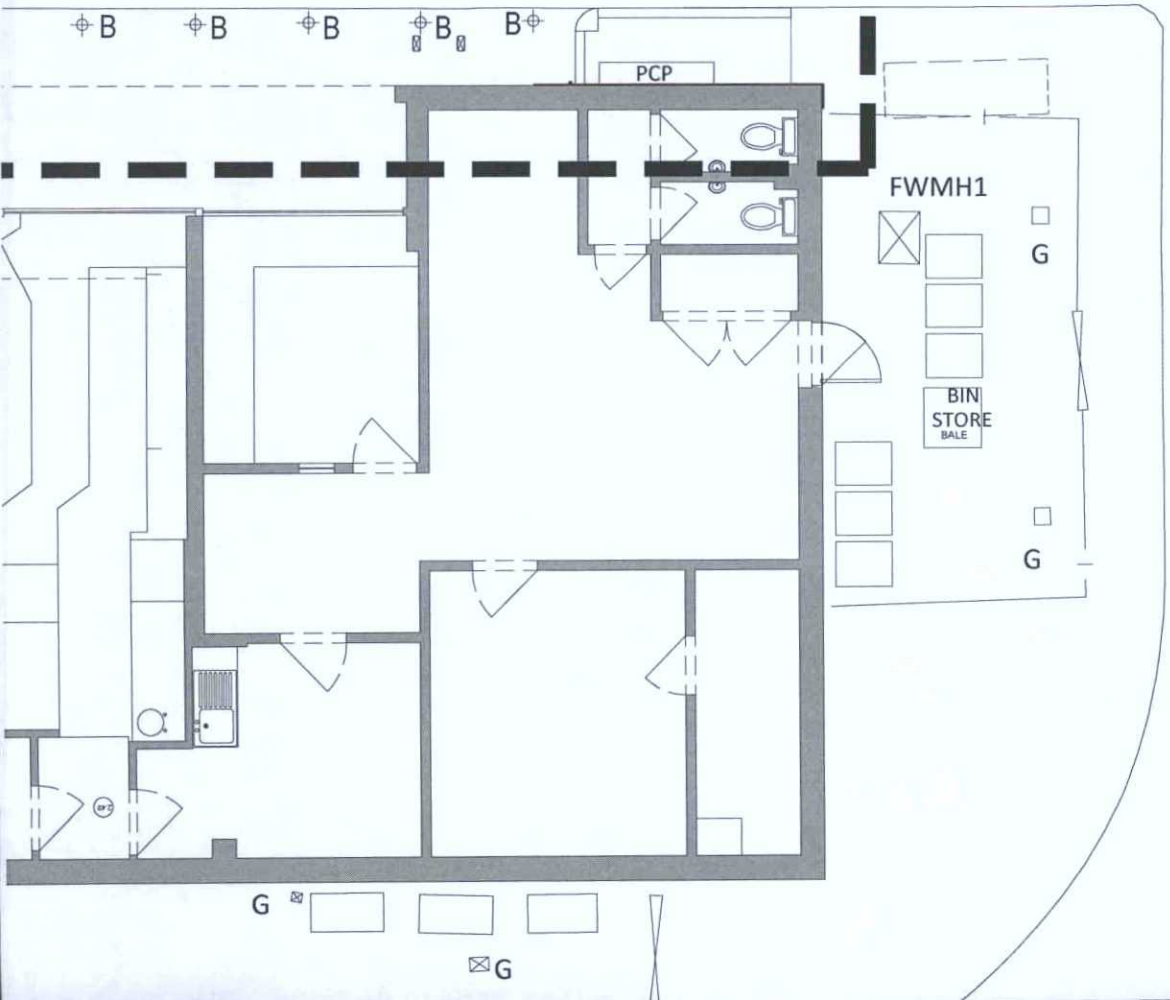
Movement joints reake

Existing car wash is repla
Car Wash enclosure is ful
(as required, TBC by
screens and enclosure to
service & gully is jet wa
emergency entry/exit, is c

8 nos. Shell
lards @ 1500mmc/c
ıg the Shopfront.

FFS
MH

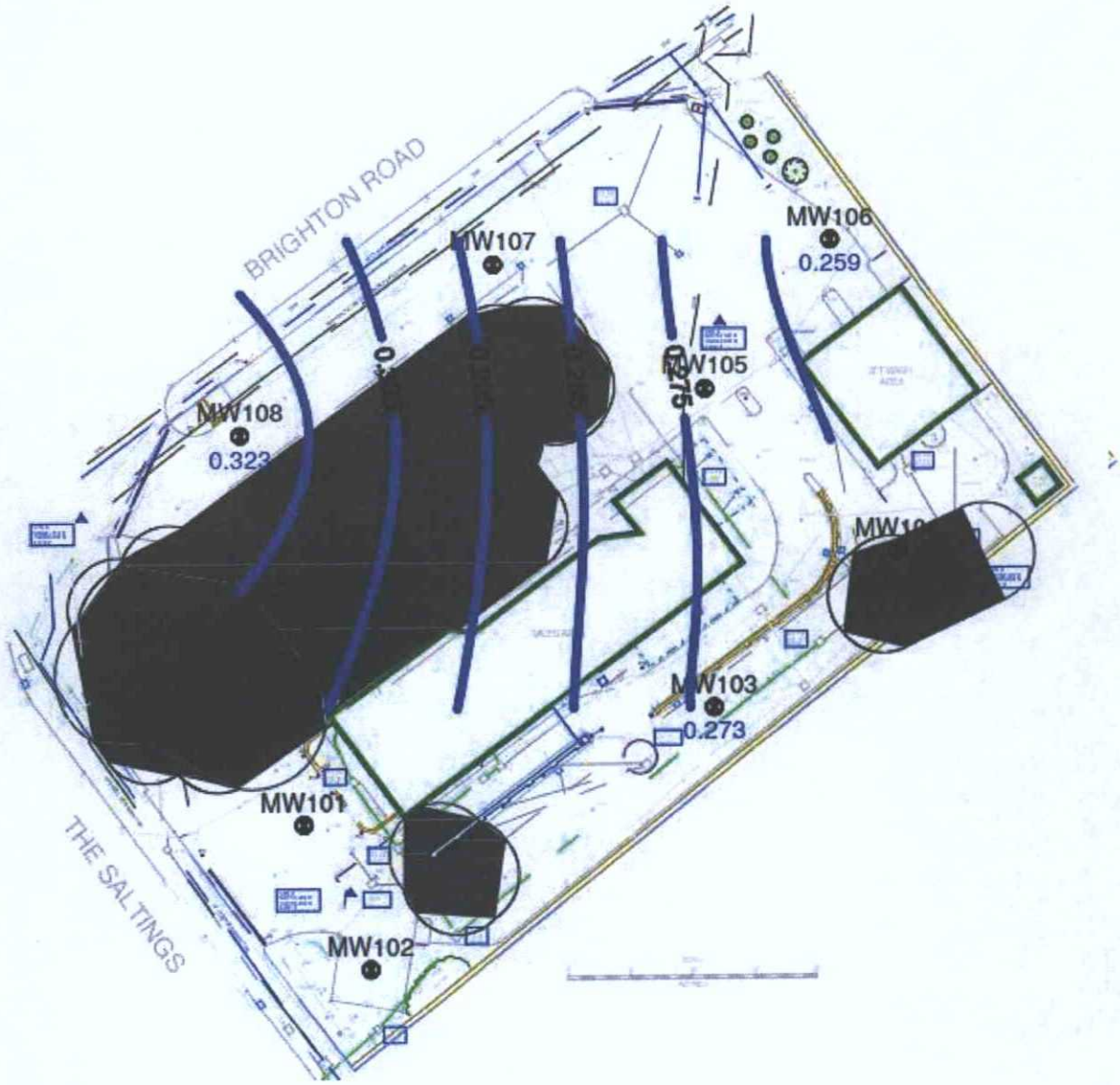
FFS
MH




Title

Location

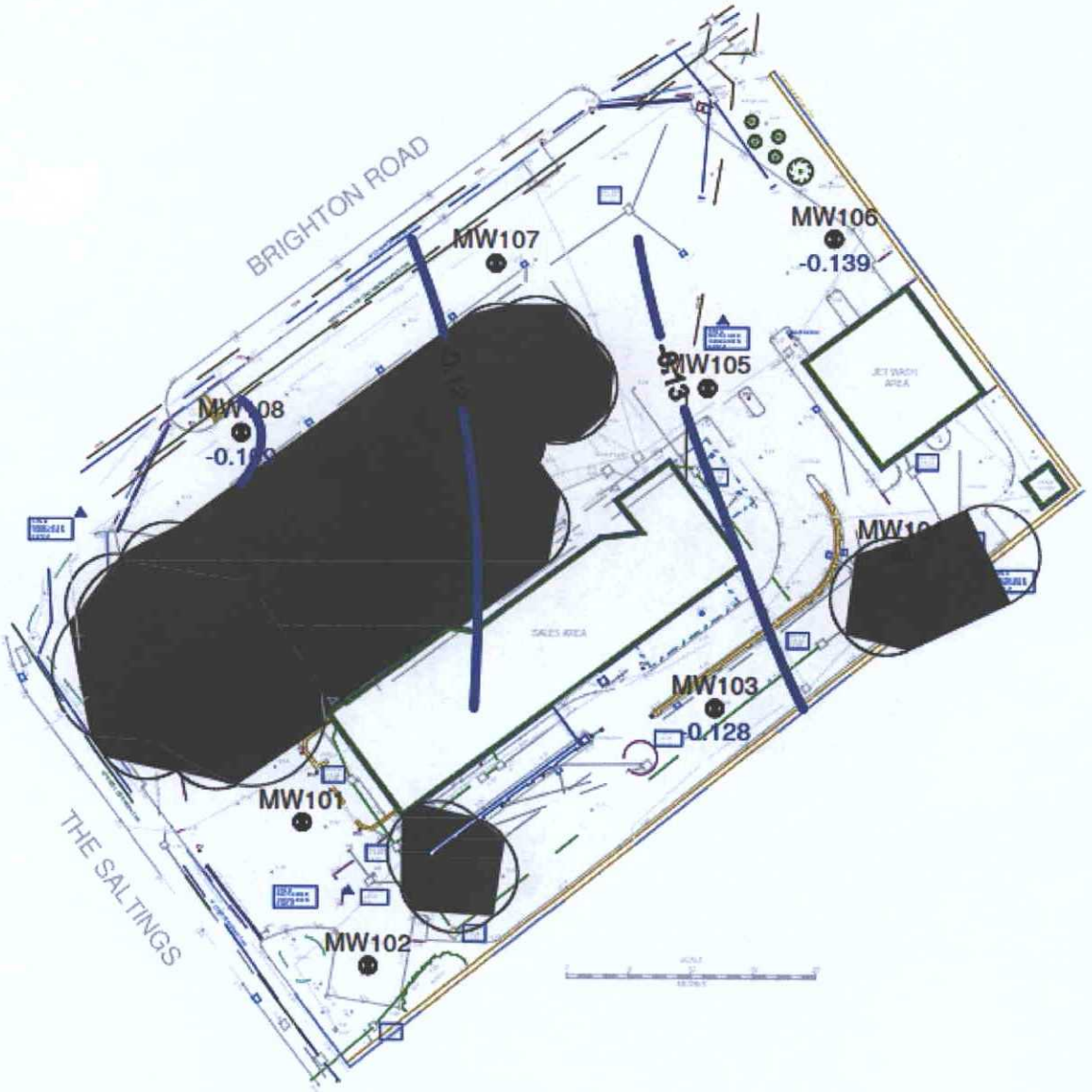
Client




| | |
|---|---|
| Title | Potentiometric Surface Plot (Mid-tide falling) |
| Location | SHELL SHOREHAM AIRPORT, BRIGHTON ROAD, SHOREHAM-BY-SEA, BRIGHTON, BN43 5LD |
| Client | SHELL UK OIL PRODUCTS LTD |

AECOM

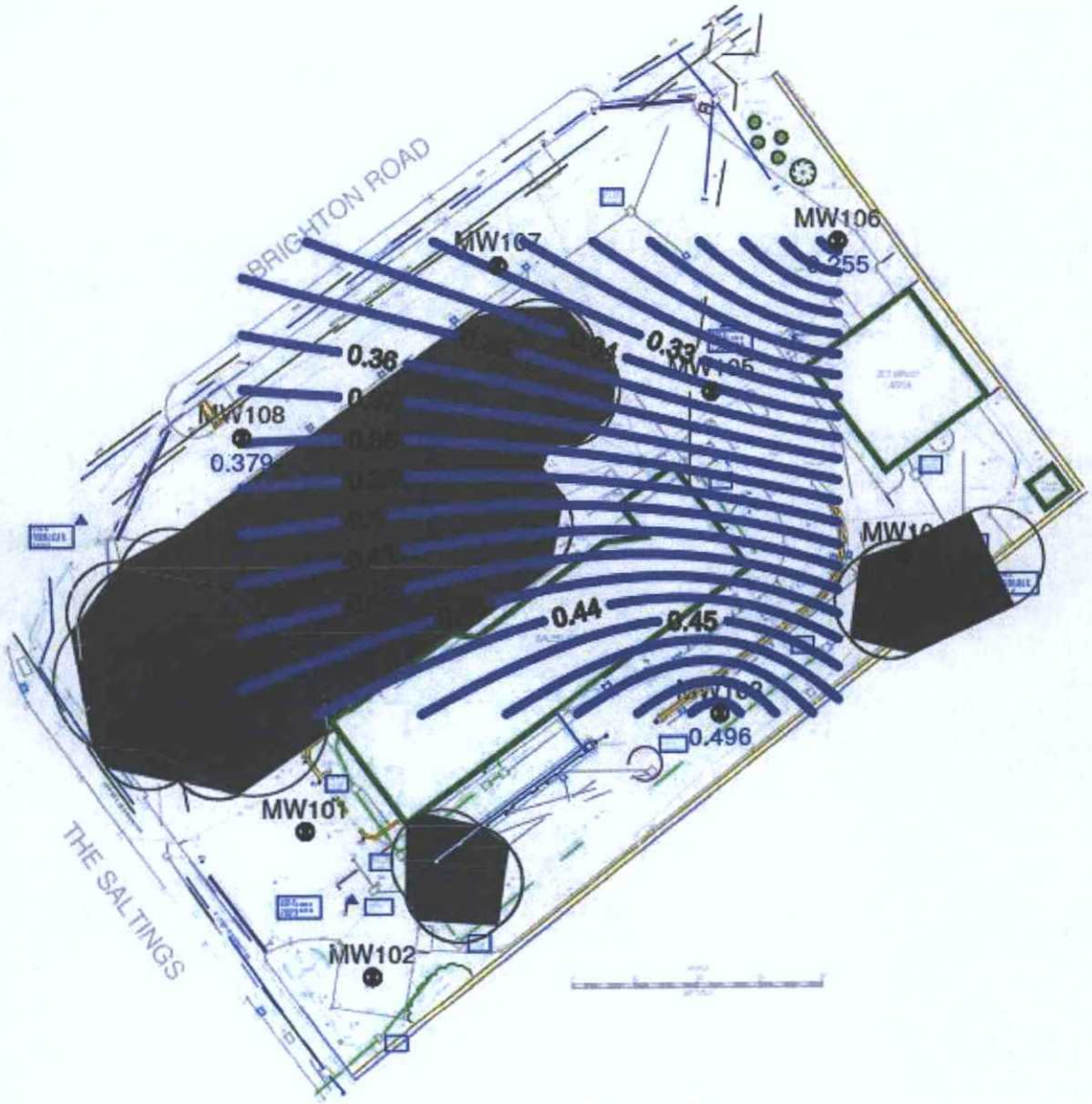
| App'd: | Drawn: | Date: |
|---|---|---|
| KM | AM | JULY 2016 |
| Status: DRAFT | | Ref: KM/LON/AM/LON |
| Scale: NTS | | Job No: 60491603 |
| Drg. Size: A4 | | FIGURE 4b |




| | |
|---|---|
| Title | Potentiometric Surface Plot (Low Tide) |
| Location | SHELL SHOREHAM AIRPORT, BRIGHTON ROAD, SHOREHAM-BY-SEA, BRIGHTON, BN43 5LD |
| Client | SHELL UK OIL PRODUCTS LTD |

AECOM

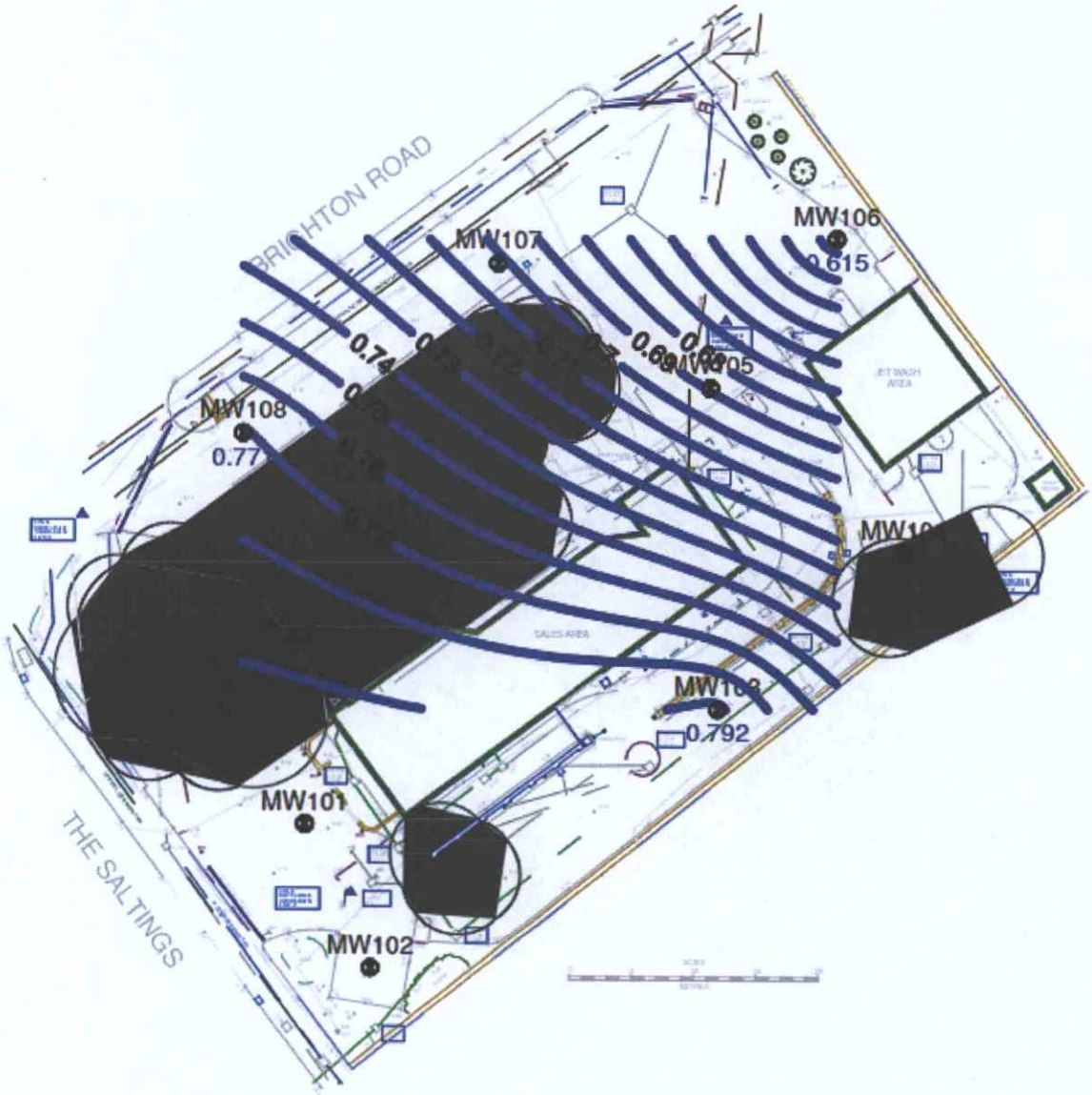
| App'd: | Drawn: | Date: |
|---|---|---|
| KM | AM | JULY 2016 |
| Status: DRAFT | | Ref: KM/LON/AM/LON |
| Scale: NTS | | Job No: 60491603 |
| Drg. Size: A4 | | FIGURE 4c |




| | |
|---|---|
| Title | Potentiometric Surface Plot (Mid Tide Rising) |
| Location | SHELL SHOREHAM AIRPORT, BRIGHTON ROAD, SHOREHAM-BY-SEA, BRIGHTON, BN43 5LD |
| Client | SHELL UK OIL PRODUCTS LTD |

AECOM

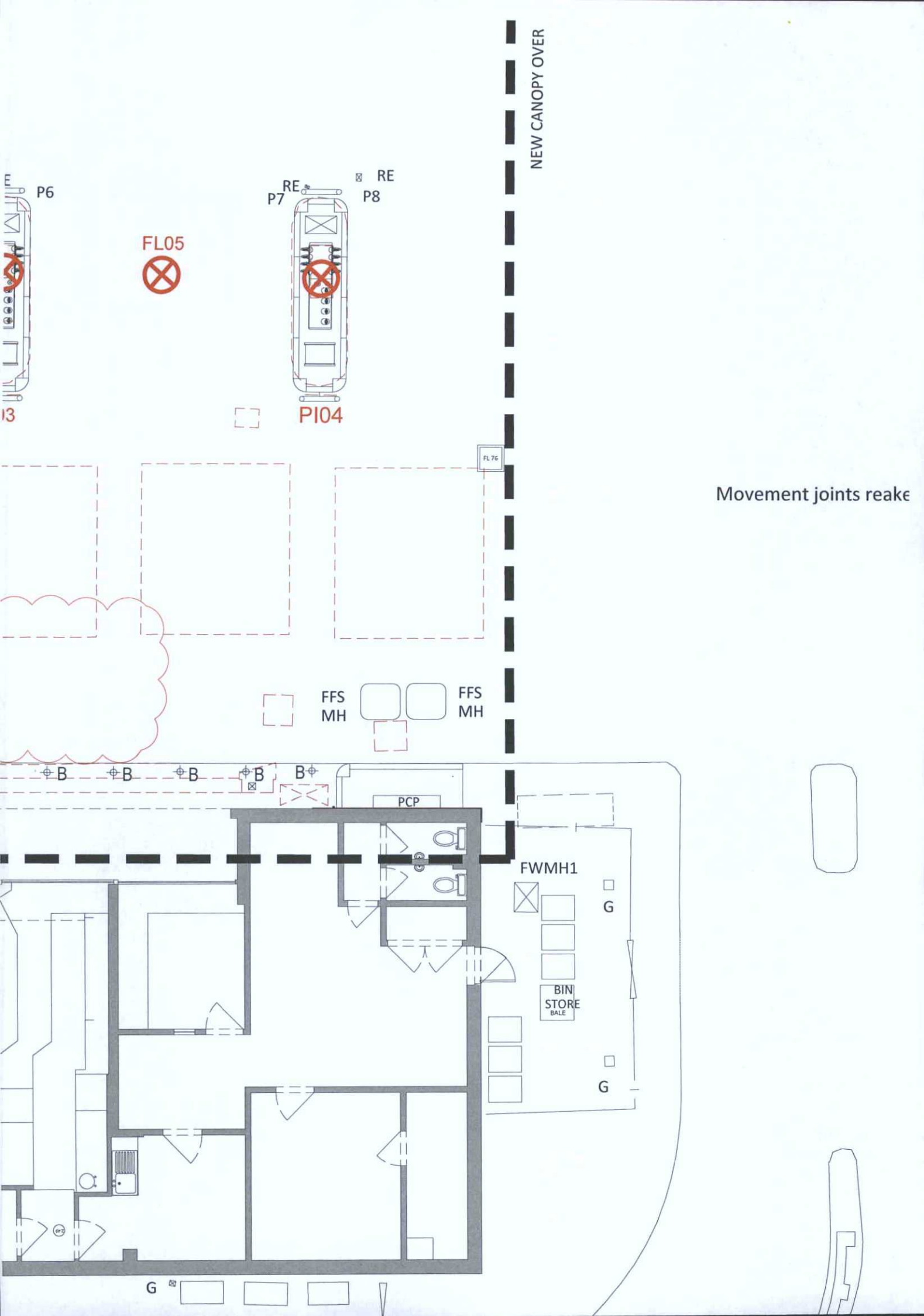
| App'd: | Drawn: | Date: |
|---|---|---|
| KM | AM | JULY 2016 |
| Status: DRAFT | | Ref: KM/LON/AM/LON |
| Scale: NTS | | Job No: 60491603 |
| Drg. Size: A4 | | FIGURE 4d |

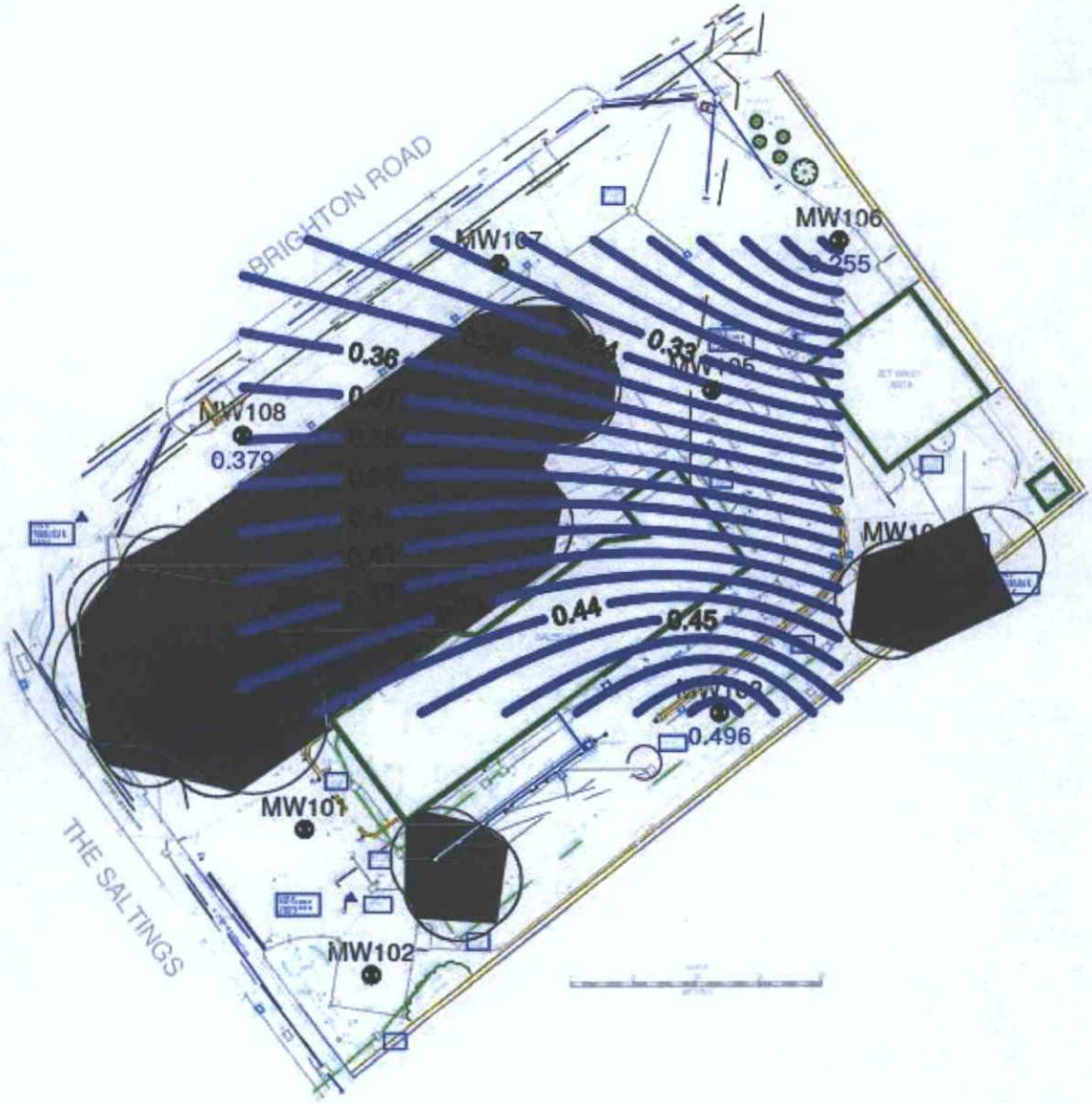



| | |
|---|---|
| Title | Potentiometric Surface Plot (High Tide) |
| Location | SHELL SHOREHAM AIRPORT, BRIGHTON ROAD, SHOREHAM-BY-SEA, BRIGHTON, BN43 5LD |
| Client | SHELL UK OIL PRODUCTS LTD |

AECOM

| App'd: | Drawn: | Date: |
|---|---|---|
| KM | AM | JULY 2016 |
| Status: DRAFT | | Ref: KM/LON/AM/LON |
| Scale: NTS | | Job No: 60491603 |
| Drg. Size: A4 | | FIGURE 4a |

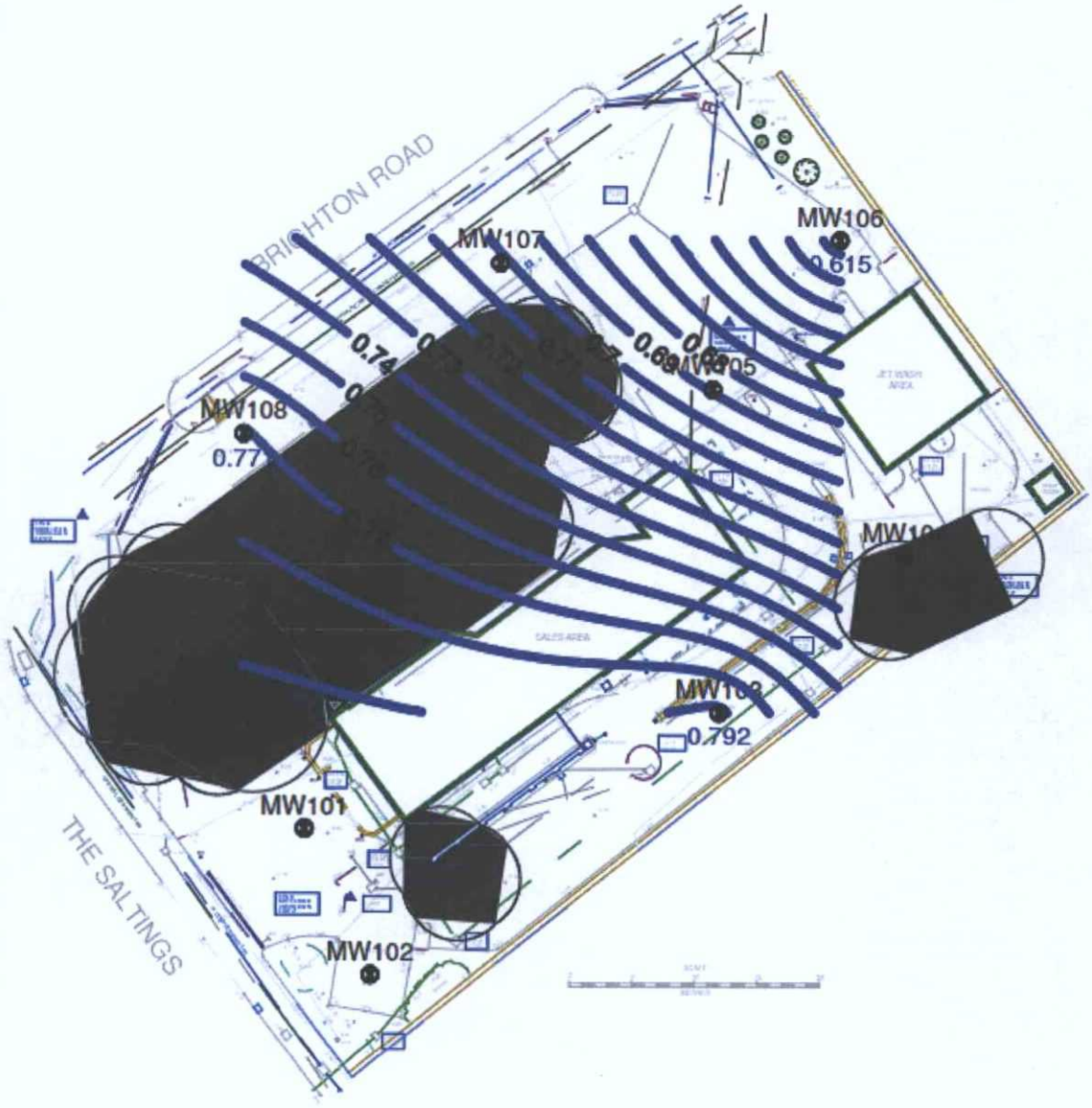

NEW CANOPY OVER
P6
RE
P7
RE
P8
FL05
PI04
FL 76
Movement joints reake
FFS
MH
FFS
MH
B
B
B
B
B
PCP
FWMH1
G
BIN
STORE
BALE
G
G




| | |
|---|---|
| Title | Potentiometric Surface Plot (Mid Tide Rising) |
| Location | SHELL SHOREHAM AIRPORT, BRIGHTON ROAD, SHOREHAM-BY-SEA, BRIGHTON, BN43 5LD |
| Client | SHELL UK OIL PRODUCTS LTD |

AECOM

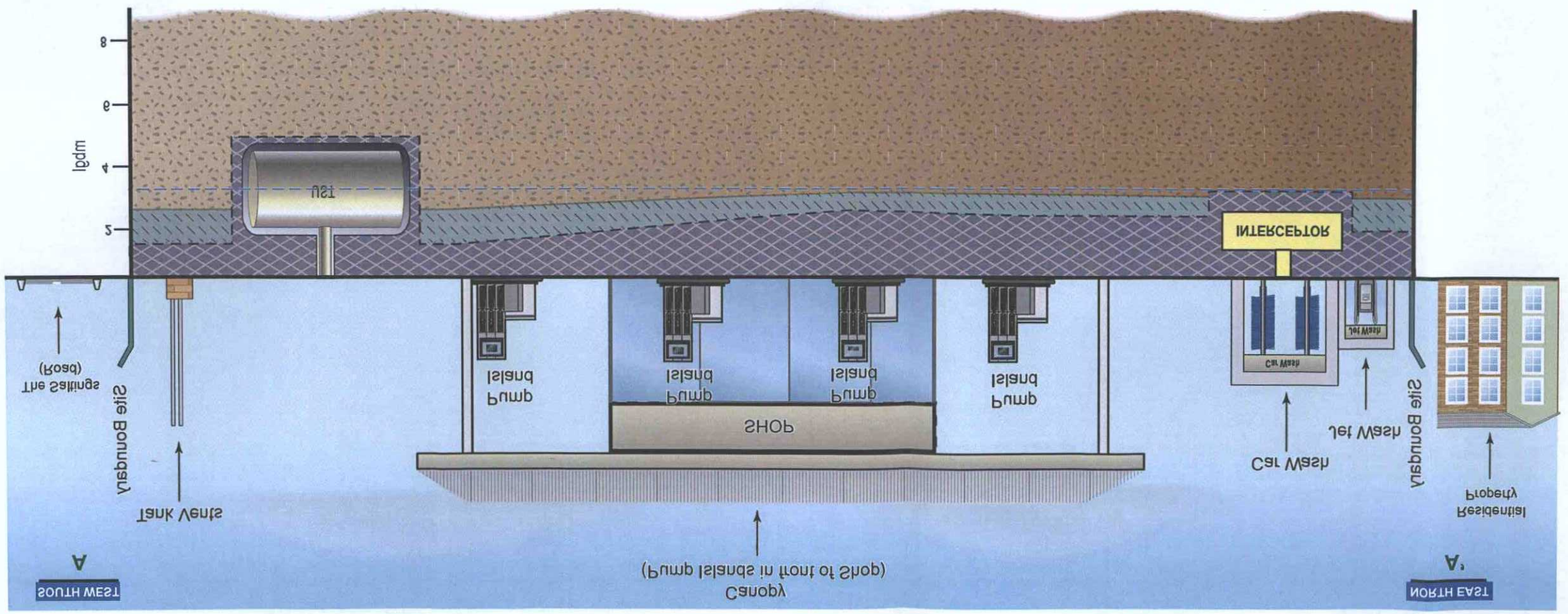
| App'd: | Drawn: | Date: |
|---|---|---|
| KM | AM | JULY 2016 |
| Status: DRAFT | | Ref: KM/LON/AM/LON |
| Scale: NTS | | Job No: 60491603 |
| Drg. Size: A4 | | FIGURE 4d |




| | |
|---|---|
| Title | Potentiometric Surface Plot (High Tide) |
| Location | SHELL SHOREHAM AIRPORT, BRIGHTON ROAD, SHOREHAM-BY-SEA, BRIGHTON, BN43 5LD |
| Client | SHELL UK OIL PRODUCTS LTD |

AECOM

| App'd: | Drawn: | Date: |
|---|---|---|
| KM | AM | JULY 2016 |
| Status: DRAFT | | Ref: KM/LON/AM/LON |
| Scale: NTS | | Job No: 60491603 |
| Drg. Size: A4 | | FIGURE 4a |


SOUTH WEST
A
NORTH EAST
A'
Tank Vents
Vapour Pipe
The Saltings
(Road)
Canopy
(Pump Islands in front of Shop)
SHOP
Pump Island
Pump Island
Pump Island
Pump Island
Vapour Pipe
Jet Wash
Car Wash
INTERCEPTOR
Residential
Property
UST
4
6
8
10
12
14
16
18
20
22
24
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# APPENDIX A TOWN PLANNING CONSENT

Adur District Council

**Development Management**

Mr David Harman
Allan B Matthews Architects
37 Fore Street
Bovey Tracey
Devon
TQ13 9AD

# PLANNING PERMISSION

TOWN AND COUNTRY PLANNING ACT 1990
TOWN AND COUNTRY PLANNING (GENERAL PERMITTED DEVELOPMENT) (AMENDMENT) (ENGLAND) ORDER 2015

## APPLICATION NUMBER: AWDM/1562/15

Details of Development
**REPLACEMENT UNDERGROUND FUEL TANKS, VENTS AND ANCILLARY FILLING EQUIPMENT ADJACENT TO WESTERN BOUNDARY AND REPLACEMENT FUEL PUMPS ON FORECOURT. ALTERATIONS TO SHOP FRONT AND REPLACEMENT CANOPY.**

Location of Development
**151 BRIGHTON ROAD SHOREHAM-BY-SEA WEST SUSSEX BN43 5LD**

In pursuance of their powers under the above-mentioned Act and Order the Council hereby notify you that they PERMIT the above development, in accordance with the application and relevant correspondence registered on 26th October 2015.

This is for reasons stated on the schedule overleaf and subject to compliance with the conditions specified thereon.

G Peck

Gary Peck
Planning Services Manager
23/12/2015

## SCHEDULE

**Conditions**

01. The development hereby permitted shall be begun before the expiration of 3 years from the date of this permission.

**Reason**: *To comply with Section 91 of the Town and Country Planning Act 1990.*

02. The development hereby permitted shall be carried out in accordance with the following approved plans:-

Drawing No: PLG-01 REV A General Arrangement as Existing Date received: 26.10.2015
Drawing No: PLG-02 REV A General Arrangement as Existing Date received: 26.10.2015
Drawing No: PLG-03 REV A Elevations as Existing Date received: 26.10.2015
Drawing No: PLG-04 REV B General Arrangement as Proposed Date received: 05.11.2015
Drawing No: PLG-05 REV B General Arrangement as Proposed Date received: 05.11.2015
Drawing No: PLG-06 REV B Elevations as Proposed Date received: 05.11.2015
Drawing No: PLG-07 Site Location Plan Date received: 26.10.2015
Drawing No: 5.01 Section Through Tank Date received: 26.10.2015
Details of Fuel Dispensers Document Ref: 906676-001 REV 6 Date received: 26.10.2015

**Reason**: *For the avoidance of doubt and in the interests of proper planning.*

03. No development shall commence until a scheme to manage the pollution risks associated with the operations of the proposed petrol filling station have been submitted to and approved, in writing, by the Local Planning Authority (LPA). The scheme shall include and address the following components:

a. Design and Method Statement for removal of Underground Storage Tank (UST's);
b. Design and Method Statement for installation of UST's and Fuel Lines;

Any changes to these components require the express consent of the LPA. The scheme shall be implemented as approved.

**Reason**: *The site lies on the Newhaven Chalk, which is classified as a principle aquifer and groundwater levels are likely to be shallow at this location.*

Cont.../

04. No development approved by this planning permission shall take place until a remediation strategy that includes the following components to deal with the risks associated with contamination of the site shall each be submitted to and approved, in writing, by the LPA:

a) A preliminary risk assessment which has identified:

- all previous uses
- potential contaminants associated with those uses
- a conceptual model of the site indicating sources, pathways and receptors
- potentially unacceptable risks arising from contamination at the site.

b) A site investigation scheme, based on (1) to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off site.

c) The results of the site investigation and the detailed risk assessment referred to in (2) and, based on these, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken.

d) A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in the remediation strategy in (3) are complete and identifying any requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action.

Any changes to these components require the express written consent of the LPA. The scheme shall be implemented as approved.

**Reason**: *The site lies above Newhaven Chalk which is designated a Principal Aquifer and groundwater levels are likely to be shallow at this location. Contamination may be present at the site as a result of its historical use(s). Any contamination present may pose a risk to groundwater underlying the site.*

05. Within 3 months of first use of the replacement infrastructure hereby permitted a verification report demonstrating completion of works set out in the approved remediation strategy and the effectiveness of the remediation shall be submitted to and approved, in writing, by the LPA. The report shall include results of sampling and monitoring carried out in accordance with the approved verification plan to demonstrate that the site remediation criteria have been met. It shall also include any plan (a "long-term monitoring and maintenance plan") for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action, as identified in the verification plan. The long-term monitoring and maintenance plan shall be implemented as approved.

**Reason**: *To ensure that any remediation, if deemed necessary is satisfactorily completed.*

Cont.../

06. If, during development, contamination not previously identified is found to be present at the site then no further development (unless otherwise agreed in writing with the LPA) shall be carried out until the developer has submitted a remediation strategy to the LPA detailing how this unsuspected contamination shall be dealt with and obtained written approval from the LPA. The remediation strategy shall be implemented as approved.

**Reason**: *To ensure that any contamination identified during the construction works is fully characterised and assessed.*

07. No infiltration of surface water drainage into the ground is permitted other than with the express written consent of the LPA, which may be given for those parts of the site where it has been demonstrated that there is no resultant unacceptable risk to controlled waters. The development shall be carried out in accordance with the approval details.

**Reason**: *To ensure that surface water drainage from the proposed development does not result in a deterioration of groundwater quality. At present the proposed drainage from the forecourt is to soakaway. The Environment Agency wish to seek improvements to this current design as it currently presents a risk to groundwater. Ideally the developer should seek connection to the sewer. If this is not possible, enhanced pollution prevention measures will be required prior to any discharge to soakaway.*

08. No development shall take place, including any works of demolition, until a Construction Method Statement (with site plan) has been submitted to and approved in writing by the Local Planning Authority. The development shall be carried out in accordance with the approved Method Statement and shall be adhered to throughout the construction/demolition period. The Statement shall provide for:-

(i) the parking of vehicles of site operatives and visitors;
(ii) loading and unloading of plant and materials;
(iii) storage of plant and materials used in constructing the development;
(iv) the erection and maintenance of security hoarding;
(v) wheel-washing facilities;
(vi) measures to control the emission of dust and dirt during construction.

**Reason**: *In the interests of highway safety and amenity.*

09. No work for the implementation of the development hereby permitted shall be undertaken on the site except between the hours of 08.00 and 18.00 on Monday to Friday and between 08.00 and 13.00 on Saturdays. No work shall take place on Sundays or on Bank or Public Holidays.

**Reason**: *To safeguard the amenities of the occupiers of neighbouring properties having regard to saved policy AG1 of the Adur District Local Plan.*

Cont.../

**Informatives / Notes to Applicant**

01. The Local Planning Authority has acted positively and proactively in determining this application by assessing the proposal against all material considerations, including planning policies and any representations that may have been received and subsequently determining to grant planning permission in accordance with the presumption in favour of sustainable development, as set out within the National Planning Policy Framework.

02. All the responsible parties should be made aware that as construction workers may come into contact with potentially contaminated material, the guidance provided in HS (G) 66 - Protection of Workers and the General Public during Development of Contaminated Land should be strictly adhered to.

03. Southern Water has identified a public water distribution main in the vicinity of the site. The exact position of the public water main must be determined on site by the applicant before the layout of the development is finalised. All existing infrastructure should be protected during the course of construction works. No excavation, mounding or tree planting should be carried out within 4 metres of the public water main without the consent of Southern Water.

    A formal application for connection to the public sewerage system is required in order to service this development.

    Initial investigations indicate there is no public surface water sewer in the area to serve the development. Alternative means of draining surface water from this development will be required. This should not involve disposal to a public foul sewer.

    The application proposes development that may produce trade effluent. No trade effluent can be discharged either directly or indirectly to any public sewer without the formal consent of Southern Water.

    The applicant is advised to discuss the above matters with Southern Water, Sparrowgrove House, Sparrowgrove, Otterbourne, Hampshire, SO21 2SW (Tel: 0330 303 0119) or www.southernwater.co.uk

Adur and Worthing Councils
Portland House
Richmond Road
Worthing
West Sussex
BN11 1LF
planning@adur-worthing.gov.uk
Telephone 01903 221065

**NOTIFICATION TO APPLICANT**

**TOWN & COUNTRY PLANNING ACT 1990**
**TOWN & COUNTRY PLANNING (GENERAL DEVELOPMENT PROCEDURE) ORDER 1995**

---

**YOUR ATTENTION IS DIRECTED TO THE FOLLOWING NOTES FROM THE ABOVE ORDER. THEY ARE FOR INFORMATION ONLY AND DO NOT PRETEND TO SET OUT THE WHOLE OF THE LAW ON THE SUBJECT. IT WOULD BE WELL FOR YOU TO CONSULT YOUR SOLICITOR IF YOU ARE IN ANY DOUBT**

**Appeals to the Secretary of State**

1. If you are aggrieved by the decision of your local planning authority to refuse permission for the proposed development or to grant it subject to conditions, then you can appeal to the Secretary of State under section 78 of the Town and Country Planning Act 1990.

2. If you want to appeal against your local planning authority's decision then you must do so within 6 months of the date of this notice. Appeals must be made using a form which you can get from the Planning Inspectorate at Temple Quay, 2 The Square, Temple Quay, Bristol BS1 6PN (Tel: 0303 444 5000) or online at www.planningportal.gov.uk/pcs

3. The Secretary of State can allow a longer period for giving notice of an appeal, but he will not normally be prepared to use this power unless there are special circumstances which excuse the delay in giving notice of appeal.

4. The Secretary of State need not consider an appeal if it seems to him that the local planning authority could not have granted planning permission for the proposed development or could not have granted it without the conditions they imposed, having regard to the statutory requirements, to the provisions of any development order and to any directions given under a development order.

5. In practice, the Secretary of State does not refuse to consider appeals solely because the local planning authority based their decision on a direction given by him.

**Purchase Notices**

6. If either the local planning authority or the Secretary of State refuses permission to develop land or grants it subject to conditions, the owner may claim that he can neither put the land to a reasonably beneficial use in its existing state nor render the land capable of a reasonably beneficial use by the carrying out of any development which has been or would be permitted.

7. In these circumstances, the owner may serve a purchase notice on the District Council in whose area the land is situated. This notice will require the Council to purchase his interest in the land in accordance with the provisions of Part VI of the Town and Planning Act 1990.

8. Further correspondence about this application should quote the reference number at the top right hand corner of the form.

9. Where this notice conveys approval or permission, conditional or unconditional, please note that the decision given does not purport to convey any consent or approval which may be required under the Building Act and Building Regulations, or any other legislation.

**Willis, Jocelyn**

| | |
|---|---|
| **From:** | Jo Morin <jo.morin@adur-worthing.gov.uk> |
| **Sent:** | 24 May 2016 17:23 |
| **To:** | Jigna Choksi |
| **Subject:** | Shell Petrol Filling Station, 151 Brighton Road, Shoreham AWDM/1562/15 |

Dear Mr Choksi

I refer to your application for approval of the details reserved by conditions of the above planning permission and can confirm that the details submitted in respect of Conditions 3, 4 and 8 are approved. I look forward to receiving the validation report (condition 5) in due course.

The Council's Contaminated Land Officer has requested, having reviewed the URS Phase aI and Phase II reports (Refs:R46370356-001 and R46370356-002, dated July 2014 and November 2014 respectively), that a watching brief and discovery strategy is submitted to the Council's Environmental Health Department prior to works commencing on site. Please contact Katharine Doherty Email: kate.doherty@adur-worthing.gov.uk or Tel: 01273 263114.

With regard to Condition 8 the applicant is advised of the requirement to enter into early discussions with and obtain any necessary licences from the Highway Authority (West Sussex County Council) to cover any temporary construction-related works that will obstruct or affect the normal operation of the public highway prior to any works commencing. Tel: 01243 642105.

Regards,

Jo Morin

--

**Jo Morin** | Principal Planning Officer | Adur & Worthing Councils
01903 221350

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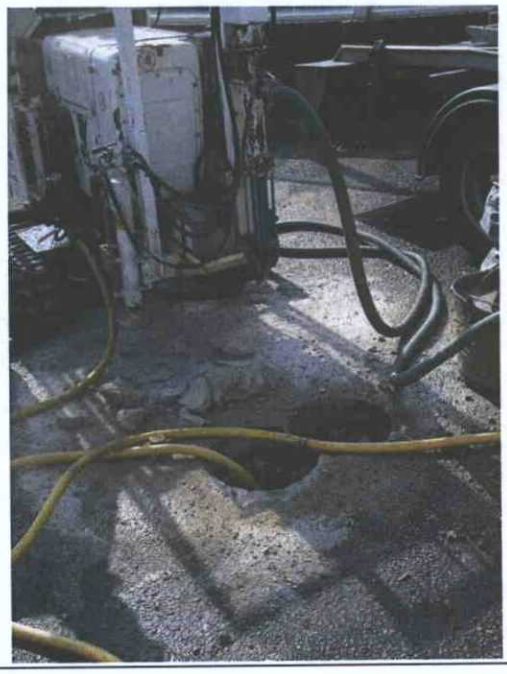
## APPENDIX B PHOTOGRAPHS



Photograph No: 1

Contractors breaking out the well head of MW108.



Photograph No: 2

Contractors pumping grout in to MW104 to decommission the monitoring well.



Photograph No: 3

MW104 after decommissioning and surface reinstatement.



Photograph No: 4

Removal of USTs from the former tank farm (Excavation EXA).



Photograph No: 5

Removal of USTs from the former tank farm (Excavation EXA).




Photograph No: 6

Photograph of the tank farm (Excavation EXA) after the old USTs have been removed.



Photograph No: 7

Contractors removing fuel lines.



Photograph No: 8

Soil bore arisings from BH201 from 1.5 – 3.0m bgl.



Photograph No: 9

Soil bore arisings from 3.0 – 4.5m bgl.



Photograph No: 10

Soil bore arisings from BH201 from 4.5 – 6.0m bgl.

# APPENDIX C BOREHOLE LOGS

Client: Shell International Limited.

Project: Shell Shoreham Airport 145 Brighton Road, Shoreham-By-Sea, Westy Sussex, BN43 5LD

Contract No: 60491603

AECOM

Record of Windowless Window Sampler Hole

**BH201**

| Samples & in situ Tests | | | | | Water Level | Strata | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Type/ No. | Schel'd Tests | PID (ppm) | Sampler Range/ %Recv (20 40 60 80) | | Reduced Level | Legend | Depth (Thick-ness) | DESCRIPTION | Visual/Olfactory Observations | Instru-ment/ Backfill |
| | | | <0.1 | | | | | (1.50) | MADE GROUND: Type 1 Backfill | | |
| 1 | | | <0.1 | | | | | | | | |
| | | | <0.1 | | | | | 1.50 | | | |
| | | | <0.1 | | | | | (1.50) | Soft light grey with orange mottling sandy CLAY. Sand is fine. (50% recovery) | | |
| 2 | | | <0.1 | | | | | | | | |
| 2.50 | ES | | <0.1 | | | | | 3.00 | | | |
| 3 | | | <0.1 | | | | | | Low density multicoloured slightly sandy fine to coarse subangular GRAVEL. Sand is fine to coarse. (50% recovery) | | |
| | | | <0.1 | | | | | | | | |
| 4 | | | <0.1 | | | | | | | | |
| | | | <0.1 | | | | | (3.00) | Layer of coarse SAND with common angular shells from 4.5m - 5.0m bgl. | | |
| 5 5.00 | ES | | <0.1 | | | | | | | | |
| | | | <0.1 | | | | | | | | |
| 6 | | | | | | | | 6.00 | | | |

GENERAL REMARKS

Borehole terminated at 6.00m

Boring Progress and Water Observations

| Date | Time | Hole Depth | Standing Level | Strike | Rise | Time (mins) | Sealed |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

Exploratory hole logs should be read in conjunction with corresponding Key Sheets.

| | | | | |
|---|---|---|---|---|
| Logged by: MP | Equipment: Comacchio GEO 305 | Co-ordinates: Not Surveyed | Ground Level: Not Surveyed | Date: Start: 13/12/2016 End: 13/12/2016 |
| Checked by: | Contractor: Geotechnical | | | |
| Status: | | | | Sheet 1 of 1 |

AGS

Style:AGS3_AECOM_ENV_WS File:J:\MANCHESTER-JOBS\SHELL UK OIL PRODUCTS LTD\60491603 GESS TR SHOREHAM AIRPORT\TECHNICAL\REPORTS\VERIFICATION REPORT\APP C - SOIL BORE LOGS\SHELL SHOREHAM AIRPORT LOGS.GPJ Printed: 10/03/2017 13:21:48
URS www.AECOM.com

# APPENDIX D WASTE TRANSFER DOCUMENTATION

WILLIAMS SOUTHERN LIMITED CONSTRUCTION

# Shell Shoreham - Imported Material Data

Last Updated: 03/01/2017

| Summary | |
|---|---|
| Aggregate | Total Tonnage |
| Type 1 | 650.46 |
| Concrete | 304 |
| 4/10mm Gravel/Shingle | 525.4 |
| Pea Shingle | 0 |

| Date | Ticket Number | Material | Carrier | Tonnage | Invoice Number |
|---|---|---|---|---|---|
| 22/11/2016 | 449469 | Type 1 | GRS | 20.12 | 351367 |
| 23/11/2016 | 449402 | Type 1 | GRS | 20.3 | 351367 |
| 23/11/2016 | 449403 | Type 1 | GRS | 19.86 | 351367 |
| 23/11/2016 | 449404 | Type 1 | GRS | 20.14 | 351367 |
| 23/11/2016 | 449405 | Type 1 | GRS | 20.16 | 351367 |
| 23/11/2016 | 449406 | Type 1 | GRS | 20.16 | 351367 |
| 23/11/2016 | 407848 | Type 1 | GRS | 19.82 | 351367 |
| 23/11/2016 | 449471 | Type 1 | GRS | 20.32 | 351367 |
| 24/11/2016 | 449472 | Type 1 | GRS | 20.36 | 351367 |
| 01/12/2016 | 448782 | 4/10MM Gravel/Shingle | GRS | 20.2 | 355384 |
| 01/12/2016 | 448781 | 4/10MM Gravel/Shingle | GRS | 20.12 | 355384 |
| 01/12/2016 | 448780 | 4/10MM Gravel/Shingle | GRS | 20.22 | 355384 |
| 01/12/2016 | 449482 | 4/10MM Gravel/Shingle | GRS | 19.7 | 355384 |
| 01/12/2016 | 448763 | 4/10MM Gravel/Shingle | GRS | 19.12 | 355384 |
| 01/12/2016 | 448762 | 4/10MM Gravel/Shingle | GRS | 19.28 | 355384 |
| 01/12/2016 | 448761 | 4/10MM Gravel/Shingle | GRS | 19.44 | 355384 |
| 01/12/2016 | 448760 | 4/10MM Gravel/Shingle | GRS | 19.5 | 355384 |
| 01/12/2016 | 448759 | 4/10MM Gravel/Shingle | GRS | 19.32 | 355384 |
| 01/12/2016 | 448758 | 4/10MM Gravel/Shingle | GRS | 19.56 | 355385 |
| 01/12/2016 | 407745 | 4/10MM Gravel/Shingle | GRS | 19.26 | 355385 |
| 01/12/2016 | 449540 | 4/10MM Gravel/Shingle | GRS | 19.78 | 355385 |
| 02/12/2016 | 448764 | 4/10MM Gravel/Shingle | GRS | 19.62 | 355385 |
| 02/12/2016 | 449576 | 4/10MM Gravel/Shingle | GRS | 19.08 | 355385 |
| 02/12/2016 | 407748 | 4/10MM Gravel/Shingle | GRS | 18.9 | 355385 |
| 02/12/2016 | 407747 | 4/10MM Gravel/Shingle | GRS | 18.8 | 355385 |
| 02/12/2016 | 448802 | 4/10MM Gravel/Shingle | GRS | 10.58 | 358450 |
| 20/12/2016 | 449561 | 4/10MM Gravel/Shingle | GRS | 19.82 | 358449 |
| 20/12/2016 | 449562 | 4/10MM Gravel/Shingle | GRS | 20.2 | 358449 |
| 20/12/2016 | 449563 | 4/10MM Gravel/Shingle | GRS | 20.36 | 358449 |
| 20/12/2016 | 449564 | 4/10MM Gravel/Shingle | GRS | 19.84 | 358449 |
| 22/12/2016 | 449580 | Type 1 | GRS | 18.9 | 362963 |
| 04/01/2017 | 449585 | Type 1 | GRS | 18.66 | 362963 |
| 04/01/2017 | 449584 | Type 1 | GRS | 18.68 | 362963 |
| 04/01/2017 | 449587 | Type 1 | GRS | 18.88 | 362963 |
| 05/01/2017 | 448769 | 4/10MM Gravel/Shingle | GRS | 10.1 | 362962 |
| 04/01/2017 | 449581 | 4/10MM Gravel/Shingle | GRS | 19.18 | 362961 |
| 04/01/2017 | 449582 | 4/10MM Gravel/Shingle | GRS | 18.72 | 362961 |
| 24/11/2016 | 449480 | Type 1 | GRS | 19.74 | 368710 |
| 28/11/2016 | 449530 | Type 1 | GRS | 20.3 | 368710 |
| 28/11/2016 | 449479 | Type 1 | GRS | 19.96 | 368710 |
| 28/11/2016 | 449531 | Type 1 | GRS | 20.46 | 368710 |
| 28/11/2016 | 449552 | Type 1 | GRS | 20.02 | 368710 |
| 28/11/2016 | 449533 | Type 1 | GRS | 20.48 | 368710 |
| 28/11/2016 | 449534 | Type 1 | GRS | 20.14 | 368710 |
| 29/11/2016 | 449474 | Type 1 | GRS | 20.26 | 368710 |
| 29/11/2016 | 449475 | Type 1 | GRS | 19.82 | 368710 |
| 29/11/2016 | 449551 | Type 1 | GRS | 19.84 | 368711 |
| 29/11/2016 | 449536 | Type 1 | GRS | 20.42 | 368711 |

| | | | | | |
|---|---|---|---|---|---|
| 29/11/2016 | 449532 | Type 1 | GRS | 20.34 | 368711 |
| 30/11/2016 | 449537 | Type 1 | GRS | 20.52 | 368711 |
| 20/09/2016 | 407867 | Type 1 | GRS | 16.98 | 326387 |
| 20/09/2016 | 407869 | Type 1 | GRS | 18.74 | 326387 |
| 20/09/2016 | 407868 | Type 1 | GRS | 19.06 | 326387 |
| 20/09/2016 | 407872 | Type 1 | GRS | 18.94 | 326387 |
| 20/09/2016 | 407871 | Type 1 | GRS | 18.86 | 326387 |
| 20/09/2016 | 407870 | Type 1 | GRS | 18.82 | 326387 |
| 21/09/2016 | 408519 | Type 1 | GRS | 20.4 | 326387 |
| 07/12/2016 | 27212 | 4/10MM Gravel/Shingle | GRS | 18.58 | 358452 |
| 09/12/2016 | 27553 | 4/10MM Gravel/Shingle | GRS | 18.12 | 358452 |
| 09/12/2016 | 26332 | 4/10MM Gravel/Shingle | GRS | 18.16 | 358452 |
| 22/12/2016 | 21866 | 4/10MM Gravel/Shingle | GRS | 19.84 | 358451 |
| 19/09/2016 | 226832 | Concrete | GRS | 19 | 326386 |
| 19/09/2016 | 226833 | Concrete | GRS | 19 | 326386 |
| 19/09/2016 | 226834 | Concrete | GRS | 19 | 326386 |
| 19/09/2016 | 220109 | Concrete | GRS | 19 | 326386 |
| 19/09/2016 | 220110 | Concrete | GRS | 19 | 326386 |
| 17/10/2016 | 235214 | Concrete | GRS | 19 | 333899 |
| 17/10/2016 | 235215 | Concrete | GRS | 19 | 333899 |
| 17/10/2016 | 235216 | Concrete | GRS | 19 | 333899 |
| 17/10/2016 | 235217 | Concrete | GRS | 19 | 333899 |
| 17/10/2016 | 235218 | Concrete | GRS | 19 | 333899 |
| 17/10/2016 | 235219 | Concrete | GRS | 19 | 333899 |
| 16/09/2016 | 226826 | Concrete | GRS | 19 | 322661 |
| 16/09/2016 | 226827 | Concrete | GRS | 19 | 322661 |
| 16/09/2016 | 226828 | Concrete | GRS | 19 | 322661 |
| 16/09/2016 | 226829 | Concrete | GRS | 19 | 322661 |
| 16/09/2016 | 226830 | Concrete | GRS | 19 | 322661 |

# Shell Shoreham - Waste Data

Last Updated: 30/01/2017

| Summary | | | | |
|---|---|---|---|---|
| European Waste Code | | Total Tonnage/ Litres | Total Loads | |
| 13 05 03 | Interceptor Sludge | 0.0 | 0 | Haz |
| 13 05 07 | Interceptor Liquids | 0.0 | 0 | Haz |
| 17 05 03 | Haz Soil | 38.0 | 2 | Haz |
| 16 10 02 | Aqueous Liquid Waste | 81.0 | 4 | Haz |
| 16 07 09 | Tank Washings | 0.0 | 0 | Haz |
| 17 01 07 | Hardcore | 19.0 | 1 | |
| 17 05 04 | Inert Soil/ Non Haz | 927.3 | 51 | |
| 17 09 04 | Mixed | 8.2 | 6 | |
| 17 01 01 | Concrete | 855.0 | 45 | |

| Date | Company | Carriers License Number | European Waste Code | Ticket Number | Skip Size | Tonnage / Litres | Disposal License Number | Invoice Number |
|---|---|---|---|---|---|---|---|---|
| 12/09/2016 | GRS | CBDU85432 | 17 01 01 | 17872 | 8w | 19 | EPR/AB3303HD | 319716 |
| 13/09/2016 | GRS | CBDU85432 | 17 01 01 | 17875 | 8w | 19 | EPR/AB3303HD | 319716 |
| 13/09/2016 | GRS | CBDU85432 | 17 01 01 | 18786 | 8w | 19 | EPR/AB3303HD | 319716 |
| 13/09/2016 | GRS | CBDU85432 | 17 01 01 | 18785 | 8w | 19 | EPR/AB3303HD | 319716 |
| 13/09/2016 | GRS | CBDU85432 | 17 01 01 | 18784 | 8w | 19 | EPR/AB3303HD | 319716 |
| 07/09/2016 | GRS | CBDU85432 | 17 01 01 | 17871 | 8w | 19 | EPR/AB3303HD | 319716 |
| 07/09/2016 | GRS | CBDU85432 | 17 01 01 | 17870 | 8w | 19 | EPR/AB3303HD | 318052 |
| 07/09/2016 | GRS | CBDU85432 | 17 01 01 | 17869 | 8w | 19 | EPR/AB3303HD | 318052 |
| 07/09/2016 | GRS | CBDU85432 | 17 01 01 | 17868 | 8w | 19 | EPR/AB3303HD | 318052 |
| 07/09/2016 | GRS | CBDU85432 | 17 01 01 | 18773 | 8w | 19 | EPR/AB3303HD | 318052 |
| 07/09/2016 | GRS | CBDU85432 | 17 01 01 | 17867 | 8w | 19 | EPR/AB3303HD | 318052 |
| 07/09/2016 | GRS | CBDU85432 | 17 01 01 | 18772 | 8w | 19 | EPR/AB3303HD | 318052 |
| 07/09/2016 | GRS | CBDU85432 | 17 01 01 | 18771 | 8w | 19 | EPR/AB3303HD | 318052 |
| 07/09/2016 | GRS | CBDU85432 | 17 01 01 | 18770 | 8w | 19 | EPR/AB3303HD | 318052 |
| 20/09/2016 | GRS | CBDU85432 | 17 01 01 | 17619 | 8w | 19 | EPR/AB3303HD | 322662 |
| 20/09/2016 | GRS | CBDU85432 | 17 01 01 | 17833 | 8w | 19 | EPR/AB3303HD | 322662 |
| 20/09/2016 | GRS | CBDU85432 | 17 01 01 | 17882 | 8w | 19 | EPR/AB3303HD | 322662 |
| 20/09/2016 | GRS | CBDU85432 | 17 01 01 | 17881 | 8w | 19 | EPR/AB3303HD | 322662 |
| 20/09/2016 | GRS | CBDU85432 | 17 01 01 | 17880 | 8w | 19 | EPR/AB3303HD | 322662 |
| 21/09/2016 | GRS | CBDU85432 | 17 01 01 | 17620 | 8w | 19 | EPR/AB3303HD | 322662 |
| 21/09/2016 | GRS | CBDU85432 | 17 01 01 | 17834 | 8w | 19 | EPR/AB3303HD | 322662 |
| 31/10/2016 | GRS | CBDU85432 | 17 05 04 | 373254 | 8w | 20.6 | 100089 | 339202 |
| 31/10/2016 | GRS | CBDU85432 | 17 05 04 | 373255 | 8w | 20.5 | 100089 | 339202 |
| 26/10/2016 | GRS | CBDU85432 | 17 05 04 | 285403 | 8w | 20.64 | 100089 | 339201 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 373251 | 8w | 20.76 | 100089 | 339201 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 373252 | 8w | 20.14 | 100089 | 339201 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 285405 | 8w | 14.62 | 100089 | 339201 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 285406 | 8w | 21.04 | 100089 | 339201 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 285404 | 8w | 19.92 | 100089 | 339201 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 285402 | 8w | 21.68 | 100089 | 339201 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 285401 | 8w | 18.54 | 100089 | 339201 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 373253 | 8w | 19.56 | 100089 | 339201 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 17845 | 8w | 15.18 | 100089 | 339757 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 17846 | 8w | 14.96 | 100089 | 339757 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 17645 | 8w | 15.22 | 100089 | 339757 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 17644 | 8w | 15.48 | 100089 | 339757 |
| 07/09/2016 | Rabbit Skips | CB/CE5544MY | 17 09 04 | 1862093 | 12y | 0.94 | 10015 | 184606 |
| 07/09/2016 | Rabbit Skips | CB/CE5544MY | 17 09 04 | 1867970 | 12y | 1 | 10015 | 184606 |
| 24/08/2016 | Rabbit Skips | CB/CE5544MY | 17 09 04 | 1854655 | 12y | 1 | 10015 | 183145 |
| 12/01/2017 | GRS | CBDU85432 | 17 01 07 | 19220 | 8w | 19 | 400517 | 362964 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 656 | 8w | 19.16 | 100089 | 340810 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 655 | 8w | 13.88 | 100089 | 340810 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 134 | 8w | 20.7 | 100089 | 340810 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 132 | 8w | 12.48 | 100089 | 340810 |
| 27/10/2016 | GRS | CBDU85432 | 17 05 04 | 133 | 8w | 16 | 100089 | 340810 |
| 28/10/2016 | GRS | CBDU85432 | 17 05 04 | 135 | 8w | 17.92 | 100089 | 340810 |
| 28/10/2016 | GRS | CBDU85432 | 17 05 04 | 658 | 8w | 19.48 | 100089 | 340810 |
| 28/10/2016 | GRS | CBDU85432 | 17 05 04 | 137 | 8w | 18.82 | 100089 | 340810 |
| 28/10/2016 | GRS | CBDU85432 | 17 05 04 | 139 | 8w | 20.98 | 100089 | 340810 |
| 28/10/2016 | GRS | CBDU85432 | 17 05 04 | 136 | 8w | 19 | 100089 | 340811 |
| 24/10/2016 | GRS | CBDU85432 | 17 05 04 | 126 | 8w | 20.2 | 100089 | 342421 |
| 24/10/2016 | GRS | CBDU85432 | 17 05 04 | 129 | 8w | 14.7 | 100089 | 342421 |
| 26/10/2016 | GRS | CBDU85432 | 17 05 04 | 130 | 8w | 16.68 | 100089 | 342421 |
| 26/10/2016 | GRS | CBDU85432 | 17 05 04 | 131 | 8w | 18.3 | 100089 | 342421 |
| 26/10/2016 | GRS | CBDU85432 | 17 05 04 | 30478 | 8w | 17 | 100089 | 247882 |
| 26/10/2016 | GRS | CBDU85432 | 17 05 04 | 30479 | 8w | 20.72 | 100089 | 247882 |
| 26/10/2016 | GRS | CBDU85432 | 17 05 04 | 30480 | 8w | 16.42 | 100089 | 247882 |
| 24/10/2016 | GRS | CBDU85432 | 17 05 04 | 127 | 8w | 12.82 | 100089 | 345220 |
| 26/10/2016 | GRS | CBDU85432 | 17 05 04 | 652 | 8w | 17.82 | 100089 | 345220 |
| 26/10/2016 | GRS | CBDU85432 | 17 05 04 | 654 | 8w | 19.86 | 100089 | 345220 |
| 26/10/2016 | GRS | CBDU85432 | 17 05 04 | 653 | 8w | 18.78 | 100089 | 345220 |
| 31/10/2016 | GRS | CBDU85432 | 17 05 04 | 138 | 8w | 18.34 | 100089 | 345220 |
| 31/10/2016 | GRS | CBDU85432 | 17 05 04 | 140 | 8w | 17.96 | 100089 | 345220 |
| 31/10/2016 | GRS | CBDU85432 | 17 05 04 | 659 | 8w | 17.96 | 100089 | 345220 |
| 31/10/2016 | GRS | CBDU85432 | 17 05 04 | 660 | 8w | 18.82 | 100089 | 345220 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 27/06/2016 | GRS | CBDU85432 | 17 05 04 | 657 | 8w | 24.08 | 100089 | 345220 |
| 05/10/2016 | GRS | CBDU85432 | 17 05 03 | 109 | 8w | 19 | 100089 | 343445 |
| 05/10/2016 | GRS | CBDU85432 | 17 05 03 | 110 | 8w | 19 | 100089 | 343445 |
| 01/11/2016 | GRS | CBDU85432 | 17 05 04 | 285410 | 8w | 15.82 | 100089 | 343445 |
| 01/11/2016 | GRS | CBDU85432 | 17 05 04 | 373256 | 8w | 14.36 | 100089 | 343445 |
| 03/11/2016 | GRS | CBDU85432 | 17 05 04 | 285412 | 8w | 19.82 | 100089 | 343445 |
| 03/11/2016 | GRS | CBDU85432 | 17 05 04 | 285411 | 8w | 18.7 | 100089 | 343445 |
| 04/11/2016 | GRS | CBDU85432 | 17 05 04 | 285414 | 8w | 18.74 | 100089 | 343445 |
| 04/11/2016 | GRS | CBDU85432 | 17 05 04 | 285415 | 8w | 16.14 | 100089 | 343445 |
| 18/11/2016 | GRS | CBDU85432 | 17 05 04 | 467342 | 8w | 19 | 83204 | 347158 |
| 18/11/2016 | GRS | CBDU85432 | 17 05 04 | 467341 | 8w | 19 | 83204 | 347158 |
| 18/11/2016 | GRS | CBDU85432 | 17 05 04 | 467340 | 8w | 19 | 83204 | 347158 |
| 18/11/2016 | GRS | CBDU85432 | 17 05 04 | 467339 | 8w | 19 | 83204 | 347158 |
| 14/11/2016 | GRS | CBDU85432 | 17 01 01 | 17674 | 8w | 19 | 400517 | 345221 |
| 14/11/2016 | GRS | CBDU85432 | 17 01 01 | 17675 | 8w | 19 | 400517 | 345221 |
| 27/10/2016 | GRS | CBDU85432 | 17 01 01 | 17667 | 8w | 19 | 400517 | 339203 |
| 26/10/2016 | GRS | CBDU85432 | 17 01 01 | 17638 | 8w | 19 | 400517 | 337863 |
| 27/10/2016 | GRS | CBDU85432 | 17 01 01 | 176688 | 8w | 19 | 400517 | 337863 |
| 20/10/2016 | GRS | CBDU85432 | 17 01 01 | 14577 | 8w | 19 | 400517 | 335277 |
| 20/10/2016 | GRS | CBDU85432 | 17 01 01 | 18855 | 8w | 19 | 400517 | 335277 |
| 20/10/2016 | GRS | CBDU85432 | 17 01 01 | 18854 | 8w | 19 | 400517 | 335277 |
| 20/10/2016 | GRS | CBDU85432 | 17 01 01 | 18853 | 8w | 19 | 400517 | 335277 |
| 13/10/2016 | GRS | CBDU85432 | 17 01 01 | 18851 | 8w | 19 | 400517 | 333900 |
| 13/10/2016 | GRS | CBDU85432 | 17 01 01 | 17900 | 8w | 19 | 400517 | 333900 |
| 13/10/2016 | GRS | CBDU85432 | 17 01 01 | 17899 | 8w | 19 | 400517 | 333900 |
| 13/10/2016 | GRS | CBDU85432 | 17 01 01 | 17898 | 8w | 19 | 400517 | 333900 |
| 19/10/2016 | GRS | CBDU85432 | 17 01 01 | 17636 | 8w | 19 | 400517 | 333900 |
| 19/10/2016 | GRS | CBDU85432 | 17 01 01 | 17637 | 8w | 19 | 400517 | 333900 |
| 19/10/2016 | GRS | CBDU85432 | 17 01 01 | 17634 | 8w | 19 | 400517 | 333900 |
| 06/10/2016 | GRS | CBDU85432 | 17 01 01 | 17626 | 8w | 19 | 400517 | 330804 |
| 06/10/2016 | GRS | CBDU85432 | 17 01 01 | 17625 | 8w | 19 | 400517 | 330804 |
| 06/10/2016 | GRS | CBDU85432 | 17 01 01 | 17895 | 8w | 19 | 400517 | 330804 |
| 11/10/2016 | GRS | CBDU85432 | 17 01 01 | 17630 | 8w | 19 | 400517 | 330804 |
| 11/10/2016 | GRS | CBDU85432 | 17 01 01 | 17631 | 8w | 19 | 400517 | 330804 |
| 11/10/2016 | GRS | CBDU85432 | 17 01 01 | 17629 | 8w | 19 | 400517 | 330804 |
| 11/10/2016 | GRS | CBDU85432 | 17 01 01 | 17627 | 8w | 19 | 400517 | 330804 |
| 16/09/2016 | GRS | CBDU85432 | 17 01 01 | 17617 | 8w | 19 | 400517 | 326388 |
| 16/09/2016 | GRS | CBDU85432 | 17 01 01 | 17616 | 8w | 19 | 400517 | 326388 |
| 16/09/2016 | GRS | CBDU85432 | 17 01 01 | 17615 | 8w | 19 | 400517 | 326388 |
| 14/11/2016 | Rabbit Skips | CB/CE5544MY | 17 09 04 | 1898554 | 12Y | 1.02 | 10015 | 187527 |
| 14/12/2016 | Rabbit Skips | CB/CE5544MY | 17 09 04 | 1914487 | 12Y | 2.1 | 10015 | 188889 |
| 14/12/2016 | Rabbit Skips | CB/CE5544MY | 17 09 04 | 1913974 | 12Y | 2.1 | 10015 | 188889 |
| 07/10/2016 | LIS | CB/TM3180GH | 16 10 02 | 71016 | 8w | 25 | 50381 | 15330 |
| 07/10/2016 | LIS | CB/TM3180GH | 16 10 02 | 71016 | 8W | 19 | 50381 | 15330 |
| 14/09/2016 | LIS | CB/TM3180GH | 16 10 02 | 14916 | | 12 | 50381 | 15292 |
| 14/09/2016 | LIS | CB/TM3180GH | 16 10 02 | 14916 | | 25 | 50381 | 15292 |