DO NOT SCALE




## NOTES

KEY:

- MW103 — Groundwater Well Installation (Superficial Perched Groundwater)
- MW101 — Groundwater Well Installation (Pennine Middle Coal Measures Formation)
- VP101 — Vapour Well Installation
- MW105A — Shallow Borehole to investigate superficial deposits, no installation
- 42.65 — Groundwater elevation (mAOD)
- mAOD — Metres Above Ordnance Datum

| REV | DESCRIPTION | DRAWN | APPROVED | DATE |
|---|---|---|---|---|

STATUS
FOR INFORMATION


CONSULTING ENGINEERS

AECOM

6th FLOOR, 1 NEW YORK STREET, MANCHESTER, M1 4HD
TEL 0161-601-1700


CLIENT
SHELL UK OIL PRODUCTS LTD

PROJECT
Shell Whitemare Pool,
Leam Lann, Gateshead.
NE10 8YB

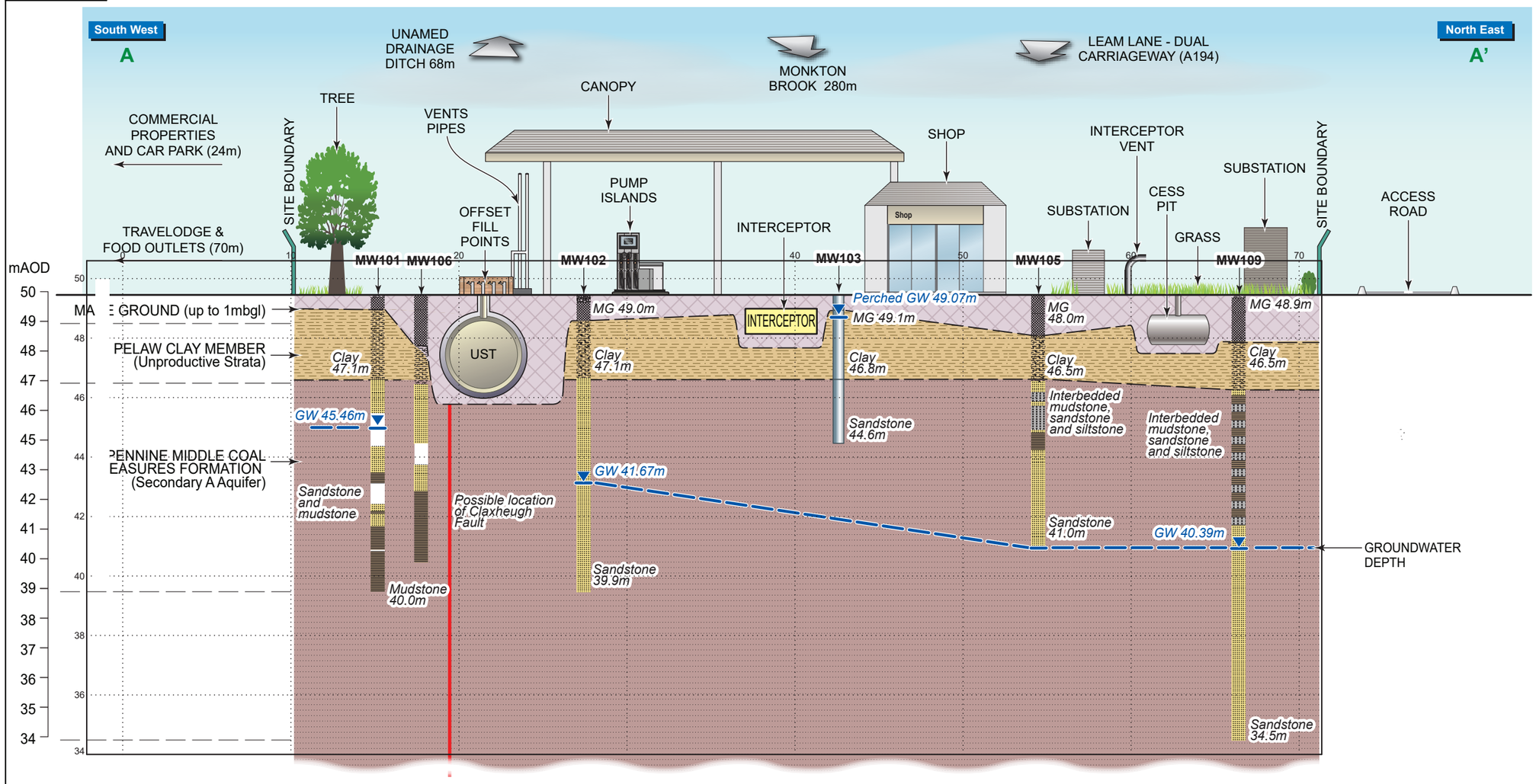
DRAWING TITLE
Figure 6
Groundwater Elevation Plot
(March 26th 2020)

| DRAWN | | CHECKED | APPROVED | DATE |
|---|---|---|---|---|
| RH | | GB | SD | APR 2020 |

| SCALE | DRG No. | REV. |
|---|---|---|
| AS SHOWN | 60608750 | |

ORIGINAL DRAWING A3

DO NOT SCALE




## AREA OF POTENTIAL CONCERN

***On-site***
***Historical***
- Historical use of the site as a petrol filling station since c.1987
- Substation located in the north western area of the site since c. 1973

***Current***
- Operational underground storage tanks serving the car forecourt and HGVs (AECOM understands there are no historic /decommissioned storage tanks on-site).
- Accidental releases to ground from off-set fill points located in the west of the site.
- Accidental releases to ground from dispenser pumps: four car fuel islands and two HGV pumps
- Accidental releases from fuel lines present between the tanks, off-set fill points and fuel islands.
- The forecourt interceptor located in the northern portion of the site and associated drainage lines.
- Made Ground.
- Substation located in the north west of the site.

## CHEMICALS OF POTENTIAL CONCERN (COPC)

***Current Potential On-site Sources***
- TPH - Petroleum hydrocarbons.
- BTEX - Benzene, toluene, ethylbenzene and xylenes.
- Petroleum Additives - Methyl tertiary butyl ether (MTBE), ethyl tertiary butyl ether (ETBE), tertiary amyl methyl ether (TAME), di-isopropyl ether (DIPE), and tertiary butyl alcohol (TBA).
- PAHs - Polycyclic aromatic hydrocarbons.
- Metals – arsenic, boron, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium and zinc.
- Asbestos.

## POTENTIAL PATHWAYS

***Human Health***
- Particulate – Ingestion, inhalation, dermal contact, with soil particulates.
- Permeation – Migration of hydrocarbon substances through plastic potable water supply pipes.

***Controlled Waters***
- Leaching – Migration of hydrocarbon substances from soils into groundwater.
- Migration of impacted shallow groundwater.

## POTENTIAL RECEPTORS

***Human Health***
- On-site shop staff.
- On-site general public and visiting staff (such as contractors, including those conducting excavation works).
- Off-site workers and visitors in commercial properties (nearest building 24m south west of site).

***Controlled Waters***
- Groundwater within Pennine Middle Coal Measures Formation (Secondary A Aquifer).
- Surface water (drain located 68m west which possibly extends 30m north west of site, Monkton Burn 280m south east of site at its closest point and flowing to the east and north east of site, and ponds 155m south west and 300m north east of site.

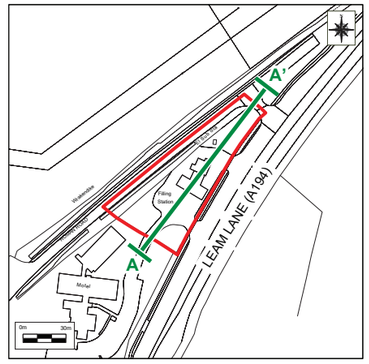
## POSSIBLE COMPLETE POLLUTANT LINKAGES

***Human Health***
- Potentially impacted soils / groundwater, followed by soil particulate dermal contact, inhalation or ingestion by visiting contractors excavating the ground.

***Controlled Waters***
- Possible linkage for COPC impact (primarily benzene) identified in the groundwater samples collected from MW102 installed in the Pennine Middle Coal Measures Formation. It has not been possible to complete a DQRA based on the current dataset.
- Possible linkage for Monkton Burn although considered unlikely based on the Stage 2 assessment given the distance to the burn. A groundwater flow direction for the site has not been determined based on the current dataset.

ORIGINAL DRAWING A3

## NOTES




TOPSOIL
Tarmacadam
MADE GROUND
MUDSTONE
SILTSTONE
SANDSTONE
No recovery/open hole

| REV | DESCRIPTION | DRAWN | APPROVED | DATE |
|---|---|---|---|---|

STATUS
FOR INFORMATION


CONSULTING ENGINEERS
AECOM
6th FLOOR, 1 NEW YORK STREET, MANCHESTER, M1 4HD
TEL 0161-601-1700


CLIENT
SHELL UK OIL PRODUCTS LTD

PROJECT
Shell Whitemare Pool,
Leam Lane, Gateshead.
NE10 8YB

DRAWING TITLE
Figure 4.7
Conceptual Site Model

| DRAWN | | CHECKED | APPROVED | DATE |
|---|---|---|---|---|
| BMC | | SD | SD | SEP 2020 |

| SCALE | DRG No. | REV. |
|---|---|---|
| AS SHOWN | 60608750 | |

# APPENDIX A PHOTOGRAPHS



Photograph No: 1

Contractors performing vacuum excavation at VP103.



Photograph No: 2

Contractors performing vacuum excavation at VP101



Photograph No: 3

Contractors performing vacuum excavation at MW105A.



Photograph No: 4

Contractors performing drilling operations at MW101.




Photograph No: 5

Safe working area set up at MW103 location.




Photograph No: 6

Site set up for drilling at MW105 location.



Photograph No: 7

Safe working area set up for drilling at MW102 location.



Photograph No: 8

Safe working area set up for drilling at MW109 location.

# APPENDIX B BOREHOLE LOGS

Client: Shell UK Oil Products Ltd.

Project: Shell Whitemare Pool, Gateshead

Contract No: 60608750

AECOM

Record of Rotary Borehole

**MW101**

| Samples & in situ Tests | | | | Water Level | Strata | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Type/ No. | Test Results | PID (ppm) | | Reduced Level m(AOD) | Legend | Depth (Thick-ness) | DESCRIPTION | Visual/Olfactory Observations | Instru-ment/ Backfill |
| | | | | | | | 0.10 | Grass and TOPSOIL. | | |
| | | | | | | | (0.40) | MADE GROUND: Soft dark brown sandy clay with lighter brown sandy mottling. Possibly reworked. | | |
| 0.50 | PID | | 0.1 | | 49.47 | | 0.50 | Firm brown slightly sandy CLAY with darker brown mottling. Occasional gravels fine, sub rounded of coal. | | |
| 1.00 | ES | | 0.1 | | 49 | | (0.70) | | | |
| 1.20 | PID | | 0.2 | | 48.77 | | 1.20 | Firm brown sandy CLAY with darker brown mottling. Occasional lenses of weathered orange sandstone. Sand fine to medium. Occasional coal instrusions. | | |
| | | | <0.1 | | | | | | | |
| 2.00 | PID | | <0.1 | | 48 | | (1.60) | | Dry, NVO | |
| 2.50 | PID | | <0.1 | | | | | | | |
| | | | | | 47.17 | | 2.80 | Weathered orange brown SANDSTONE. Sand fine to coarse, gravel sub angular to sub rounded. Refusal due to bedrock at 3m. | | |
| 3.00 | PID | | <0.1 | | 47 | | 3.00 | | | |
| | | | | | 46.67 | | (0.30) 3.30 | Brown SANDSTONE, sand fine to coarse, gravels sub angular to sub rounded. | | |
| | | | <0.1 | | | | 3.55 | Yellow brown SANDSTONE. Sand fine to coarse, gravels sub angular to sub rounded. | | |
| | | | | | | | (0.45) | | | |
| 4.00 | PID | | <0.1 | | 45.97 46 | | 4.00 | Yellow brown coarse SANDSTONE with coal intrusions. Horizontal fractures present. No recovery. | | |
| | | | | | | | (1.10) | | | |
| | | | | | 44.87 45 | | 5.10 | | | |
| | | | | | | | (0.40) | Yellow brown fractured SANDSTONE cobbles. Cobbles fine to coarse, sub angular to sub rounded. | | |
| 5.50 | PID | | <0.1 | | 44.47 | | 5.50 | Yellow brown weathered SANDSTONE cobbles. Cobbles fine to medium, sub angular to sub rounded. | | |
| | | | | | | | (0.50) | | Wet from drilling, NVO | |
| 6.00 | PID | | <0.1 | | 43.97 44 | | 6.00 | Grey weathered MUDSTONE. Gravels fine to medium, sub angular to sub rounded. | | |
| | | | | | 43.57 | | (0.40) 6.40 | No recovery. | | |
| | | | | | | | (0.65) | | | |
| 7.00 | PID | | <0.1 | | 42.92 43 | | 7.05 | | Damp. NVO. | |
| | | | | | | | 7.30 | Yellow brown coarse SANDSTONE cobbles. | | |
| | | | | | | | 7.40 | Friable grey MUDSTONE. Gravels fine to medium, sub angular to sub rounded. | | |
| 7.50 | PID | | <0.1 | | | | (0.40) | Yellow brown fine to coarse sub angular to sub rounded SANDSTONE cobbles. | | |
| | | | | | 42.17 | | 7.80 | Friable grey MUDSTONE. Gravels fine to medium, sub angular to sub rounded. | | |
| 8.00 | PID | | <0.1 | | 42 | | (0.80) | | | |
| | | | | | 41.37 | | 8.60 | | | |
| | | | | | | | 8.65 | Fine to coarse brown and sub angular to sub rounded SANDSTONE cobbles. | | |
| | | | | | 41 | | | Friable brown grey MUDSTONE. Gravels fine to medium, sub angular to sub rounded. | | |
| | | | | | | | (1.35) | | | |
| | | | | | 39.97 40 | | 10.00 | | | |

## GENERAL REMARKS

**Borehole terminated at 10.00m**

NVO - No visual or olfactory.
m bgl - metre below ground level.
Vac ex to 1.2m bgl at 300mm diameter.
Casing diameter 140mm, switched to 101mm at bedrock.
Sample barrel diameter 116mm to 2.82m bgl then 84mm once in bedrock.
Borehole terminated at target depth.
50mm HDPE, 0.5mm slot well installed.

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

| Water Added | |
|---|---|
| From | To |
| | |

| | | | | | |
|---|---|---|---|---|---|
| Logged by: LM | Equipment: Comacchio GEO 205 | Co-ordinates: NGR E: 431172.71m | Ground Level: OS Level: 49.97mAOD | Date: Start: 11/11/2019 | AGS |
| Checked by: SD | Contractor: Geotron UK Ltd. | NGR N: 561547.79m | | End: 26/11/2019 | Sheet 1 of 1 |
| Status: Draft | | | | | |

Client: Shell UK Oil Products Ltd.

Project: Shell Whitemare Pool, Gateshead

Contract No: 60608750

AECOM

Record of Rotary Borehole

**MW102**

| Samples & in situ Tests | | | | Water Level | Strata | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Type/ No. | Test Results | PID (ppm) | | Reduced Level m(AOD) | Legend | Depth (Thick-ness) | DESCRIPTION | Visual/Olfactory Observations | Instru-ment/ Backfill |
| | | | | | 49.61 | | (0.26) 0.26 | MADE GROUND: Tarmac. | | |
| 0.50 | PID | | <0.1 | | | | (0.65) | MADE GROUND: Light brown slightly clayey fine to coarse sub angular gravel - stone fill. | Dry, NVO | |
| 1.00 | ES PID | | <0.1 | | 48.96 | | 0.90 | Dark brown slightly gravelly sandy CLAY. Gravel fine to medium, sub angular to sub rounded. Sand is fine to medium. | Wet from Vac Ex, NVO | |
| 1.50 | PID | | <0.1 | | | | (0.70) | | | |
| 2.00 | PID | N = 15 | <0.1 | | 48.26 | | 1.60 | Dark brown gravelly sandy CLAY with grey mottling. Pockets of yellow sand at 2.4m, sand fine to medium. Occasional coal instrusions. | | |
| 2.50 | PID | | <0.1 | | | | (1.20) | | | |
| 3.00 | PID | N = 18 N = 16 | <0.1 | | 47.06 | | 2.80 | Yellow brown SANDSTONE cobbles. Sand fine to medium, gravels fine to coarse, sub angular to sub rounded. | | |
| 3.50 | PID | | <0.1 | | | | (1.20) | | Dry, NVO | |
| 4.00 | PID | | <0.1 | | 45.86 | | 4.00 | Friable grey laminated SANDSTONE with occasional coal instrusions. | | |
| 4.50 | PID | | | | 45.36 | | (0.50) 4.50 | Yellow brown SANDSTONE with occasional coal inclusions. | | |
| 5.00 | PID | | <0.1 | | | | 4.70 (0.60) | Friable grey laminated SANDSTONE with occasional coal intrusions. | | |
| | | | | | 44.56 | | 5.30 | Yellow brown SANDSTONE Sand fine to medium, gravels fine to coarse, sub angular to sub rounded. | | |
| | | | | | | | (4.70) | | Damp, NVO | |
| | | | | | 39.86 | | 10.00 | | | |

## GENERAL REMARKS

**Borehole terminated at 10.00m**

NVO - No visual or olfactory.
m bgl - metre below ground level.
Vac ex to 1.6m bgl at 300mm diameter.
Casing diameter 140mm, switched to 101mm at bedrock.
Sample barrel diameter 116mm to 2.80m bgl then 84mm once in bedrock. SPTs completed at 2.0m bgl, 3.0m bgl and 3.5m bgl.
Borehole terminated at target depth.
50mm HDPE, 0.5mm slot well installed.

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

| Water Added | |
|---|---|
| From | To |
| | |

| Logged by: | Equipment: | Co-ordinates: | Ground Level: | Date: | |
|---|---|---|---|---|---|
| LM | Comacchio GEO 205 | NGR E: 431198.16m | OS Level: 49.86mAOD | Start: 12/11/2019 | AGS |
| Checked by: SD | Contractor: | NGR N: 561547.46m | | End: 27/11/2019 | Sheet 1 of 1 |
| Status: Draft | Geotron UK Ltd. | | | | |

Client: Shell UK Oil Products Ltd.

Project: Shell Whitemare Pool, Gateshead

Contract No: 60608750

AECOM

Record of Rotary Borehole

**MW103**

| Samples & in situ Tests | | | | Water Level | Strata | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Type/ No. | Test Results | PID (ppm) | | Reduced Level m(AOD) | Legend | Depth (Thick-ness) | DESCRIPTION | Visual/Olfactory Observations | Instru-ment/ Backfill |
| | | | | | | | 0.18 | MADE GROUND: Tarmac. | | |
| | | | | | | | (0.32) | MADE GROUND: Sub base dark brown sandy gravel of stone and pottery. Gravel fine to coarse with occasional cobbles. Sand fine to medium. | | |
| 0.50 | PID | | <0.1 | | 49.11 | | 0.50 | | | |
| | | | | | 49 | | (0.70) | Soft to firm dark grey sandy CLAY. Sand is fine to medium. Brown mottling at 1.0m. | | |
| 1.00 | PID | | <0.1 | | 48.41 | | 1.20 | | | |
| 1.50 | PID | N = 5 | 0.2 | | 48 | | (0.85) | Soft to firm brown slightly sandy CLAY. Sand fine to medium. Rare gravels of sandstone and coal, gravel is fine, sub rounded to rounded. | Dry, NVO | |
| 2.00 | PID | | 0.3 | | 47.56 | | 2.05 | | | |
| | | | | | | | (0.45) | Soft to firm brown sandy CLAY. Sand fine to medium. Firmer at 2.05m. Rare gravels of sandstone and coal, gravel is fine to medium, sub rounded to rounded. | | |
| 2.50 | PID | | 0.2 | | 47.11 | | 2.50 | | | |
| | | | | | 47 | | 2.70 | Firm brown sandy CLAY with occasional gravels, fine to medium, sub angular to sub rounded. | | |
| 3.00 | PID | N = 26 | | | | | 2.80 | Orange brown weathered SANDSTONE. | | |
| | | | | | | | (0.50) | Interbedded sandy MUDSTONE. | | |
| | | | 0.1 | | 46.31 | | 3.30 | Easily friable SANDSTONE with laminations of mudstone and coal inclusions. | | |
| | | N = 48 | | | 46 | | | | Damp, NVO | |
| 4 | | | 0.1 | | | | (1.70) | | | |
| | | | | | 45 | | | | | |
| 5 | | | | | 44.61 | | 5.00 | | | |
| | | | | | | | | **Borehole terminated at 5.00m** | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |

## GENERAL REMARKS

NVO - No visual or olfactory.
m bgl - metre below ground level.
Vac ex to 1.2m bgl at 300mm diameter.
Casing diameter 140mm, switched to 101mm at bedrock.
Sample barrel diameter 116mm to 2.80m bgl then 84mm once in bedrock. SPTs completed at 1.65m bgl, 2.95m bgl and 3.8m bgl.
Borehole terminated at target depth.
50mm HDPE, 0.5mm slot well installed.

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

| Water Added | |
|---|---|
| From | To |
| | |

| | | | | | |
|---|---|---|---|---|---|
| Logged by: LM | Equipment: Comacchio GEO 205 | Co-ordinates: NGR E: 431209.56m | Ground Level: OS Level: 49.61mAOD | Date: Start: 12/11/2019 | AGS |
| Checked by: SD | Contractor: Geotron UK Ltd. | NGR N: 561564.29m | | End: 20/11/2019 | Sheet 1 of 1 |
| Status: Draft | | | | | |

Client: Shell UK Oil Products Ltd.

Project: Shell Whitemare Pool, Gateshead

Contract No: 60608750

AECOM

Record of Rotary Borehole

**MW104**

| Samples & in situ Tests | | | | Water Level | Strata | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Type/ No. | Test Results | PID (ppm) | | Reduced Level | Legend | Depth (Thick-ness) | DESCRIPTION | Visual/Olfactory Observations | Instru-ment/ Backfill |
| | | | | | | | (0.30) 0.30 | MADE GROUND: Grass and topsoil. Sandy gravelly clay. | | |
| 0.50 | ES PID | | 0.2 | | | | (0.90) | Dark brown sandy gravelly CLAY with orange brown mottling and coal inclusions. Sand is fine to medium, gravel is fine to medium sub angular to sub rounded. Occasional sub angular cobble. | | |
| 1 1.00 | PID | | 0.3 | | | | 1.20 | | Wet from Vac Ex, NVO | |
| 1.50 | PID | | 0.1 | | | | (1.30) | Dark brown sandy gravelly CLAY. Sand is fine to medium, gravel is fine to medium sub angular to sub rounded. Occasional sub angular cobble. With grey mottling. | Dry, NVO | |
| 2 2.00 | PID | | <0.1 | | | | 2.50 | | | |
| 2.50 | PID | | <0.1 | | | | (0.90) | Lighter brown sandy gravelly CLAY with orange brown mottling and coal inclusions. Sand is fine to medium, gravel is fine to medium sub angular to sub rounded. Occasional sub angular cobble. | | |
| 3 | | | <0.1 | | | | 3.40 | | | |
| | | | | | | | | **Borehole terminated at 3.40m** | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |

## GENERAL REMARKS

NVO - No visual or olfactory.
m bgl - metre below ground level.
Vac ex to 1.2m bgl at 300mm diameter.
Borehole terminated at target depth.
Location backfilled as shallow perched water not encountered.

| Water Added | |
|---|---|
| From | To |
| | |

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

| Logged by: LM | Equipment: Comacchio GEO 205 | Co-ordinates: Not Surveyed | Ground Level: Not Surveyed | Date: Start: 11/11/2019 End: 21/11/2019 | AGS |
|---|---|---|---|---|---|
| Checked by: SD | Contractor: Geotron UK Ltd. | | | | |
| Status: Draft | | | | | Sheet 1 of 1 |

Client: Shell UK Oil Products Ltd.

Project: Shell Whitemare Pool, Gateshead

Contract No: 60608750

AECOM

Record of Rotary Borehole

**MW105**

| Samples & in situ Tests | | | | Water Level | Strata | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Type/ No. | Test Results | PID (ppm) | | Reduced Level m(AOD) | Legend | Depth (Thick-ness) | DESCRIPTION | Visual/Olfactory Observations | Instru-ment/ Backfill |
| | | | | | | | 0.10 | MADE GROUND: Grass and topsoil. | | |
| 0.50 | PID | | <0.1 | | 49 | | (0.50) | MADE GROUND: Soft reworked brown sandy gravelly clay. Sand is fine to medium, gravel fine to coarse, sub angular to sub rounded stone and brick. | | |
| | | | | | 48.83 | | 0.60 | | | |
| 1.00 | PID | | <0.1 | | | | (0.60) | MADE GROUND: Soft reworked dark brown slightly sandy gravelly clay. Sand is fine to medium, gravel is fine to coarse, sub angular to sub rounded of stone. Some large pieces of stone present. | | |
| | | | | | 48.23 | | 1.20 | | | |
| | | | | | | | 1.40 | MADE GROUND: Reworked brown clay. | | |
| 1.50 | PID | | <0.1 | | 48 | | | Dark brown slightly sandy gravelly CLAY. Sand is fine to medium, gravel is fine to coarse sub angular to sub rounded. Grey mottling and coal inclusions. Pocket of sand at 2.10m. | | |
| 2.00 | PID | | <0.1 | | | | (1.50) | | | |
| 2.50 | PID | | <0.1 | | 47 | | | | | |
| | | | | | 46.53 | | 2.90 | | | |
| | | | | | | | 3.15 | Orange brown weathered SANDSTONE mixed with dark brown sandy gravelly clay. | | |
| | | | | | | | 3.25 | Hard grey SANDSTONE with orange laminations. | | |
| | | | | | 46 | | (0.30) | Grey brown friable sandy SILTSTONE. | | |
| | | | | | 45.88 | | 3.55 | | Dry, NVO | |
| | | | | | | | 3.70 | Hard grey SANDSTONE. | | |
| | | | | | | | | Grey brown friable SILTSTONE. | | |
| | | | | | | | (0.80) | | | |
| | | | | | 45 | | | | | |
| | | | | | 44.93 | | 4.50 | | | |
| | | | | | | | 4.60 | Friable grey brown SANDSTONE. | | |
| | | | | | | | | Grey friable MUDSTONE. | | |
| 5.00 | PID | | <0.1 | | | | (0.60) | | | |
| | | | | | 44.23 | | 5.20 | | | |
| | | | | | | | 5.25 | Hard grey SANDSTONE. | | |
| | | | | | 44 | | 5.50 | Grey brown SANDSTONE. | | |
| 5.50 | PID | | <0.1 | | | | 5.60 | Grey friable SANDSTONE. | | |
| | | | | | | | | Hard grey SANDSTONE. | | |
| | | | | | | | (0.40) | | | |
| 6.00 | PID | | <0.1 | | 43.43 | | 6.00 | | | |
| | | | | | | | | Grey friable SANDSTONE. | | |
| 6.50 | PID | | <0.1 | | 43 | | (0.90) | | | |
| 6.90 | PID | | | | 42.53 | | 6.90 | | | |
| | | | | | | | | Grey brown SANDSTONE with brown and black striations. Sand is coarse grained. | | |
| | | | | | 42 | | (1.10) | | Damp, NVO | |
| | | | | | 41.43 | | 8.00 | | | |
| | | | | | | | 8.10 | Grey brown SANDSTONE with black coal inclusion. | | |
| | | | | | | | (0.30) | | | |
| | | | | | 41.03 | | 8.40 | Yellow brown SANDSTONE. Sand is coarse grained. Black striations. | | |
| | | | | | | | | **Borehole terminated at 8.40m** | | |

## GENERAL REMARKS

NVO - No visual or olfactory.
m bgl - metre below ground level.
Vac ex to 1.2m bgl at 300mm diameter.
Casing diameter 140mm, switched to 101mm at bedrock.
Sample barrel diameter 116mm to 2.90m bgl then 84mm once in bedrock.
Borehole terminated at target depth.
50mm HDPE, 0.5mm slot well installed.

Water Added

| From | To |
|---|---|
| | |

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

| Logged by: LM | Equipment: Comacchio GEO 205 | Co-ordinates: NGR E: 431206.87m | Ground Level: OS Level: 49.43mAOD | Date: Start: 13/11/2019 | AGS |
|---|---|---|---|---|---|
| Checked by: SD | Contractor: Geotron UK Ltd. | NGR N: 561591.70m | | End: 03/12/2019 | Sheet 1 of 1 |
| Status: Draft | | | | | |

Client: Shell UK Oil Products Ltd.

Project: Shell Whitemare Pool, Gateshead

Contract No: 60608750

AECOM

Record of Vac Ex Borehole

**MW105A**

| Samples & in situ Tests | | | | Water Level | Strata | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Type/ No. | Test Results | PID (ppm) | | Reduced Level | Legend | Depth (Thick-ness) | DESCRIPTION | Visual/Olfactory Observations | Instru-ment/ Backfill |
| | | | | | | | 0.14 | MADE GROUND: Tarmac. | | |
| | | | | | | | (0.47) | MADE GROUND: Sub base light brown sandy medium to coarse sub angular gravel of stone, brick and concrete. Brick wall obstruction at 0.6m - borehole terminated. | Dry, NVO | |
| | | | | | | | 0.60 | | | |
| | | | | | | | | **Borehole terminated at 0.60m** | | |

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GENERAL REMARKS

NVO - No visual or olfactory.
m bgl - metre below ground level.
Vac ex to 0.6m bgl at 300mm diameter.
Borehole terminated early due to brick wall in pit.

Water Added

| From | To |
|---|---|
| | |

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

| Logged by: LM | Equipment: Comacchio GEO 205 | Co-ordinates: Not Surveyed | Ground Level: Not Surveyed | Date: Start: 13/11/2019 End: 13/11/2019 | AGS |
|---|---|---|---|---|---|
| Checked by: SD | Contractor: Geotron UK Ltd. | | | | |
| Status: Draft | | | | | Sheet 1 of 1 |

Client: Shell UK Oil Products Ltd.

Project: Shell Whitemare Pool, Gateshead

Contract No: 60608750

AECOM

Record of Rotary Borehole

**MW106**

| Samples & in situ Tests | | | | Water Level | Strata | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Type/ No. | Test Results | PID (ppm) | | Reduced Level m(AOD) | Legend | Depth (Thick-ness) | DESCRIPTION | Visual/Olfactory Observations | Instru-ment/ Backfill |
| | | | | | 49.46 | | (0.50) 0.50 | Dark brown silty sandy CLAY. Sand fine to medium, occasional sub angular to sub rounded fine to medium gravel. | | |
| 0.50 | PID | | 0.2 | | | | | | | |
| 1.00 | PID | | 0.2 | | 48.76 | | (0.70) 1.20 | MADE GROUND: Dark brown firm sandy gravelly CLAY. Gravel sub angular to sub rounded, sand fine to medium with occasional rootlets. | | |
| | | | | | 48.26 | | (0.50) 1.70 | MADE GROUND: Brown reworked sandy CLAY. | | |
| 1.70 | PID | | 0.1 | | | | | | | |
| | | | | | 46.96 | | (1.30) 3.00 | Firm, dark brown slightly sandy CLAY. Occasional pockets of sand and coal inclusions. Sand is fine to medium. Grey mottling. | Dry, NVO | |
| 3.00 | PID | | 0.1 | | | | | | | |
| | | | | | 46.46 | | (0.50) 3.50 | Yellow brown medium to coarse SANDSTONE. No recovery 3.4-3.5m. | | |
| 3.50 | PID | | 4.8 | | | | | | | |
| | | | | | | | (1.50) | Yellow brown medium to coarse SANDSTONE. | | |
| | | | | | 44.96 | | 5.00 | | Damp, NVO | |
| | | | | | | | (0.70) | No recovery. | Damp, black staining, slight odour | |
| | | | | | 44.26 | | 5.70 | | Damp, NVO | |
| | | | | | 43.96 | | (0.30) 6.00 | Brown coarse SANDSTONE cobbles. | | |
| | | | | | | | (0.60) | Brown coarse fractured SANDSTONE with black striations. | Damp, Pockets of black staining | |
| | | | | | 43.36 | | 6.60 | | | |
| | | | | | | | | Grey brown MUDSTONE | Damp, NVO | |
| | | | | | | | (2.40) | | Dry, NVO | |
| | | | | | 40.96 | | 9.00 | | | |
| | | | | | | | | **Borehole terminated at 9.00m** | | |

## GENERAL REMARKS

NVO - No visual or olfactory.
m bgl - metre below ground level.
Vac ex to 1.2m bgl at 300mm diameter.
Casing diameter 140mm, switched to 101mm at bedrock.
Sample barrel diameter 116mm to 2.82m bgl then 84mm once in bedrock.
Borehole terminated at target depth.
50mm HDPE, 0.5mm slot well installed.

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

| Water Added | |
|---|---|
| From | To |
| | |

| Logged by: LM | Equipment: Comacchio GEO 205 | Co-ordinates: NGR E: 431170.91m | Ground Level: OS Level: 49.96mAOD | Date: Start: 12/11/2019 | AGS |
|---|---|---|---|---|---|
| Checked by: SD | Contractor: Geotron UK Ltd. | NGR N: 561559.36m | | End: 26/11/2019 | Sheet 1 of 1 |
| Status: Draft | | | | | |

Client: Shell UK Oil Products Ltd.

Project: Shell Whitemare Pool, Gateshead

Contract No: 60608750

AECOM

Record of Vac Ex Borehole

**MW107**

| Samples & in situ Tests | | | | Water Level | Strata | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Type/ No. | Test Results | PID (ppm) | | Reduced Level | Legend | Depth (Thick-ness) | DESCRIPTION | Visual/Olfactory Observations | Instru-ment/ Backfill |
| | | | | | | | 0.10 | TOPSOIL | | |
| 0.50 | ES PID | | 0.5 | | | | (1.10) | MADE GROUND: Dark brown firm sandy gravelly clay. Gravel sub angular to sub rounded, sand is fine to medium. Rootlets present. | Dry, NVO | |
| 1.00 | PID | | 0.1 | | | | 1.20 | | | |
| | | | | | | | | **Borehole terminated at 1.20m** | | |

## GENERAL REMARKS

NVO - No visual or olfactory.
Vac ex to 1.2m bgl at 300mm diameter.
Borehole terminated at 1.2m bgl.
Location backfilled as no shallow perched water encountered in adjacent MW106.

Water Added

| From | To |
|---|---|
| | |

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

| Logged by: | Equipment: | Co-ordinates: | Ground Level: | Date: | |
|---|---|---|---|---|---|
| LM | Vacuum excavation | Not Surveyed | Not Surveyed | Start: 12/11/2019 | AGS |
| Checked by: SD | Contractor: | | | End: 12/11/2019 | |
| Status: Draft | Geotron UK Ltd. | | | | Sheet 1 of 1 |

Client: Shell UK Oil Products Ltd.

Project: Shell Whitemare Pool, Gateshead

Contract No: 60608750

AECOM

Record of Rotary Borehole

**MW108**

| Samples & in situ Tests | | | | Water Level | Strata | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Type/ No. | Test Results | PID (ppm) | | Reduced Level | Legend | Depth (Thick-ness) | DESCRIPTION | Visual/Olfactory Observations | Instru-ment/ Backfill |
| | | | | | | | 0.25 | MADE GROUND: Tarmac. | | |
| 0.50 | PID | | 0.1 | | | | (0.85) | MADE GROUND: Light brown sandy gravelly clay. Sand fine to medium. Gravels fine to coarse, sub angular to sub rounded of stone, concrete and tarmac. More gravelly from 0.8m - fill material sub angular. | | |
| 1 1.00 | PID | | 0.1 | | | | 1.10 | | | |
| 1.10 | PID | | 0.1 | | | | (1.60) | Dark brown slightly gravelly sandy CLAY with grey mottling. Sand is fine to medium, gravel is fine to medium of coal. | Dry, NVO | |
| 2 | | | | | | | 2.70 | | | |
| | | | | | | | | **Borehole terminated at 2.70m** | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
| 5 | | | | | | | | | | |
| 6 | | | | | | | | | | |
| 7 | | | | | | | | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | | | | | | | | | | |

## GENERAL REMARKS

NVO - No visual or olfactory.
m bgl - metre below ground level.
Vac ex to 1.6m bgl at 300mm diameter.
Casing diameter 140mm.
Sample barrel diameter 116mm to 2.70m bgl.
Borehole terminated at target depth. Refusal at bedrock.
Borehole backfilled.

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

| Water Added | |
|---|---|
| From | To |
| | |

| | | | | | |
|---|---|---|---|---|---|
| Logged by: LM | Equipment: Comacchio GEO 205 | Co-ordinates: Not Surveyed | Ground Level: Not Surveyed | Date: Start: 12/11/2019 | AGS |
| Checked by: SD | Contractor: Geotron UK Ltd. | | | End: 27/11/2019 | Sheet 1 of 1 |
| Status: Draft | | | | | |

Client: Shell UK Oil Products Ltd.

Project: Shell Whitemare Pool, Gateshead

Contract No: 60608750

AECOM

Record of Rotary Borehole

**MW109**

| Samples & in situ Tests | | | | Water Level | Strata | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Type/ No. | Test Results | PID (ppm) | | Reduced Level m(AOD) | Legend | Depth (Thick-ness) | DESCRIPTION | Visual/Olfactory Observations | Instru-ment/ Backfill |
| | | | | | | | 0.10 | Grass and TOPSOIL. | | |
| 0.50 | PID | | 0.1 | | 48.86 | | (0.50) 0.60 | MADE GROUND: Brown gravelly fine to medium sand. Gravel fine to coarse, sub rounded stone and sandstone with occasional patch of clay. | | |
| 1 1.00 | PID | | <0.1 | | | | (1.00) | MADE GROUND: Reworked soft to firm brown sandy clay. Orange brown sandy lenses and occasional sandstone cobble. Gravels fine to medium, sub angular to sub rounded. Coal instrusions at 1.5m and glass at 1.55m. | | |
| 1.50 | PID | N = 6 | <0.1 | | 47.86 | | 1.60 | | | |
| 2 2.00 | PID | | <0.1 | | | | | Soft to firm brown sandy CLAY. Orange brown sandy lenses, occasional sandstone gravels and rare sandstone cobbles. Gravels fine to medium, sub angular to sub rounded. | | |
| 2.30 | ES | | | | | | | | | |
| 2.50 | PID | | <0.1 | | | | (1.60) | | | |
| 3 3.00 | PID | N = 17 | <0.1 | | 46.26 | | 3.20 | | | |
| | | N = 0 | | | | | 3.40 | Weathered firm grey SANDSTONE. | | |
| 3.50 | PID | | <0.1 | | | | | Interbedded sandy SHALE (Siltstone and Mudstone). Easily friable. | | |
| 4 4.00 | PID | | | | | | | | | |
| 4.50 | PID | | <0.1 | | | | | | | |
| 5 5.00 | PID | | <0.1 | | | | | | Dry, NVO | |
| 5.50 | PID | | <0.1 | | | | (4.40) | | | |
| 6 6.00 | PID | | <0.1 | | | | | | | |
| 6.50 | PID | | <0.1 | | | | | | | |
| 7 7.00 | PID | | <0.1 | | | | | | | |
| 7.50 | PID | | <0.1 | | | | | | | |
| | | | | | 41.66 | | 7.80 | | | |
| 8 8.00 | PID | | <0.1 | | | | | Hard grey SANDSTONE interbedded with mudstone at 8.15m and 8.30m. Coal intrusions. Sand fine to medium. | | |
| 9 | | | | | | | (2.05) | | | |
| | | | | | 39.61 | | 9.85 | | | |
| 10 | | | | | | | (5.15) | *description on next page* | | |

## GENERAL REMARKS

NVO - No visual or olfactory.
m bgl - metre below ground level.
Vac ex to 1.2m bgl at 300mm diameter.
Casing diameter 140mm, switched to 101mm at bedrock
Sample barrel diameter 116mm to 3.40m bgl then 84mm once in bedrock. SPTs completed at 1.65m bgl, 2.95m bgl and 3.4m bgl.
Borehole terminated at target depth.
50mm HDPE, 0.5mm slot well installed.

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

| Water Added | |
|---|---|
| From | To |
| | |

| Logged by: LM | Equipment: Comacchio GEO 205 | Co-ordinates: NGR E: 431226.29m | Ground Level: OS Level: 49.46mAOD | Date: Start: 13/11/2019 | AGS |
|---|---|---|---|---|---|
| Checked by: SD | Contractor: Geotron UK Ltd. | NGR N: 561589.17m | | End: 22/11/2019 | Sheet 1 of 2 |
| Status: Draft | | | | | |

Client: Shell UK Oil Products Ltd.

Project: Shell Whitemare Pool, Gateshead

Contract No: 60608750

AECOM

Record of Rotary Borehole

**MW109**

| Samples & in situ Tests | | | | Water Level | Strata | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Type/ No. | Test Results | PID (ppm) | | Reduced Level m(AOD) | Legend | Depth (Thick-ness) | DESCRIPTION | Visual/Olfactory Observations | Instru-ment/ Backfill |
| | | | | | 39 | | | Hard grey SANDSTONE, darker in colour.<br>Coal instrusions. Sand medium to coarse.<br>No mudstone inclusions.<br>*Stratum text copied from layer at 39.612mAOD from previous sheet.* | | |
| 11 | | | | | | | | | | |
| | | | | | 38 | | | | | |
| 12 | | | | | | | | | | |
| | | | | | 37 | | (5.15) | | Damp, NVO | |
| 13 | | | | | | | | | | |
| | | | | | 36 | | | | | |
| 14 | | | | | | | | | | |
| | | | | | 35 | | | | | |
| 15 | | | | | 34.46 | | 15.00 | | | |
| | | | | | | | | **Borehole terminated at 15.00m** | | |
| 16 | | | | | | | | | | |
| 17 | | | | | | | | | | |
| 18 | | | | | | | | | | |
| 19 | | | | | | | | | | |
| 20 | | | | | | | | | | |

GENERAL REMARKS

NVO - No visual or olfactory.
m bgl - metre below ground level.
Vac ex to 1.2m bgl at 300mm diameter.
Casing diameter 140mm, switched to 101mm at bedrock.
Sample barrel diameter 116mm to 3.40m bgl then 84mm once in bedrock. SPTs completed at 1.65m bgl, 2.95m bgl and 3.4m bgl.
Borehole terminated at target depth.
50mm HDPE, 0.5mm slot well installed.

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

| Water Added | |
|---|---|
| From | To |
| | |

| | | | | |
|---|---|---|---|---|
| Logged by: LM | Equipment: Comacchio GEO 205 | Co-ordinates: NGR E: 431226.29m | Ground Level: OS Level: 49.46mAOD | Date: Start: 13/11/2019 |
| Checked by: SD | Contractor: Geotron UK Ltd. | NGR N: 561589.17m | | End: 22/11/2019 |
| Status: Draft | | | | AGS |

Client: Shell UK Oil Products Ltd.

Project: Shell Whitemare Pool, Gateshead

Contract No: 60608750

AECOM

Record of Vac Ex Borehole

**VP101**

| Samples & in situ Tests | | | | Water Level | Strata | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Type/ No. | Test Results | PID (ppm) | | Reduced Level m(AOD) | Legend | Depth (Thick-ness) | DESCRIPTION | Visual/Olfactory Observations | Instru-ment/ Backfill |
| | | | | | | | 0.10 | Grass and TOPSOIL. | | |
| 0.50 | ES PID | | 0.2 | | | | (1.10) | MADE GROUND: Firm dark brown slightly gravelly sandy CLAY. Brick present in pit, sub angular to sub rounded, fine with rootlets. | Dry, NVO | |
| 1.00 | PID | | 0.1 | | 49 48.71 | | 1.20 | | | |
| | | | | | | | | **Borehole terminated at 1.20m** | | |

## GENERAL REMARKS

NVO - No visual or olfactory.
m bgl - metre below ground level.
Vac ex to 1.2m bgl at 300mm diameter.
Borehole terminated at target depth.
50mm HDPE, 0.5mm slot well installed.

Water Added

| From | To |
|---|---|
| | |

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

| Logged by: LM | Equipment: Vacuum excavation | Co-ordinates: NGR E: 431172.01m | Ground Level: OS Level: 49.91mAOD | Date: Start: 11/11/2019 | AGS |
|---|---|---|---|---|---|
| Checked by: SD | Contractor: Geotron UK Ltd. | NGR N: 561546.71m | | End: 11/11/2019 | Sheet 1 of 1 |
| Status: Draft | | | | | |

Client: Shell UK Oil Products Ltd.

Project: Shell Whitemare Pool, Gateshead

Contract No: 60608750

AECOM

Record of Vac Ex Borehole

**VP102**

| Samples & in situ Tests | | | | Water Level | Strata | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Type/ No. | Test Results | PID (ppm) | | Reduced Level m(AOD) | Legend | Depth (Thick-ness) | DESCRIPTION | Visual/Olfactory Observations | Instru-ment/ Backfill |
| | | | | | | | 0.25 | MADE GROUND: Tarmac. | Dry, NVO | |
| 0.50 | PID | | 0.3 | | | | (0.85) | MADE GROUND: Light brown sandy gravelly clay. Sand is fine to medium, gravel is fine to coarse, subrounded stone. Occasional larger cobbles. | Wet from Vac Ex, NVO | |
| 1.00 | ES PID | | 0.1 | | 48.77 | | 1.10 | | | |
| | | | | | 48.67 | | 1.20 | Dark brown slightly gravelly sandy CLAY. Sand fine to medium, gravel fine to medium of coal. Grey mottling. | | |
| | | | | | | | | **Borehole terminated at 1.20m** | | |

## GENERAL REMARKS

NVO - No visual or olfactory.
m bgl - metre below ground level.
Vac ex to 1.2m bgl at 300mm diameter.
Borehole terminated at target depth.
50mm HDPE, 0.5mm slot well installed.

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

| Water Added | |
|---|---|
| From | To |
| | |

| | | | | | |
|---|---|---|---|---|---|
| Logged by: LM | Equipment: Vacuum excavation | Co-ordinates: NGR E: 431197.71m | Ground Level: OS Level: 49.87mAOD | Date: Start: 12/11/2019 | AGS |
| Checked by: SD | Contractor: Geotron UK Ltd. | NGR N: 561547.04m | | End: 12/11/2019 | Sheet 1 of 1 |
| Status: Draft | | | | | |

Client: Shell UK Oil Products Ltd.

Project: Shell Whitemare Pool, Gateshead

Contract No: 60608750

AECOM

Record of Vac Ex Borehole

**VP103**

| Samples & in situ Tests | | | | Water Level | Strata | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth | Type/ No. | Test Results | PID (ppm) | | Reduced Level m(AOD) | Legend | Depth (Thick-ness) | DESCRIPTION | Visual/Olfactory Observations | Instru-ment/ Backfill |
| | | | | | | | 0.20 | MADE GROUND: Tarmac. | | |
| 0.50 | ES PID | | 0.2 | | 49 | | (1.00) | MADE GROUND: Reworked light brown slightly sandy gravelly clay. Fine to medium sub angular to sub rounded sandstone, stone and concrete. Fine to medium sand. | Dry, NVO | |
| 1.20 | PID | | 0.1 | | 48.29 | | 1.20 | | Wet from Vac Ex, NVO | |
| | | | | | | | | **Borehole terminated at 1.20m** | | |

## GENERAL REMARKS

NVO - No visual or olfactory.
m bgl - metre below ground level.
Vac ex to 1.2m bgl at 300mm diameter.
Borehole terminated at target depth.
50mm HDPE, 0.5mm slot well installed.

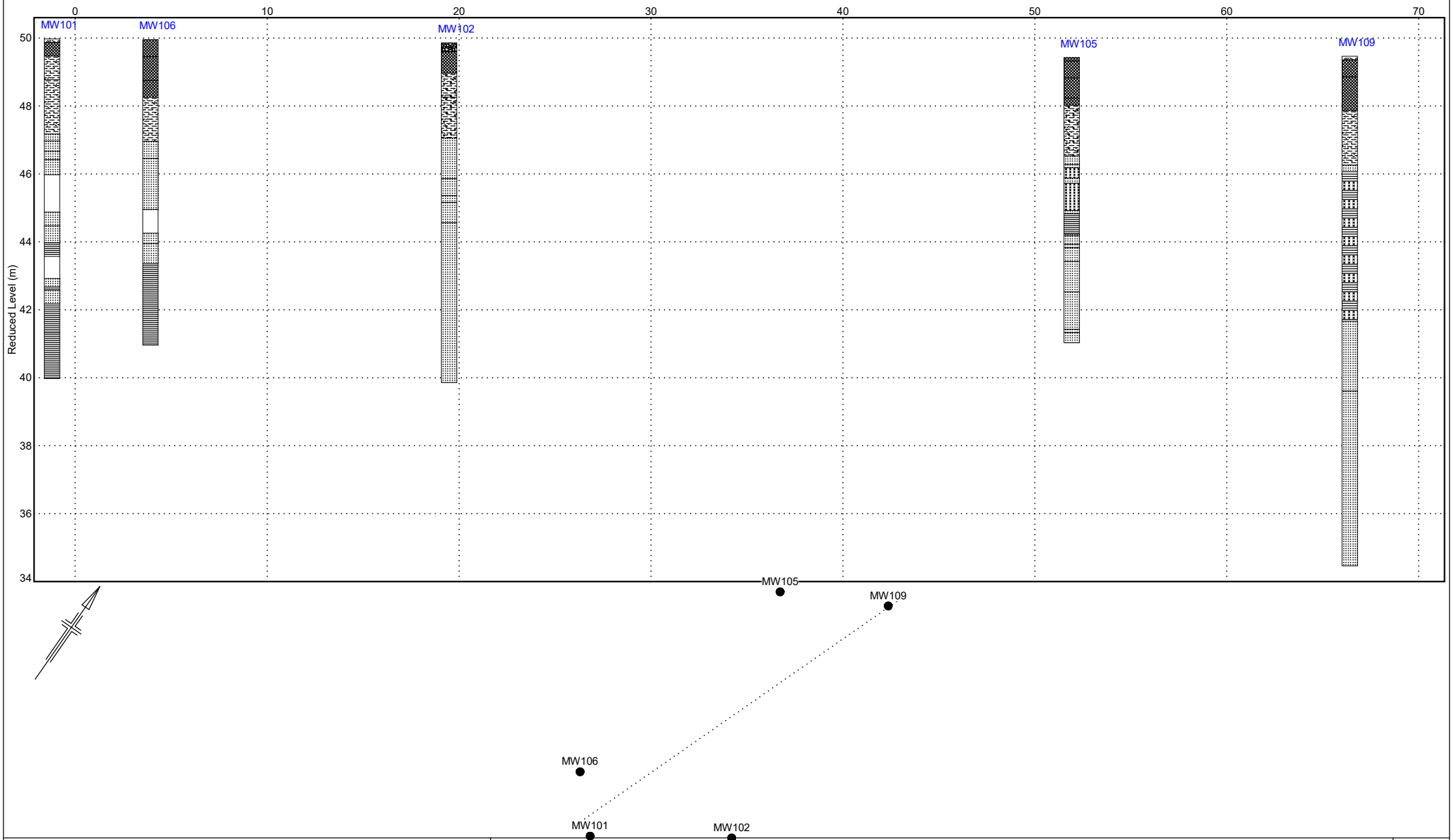
Water Added

| From | To |
|---|---|
| | |

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

| Logged by: LM | Equipment: Vacuum excavation | Co-ordinates: NGR E: 431207.80m | Ground Level: OS Level: 49.49mAOD | Date: Start: 13/11/2019 | AGS |
|---|---|---|---|---|---|
| Checked by: SD | Contractor: Geotron UK Ltd. | NGR N: 561570.03m | | End: 13/11/2019 | Sheet 1 of 1 |
| Status: Draft | | | | | |

Figure A - Geological Cross Section On Site




# SUBSURFACE SECTION

**Client:** Shell UK Oil Products Ltd

**Project:** Shell Whitemare Pool, Gateshead

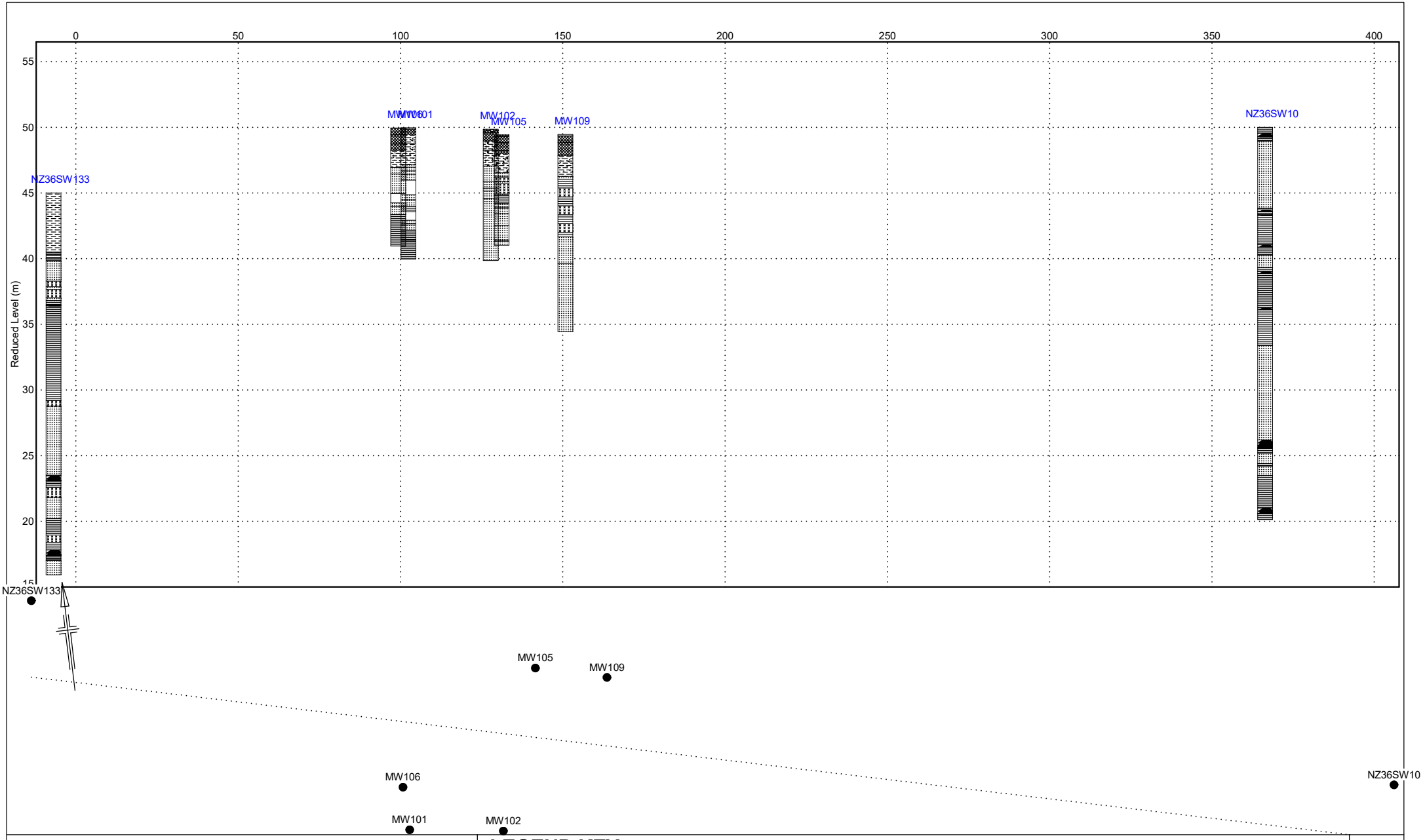
**Number:** 60608750

## LEGEND KEY

- TOPSOIL
- MADE GROUND
- Sandy CLAY
- SANDSTONE
- No recovery/open hole
- MUDSTONE
- Tarmacadam
- Gravelly sandy CLAY
- Sandy gravelly CLAY
- SILTSTONE
- Interbedded mudstone and siltstone

AECOM

Figure B - Geological Cross Section West to East




## SUBSURFACE SECTION

**Client:** Shell UK Oil Products Ltd

**Project:** Shell Whitemare Pool, Gateshead

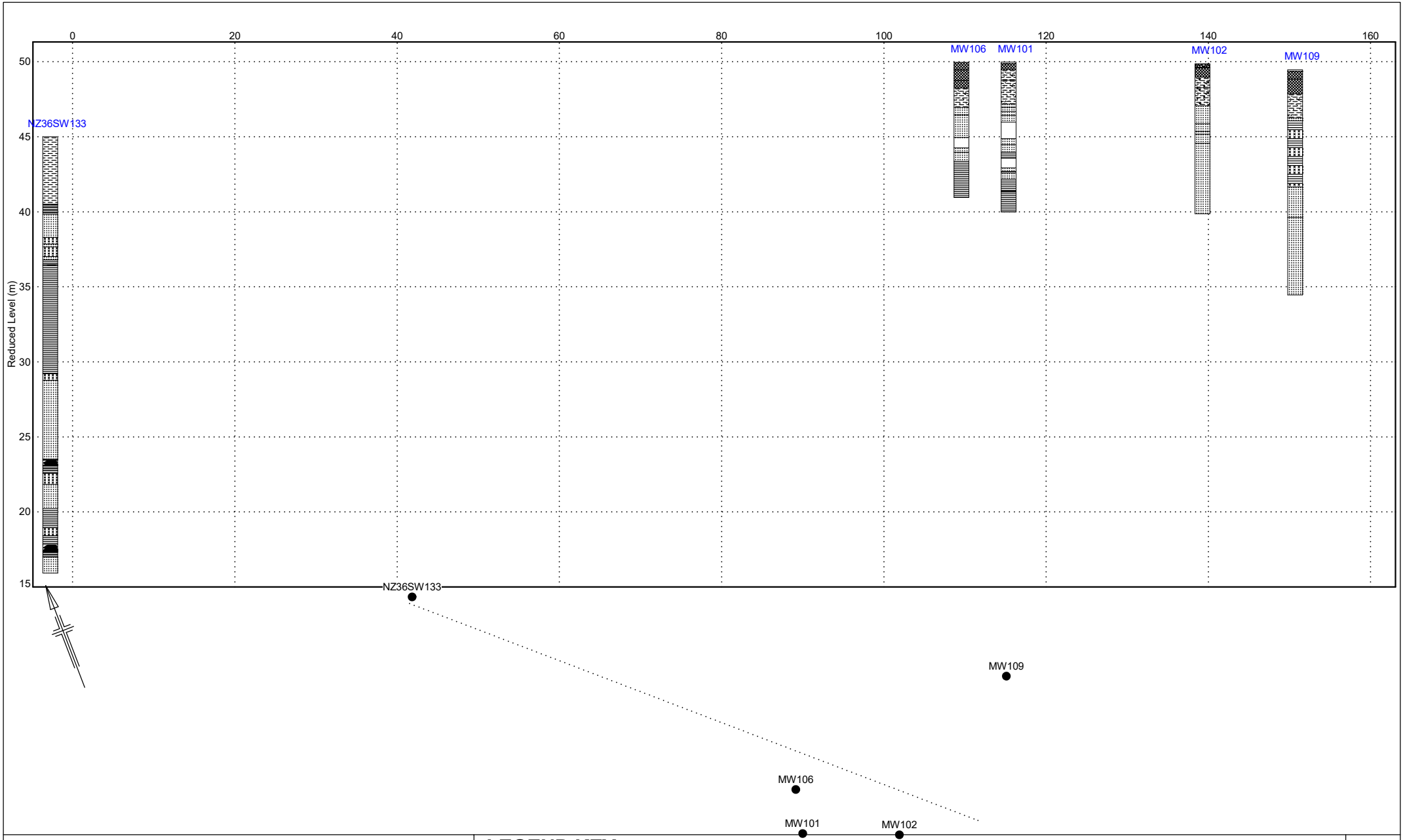
**Number:** 60608750

## LEGEND KEY

- TOPSOIL
- MADE GROUND
- Sandy CLAY
- SANDSTONE
- No recovery/open hole
- MUDSTONE
- Tarmacadam
- Gravelly sandy CLAY
- Sandy gravelly CLAY
- SILTSTONE
- Interbedded mudstone and siltstone
- COAL
- CLAY
- Shale

AECOM

Figure C - Geological Cross Section North West to South East




## SUBSURFACE SECTION

**Client:** Shell UK Oil Products Ltd

**Project:** Shell Whitemare Pool, Gateshead

**Number:** 60608750

## LEGEND KEY

- TOPSOIL
- MADE GROUND
- Sandy CLAY
- SANDSTONE
- No recovery/open hole
- MUDSTONE
- Tarmacadam
- Gravelly sandy CLAY
- Interbedded mudstone and siltstone
- CLAY
- Shale
- SILTSTONE
- COAL

AECOM

# APPENDIX C FIELD DATA TABLES

TABLE 1
GROUNDWATER ELEVATIONS MEASUREMENTS

| Site | Shell Whitemare Pool |
|---|---|
| Sample Round | December 2019 to March 2020 |

| Borehole | Ground elevation (m AOD) | Elevation of top of pipe (m AOD) | Top and base of screen (mbgl) | | Base of drilled borehole (mbgl) | Top and base of screen (mAOD) | | Base of borehole (mAOD) | Dip date | Depth to LNAPL (m below top pipe) | Depth to water (m below top pipe) | Depth to base (m below top pipe) | Difference from installed depth / silt thickness (m) | NAPL Surface Elevation (mAOD) | Groundwater elevation (m AOD) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW101 | 49.97 | 49.87 | 3.3 | 7 | 7 | 46.67 | 42.97 | 42.97 | 10/12/2019 | - | 4.18 | 6.83 | 0.17 | - | 45.69 | PID <0.1ppm |
| | 49.97 | 49.87 | 3.3 | 7 | 7 | 46.67 | 42.97 | 42.97 | 05/02/2020 | - | 4.37 | 6.75 | 0.25 | - | 45.50 | PID 0.2ppm |
| | 49.97 | 49.87 | 3.3 | 7 | 7 | 46.67 | 42.97 | 42.97 | 20/03/2020 | - | 4.36 | 6.76 | 0.24 | - | 45.51 | PID 0.5ppm |
| | 49.97 | 49.87 | 3.3 | 7 | 7 | 46.67 | 42.97 | 42.97 | 26/03/2020 | - | 4.41 | 6.695 | 0.31 | - | 45.46 | PID 0.7ppm |
| MW102 | 49.86 | 49.71 | 6.5 | 9.5 | 9.5 | 43.36 | 40.36 | 40.36 | 10/12/2019 | - | 6.54 | 9.47 | 0.03 | - | 43.17 | PID 1.0ppm |
| | 49.86 | 49.71 | 6.5 | 9.5 | 9.5 | 43.36 | 40.36 | 40.36 | 05/02/2020 | - | 8.26 | 9.36 | 0.14 | - | 41.44 | PID 178.3ppm |
| | 49.86 | 49.71 | 6.5 | 9.5 | 9.5 | 43.36 | 40.36 | 40.36 | 20/03/2020 | - | 7.96 | 9.47 | 0.03 | - | 41.75 | PID 27.8ppm |
| | 49.86 | 49.71 | 6.5 | 9.5 | 9.5 | 43.36 | 40.36 | 40.36 | 26/03/2020 | - | 8.04 | 9.36 | 0.14 | - | 41.67 | PID 149.9ppm |
| MW103 | 49.61 | 49.52 | 0.5 | 2 | 2 | 49.11 | 47.61 | 47.61 | 10/12/2019 | - | 0.43 | 1.77 | 0.23 | - | 49.10 | PID <0.1ppm |
| | 49.61 | 49.52 | 0.5 | 2 | 2 | 49.11 | 47.61 | 47.61 | 05/02/2020 | - | 0.47 | 1.70 | 0.30 | - | 49.06 | PID 0.2ppm |
| | 49.61 | 49.52 | 0.5 | 2 | 2 | 49.11 | 47.61 | 47.61 | 20/03/2020 | - | 0.40 | 1.70 | 0.30 | - | 49.12 | PID <0.1ppm |
| | 49.61 | 49.52 | 0.5 | 2 | 2 | 49.11 | 47.61 | 47.61 | 26/03/2020 | - | 0.46 | 1.70 | 0.30 | - | 49.07 | PID 0.1ppm |
| MW105 | 49.43 | 49.23 | 5.5 | 8 | 8 | 43.93 | 41.43 | 41.43 | 10/12/2019 | - | 6.41 | 7.94 | 0.06 | - | 42.82 | PID 0.2ppm |
| | 49.43 | 49.23 | 5.5 | 8 | 8 | 43.93 | 41.43 | 41.43 | 05/02/2020 | - | DRY | 7.84 | 0.16 | - | - | PID 0.2ppm |
| | 49.43 | 49.23 | 5.5 | 8 | 8 | 43.93 | 41.43 | 41.43 | 20/03/2020 | - | 7.84 | 7.87 | 0.13 | - | 41.39 | PID 8.2ppm |
| | 49.43 | 49.23 | 5.5 | 8 | 8 | 43.93 | 41.43 | 41.43 | 26/03/2020 | - | 7.85 | 7.85 | 0.15 | - | 41.38 | PID 8.0ppm |
| MW106 | 49.96 | 49.81 | 3.6 | 6.6 | 6.6 | 46.36 | 43.36 | 43.36 | 10/12/2019 | - | 4.74 | 6.61 | -0.01 | - | 45.07 | PID 66.2ppm |
| | 49.96 | 49.81 | 3.6 | 6.6 | 6.6 | 46.36 | 43.36 | 43.36 | 05/02/2020 | - | 5.14 | 6.50 | 0.10 | - | 44.68 | PID 0.4ppm |
| MW109 | 49.46 | 49.35 | 6.4 | 9.4 | 9.4 | 43.06 | 40.06 | 40.06 | 10/12/2019 | - | 6.70 | 9.48 | -0.08 | - | 42.65 | PID <0.1ppm |
| | 49.46 | 49.35 | 6.4 | 9.4 | 9.4 | 43.06 | 40.06 | 40.06 | 05/02/2020 | - | 9.25 | 9.47 | -0.07 | - | 40.10 | PID 7.6ppm |
| | 49.46 | 49.35 | 6.4 | 9.4 | 9.4 | 43.06 | 40.06 | 40.06 | 20/03/2020 | - | 8.75 | 9.40 | 0.00 | - | 40.59 | PID 1.4ppm |
| | 49.46 | 49.35 | 6.4 | 9.4 | 9.4 | 43.06 | 40.06 | 40.06 | 26/03/2020 | - | 8.96 | 9.38 | 0.02 | - | 40.39 | PID 0.6ppm |
| VP101 | 49.91 | 49.821 | 0.7 | 1.2 | 1.2 | 49.21 | 48.71 | 48.71 | 11/12/2019 | - | 0.94 | 1.00 | 0.20 | - | 48.89 | PID 3.8ppm |
| | 49.91 | 49.821 | 0.7 | 1.2 | 1.2 | 49.21 | 48.71 | 48.71 | 05/02/2020 | - | 0.96 | 0.99 | 0.21 | - | 48.86 | PID 1.3ppm |
| | 49.91 | 49.821 | 0.7 | 1.2 | 1.2 | 49.21 | 48.71 | 48.71 | 20/03/2020 | - | 0.99 | 1.01 | 0.19 | - | 48.84 | PID 2.9ppm |
| | 49.91 | 49.821 | 0.7 | 1.2 | 1.2 | 49.21 | 48.71 | 48.71 | 26/03/2020 | - | 0.80 | 1.00 | 0.20 | - | 49.02 | PID 3.1ppm |
| VP102 | 49.87 | 49.767 | 0.7 | 1.2 | 1.2 | 49.17 | 48.67 | 48.67 | 12/12/2019 | - | 0.67 | 1.00 | 0.20 | - | 49.10 | PID 13.1ppm |
| | 49.87 | 49.767 | 0.7 | 1.2 | 1.2 | 49.17 | 48.67 | 48.67 | 05/02/2020 | - | 0.68 | 1.00 | 0.20 | - | 49.09 | PID 23.0ppm |
| | 49.87 | 49.767 | 0.7 | 1.2 | 1.2 | 49.17 | 48.67 | 48.67 | 20/03/2020 | - | 0.67 | 1.01 | 0.19 | - | 49.10 | PID 27.8ppm |
| | 49.87 | 49.767 | 0.7 | 1.2 | 1.2 | 49.17 | 48.67 | 48.67 | 26/03/2020 | - | 0.70 | 1.11 | 0.09 | - | 49.06 | PID 19.0ppm |
| VP103 | 49.49 | 49.371 | 0.7 | 1.2 | 1.2 | 48.79 | 48.29 | 48.29 | 11/12/2019 | - | 0.44 | 0.93 | 0.27 | - | 48.93 | PID 2.8ppm |
| | 49.49 | 49.371 | 0.7 | 1.2 | 1.2 | 48.79 | 48.29 | 48.29 | 05/02/2020 | - | 0.58 | 0.93 | 0.28 | - | 48.79 | PID 10.7ppm |
| | 49.49 | 49.371 | 0.7 | 1.2 | 1.2 | 48.79 | 48.29 | 48.29 | 20/03/2020 | - | 0.48 | 0.93 | 0.27 | - | 48.89 | PID 8.6 ppm |
| | 49.49 | 49.371 | 0.7 | 1.2 | 1.2 | 48.79 | 48.29 | 48.29 | 26/03/2020 | - | 0.52 | 0.94 | 0.26 | - | 48.85 | PID 8.0ppm |

**Legend**
m bgl - metres below ground level
m AOD - metres Above Ordnance Datum

**Notes**
Boreholes were levelled to ordnance datum on 12th December 2019

TABLE 2
GROUNDWATER QUALITY MEASUREMENTS

| | |
|---|---|
| **Site** | Shell Whitemare Pool |
| **Sample Round** | December 2019 |

| Borehole | Purge Date | Purge Method | Purge Technique | Purge Volume (L) | pH | Temperature (°C) | Conductivity (µS/cm$^{c}$) | ORP (mV) | ORP (mV) Corrected | Dissolved Oxygen (mg/L) | Comments | Sample Date | Sample Method | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW101 | 11/12/2019 | Low flow purging | Peristaltic pump | 4 | 7.10 | 11.60 | 510.39 | 59.2 | 273 | 1.60 | Clear, NVO | 11/12/2019 | Peristaltic pump | |
| | | | | 6 | 6.95 | 11.64 | 524.2 | 62.6 | 277 | 1.53 | | | | |
| | | | | 8 | 6.86 | 11.64 | 519.03 | 64.4 | 278 | 1.45 | | | | |
| MW102 | 11/12/2019 | Low flow purging | Peristaltic pump | 6 | 7.08 | 9.35 | 1544.6 | 45.3 | 261 | 0.61 | Clear, HC odour. | 11/12/2019 | Peristaltic pump | Duplicate taken |
| | | | | 8 | 7.06 | 9.05 | 1560.9 | 43.1 | 259 | 0.53 | | | | |
| | | | | 10 | 7.04 | 8.98 | 1580.2 | 38.9 | 255 | 0.48 | | | | |
| MW103 | 11/12/2019 | Low flow purging | Peristaltic pump | 2 | 7.07 | 7.87 | 1341.2 | 70.9 | 288 | 3.12 | Clear, NVO | 11/12/2019 | Peristaltic pump | |
| | | | | 2.5 | 7.11 | 7.77 | 1312.7 | 70.8 | 288 | 3.45 | | | | |
| | | | | 3 | 7.16 | 7.73 | 1236.3 | 70.8 | 288 | 3.81 | | | | |
| MW105 | 11/12/2019 | Dewater and sample | Peristaltic pump | 16 | 6.72 | 11.51 | 1101.9 | 44.7 | 259 | 4.12 | Clear, NVO. Purged dry at 20 litres. | 12/12/2019 | Peristaltic pump | Sampled following day after water level recovered |
| | | | | 18 | 6.75 | 11.41 | 1157.2 | 43.8 | 258 | 3.34 | | | | |
| | | | | 20 | 6.76 | 11.37 | 1166.7 | 42.6 | 257 | 1.06 | | | | |
| MW106 | 11/12/2019 | Low flow purging | Peristaltic pump | 2 | 6.20 | 9.89 | 1137.5 | 27.2 | 243 | 0.65 | Clear, slight HC odour | 11/12/2019 | Peristaltic pump | |
| | | | | 4 | 6.21 | 9.59 | 1154.5 | 27.6 | 243 | 0.88 | | | | |
| | | | | 6 | 6.21 | 9.79 | 1141.9 | 27.3 | 243 | 0.69 | | | | |
| MW109 | 11/12/2019 | Dewater and sample | Peristaltic pump | 12 | 7.35 | 11.64 | 1454.5 | 73.0 | 287 | 0.59 | Clear, NVO. Purged dry at 18 litres. | 12/12/2019 | Peristaltic pump | Sampled following day after water level recovered |
| | | | | 15 | 7.23 | 11.45 | 1531.9 | 72.7 | 287 | 1.28 | | | | |
| | | | | 18 | 7.16 | 11.83 | 1526.7 | 72.4 | 286 | 2.29 | | | | |

**Legend**

°C - degrees celsius
L - Litres
NVO - no visible or olfactory evidence of impact
pH - potential of Hydrogen (dimensionless)
mg/L - milligrams per litre
µS - micro siemens
mV - milli volts
ORP - Oxidation Reduction Potential

**Notes**

ORP is corrected against temperature of groundwater.
Equation: Eh = Em + Eref
Where: Eh = Corrected ORP value
EM = ORP measured by probe
Eref = Correction factor = [(temperature2) x -0.0013)-(temperature x 0.6656)+222.02] (for a 3.5mol KCl probe)

| Temperature | Approximate specific correction factor |
|---|---|
| 10°C | 215.2 |
| 15°C | 211.7 |
| 20°C | 208.2 |

TABLE 3
GROUNDWATER QUALITY MEASUREMENTS

| | |
|---|---|
| **Site** | Shell Whitemare Pool |
| **Sample Round** | February 2020 |

| Borehole | Purge Date | Purge Method | Purge Technique | Purge Volume (L) | pH | Temperature (°C) | Conductivity (µS/cm$^c$) | ORP (mV) | ORP (mV) Corrected | Dissolved Oxygen (mg/L) | Comments | Sample Date | Sample Method | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW101 | 06/02/2020 | Low flow purging | Peristaltic pump | 2 | 6.56 | 10.86 | 1137.9 | 190.8 | 405 | 0.88 | Clear, NVO | 06/02/2020 | Peristaltic pump | Duplicate taken |
| | | | | 2.6 | 6.46 | 10.94 | 1145.1 | 187.2 | 402 | 0.89 | | | | |
| | | | | 3.3 | 6.40 | 10.96 | 1153.5 | 185.9 | 400 | 0.85 | | | | |
| MW102 | 06/02/2020 | Low flow purging | Peristaltic pump | 1.3 | 5.67 | 9.96 | 1751.4 | 172.4 | 388 | 0.33 | Slightly black purge water in bucket. Strong HC odour. | 06/02/2020 | Peristaltic pump | - |
| | | | | 1.5 | 5.73 | 10.06 | 1750.3 | 169.2 | 384 | 0.29 | | | | |
| | | | | 1.7 | 5.80 | 10.15 | 1762.5 | 167.3 | 382 | 0.26 | | | | |
| MW103 | 05/02/2020 | Low flow purging | Peristaltic pump | 2.1 | 8.54 | 7.16 | 1644.9 | 184.5 | 402 | 2.04 | Clear, NVO | 05/02/2020 | Peristaltic pump | - |
| | | | | 2.5 | 8.35 | 7.11 | 1664.9 | 183.9 | 401 | 1.88 | | | | |
| | | | | 2.7 | 8.17 | 7.10 | 1688.4 | 182.3 | 400 | 1.74 | | | | |
| MW105 | 07/02/2020 | - | - | - | | | | | | | Insufficient water to purge and monitor. | - | - | Insufficient water to sample. |
| MW106 | 07/02/020 | Low flow purging | Peristaltic pump | 5.5 | 5.87 | 10.20 | 1497.9 | 149.5 | 365 | 0.51 | Clear, NVO. Slug/Interface Probe stuck down monitoring well. Unable to complete groundwater gauging during purging but likely to be stable based on previous monitoring. | 07/02/2020 | Peristaltic pump | - |
| | | | | 6 | 5.81 | 10.25 | 1563.8 | 144.1 | 359 | 0.38 | | | | |
| | | | | 6.5 | 5.79 | 10.29 | 1564.9 | 139.3 | 354 | 0.30 | | | | |
| MW109 | 05/02/2020 | - | - | - | | | | | | | Insufficient water to purge and monitor. Attempted with bailer and peristaltic pump - bailer retrieved 0.5cm of turbid silty water. | - | - | Insufficient water to sample. |

**Legend**

°C - degrees celsius
L - Litres
NVO - no visible or olfactory evidence of impact
pH - potential of Hydrogen (dimensionless)
mg/L - milligrams per litre
mS - milli siemens
mV - milli volts
ORP - Oxidation Reduction Potential

**Notes**

ORP is corrected against temperature of groundwater.
Equation: Eh = Em + Eref
Where: Eh = Corrected ORP value
EM = ORP measured by probe
Eref = Correction factor = [(temperature2) x -0.0013)-(temperature x 0.6656)+222.02] (for a 3.5mol KCl probe)

| Temperature | Approximate specific correction factor |
|---|---|
| 10°C | 215.2 |
| 15°C | 211.7 |
| 20°C | 208.2 |

TABLE 4
VAPOUR MONITORING

| | |
|---|---|
| **Site** | Shell Whitemare Pool |
| **Sample Round** | December 2019 |

| Sample Location | Sample Date | Depth to Base (m bgl) | Depth to Groundwater m bgl) | Sample Tube ID | PID Reading (ppm) | | Flow Pod (L/hr) | Barometric Pressure (mb) | Methane ($CH_4$) %LEL | Carbon Dioxide ($CO_2$) %v/v | Oxygen ($O_2$) % v/v | Methane Flow (l/hr) | Carbon Dioxide Flow (l/hr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Pre-purge | Post-purge | Peak | | Peak | Peak | Peak | | |
| VP101 | 11/12/2019 | 1.0 | 0.935 | 496 | 3.8 | 1 | 0.7 | 992 | <0.1 | 0.5 | 19.7 | 0.0007 | 0.0035 |
| VP102 | 12/12/2019 | 1.0 | 0.670 | M1164139 | 13.1 | 1 | 2.5 | 991 | <0.1 | 0.1 | 19.8 | 0.0025 | 0.0025 |
| VP103 | 11/12/2019 | 0.9 | 0.440 | 352 | 2.8 | 1 | 1.9 | 990 | <0.1 | 0.1 | 19.9 | 0.0019 | 0.0019 |

**Legend:**

ppm - parts per million
L/hr - litres per hour
LEL - lower explosive limit
-- - not encountered
mb - milliBar
m bgl - metres below ground level

CS: CIRIA Characteristic Situation. Volumetric flow rate of $CH_4$ or $CO_2$ (litre/hour):

CS1 (very low risk): <0.07l/hr ($CH_4$ <1% and/or $CO_2$ <5%).
CS2 (low risk): <0.7l/hr (CH4 >1% and/or CO2 >5%).

NHBC Traffic Light Classification

Green: $CH_4$< 1%, $CH_4$ flow rate< 0.16l/hr, $CO_2$ <5%, $CO_2$ flow rate <0.78l/hr
Amber 1: 1% <$CH_4$< 5%, 0.16l/hr <$CH_4$ flow rate< 0.63l/hr, 5% <$CO_2$< 10%, 0.7l/hr <$CO_2$ flow rate< 1.56l/hr
Amber 2: 5%< $CH_4$ <20%, 0.63l/hr <$CH_4$ flow rate <1.56l/hr, 10% <$CO_2$ <30%, 1.56l/hr <$CO_2$ flow rate <3.13l/hr

# APPENDIX D HYDRAULIC CONDUCTIVITY DATA

Table 5 - Hydraulic Conductivity Test Data Summary- Shell Whitemare Pool

| Monitoring Well | Top and base of screen (mbgl) | | Effective Screened Strata | Test Date | Aquifer Test | Water level within Screened section | K (m/s) | K (m/d) | Comments |
|---|---|---|---|---|---|---|---|---|---|
| **MW101** | 3.3 | 7 | Sandstone | 12/12/2019 | Bailer - Rising 1 | Y | 3.70E-05 | 3.2 | |
| | | | | | Bailer - Rising 2 | Y | 3.36E-05 | 2.9 | |
| | | | | | Bailer - Rising 3 | Y | 4.28E-05 | 3.7 | |
| | | | | 06/02/2020 | Slug - Falling 1 | Y | 1.74E-05 | 1.5 | |
| | | | | | Slug - Rising 1 | Y | 4.05E-05 | 3.5 | |
| | | | | | Slug - Falling 2 | Y | 3.59E-05 | 3.1 | |
| | | | | | Slug - Rising 2 | Y | - | - | |
| **MW102** | 6.5 | 9.5 | Sandstone | 12/12/2019 | Bailer - Rising 1 | Y | 2.89E-06 | 0.25 | Conductivity value and water level dropped between monitoring events. This may be due to the groundwater level in December 2019 being present in a more permeable section (or fracture) of the bedrock. |
| | | | | | Bailer - Rising 2 | Y | 1.85E-06 | 0.16 | |
| | | | | | Bailer - Rising 3 | Y | 2.08E-06 | 0.18 | |
| | | | | 07/02/2020 | Slug - Falling 1 | Y | 1.16E-06 | 0.1 | |
| | | | | | Slug - Rising 1 | Y | 1.62E-06 | 0.14 | |
| **MW106** | 3.6 | 6.6 | Sandstone | 06/02/2020 | Slug - Falling 1 | Y | - | - | Only manual test results obtained as equipment stuck in the well and not reflective of full recovery. |
| **MW109** | 6.5 | 9.5 | Interbedded mudstone / sandstone and sandstone | 12/12/2019 | Bailer - Rising 1 | Y | 6.60E-07 | 0.057 | |
| | | | | | Bailer - Rising 2 | Y | 6.83E-07 | 0.059 | |
| | | | | | Bailer - Rising 3 | Y | 7.64E-07 | 0.066 | |

| | |
|---|---|
| **Min** | 0.06 |
| **Max** | 3.70 |
| **MW101** | 2.98 |
| **MW102** | 0.17 |
| **MW109** | 0.06 |
| **Geomean of Averages** | 0.31 |

Notes:

ND = not detected

m = metres

bgl = below ground level

NAPL = non-aqueous phase liquid

- = not interpreted

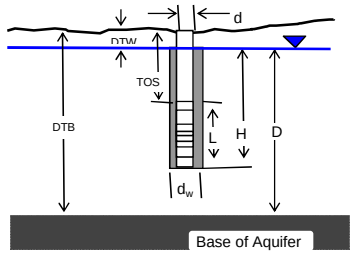
Site: **Shell Whitemare Pool** Well ID: **MW101** Test No: **RHT1**

Date: **12/12/2019**
Fieldwork by: **LMcM**
Processed by: **LMcM / SD**
Checked by: **JL / EP**
Test type (rising/falling): **Rising**

No. of data points: 107

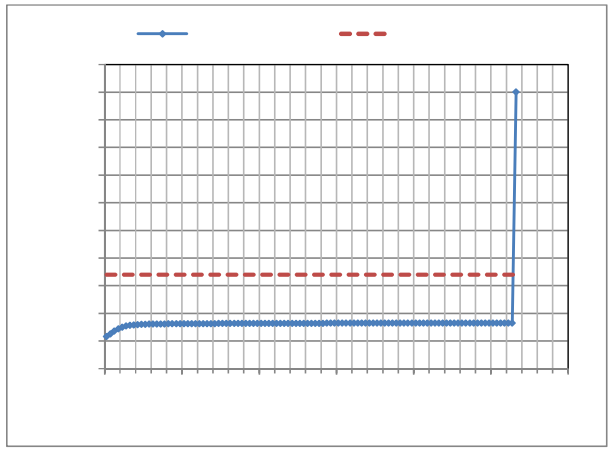
## INPUT

| | | |
|---|---|---|
| Well construction: | | |
| Drilling technique | Rotary / Percussive | |
| Bore diameter ($d_w$) | 0.101 | Meter |
| Casing diameter external | 0.063 | Meter |
| Casing diameter internal | 0.05 | Meter |
| Effective diameter ($d_c$) | 0.101 | Meter |
| Total screen length (L) | 3.7 | Meter |
| Depths to: | | |
| water level (DTW) | 4.17 | Meter |
| top of screen (TOS) | 3.3 | Meter |
| base of aquifer (DTB) | 7 | Meter |
| 'Slug' details: | | |
| length | 0.91 | Meter |
| diameter | 0.038 | Meter |
| type: | Bailer | |
| Geology and annular fill materials: | | |
| across screen -- | Gravel | |
| above screen -- | Bentonite | |
| aquifer material -- | Medium-Grained Sandsto | |




| | Elapsed time | Water Level | Draw-down |
|---|---|---|---|
| | Hr:Min:Sec | Meter | Meter |
| Pre-start | 0:00:00.0 | 4.17 | |
| Final obs: | 0:01:47.0 | -0.00245 | 4.17245 |

| Entry | Reduced Dataset | | |
|---|---|---|---|
| 1 | 0:00:01.0 | 4.423 | 0.253 |
| 3 | 0:00:03.0 | 4.319 | 0.149 |
| 5 | 0:00:05.0 | 4.250 | 0.080 |
| 7 | 0:00:07.0 | 4.219 | 0.049 |
| 9 | 0:00:09.0 | 4.206 | 0.035 |
| 11 | 0:00:11.0 | 4.198 | 0.028 |
| 13 | 0:00:13.0 | 4.195 | 0.025 |
| 15 | 0:00:15.0 | 4.193 | 0.023 |
| 17 | 0:00:17.0 | 4.191 | 0.021 |
| 19 | 0:00:19.0 | 4.190 | 0.020 |
| 21 | 0:00:21.0 | 4.188 | 0.018 |
| 23 | 0:00:23.0 | 4.188 | 0.018 |
| 25 | 0:00:25.0 | 4.187 | 0.017 |
| 27 | 0:00:27.0 | 4.186 | 0.016 |
| 29 | 0:00:29.0 | 4.186 | 0.016 |
| 31 | 0:00:31.0 | 4.185 | 0.015 |
| 33 | 0:00:33.0 | 4.184 | 0.014 |
| 35 | 0:00:35.0 | 4.183 | 0.013 |
| 37 | 0:00:37.0 | 4.183 | 0.013 |
| 39 | 0:00:39.0 | 4.183 | 0.013 |
| 41 | 0:00:41.0 | 4.183 | 0.013 |
| 43 | 0:00:43.0 | 4.182 | 0.012 |
| 45 | 0:00:45.0 | 4.182 | 0.012 |
| 47 | 0:00:47.0 | 4.181 | 0.011 |
| 49 | 0:00:49.0 | 4.181 | 0.011 |
| 51 | 0:00:51.0 | 4.181 | 0.010 |
| 53 | 0:00:53.0 | 4.181 | 0.010 |
| 55 | 0:00:55.0 | 4.180 | 0.010 |
| 57 | 0:00:57.0 | 4.180 | 0.010 |
| 59 | 0:00:59.0 | 4.179 | 0.009 |
| 61 | 0:01:01.0 | 4.179 | 0.009 |
| 63 | 0:01:03.0 | 4.179 | 0.009 |
| 65 | 0:01:05.0 | 4.179 | 0.009 |
| 67 | 0:01:07.0 | 4.177 | 0.007 |
| 69 | 0:01:09.0 | 4.178 | 0.008 |
| 71 | 0:01:11.0 | 4.178 | 0.008 |
| 73 | 0:01:13.0 | 4.178 | 0.008 |
| 75 | 0:01:15.0 | 4.178 | 0.008 |
| 77 | 0:01:17.0 | 4.178 | 0.008 |
| 79 | 0:01:19.0 | 4.178 | 0.008 |



## COMPUTED

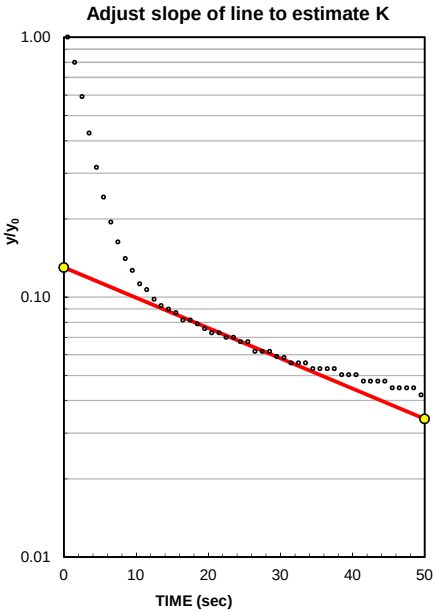
| | | |
|---|---|---|
| $L_{wetted}$ | 2.83 | Meter |
| D = | 2.83 | Meter |
| H = | 2.83 | Meter |
| $L/r_w$ = | 56.04 | - |
| $y_{0\text{-DISPLACEMENT}}$ = | 0.25 | meter |
| $y_{0\text{-SLUG}}$ eff casing= | 0.13 | meter |
| $y_{0\text{-SLUG}}$ = | 0.53 | meter |
| Fully penetrate C = | 2.958 | |
| ln(Re/rw) = | 3.067 | |
| Re = | 3.56 | meter |
| Slope = | 0.011649 | $\log_{10}$/sec |
| $t_{90\%}$ recovery = | 86 | sec |

Input is consistent.

**K = 3.2 meter/day**

Observed slug discrepancy: 70%
Eff casing slug discrepancy: 65%

**K= 3.2 is greater than likely maximum of 3.05 for Medium-Grained Sandstone**




**USEPA EPA/600/R-93/202, 1994**

| | |
|---|---|
| Check that intercept is at 00:00:00 | YES |
| Intercept of straight line on Y/Yo axis | 0.13 |
| Observed drawdown (m) | 0.2526 |
| Inferred drawdown for formation (m) | 0.0328 |
| Expected displacement based on slug volume (m) | 0.5256 |
| Vol. water recharged by filter pack (m3) | 0.0010 |
| Vol. filter pack that recharged water originated from (m3) | 0.0002 |
| Specific yield of filter pack (-) | 6.02 |
| Effective casing radius (m) | 0.100 |
| Effective casing diameter (m) | 0.200 |

**Butler, 1997**

| | |
|---|---|
| Effective casing radius (m) | 0.100 |
| Effective casing diameter (m) | 0.200 |

**Check significance of varying screen length during test**

| | |
|---|---|
| Was the water level always above top of screen? | No |
| Displacement (yo) as % of initial saturated screen length | 9% |

**REMARKS:**

Most of recovery in first 10 seconds

Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted by URS from one developed by USGS
Changes copyright URS Infrastructure & Environment UK Ltd, 2014

Site: **Shell Whitemare Pool** Well ID: **MW101** Test No: **RHT2**

Date: **12/12/2019**
Fieldwork by: **LMcM**
Processed by: **LMcM / SD**
Checked by: **JL / EP**
Test type (rising/falling): **Rising**

No. of data points: 133

## INPUT

| | | |
|---|---|---|
| Well construction: | | |
| Drilling technique | Rotary / Percussive | |
| Bore diameter ($d_w$) | 0.101 | Meter |
| Casing diameter external | 0.063 | Meter |
| Casing diameter internal | 0.05 | Meter |
| Effective diameter ($d_c$) | 0.101 | Meter |
| Total screen length (L) | 3.7 | Meter |
| Depths to: | | |
| water level (DTW) | 4.171 | Meter |
| top of screen (TOS) | 3.3 | Meter |
| base of aquifer (DTB) | 7 | Meter |
| 'Slug' details: | | |
| length | 0.91 | Meter |
| diameter | 0.038 | Meter |
| type: | Bailer | |
| Geology and annular fill materials: | | |
| across screen -- | Gravel | |
| above screen -- | Bentonite | |
| aquifer material -- | Medium-Grained Sandsto | |

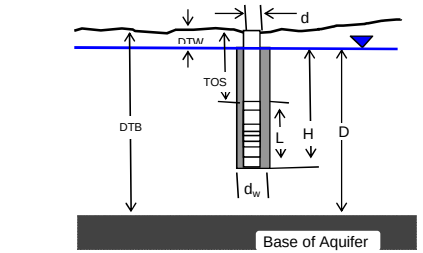
## COMPUTED

| | | |
|---|---|---|
| $L_{wetted}$ | 2.829 | Meter |
| D = | 2.829 | Meter |
| H = | 2.829 | Meter |
| $L/r_w$ = | 56.02 | - |
| $y_{0\text{-DISPLACEMENT}}$ = | 0.28 | meter |
| $y_{0\text{-SLUG}}$ eff casing= | 0.13 | meter |
| $y_{0\text{-SLUG}}$ = | 0.53 | meter |
| Fully penetrate C = | 2.957 | |
| ln(Re/rw) = | 3.067 | |
| Re = | 3.56 | meter |
| Slope = | 0.010702 | $\log_{10}$/sec |
| $t_{90\%}$ recovery = | 93 | sec |

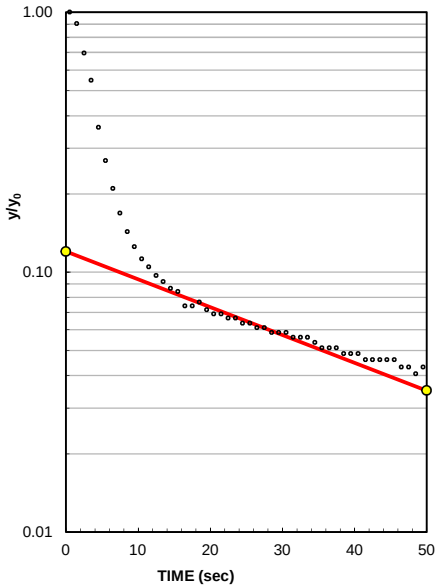
**Input is consistent.**

**K = 2.9 meter/day**

Observed slug discrepancy: 62%
Eff casing slug discrepancy: 73%

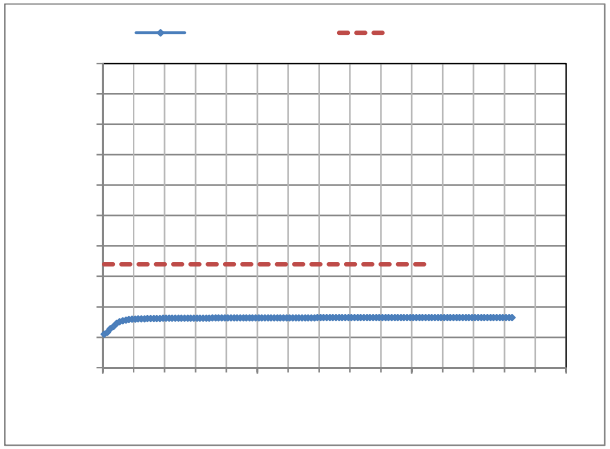



**Adjust slope of line to estimate K**




| | Elapsed time | Water Level | Draw-down |
|---|---|---|---|
| | Hr:Min:Sec | Meter | Meter |
| Pre-start | 0:00:00.0 | 4.171 | |
| Final obs: | 0:01:43.0 | 4.1774 | -0.0064 |

| Entry | Reduced Dataset | | |
|---|---|---|---|
| 1 | 0:00:01.0 | 4.449 | 0.278 |
| 4 | 0:00:04.0 | 4.323 | 0.152 |
| 7 | 0:00:07.0 | 4.229 | 0.058 |
| 10 | 0:00:10.0 | 4.206 | 0.035 |
| 13 | 0:00:13.0 | 4.198 | 0.027 |
| 16 | 0:00:16.0 | 4.194 | 0.023 |
| 19 | 0:00:19.0 | 4.192 | 0.021 |
| 22 | 0:00:22.0 | 4.190 | 0.019 |
| 25 | 0:00:25.0 | 4.189 | 0.018 |
| 28 | 0:00:28.0 | 4.188 | 0.017 |
| 31 | 0:00:31.0 | 4.187 | 0.016 |
| 34 | 0:00:34.0 | 4.187 | 0.016 |
| 37 | 0:00:37.0 | 4.185 | 0.014 |
| 40 | 0:00:40.0 | 4.185 | 0.014 |
| 43 | 0:00:43.0 | 4.184 | 0.013 |
| 46 | 0:00:46.0 | 4.184 | 0.013 |
| 49 | 0:00:49.0 | 4.182 | 0.011 |
| 52 | 0:00:52.0 | 4.182 | 0.011 |
| 55 | 0:00:55.0 | 4.182 | 0.011 |
| 58 | 0:00:58.0 | 4.182 | 0.011 |
| 61 | 0:01:01.0 | 4.182 | 0.011 |
| 64 | 0:01:04.0 | 4.181 | 0.010 |
| 67 | 0:01:07.0 | 4.181 | 0.010 |
| 70 | 0:01:10.0 | 4.180 | 0.009 |
| 73 | 0:01:13.0 | 4.180 | 0.009 |
| 76 | 0:01:16.0 | 4.180 | 0.009 |
| 79 | 0:01:19.0 | 4.180 | 0.009 |
| 82 | 0:01:22.0 | 4.178 | 0.007 |
| 85 | 0:01:25.0 | 4.179 | 0.008 |
| 88 | 0:01:28.0 | 4.179 | 0.008 |
| 91 | 0:01:31.0 | 4.179 | 0.008 |
| 94 | 0:01:34.0 | 4.179 | 0.008 |
| 97 | 0:01:37.0 | 4.178 | 0.007 |
| 100 | 0:01:40.0 | 4.178 | 0.007 |
| 103 | 0:01:43.0 | 4.178 | 0.007 |
| 106 | 0:01:46.0 | 4.178 | 0.007 |
| 109 | 0:01:49.0 | 4.177 | 0.006 |
| 112 | 0:01:52.0 | 4.177 | 0.006 |
| 115 | 0:01:55.0 | 4.177 | 0.006 |
| 118 | 0:01:58.0 | 4.177 | 0.006 |



**USEPA EPA/600/R-93/202, 1994**

| | |
|---|---|
| Check that intercept is at 00:00:00 | YES |
| Intercept of straight line on Y/Yo axis | 0.12 |
| Observed drawdown (m) | 0.2782 |
| Inferred drawdown for formation (m) | 0.0334 |
| Expected displacement based on slug volume (m) | 0.5256 |
| Vol. water recharged by filter pack (m3) | 0.0010 |
| Vol. filter pack that recharged water originated from (m3) | 0.0002 |
| Specific yield of filter pack (-) | **5.91** |
| Effective casing radius (m) | 0.099 |
| Effective casing diameter (m) | **0.198** |

**Butler, 1997**

| | |
|---|---|
| Effective casing radius (m) | 0.099 |
| Effective casing diameter (m) | **0.198** |

**Check significance of varying screen length during test**

| | |
|---|---|
| Was the water level always above top of screen? | #N/A |
| Displacement (yo) as % of initial saturated screen length | 10% |

**REMARKS:**

Most of recovery in first 10 seconds

Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted by URS from one developed by USGS
Changes copyright URS Infrastructure & Environment UK Ltd, 2014

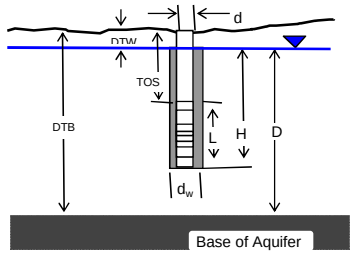
Site: **Shell Whitemare Pool** Well ID: **MW101** Test No: **RHT3**

Date: **12/12/2019**
Fieldwork by: **LMcM**
Processed by: **LMcM / SD**
Checked by: **JL / EP**
Test type (rising/falling): **Rising**

No. of data points: 96

## INPUT

| | | |
|---|---|---|
| Well construction: | | |
| Drilling technique | Rotary / Percussive | |
| Bore diameter ($d_w$) | 0.101 | Meter |
| Casing diameter external | 0.063 | Meter |
| Casing diameter internal | 0.05 | Meter |
| Effective diameter ($d_c$) | 0.101 | Meter |
| Total screen length (L) | 3.7 | Meter |
| Depths to: | | |
| water level (DTW) | 4.175 | Meter |
| top of screen (TOS) | 3.3 | Meter |
| base of aquifer (DTB) | 7 | Meter |
| 'Slug' details: | | |
| length | 0.91 | Meter |
| diameter | 0.038 | Meter |
| type: | Bailer | |
| Geology and annular fill materials: | | |
| across screen -- | Gravel | |
| above screen -- | Bentonite | |
| aquifer material -- | Medium-Grained Sandsto | |




## COMPUTED

| | | |
|---|---|---|
| $L_{wetted}$ | 2.825 | Meter |
| D = | 2.825 | Meter |
| H = | 2.825 | Meter |
| $L/r_w$ = | 55.94 | - |
| $y_{0\text{-DISPLACEMENT}}$ = | 0.20 | meter |
| $y_{0\text{-SLUG}}$ eff casing= | 0.13 | meter |
| $y_{0\text{-SLUG}}$ = | 0.53 | meter |
| Fully penetrate C = | 2.955 | |
| ln(Re/rw) = | 3.066 | |
| Re = | 3.56 | meter |
| Slope = | 0.013319 | $\log_{10}$/sec |
| $t_{90\%}$ recovery = | 75 | sec |

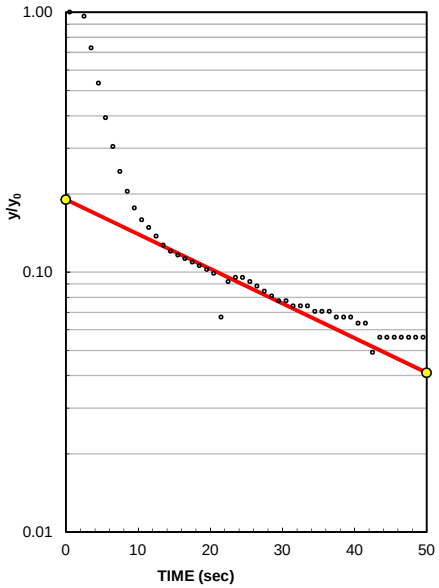
**Input is consistent.**

**K = 3.7 meter/day**

Observed slug discrepancy: 89%
Eff casing slug discrepancy: 44%

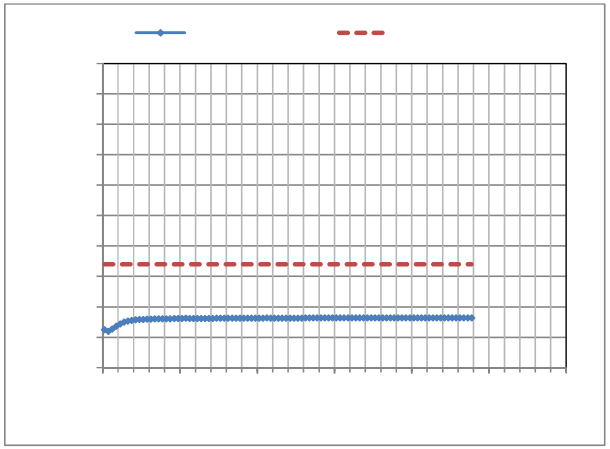
**K= 3.7 is greater than likely maximum of 3.05 for Medium-Grained Sandstone**

**Adjust slope of line to estimate K**




| | Elapsed time | Water Level | Draw-down |
|---|---|---|---|
| | Hr:Min:Sec | Meter | Meter |
| Pre-start | 0:00:00.0 | 4.175 | |
| Final obs: | 0:01:36.0 | 4.1814 | -0.0064 |

| Entry | Reduced Dataset | | |
|---|---|---|---|
| 1 | 0:00:01.0 | 4.376 | 0.201 |
| 3 | 0:00:03.0 | 4.369 | 0.194 |
| 5 | 0:00:05.0 | 4.282 | 0.107 |
| 7 | 0:00:07.0 | 4.236 | 0.061 |
| 9 | 0:00:09.0 | 4.216 | 0.041 |
| 11 | 0:00:11.0 | 4.207 | 0.032 |
| 13 | 0:00:13.0 | 4.203 | 0.028 |
| 15 | 0:00:15.0 | 4.199 | 0.024 |
| 17 | 0:00:17.0 | 4.198 | 0.023 |
| 19 | 0:00:19.0 | 4.196 | 0.021 |
| 21 | 0:00:21.0 | 4.195 | 0.020 |
| 23 | 0:00:23.0 | 4.194 | 0.018 |
| 25 | 0:00:25.0 | 4.194 | 0.019 |
| 27 | 0:00:27.0 | 4.193 | 0.018 |
| 29 | 0:00:29.0 | 4.191 | 0.016 |
| 31 | 0:00:31.0 | 4.191 | 0.016 |
| 33 | 0:00:33.0 | 4.190 | 0.015 |
| 35 | 0:00:35.0 | 4.189 | 0.014 |
| 37 | 0:00:37.0 | 4.189 | 0.014 |
| 39 | 0:00:39.0 | 4.189 | 0.013 |
| 41 | 0:00:41.0 | 4.188 | 0.013 |
| 43 | 0:00:43.0 | 4.185 | 0.010 |
| 45 | 0:00:45.0 | 4.186 | 0.011 |
| 47 | 0:00:47.0 | 4.186 | 0.011 |
| 49 | 0:00:49.0 | 4.186 | 0.011 |
| 51 | 0:00:51.0 | 4.186 | 0.011 |
| 53 | 0:00:53.0 | 4.186 | 0.011 |
| 55 | 0:00:55.0 | 4.186 | 0.011 |
| 57 | 0:00:57.0 | 4.185 | 0.010 |
| 59 | 0:00:59.0 | 4.185 | 0.010 |
| 61 | 0:01:01.0 | 4.184 | 0.009 |
| 63 | 0:01:03.0 | 4.184 | 0.009 |
| 65 | 0:01:05.0 | 4.184 | 0.009 |
| 67 | 0:01:07.0 | 4.184 | 0.009 |
| 69 | 0:01:09.0 | 4.184 | 0.009 |
| 71 | 0:01:11.0 | 4.184 | 0.008 |
| 73 | 0:01:13.0 | 4.184 | 0.008 |
| 75 | 0:01:15.0 | 4.184 | 0.008 |
| 77 | 0:01:17.0 | 4.183 | 0.008 |
| 79 | 0:01:19.0 | 4.183 | 0.008 |



**USEPA EPA/600/R-93/202, 1994**

| | |
|---|---|
| Check that intercept is at 00:00:00 | YES |
| Intercept of straight line on Y/Yo axis | 0.19 |
| Observed drawdown (m) | 0.2014 |
| Inferred drawdown for formation (m) | 0.0383 |
| Expected displacement based on slug volume (m) | 0.5256 |
| Vol. water recharged by filter pack (m3) | 0.0010 |
| Vol. filter pack that recharged water originated from (m3) | 0.0002 |
| Specific yield of filter pack (-) | **5.11** |
| Effective casing radius (m) | 0.093 |
| Effective casing diameter (m) | **0.185** |

**Butler, 1997**

| | |
|---|---|
| Effective casing radius (m) | 0.093 |
| Effective casing diameter (m) | **0.185** |

**Check significance of varying screen length during test**

| | |
|---|---|
| Was the water level always above top of screen? | #N/A |
| Displacement (yo) as % of initial saturated screen length | 7% |

**REMARKS:**

Most of recovery in first 10 seconds

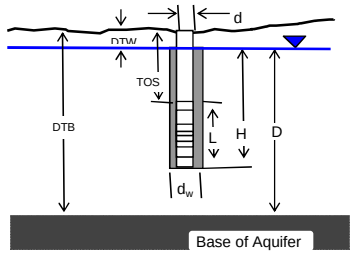
Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted by URS from one developed by USGS
Changes copyright URS Infrastructure & Environment UK Ltd, 2014

| | | | | | |
|---|---|---|---|---|---|
| **Site:** | **Whitemare Pool** | **Well ID:** | **MW101** | **Test No:** | **FHT1** |
| | | | | **Date:** | **06/02/2020** |
| | | | | **Fieldwork by:** | **Georgia Bath** |
| | | | | **Processed by:** | **Sophie Doyle** |
| | | | | **Checked by:** | **Emma Peace** |
| | | | | **Test type (rising/falling):** | **Falling** |

No. of data points: 558

## INPUT

| Well construction: | | |
|---|---|---|
| Drilling technique | Rotary / Percussive | |
| Bore diameter ($d_w$) | 0.101 | Meter |
| Casing diameter external | 0.063 | Meter |
| Casing diameter internal | 0.05 | Meter |
| Effective diameter ($d_c$) | 0.101 | Meter |
| Total screen length (L) | 3.7 | Meter |
| **Depths to:** | | |
| water level (DTW) | 4.3837 | Meter |
| top of screen (TOS) | 3.3 | Meter |
| base of aquifer (DTB) | 7 | Meter |
| **'Slug' details:** | | |
| length | 1.286 | Meter |
| diameter | 0.036 | Meter |
| type: | 2 part slug | |
| **Geology and annular fill materials:** | | |
| across screen -- | Gravel | |
| above screen -- | Bentonite | |
| aquifer material -- | Medium-Grained Sandsto | |




## COMPUTED

| | | |
|---|---|---|
| $L_{wetted}$ | 2.6163 | Meter |
| D = | 2.6163 | Meter |
| H = | 2.6163 | Meter |
| $L/r_w$ = | 51.81 | - |
| $y_{0\text{-DISPLACEMENT}}$ = | 0.51 | meter |
| $y_{0\text{-SLUG}}$ eff casing= | 0.16 | meter |
| $y_{0\text{-SLUG}}$ = | 0.67 | meter |
| Fully penetrate C = | 2.817 | |
| ln(Re/rw) = | 3.003 | |
| Re = | 3.34 | meter |
| Slope = | 0.005229 | $\log_{10}$/sec |
| $t_{90\%}$ recovery = | 191 | sec |

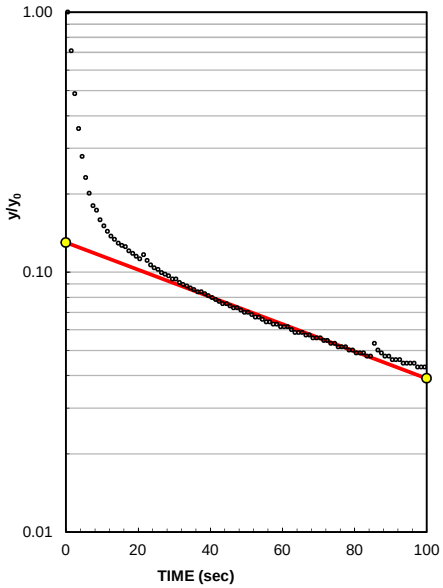
**Input is consistent.**

**K = 1.5 meter/day**

Observed slug discrepancy: 27%

Eff casing slug discrepancy: 103%

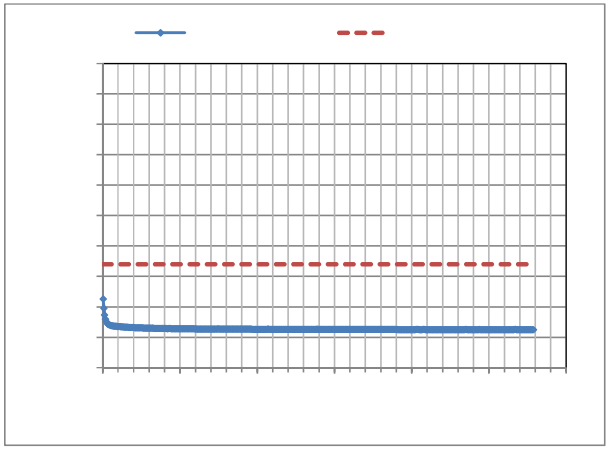
**Adjust slope of line to estimate K**




| | Elapsed time | Water Level | Draw-down |
|---|---|---|---|
| | Hr:Min:Sec | Meter | Meter |
| Pre-start | 0:00:00.0 | 4.3837 | |
| Final obs: | 0:09:18.0 | 4.3775 | 0.0062 |

**Reduced Dataset**

| Entry | | | |
|---|---|---|---|
| 1 | 0:00:01.0 | 3.875 | 0.509 |
| 14 | 0:00:14.0 | 4.316 | 0.068 |
| 27 | 0:00:27.0 | 4.333 | 0.051 |
| 40 | 0:00:40.0 | 4.342 | 0.041 |
| 53 | 0:00:53.0 | 4.350 | 0.034 |
| 66 | 0:01:06.0 | 4.354 | 0.030 |
| 79 | 0:01:19.0 | 4.358 | 0.026 |
| 92 | 0:01:32.0 | 4.360 | 0.023 |
| 105 | 0:01:45.0 | 4.363 | 0.021 |
| 118 | 0:01:58.0 | 4.365 | 0.019 |
| 131 | 0:02:11.0 | 4.366 | 0.018 |
| 144 | 0:02:24.0 | 4.367 | 0.017 |
| 157 | 0:02:37.0 | 4.368 | 0.016 |
| 170 | 0:02:50.0 | 4.369 | 0.015 |
| 183 | 0:03:03.0 | 4.370 | 0.014 |
| 196 | 0:03:16.0 | 4.370 | 0.013 |
| 209 | 0:03:29.0 | 4.371 | 0.013 |
| 222 | 0:03:42.0 | 4.371 | 0.013 |
| 235 | 0:03:55.0 | 4.372 | 0.012 |
| 248 | 0:04:08.0 | 4.373 | 0.011 |
| 261 | 0:04:21.0 | 4.373 | 0.011 |
| 274 | 0:04:34.0 | 4.373 | 0.011 |
| 287 | 0:04:47.0 | 4.373 | 0.011 |
| 300 | 0:05:00.0 | 4.373 | 0.011 |
| 313 | 0:05:13.0 | 4.374 | 0.010 |
| 326 | 0:05:26.0 | 4.374 | 0.010 |
| 339 | 0:05:39.0 | 4.375 | 0.009 |
| 352 | 0:05:52.0 | 4.375 | 0.009 |
| 365 | 0:06:05.0 | 4.375 | 0.009 |
| 378 | 0:06:18.0 | 4.375 | 0.009 |
| 391 | 0:06:31.0 | 4.375 | 0.008 |
| 404 | 0:06:44.0 | 4.375 | 0.008 |
| 417 | 0:06:57.0 | 4.375 | 0.009 |
| 430 | 0:07:10.0 | 4.376 | 0.008 |
| 443 | 0:07:23.0 | 4.375 | 0.008 |
| 456 | 0:07:36.0 | 4.376 | 0.008 |
| 469 | 0:07:49.0 | 4.376 | 0.008 |
| 482 | 0:08:02.0 | 4.376 | 0.008 |
| 495 | 0:08:15.0 | 4.376 | 0.008 |
| 508 | 0:08:28.0 | 4.376 | 0.008 |



**USEPA EPA/600/R-93/202, 1994**

| | |
|---|---|
| Check that intercept is at 00:00:00 | YES |
| Intercept of straight line on Y/Yo axis | 0.13 |
| Observed drawdown (m) | 0.5085 |
| Inferred drawdown for formation (m) | 0.0661 |
| Expected displacement based on slug volume (m) | 0.6667 |
| Vol. water recharged by filter pack (m3) | 0.0012 |
| Vol. filter pack that recharged water originated from (m3) | 0.0003 |
| Specific yield of filter pack (-) | **3.64** |
| Effective casing radius (m) | 0.079 |
| Effective casing diameter (m) | **0.159** |

**Butler, 1997**

| | |
|---|---|
| Effective casing radius (m) | 0.079 |
| Effective casing diameter (m) | **0.159** |

**Check significance of varying screen length during test**

| | |
|---|---|
| Was the water level always above top of screen? | **No** |
| Displacement (yo) as % of initial saturated screen length | 19% |

**REMARKS:**

Majority of recovery occurred in first 20 seconds

Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted by URS from one developed by USGS

Changes copyright URS Infrastructure & Environment UK Ltd, 2014

| | | | | | |
|---|---|---|---|---|---|
| **Site:** | **Whitemare Pool** | **Well ID:** | **MW101** | **Test No:** | **RHT1** |
| | | | | **Date:** | **06/02/2020** |
| | | | | **Fieldwork by:** | **Georgia Bath** |
| | | | | **Processed by:** | **GB / SD** |
| | | | | **Checked by:** | **E Peace** |
| | | | | **Test type (rising/falling):** | **Rising** |

No. of data points: 622

## INPUT

| Well construction: | | |
|---|---|---|
| Drilling technique | Rotary / Percussive | |
| Bore diameter ($d_w$) | 0.101 | Meter |
| Casing diameter external | 0.063 | Meter |
| Casing diameter internal | 0.05 | Meter |
| Effective diameter ($d_c$) | 0.101 | Meter |
| Total screen length (L) | 3.7 | Meter |
| **Depths to:** | | |
| water level (DTW) | 4.3813 | Meter |
| top of screen (TOS) | 3.3 | Meter |
| base of aquifer (DTB) | 7 | Meter |
| **'Slug' details:** | | |
| length | 1.3 | Meter |
| diameter | 0.036 | Meter |
| type: | 2 section slug | |
| **Geology and annular fill materials:** | | |
| across screen -- | Gravel | |
| above screen -- | Bentonite | |
| aquifer material -- | Medium-Grained Sandsto | |

## COMPUTED

| | | |
|---|---|---|
| $L_{wetted}$ | 2.6187 | Meter |
| D = | 2.6187 | Meter |
| H = | 2.6187 | Meter |
| $L/r_w$ = | 51.86 | - |
| $y_{0\text{-DISPLACEMENT}}$ = | 1.01 | meter |
| $y_{0\text{-SLUG}}$ eff casing= | 0.17 | meter |
| $y_{0\text{-SLUG}}$ = | 0.67 | meter |
| Fully penetrate C = | 2.819 | |
| ln(Re/rw) = | 3.003 | |
| Re = | 3.34 | meter |
| Slope = | 0.011994 | $\log_{10}$/sec |
| $t_{90\%}$ recovery = | 83 | sec |

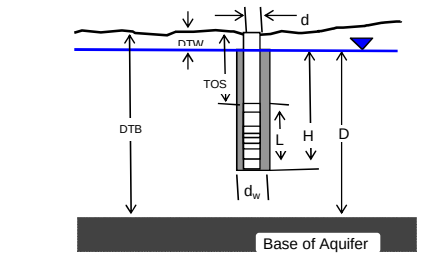
**Input is consistent.**

**K = 3.5 meter/day**

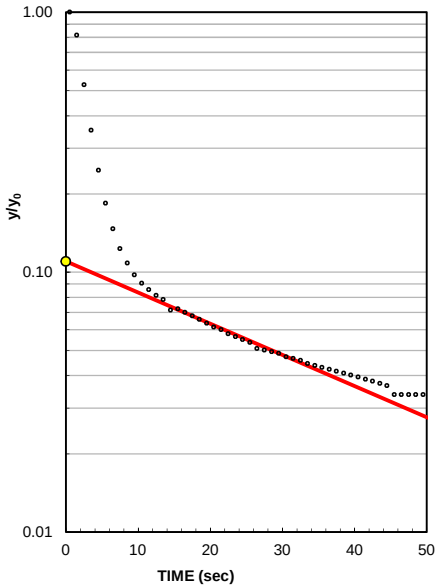
Observed slug discrepancy: 40%

Eff casing slug discrepancy: 144%

**K= 3.5 is greater than likely maximum of 3.05 for Medium-Grained Sandstone**

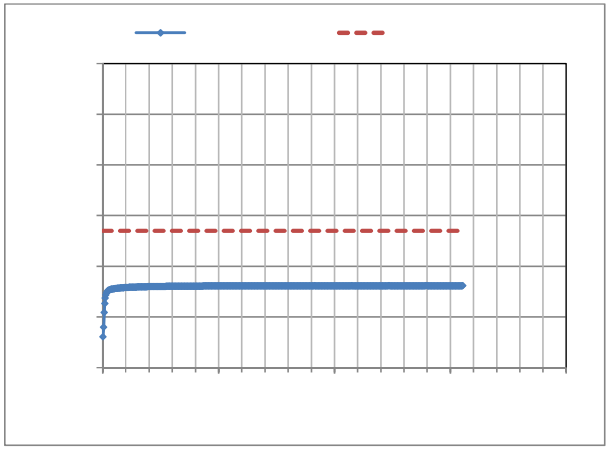



**Adjust slope of line to estimate K**




| | Elapsed time | Water Level | Draw-down |
|---|---|---|---|
| | Hr:Min:Sec | Meter | Meter |
| Pre-start | 0:00:00.0 | 4.3813 | |
| Final obs: | 0:10:22.0 | 4.3831 | -0.0018 |

| Entry | Reduced Dataset | | |
|---|---|---|---|
| 1 | 0:00:01.0 | 5.392 | 1.011 |
| 16 | 0:00:16.0 | 4.454 | 0.073 |
| 31 | 0:00:31.0 | 4.429 | 0.048 |
| 46 | 0:00:46.0 | 4.415 | 0.034 |
| 61 | 0:01:01.0 | 4.410 | 0.029 |
| 76 | 0:01:16.0 | 4.405 | 0.023 |
| 91 | 0:01:31.0 | 4.401 | 0.020 |
| 106 | 0:01:46.0 | 4.398 | 0.017 |
| 121 | 0:02:01.0 | 4.397 | 0.016 |
| 136 | 0:02:16.0 | 4.395 | 0.013 |
| 151 | 0:02:31.0 | 4.394 | 0.013 |
| 166 | 0:02:46.0 | 4.392 | 0.011 |
| 181 | 0:03:01.0 | 4.392 | 0.010 |
| 196 | 0:03:16.0 | 4.392 | 0.010 |
| 211 | 0:03:31.0 | 4.391 | 0.010 |
| 226 | 0:03:46.0 | 4.390 | 0.009 |
| 241 | 0:04:01.0 | 4.390 | 0.008 |
| 256 | 0:04:16.0 | 4.390 | 0.008 |
| 271 | 0:04:31.0 | 4.390 | 0.008 |
| 286 | 0:04:46.0 | 4.390 | 0.008 |
| 301 | 0:05:01.0 | 4.389 | 0.008 |
| 316 | 0:05:16.0 | 4.389 | 0.008 |
| 331 | 0:05:31.0 | 4.388 | 0.007 |
| 346 | 0:05:46.0 | 4.388 | 0.007 |
| 361 | 0:06:01.0 | 4.387 | 0.006 |
| 376 | 0:06:16.0 | 4.388 | 0.007 |
| 391 | 0:06:31.0 | 4.388 | 0.007 |
| 406 | 0:06:46.0 | 4.388 | 0.007 |
| 421 | 0:07:01.0 | 4.387 | 0.006 |
| 436 | 0:07:16.0 | 4.387 | 0.006 |
| 451 | 0:07:31.0 | 4.387 | 0.005 |
| 466 | 0:07:46.0 | 4.387 | 0.005 |
| 481 | 0:08:01.0 | 4.387 | 0.005 |
| 496 | 0:08:16.0 | 4.386 | 0.005 |
| 511 | 0:08:31.0 | 4.387 | 0.005 |
| 526 | 0:08:46.0 | 4.387 | 0.005 |
| 541 | 0:09:01.0 | 4.387 | 0.005 |
| 556 | 0:09:16.0 | 4.386 | 0.005 |
| 571 | 0:09:31.0 | 4.386 | 0.005 |
| 586 | 0:09:46.0 | 4.386 | 0.005 |



**USEPA EPA/600/R-93/202, 1994**

| | |
|---|---|
| Check that intercept is at 00:00:00 | YES |
| Intercept of straight line on Y/Yo axis | 0.11 |
| Observed drawdown (m) | 1.0109 |
| Inferred drawdown for formation (m) | 0.1112 |
| Expected displacement based on slug volume (m) | 0.6739 |
| Vol. water recharged by filter pack (m3) | 0.0011 |
| Vol. filter pack that recharged water originated from (m3) | 0.0005 |
| Specific yield of filter pack (-) | **2.03** |
| Effective casing radius (m) | 0.062 |
| Effective casing diameter (m) | **0.123** |

**Butler, 1997**

| | |
|---|---|
| Effective casing radius (m) | 0.062 |
| Effective casing diameter (m) | **0.123** |

**Check significance of varying screen length during test**

| | |
|---|---|
| Was the water level always above top of screen? | **No** |
| Displacement (yo) as % of initial saturated screen length | 39% |

**REMARKS:**

Majority of recovery occurred in first 10 seconds

Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted by URS from one developed by USGS

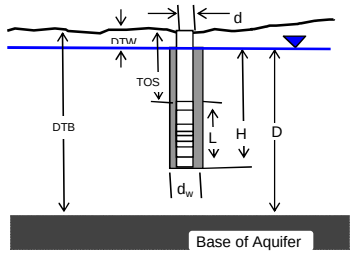
Changes copyright URS Infrastructure & Environment UK Ltd, 2014

| | | | | | |
|---|---|---|---|---|---|
| **Site:** | **Whitemare Pool** | **Well ID:** | **MW101** | **Test No:** | **FHT2** |
| | | | | **Date:** | **06/02/2020** |
| | | | | **Fieldwork by:** | **Georgia Bath** |
| | | | | **Processed by:** | **Sophie Doyle** |
| | | | | **Checked by:** | **E Peace** |
| | | | | **Test type (rising/falling):** | **Falling** |

No. of data points: 473

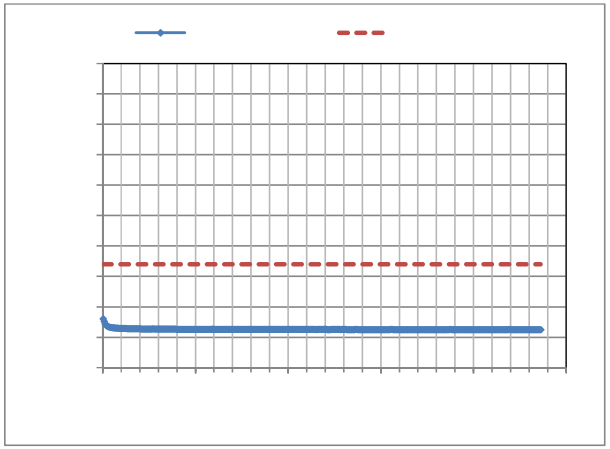
## INPUT

| Well construction: | | |
|---|---|---|
| Drilling technique | Rotary / Percussive | |
| Bore diameter ($d_w$) | 0.101 | Meter |
| Casing diameter external | 0.063 | Meter |
| Casing diameter internal | 0.05 | Meter |
| Effective diameter ($d_c$) | 0.101 | Meter |
| Total screen length (L) | 3.7 | Meter |
| **Depths to:** | | |
| water level (DTW) | 4.3818 | Meter |
| top of screen (TOS) | 3.3 | Meter |
| base of aquifer (DTB) | 7 | Meter |
| **'Slug' details:** | | |
| length | 0.643 | Meter |
| diameter | 0.036 | Meter |
| type: | 1 part slug | |
| **Geology and annular fill materials:** | | |
| across screen -- | Gravel | |
| above screen -- | Bentonite | |
| aquifer material -- | Medium-Grained Sandsto | |




| | Elapsed time | Water Level | Draw-down |
|---|---|---|---|
| | Hr:Min:Sec | Meter | Meter |
| Pre-start | 0:00:00.0 | 4.3818 | |
| Final obs: | 0:07:53.0 | 4.3785 | 0.0033 |

| Entry | Reduced Dataset | | |
|---|---|---|---|
| 1 | 0:00:01.0 | 4.197 | 0.185 |
| 12 | 0:00:12.0 | 4.344 | 0.038 |
| 23 | 0:00:23.0 | 4.358 | 0.023 |
| 34 | 0:00:34.0 | 4.363 | 0.019 |
| 45 | 0:00:45.0 | 4.366 | 0.016 |
| 56 | 0:00:56.0 | 4.366 | 0.016 |
| 67 | 0:01:07.0 | 4.369 | 0.013 |
| 78 | 0:01:18.0 | 4.370 | 0.012 |
| 89 | 0:01:29.0 | 4.371 | 0.011 |
| 100 | 0:01:40.0 | 4.372 | 0.010 |
| 111 | 0:01:51.0 | 4.372 | 0.010 |
| 122 | 0:02:02.0 | 4.371 | 0.010 |
| 133 | 0:02:13.0 | 4.373 | 0.009 |
| 144 | 0:02:24.0 | 4.373 | 0.009 |
| 155 | 0:02:35.0 | 4.373 | 0.008 |
| 166 | 0:02:46.0 | 4.373 | 0.008 |
| 177 | 0:02:57.0 | 4.374 | 0.008 |
| 188 | 0:03:08.0 | 4.374 | 0.008 |
| 199 | 0:03:19.0 | 4.374 | 0.008 |
| 210 | 0:03:30.0 | 4.375 | 0.007 |
| 221 | 0:03:41.0 | 4.375 | 0.007 |
| 232 | 0:03:52.0 | 4.375 | 0.007 |
| 243 | 0:04:03.0 | 4.376 | 0.006 |
| 254 | 0:04:14.0 | 4.375 | 0.007 |
| 265 | 0:04:25.0 | 4.376 | 0.006 |
| 276 | 0:04:36.0 | 4.376 | 0.006 |
| 287 | 0:04:47.0 | 4.376 | 0.006 |
| 298 | 0:04:58.0 | 4.376 | 0.006 |
| 309 | 0:05:09.0 | 4.376 | 0.006 |
| 320 | 0:05:20.0 | 4.376 | 0.005 |
| 331 | 0:05:31.0 | 4.376 | 0.005 |
| 342 | 0:05:42.0 | 4.376 | 0.005 |
| 353 | 0:05:53.0 | 4.376 | 0.005 |
| 364 | 0:06:04.0 | 4.376 | 0.005 |
| 375 | 0:06:15.0 | 4.374 | 0.008 |
| 386 | 0:06:26.0 | 4.376 | 0.005 |
| 397 | 0:06:37.0 | 4.377 | 0.005 |
| 408 | 0:06:48.0 | 4.376 | 0.005 |
| 419 | 0:06:59.0 | 4.376 | 0.005 |
| 430 | 0:07:10.0 | 4.377 | 0.005 |



## COMPUTED

| | | |
|---|---|---|
| $L_{wetted}$ | 2.6182 | Meter |
| D = | 2.6182 | Meter |
| H = | 2.6182 | Meter |
| $L/r_w$ = | 51.85 | - |
| $y_{0\text{-DISPLACEMENT}}$ = | 0.18 | meter |
| $y_{0\text{-SLUG}}$ eff casing= | 0.08 | meter |
| $y_{0\text{-SLUG}}$ = | 0.33 | meter |
| Fully penetrate C = | 2.818 | |
| ln(Re/rw) = | 3.003 | |
| Re = | 3.34 | meter |
| Slope = | 0.01083 | $\log_{10}$/sec |
| $t_{90\%}$ recovery = | 92 | sec |

**Input is consistent.**

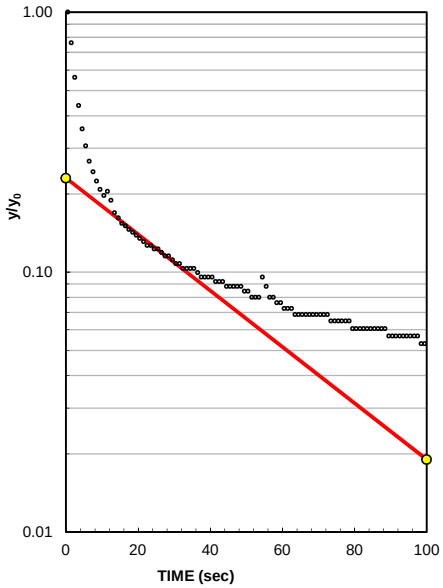
**K = 3.1 meter/day**

Observed slug discrepancy: 57%

Eff casing slug discrepancy: 77%

**K= 3.1 is greater than likely maximum of 3.05 for Medium-Grained Sandstone**

**Adjust slope of line to estimate K**




**USEPA EPA/600/R-93/202, 1994**

| | |
|---|---|
| Check that intercept is at 00:00:00 | YES |
| Intercept of straight line on Y/Yo axis | 0.23 |
| Observed drawdown (m) | 0.1849 |
| Inferred drawdown for formation (m) | 0.0425 |
| Expected displacement based on slug volume (m) | 0.3333 |
| Vol. water recharged by filter pack (m3) | 0.0006 |
| Vol. filter pack that recharged water originated from (m3) | 0.0002 |
| Specific yield of filter pack (-) | **2.74** |
| Effective casing radius (m) | 0.070 |
| Effective casing diameter (m) | **0.140** |

**Butler, 1997**

| | |
|---|---|
| Effective casing radius (m) | 0.070 |
| Effective casing diameter (m) | **0.140** |

**Check significance of varying screen length during test**

| | |
|---|---|
| Was the water level always above top of screen? | **No** |
| Displacement (yo) as % of initial saturated screen length | 7% |

**REMARKS:**

Majority of recovery occurred in first 10 seconds

Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted by URS from one developed by USGS

Changes copyright URS Infrastructure & Environment UK Ltd, 2014

| | | | | | |
|---|---|---|---|---|---|
| **Site:** | **Whitemare Pool** | **Well ID:** | **MW101** | **Test No:** | **RHT2** |
| | | | | **Date:** | **06/02/2020** |
| | | | | **Fieldwork by:** | **Georgia Bath** |
| | | | | **Processed by:** | **Sophie Doyle** |
| | | | | **Checked by:** | **Emma Peace** |
| | | | | **Test type (rising/falling):** | **Rising** |

## INPUT

| Well construction: | | |
|---|---|---|
| Drilling technique | Rotary / Percussive | |
| Bore diameter ($d_w$) | 0.101 | Meter |
| Casing diameter external | 0.063 | Meter |
| Casing diameter internal | 0.05 | Meter |
| Effective diameter ($d_c$) | 0.101 | Meter |
| Total screen length (L) | 3.7 | Meter |
| **Depths to:** | | |
| water level (DTW) | 4.3823 | Meter |
| top of screen (TOS) | 3.3 | Meter |
| base of aquifer (DTB) | 7 | Meter |
| **'Slug' details:** | | |
| length | 0.643 | Meter |
| diameter | 0.036 | Meter |
| type: | 1 part slug | |
| **Geology and annular fill materials:** | | |
| across screen -- | Gravel | |
| above screen -- | Bentonite | |
| aquifer material -- | Medium-Grained Sandsto | |

## COMPUTED

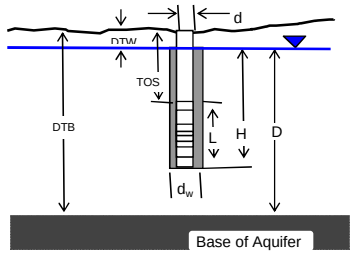
| | | |
|---|---|---|
| $L_{wetted}$ | 2.6177 | Meter |
| D = | 2.6177 | Meter |
| H = | 2.6177 | Meter |
| $L/r_w$ = | 51.84 | - |
| $y_{0\text{-DISPLACEMENT}}$ = | 0.16 | meter |
| $y_{0\text{-SLUG}}$ eff casing= | 0.08 | meter |
| $y_{0\text{-SLUG}}$ = | 0.33 | meter |
| Fully penetrate C = | 2.818 | |
| ln(Re/rw) = | 3.003 | |
| Re = | 3.34 | meter |
| Slope = | 0.005388 | $\log_{10}$/sec |
| $t_{90\%}$ recovery = | 186 | sec |

**Input is consistent.**

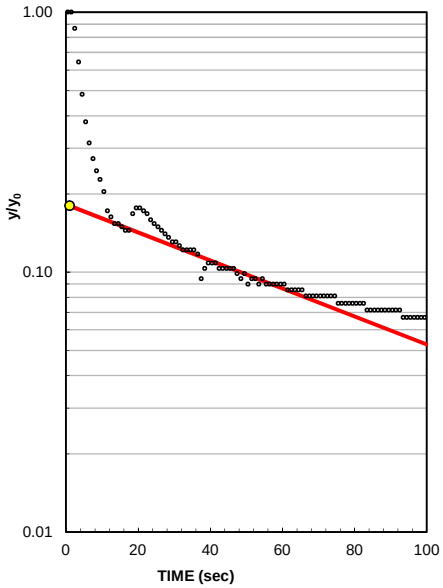
**K = 1.6 meter/day**

Observed slug discrepancy: 72%

Eff casing slug discrepancy: 63%



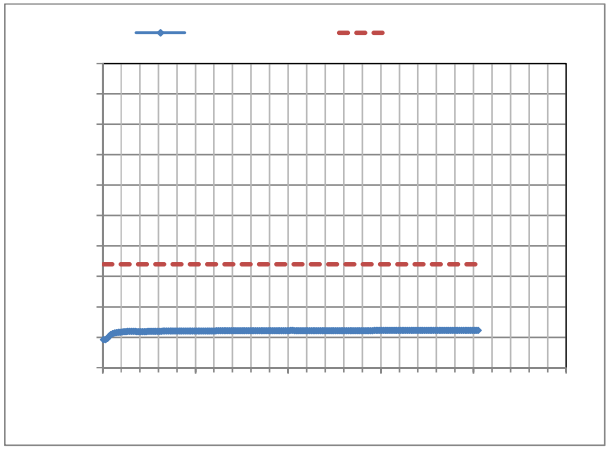

**Adjust slope of line to estimate K**




No. of data points: 203

| | Elapsed time | Water Level | Draw-down |
|---|---|---|---|
| | Hr:Min:Sec | Meter | Meter |
| Pre-start | 0:00:00.0 | 4.3823 | |
| Final obs: | 0:03:23.0 | 4.3878 | -0.0055 |

| Entry | Reduced Dataset | | |
|---|---|---|---|
| 1 | 0:00:01.0 | 4.539 | 0.157 |
| 6 | 0:00:06.0 | 4.442 | 0.059 |
| 11 | 0:00:11.0 | 4.414 | 0.032 |
| 16 | 0:00:16.0 | 4.406 | 0.023 |
| 21 | 0:00:21.0 | 4.410 | 0.028 |
| 26 | 0:00:26.0 | 4.406 | 0.023 |
| 31 | 0:00:31.0 | 4.403 | 0.020 |
| 36 | 0:00:36.0 | 4.401 | 0.019 |
| 41 | 0:00:41.0 | 4.399 | 0.017 |
| 46 | 0:00:46.0 | 4.399 | 0.016 |
| 51 | 0:00:51.0 | 4.396 | 0.014 |
| 56 | 0:00:56.0 | 4.396 | 0.014 |
| 61 | 0:01:01.0 | 4.396 | 0.014 |
| 66 | 0:01:06.0 | 4.396 | 0.013 |
| 71 | 0:01:11.0 | 4.395 | 0.013 |
| 76 | 0:01:16.0 | 4.394 | 0.012 |
| 81 | 0:01:21.0 | 4.394 | 0.012 |
| 86 | 0:01:26.0 | 4.394 | 0.011 |
| 91 | 0:01:31.0 | 4.394 | 0.011 |
| 96 | 0:01:36.0 | 4.393 | 0.010 |
| 101 | 0:01:41.0 | 4.393 | 0.010 |
| 106 | 0:01:46.0 | 4.392 | 0.010 |
| 111 | 0:01:51.0 | 4.393 | 0.010 |
| 116 | 0:01:56.0 | 4.392 | 0.010 |
| 121 | 0:02:01.0 | 4.392 | 0.010 |
| 126 | 0:02:06.0 | 4.391 | 0.009 |
| 131 | 0:02:11.0 | 4.391 | 0.009 |
| 136 | 0:02:16.0 | 4.391 | 0.009 |
| 141 | 0:02:21.0 | 4.391 | 0.009 |
| 146 | 0:02:26.0 | 4.391 | 0.009 |
| 151 | 0:02:31.0 | 4.391 | 0.008 |
| 156 | 0:02:36.0 | 4.391 | 0.008 |
| 161 | 0:02:41.0 | 4.391 | 0.008 |
| 166 | 0:02:46.0 | 4.388 | 0.005 |
| 171 | 0:02:51.0 | 4.391 | 0.008 |
| 176 | 0:02:56.0 | 4.391 | 0.008 |
| 181 | 0:03:01.0 | 4.391 | 0.008 |
| 186 | 0:03:06.0 | 4.390 | 0.008 |
| 191 | 0:03:11.0 | 4.391 | 0.008 |
| 196 | 0:03:16.0 | 4.391 | 0.008 |



**USEPA EPA/600/R-93/202, 1994**

| | |
|---|---|
| Check that intercept is at 00:00:00 | NO |
| Intercept of straight line on Y/Yo axis | 0.18 |
| Observed drawdown (m) | 0.1569 |
| Inferred drawdown for formation (m) | 0.0282 |
| Expected displacement based on slug volume (m) | 0.3333 |
| Vol. water recharged by filter pack (m3) | 0.0006 |
| Vol. filter pack that recharged water originated from (m3) | 0.0001 |
| Specific yield of filter pack (-) | **4.33** |
| Effective casing radius (m) | 0.086 |
| Effective casing diameter (m) | **0.172** |

**Butler, 1997**

| | |
|---|---|
| Effective casing radius (m) | 0.086 |
| Effective casing diameter (m) | **0.172** |

**Check significance of varying screen length during test**

| | |
|---|---|
| Was the water level always above top of screen? | **No** |
| Displacement (yo) as % of initial saturated screen length | 6% |

**REMARKS:**

Data not processed given jump in data

Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted by URS from one developed by USGS

Changes copyright URS Infrastructure & Environment UK Ltd, 2014

**Site:** Shell Whitemare Pool **Well ID:** MW102 **Test No:** RHT1

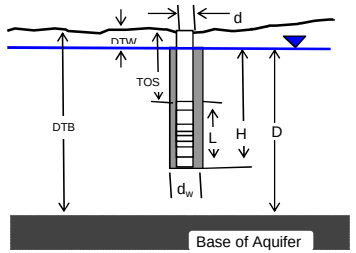
**Date:** 12/12/2019
**Fieldwork by:** LMcM
**Processed by:** LMcM / SD
**Checked by:** JL / EP
**Test type (rising/falling):** Rising

No. of data points: 792

| | Elapsed time Hr:Min:Sec | Water Level Meter | Draw-down Meter |
|---|---|---|---|
| Pre-start | 0:00:00.0 | 6.48 | |
| Final obs: | 0:13:12.0 | 6.4978 | -0.0178 |

## INPUT

| Well construction: | | |
|---|---|---|
| Drilling technique | Rotary / Percussive | |
| Bore diameter ($d_w$) | 0.101 | Meter |
| Casing diameter external | 0.063 | Meter |
| Casing diameter internal | 0.05 | Meter |
| Effective diameter ($d_c$) | 0.095 | Meter |
| Total screen length (L) | 3 | Meter |
| **Depths to:** | | |
| water level (DTW) | 6.48 | Meter |
| top of screen (TOS) | 6.5 | Meter |
| base of aquifer (DTB) | 9.5 | Meter |
| **'Slug' details:** | | |
| length | 0.91 | Meter |
| diameter | 0.038 | Meter |
| type: | Bailer | |
| **Geology and annular fill materials:** | | |
| across screen -- | Gravel | |
| above screen -- | Bentonite | |
| aquifer material -- | Medium-Grained Sandsto | |




## COMPUTED

| | | |
|---|---|---|
| $L_{wetted}$ | 3 | Meter |
| D = | 3.02 | Meter |
| H = | 3.02 | Meter |
| $L/r_w$ = | 59.41 | - |
| $y_{0\text{-DISPLACEMENT}}$ = | 0.27 | meter |
| $y_{0\text{-SLUG}}$ eff casing= | 0.14 | meter |
| $y_{0\text{-SLUG}}$ = | 0.53 | meter |
| Fully penetrate C = | 3.062 | |
| ln(Re/rw) = | 3.121 | |
| Re = | 3.76 | meter |
| Slope = | 0.001082 | $\log_{10}$/sec |
| $t_{90\%}$ recovery = | 924 | sec |

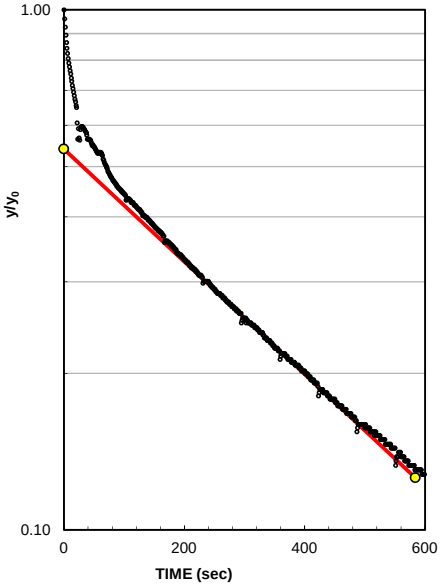
**Input is consistent.**

**K = 0.25 meter/day**

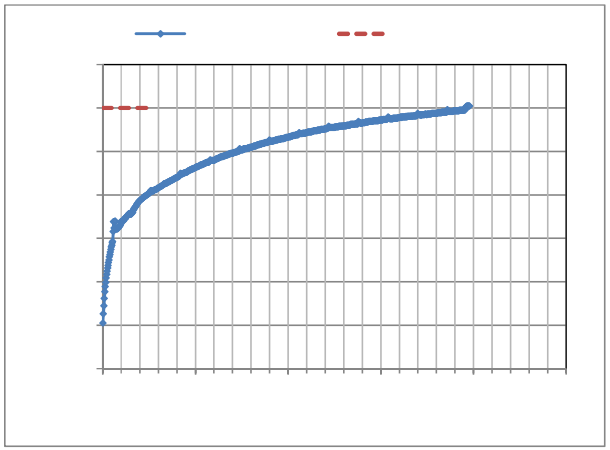
Observed slug discrepancy: 65%
Eff casing slug discrepancy: 60%

**K= 0.25 is less than likely minimum of 0.305 for Medium-Grained Sandstone**

**Adjust slope of line to estimate K**




| Entry | Reduced Dataset | | |
|---|---|---|---|
| 1 | 0:00:01.0 | 6.748 | 0.268 |
| 20 | 0:00:20.0 | 6.658 | 0.178 |
| 39 | 0:00:39.0 | 6.634 | 0.154 |
| 58 | 0:00:58.0 | 6.622 | 0.142 |
| 77 | 0:01:17.0 | 6.609 | 0.129 |
| 96 | 0:01:36.0 | 6.600 | 0.120 |
| 115 | 0:01:55.0 | 6.594 | 0.114 |
| 134 | 0:02:14.0 | 6.588 | 0.108 |
| 153 | 0:02:33.0 | 6.582 | 0.102 |
| 172 | 0:02:52.0 | 6.576 | 0.096 |
| 191 | 0:03:11.0 | 6.571 | 0.091 |
| 210 | 0:03:30.0 | 6.566 | 0.086 |
| 229 | 0:03:49.0 | 6.563 | 0.083 |
| 248 | 0:04:08.0 | 6.558 | 0.078 |
| 267 | 0:04:27.0 | 6.555 | 0.075 |
| 286 | 0:04:46.0 | 6.551 | 0.071 |
| 305 | 0:05:05.0 | 6.548 | 0.068 |
| 324 | 0:05:24.0 | 6.545 | 0.065 |
| 343 | 0:05:43.0 | 6.542 | 0.062 |
| 362 | 0:06:02.0 | 6.538 | 0.058 |
| 381 | 0:06:21.0 | 6.536 | 0.056 |
| 400 | 0:06:40.0 | 6.534 | 0.054 |
| 419 | 0:06:59.0 | 6.531 | 0.051 |
| 438 | 0:07:18.0 | 6.529 | 0.049 |
| 457 | 0:07:37.0 | 6.526 | 0.046 |
| 476 | 0:07:56.0 | 6.525 | 0.045 |
| 495 | 0:08:15.0 | 6.523 | 0.043 |
| 514 | 0:08:34.0 | 6.521 | 0.041 |
| 533 | 0:08:53.0 | 6.520 | 0.040 |
| 552 | 0:09:12.0 | 6.516 | 0.036 |
| 571 | 0:09:31.0 | 6.516 | 0.036 |
| 590 | 0:09:50.0 | 6.515 | 0.035 |
| 609 | 0:10:09.0 | 6.513 | 0.033 |
| 628 | 0:10:28.0 | 6.512 | 0.032 |
| 647 | 0:10:47.0 | 6.511 | 0.031 |
| 666 | 0:11:06.0 | 6.510 | 0.030 |
| 685 | 0:11:25.0 | 6.508 | 0.028 |
| 704 | 0:11:44.0 | 6.507 | 0.027 |
| 723 | 0:12:03.0 | 6.506 | 0.026 |
| 742 | 0:12:22.0 | 6.505 | 0.025 |



**USEPA EPA/600/R-93/202, 1994**

| | |
|---|---|
| Check that intercept is at 00:00:00 | YES |
| Intercept of straight line on Y/Yo axis | 0.54 |
| Observed drawdown (m) | 0.2677 |
| Inferred drawdown for formation (m) | 0.1446 |
| Expected displacement based on slug volume (m) | 0.5256 |
| Vol. water recharged by filter pack (m3) | 0.0007 |
| Vol. filter pack that recharged water originated from (m3) | 0.0007 |
| Specific yield of filter pack (-) | 1.06 |
| Effective casing radius (m) | 0.048 |
| Effective casing diameter (m) | 0.095 |

**Butler, 1997**

| | |
|---|---|
| Effective casing radius (m) | 0.048 |
| Effective casing diameter (m) | 0.095 |

**Check significance of varying screen length during test**

| | |
|---|---|
| Was the water level always above top of screen? | No |
| Displacement (yo) as % of initial saturated screen length | - |

**REMARKS:**

Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted by URS from one developed by USGS
Changes copyright URS Infrastructure & Environment UK Ltd, 2014

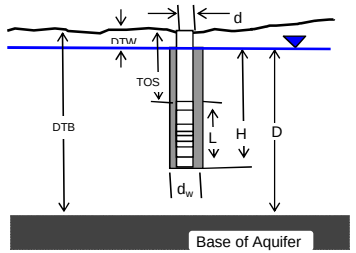
**Site:** Shell Whitemare Pool **Well ID:** MW102 **Test No:** RHT2

**Date:** 12/12/2019
**Fieldwork by:** LMcM
**Processed by:** LMcM / SD
**Checked by:** JL / EP
**Test type (rising/falling):** Rising

No. of data points: 1017

## INPUT

| Well construction: | | |
|---|---|---|
| Drilling technique | Rotary / Percussive | |
| Bore diameter ($d_w$) | 0.101 | Meter |
| Casing diameter external | 0.063 | Meter |
| Casing diameter internal | 0.05 | Meter |
| Effective diameter ($d_c$) | 0.087 | Meter |
| Total screen length (L) | 3 | Meter |
| **Depths to:** | | |
| water level (DTW) | 6.492 | Meter |
| top of screen (TOS) | 6.5 | Meter |
| base of aquifer (DTB) | 9.5 | Meter |
| **'Slug' details:** | | |
| length | 0.91 | Meter |
| diameter | 0.038 | Meter |
| type: | Bailer | |
| **Geology and annular fill materials:** | | |
| across screen -- | Gravel | |
| above screen -- | Bentonite | |
| aquifer material -- | Medium-Grained Sandsto | |




## COMPUTED

| | | |
|---|---|---|
| $L_{wetted}$ | 3 | Meter |
| D = | 3.008 | Meter |
| H = | 3.008 | Meter |
| $L/r_w$ = | 59.41 | - |
| $y_{0\text{-DISPLACEMENT}}$ = | 0.22 | meter |
| $y_{0\text{-SLUG}}$ eff casing= | 0.17 | meter |
| $y_{0\text{-SLUG}}$ = | 0.53 | meter |
| Fully penetrate C = | 3.062 | |
| ln(Re/rw) = | 3.118 | |
| Re = | 3.75 | meter |
| Slope = | 0.000795 | $\log_{10}$/sec |
| $t_{90\%}$ recovery = | 1259 | sec |

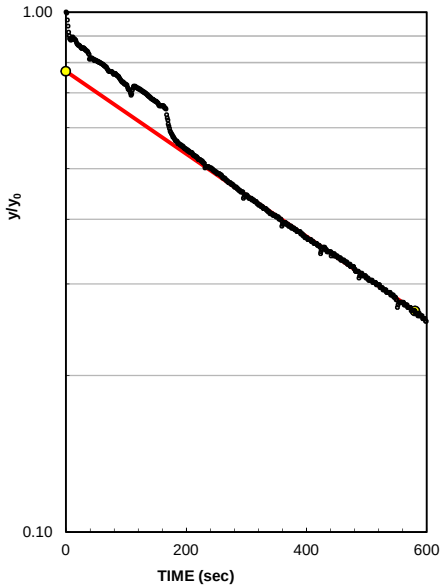
**Input is consistent.**

**K = 0.16 meter/day**

Observed slug discrepancy: 80%
Eff casing slug discrepancy: 26%

**K= 0.16 is less than likely minimum of 0.305 for Medium-Grained Sandstone**

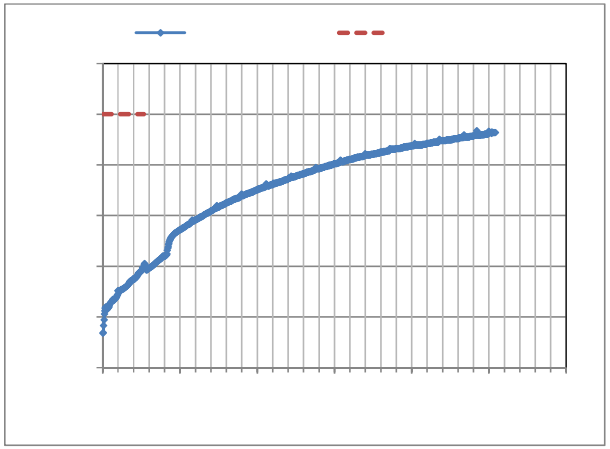
**Adjust slope of line to estimate K**




| | Elapsed time | Water Level | Draw-down |
|---|---|---|---|
| | Hr:Min:Sec | Meter | Meter |
| Pre-start | 0:00:00.0 | 6.492 | |
| Final obs: | 0:16:57.0 | 6.5162 | -0.0242 |

**Reduced Dataset**

| Entry | | | |
|---|---|---|---|
| 1 | 0:00:01.0 | 6.716 | 0.224 |
| 26 | 0:00:26.0 | 6.684 | 0.192 |
| 51 | 0:00:51.0 | 6.673 | 0.181 |
| 76 | 0:01:16.0 | 6.664 | 0.172 |
| 101 | 0:01:41.0 | 6.654 | 0.162 |
| 126 | 0:02:06.0 | 6.651 | 0.159 |
| 151 | 0:02:31.0 | 6.643 | 0.151 |
| 176 | 0:02:56.0 | 6.623 | 0.131 |
| 201 | 0:03:21.0 | 6.614 | 0.122 |
| 226 | 0:03:46.0 | 6.608 | 0.116 |
| 251 | 0:04:11.0 | 6.602 | 0.110 |
| 276 | 0:04:36.0 | 6.597 | 0.105 |
| 301 | 0:05:01.0 | 6.592 | 0.100 |
| 326 | 0:05:26.0 | 6.587 | 0.095 |
| 351 | 0:05:51.0 | 6.583 | 0.090 |
| 376 | 0:06:16.0 | 6.578 | 0.086 |
| 401 | 0:06:41.0 | 6.575 | 0.083 |
| 426 | 0:07:06.0 | 6.570 | 0.078 |
| 451 | 0:07:31.0 | 6.568 | 0.076 |
| 476 | 0:07:56.0 | 6.565 | 0.073 |
| 501 | 0:08:21.0 | 6.561 | 0.069 |
| 526 | 0:08:46.0 | 6.558 | 0.066 |
| 551 | 0:09:11.0 | 6.555 | 0.063 |
| 576 | 0:09:36.0 | 6.552 | 0.060 |
| 601 | 0:10:01.0 | 6.549 | 0.057 |
| 626 | 0:10:26.0 | 6.546 | 0.054 |
| 651 | 0:10:51.0 | 6.544 | 0.052 |
| 676 | 0:11:16.0 | 6.541 | 0.049 |
| 701 | 0:11:41.0 | 6.540 | 0.048 |
| 726 | 0:12:06.0 | 6.538 | 0.046 |
| 751 | 0:12:31.0 | 6.535 | 0.043 |
| 776 | 0:12:56.0 | 6.533 | 0.041 |
| 801 | 0:13:21.0 | 6.531 | 0.039 |
| 826 | 0:13:46.0 | 6.531 | 0.039 |
| 851 | 0:14:11.0 | 6.528 | 0.036 |
| 876 | 0:14:36.0 | 6.526 | 0.034 |
| 901 | 0:15:01.0 | 6.526 | 0.033 |
| 926 | 0:15:26.0 | 6.523 | 0.031 |
| 951 | 0:15:51.0 | 6.522 | 0.030 |
| 976 | 0:16:16.0 | 6.521 | 0.029 |



**USEPA EPA/600/R-93/202, 1994**

| | |
|---|---|
| Check that intercept is at 00:00:00 | YES |
| Intercept of straight line on Y/Yo axis | 0.77 |
| Observed drawdown (m) | 0.2243 |
| Inferred drawdown for formation (m) | 0.1727 |
| Expected displacement based on slug volume (m) | 0.5256 |
| Vol. water recharged by filter pack (m3) | 0.0007 |
| Vol. filter pack that recharged water originated from (m3) | 0.0008 |
| Specific yield of filter pack (-) | 0.82 |
| Effective casing radius (m) | 0.044 |
| Effective casing diameter (m) | 0.087 |

**Butler, 1997**

| | |
|---|---|
| Effective casing radius (m) | 0.044 |
| Effective casing diameter (m) | 0.087 |

**Check significance of varying screen length during test**

| | |
|---|---|
| Was the water level always above top of screen? | No |
| Displacement (yo) as % of initial saturated screen length | - |

**REMARKS:**

Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted by URS from one developed by USGS
Changes copyright URS Infrastructure & Environment UK Ltd, 2014

**Site:** Shell Whitemare Pool **Well ID:** MW102 **Test No:** RHT3

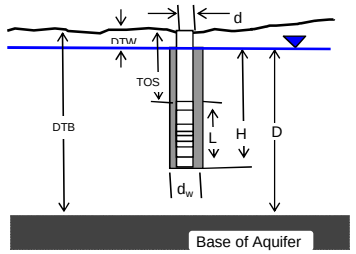
**Date:** 12/12/2019
**Fieldwork by:** LMcM
**Processed by:** LMcM / SD
**Checked by:** JL / EP
**Test type (rising/falling):** Rising

No. of data points: 842

| | Elapsed time Hr:Min:Sec | Water Level Meter | Draw-down Meter |
|---|---|---|---|
| Pre-start | 0:00:00.0 | 6.492 | |
| Final obs: | 0:14:02.0 | 6.5247 | -0.0327 |

## INPUT

| Well construction: | | |
|---|---|---|
| Drilling technique | Rotary / Percussive | |
| Bore diameter ($d_w$) | 0.101 | Meter |
| Casing diameter external | 0.063 | Meter |
| Casing diameter internal | 0.05 | Meter |
| Effective diameter ($d_c$) | 0.093 | Meter |
| Total screen length (L) | 3 | Meter |
| **Depths to:** | | |
| water level (DTW) | 6.492 | Meter |
| top of screen (TOS) | 6.5 | Meter |
| base of aquifer (DTB) | 9.5 | Meter |
| **'Slug' details:** | | |
| length | 0.91 | Meter |
| diameter | 0.038 | Meter |
| type: | Bailer | |
| **Geology and annular fill materials:** | | |
| across screen -- | Gravel | |
| above screen -- | Bentonite | |
| aquifer material -- | Medium-Grained Sandsto | |




## COMPUTED

| | | |
|---|---|---|
| $L_{wetted}$ | 3 | Meter |
| D = | 3.008 | Meter |
| H = | 3.008 | Meter |
| $L/r_w$ = | 59.41 | - |
| $y_{0\text{-DISPLACEMENT}}$ = | 0.22 | meter |
| $y_{0\text{-SLUG}}$ eff casing= | 0.15 | meter |
| $y_{0\text{-SLUG}}$ = | 0.53 | meter |
| Fully penetrate C = | 3.062 | |
| ln(Re/rw) = | 3.118 | |
| Re = | 3.75 | meter |
| Slope = | 0.00079 | $log_{10}$/sec |
| $t_{90\%}$ recovery = | 1266 | sec |

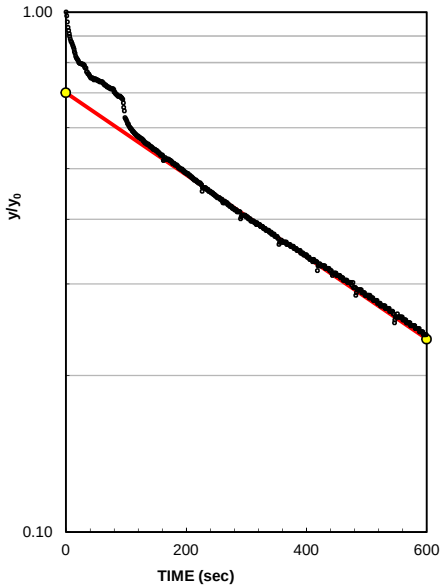
**Input is consistent.**

**K = 0.18 meter/day**

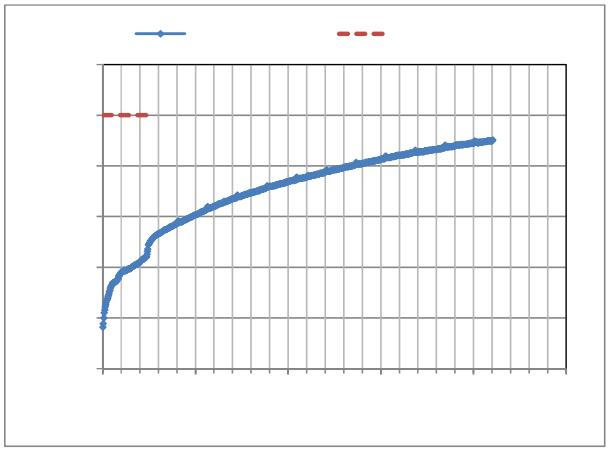
Observed slug discrepancy: 83%
Eff casing slug discrepancy: 35%

**K= 0.18 is less than likely minimum of 0.305 for Medium-Grained Sandstone**

**Adjust slope of line to estimate K**




| Entry | Reduced Dataset | | |
|---|---|---|---|
| 1 | 0:00:01.0 | 6.709 | 0.217 |
| 22 | 0:00:22.0 | 6.666 | 0.174 |
| 43 | 0:00:43.0 | 6.654 | 0.162 |
| 64 | 0:01:04.0 | 6.650 | 0.158 |
| 85 | 0:01:25.0 | 6.643 | 0.151 |
| 106 | 0:01:46.0 | 6.623 | 0.131 |
| 127 | 0:02:07.0 | 6.616 | 0.124 |
| 148 | 0:02:28.0 | 6.610 | 0.118 |
| 169 | 0:02:49.0 | 6.605 | 0.113 |
| 190 | 0:03:10.0 | 6.601 | 0.109 |
| 211 | 0:03:31.0 | 6.596 | 0.104 |
| 232 | 0:03:52.0 | 6.592 | 0.100 |
| 253 | 0:04:13.0 | 6.587 | 0.095 |
| 274 | 0:04:34.0 | 6.584 | 0.092 |
| 295 | 0:04:55.0 | 6.580 | 0.088 |
| 316 | 0:05:16.0 | 6.577 | 0.085 |
| 337 | 0:05:37.0 | 6.575 | 0.083 |
| 358 | 0:05:58.0 | 6.571 | 0.079 |
| 379 | 0:06:19.0 | 6.569 | 0.077 |
| 400 | 0:06:40.0 | 6.566 | 0.074 |
| 421 | 0:07:01.0 | 6.563 | 0.070 |
| 442 | 0:07:22.0 | 6.561 | 0.069 |
| 463 | 0:07:43.0 | 6.558 | 0.066 |
| 484 | 0:08:04.0 | 6.555 | 0.063 |
| 505 | 0:08:25.0 | 6.553 | 0.061 |
| 526 | 0:08:46.0 | 6.551 | 0.059 |
| 547 | 0:09:07.0 | 6.547 | 0.055 |
| 568 | 0:09:28.0 | 6.547 | 0.055 |
| 589 | 0:09:49.0 | 6.545 | 0.053 |
| 610 | 0:10:10.0 | 6.543 | 0.050 |
| 631 | 0:10:31.0 | 6.540 | 0.048 |
| 652 | 0:10:52.0 | 6.539 | 0.047 |
| 673 | 0:11:13.0 | 6.537 | 0.045 |
| 694 | 0:11:34.0 | 6.536 | 0.044 |
| 715 | 0:11:55.0 | 6.534 | 0.042 |
| 736 | 0:12:16.0 | 6.533 | 0.041 |
| 757 | 0:12:37.0 | 6.530 | 0.038 |
| 778 | 0:12:58.0 | 6.529 | 0.037 |
| 799 | 0:13:19.0 | 6.528 | 0.036 |
| 820 | 0:13:40.0 | 6.527 | 0.035 |



**USEPA EPA/600/R-93/202, 1994**

| | |
|---|---|
| Check that intercept is at 00:00:00 | YES |
| Intercept of straight line on Y/Yo axis | 0.70 |
| Observed drawdown (m) | 0.2171 |
| Inferred drawdown for formation (m) | 0.1520 |
| Expected displacement based on slug volume (m) | 0.5256 |
| Vol. water recharged by filter pack (m3) | 0.0007 |
| Vol. filter pack that recharged water originated from (m3) | 0.0007 |
| Specific yield of filter pack (-) | 0.99 |
| Effective casing radius (m) | 0.046 |
| Effective casing diameter (m) | 0.093 |

**Butler, 1997**

| | |
|---|---|
| Effective casing radius (m) | 0.046 |
| Effective casing diameter (m) | 0.093 |

**Check significance of varying screen length during test**

| | |
|---|---|
| Was the water level always above top of screen? | No |
| Displacement (yo) as % of initial saturated screen length | - |

**REMARKS:**

Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted by URS from one developed by USGS
Changes copyright URS Infrastructure & Environment UK Ltd, 2014

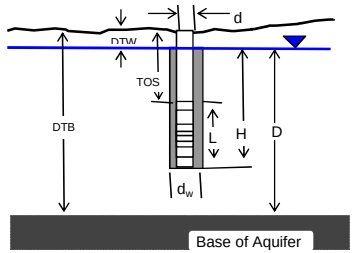
**Site:** Whitemare Pool **Well ID:** MW102 **Test No:** FHT1

**Date:** 07/02/2020
**Fieldwork by:** Georgia Bath
**Processed by:** Sophie Doyle
**Checked by:** Emma Peace
**Test type (rising/falling):** Falling

No. of data points: 3600

## INPUT

| Well construction: | | |
|---|---|---|
| Drilling technique | Rotary / Percussive | |
| Bore diameter ($d_w$) | 0.101 | Meter |
| Casing diameter external | 0.063 | Meter |
| Casing diameter internal | 0.05 | Meter |
| Effective diameter ($d_c$) | 0.068 | Meter |
| Total screen length (L) | 3 | Meter |
| **Depths to:** | | |
| water level (DTW) | 8.125 | Meter |
| top of screen (TOS) | 6.5 | Meter |
| base of aquifer (DTB) | 9.5 | Meter |
| **'Slug' details:** | | |
| length | 0.643 | Meter |
| diameter | 0.036 | Meter |
| type: | 1 part slug | |
| **Geology and annular fill materials:** | | |
| across screen -- | Gravel | |
| above screen -- | Bentonite | |
| aquifer material -- | Fine-Grained Sandstone | |




## COMPUTED

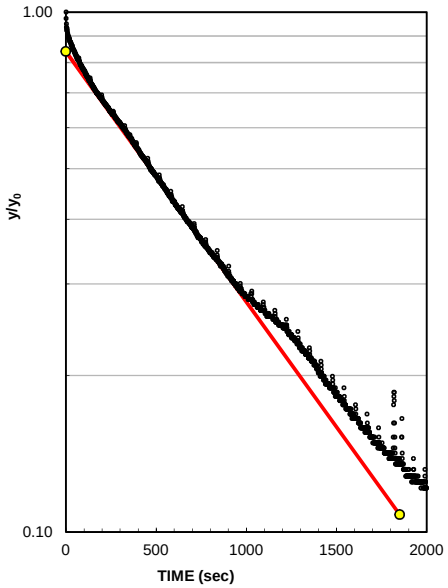
| | | |
|---|---|---|
| $L_{wetted}$ | 1.375 | Meter |
| D = | 1.375 | Meter |
| H = | 1.375 | Meter |
| $L/r_w$ = | 27.23 | - |
| $y_{0\text{-DISPLACEMENT}}$ = | 0.21 | meter |
| $y_{0\text{-SLUG}}$ eff casing= | 0.18 | meter |
| $y_{0\text{-SLUG}}$ = | 0.33 | meter |
| Fully penetrate C = | 1.980 | |
| ln(Re/rw) = | 2.465 | |
| Re = | 1.95 | meter |
| Slope = | 0.000482 | $log_{10}$/sec |
| $t_{90\%}$ recovery = | 2077 | sec |

**Input is consistent.**

**K = 0.1 meter/day**

Observed slug discrepancy: 44%
Eff casing slug discrepancy: 17%

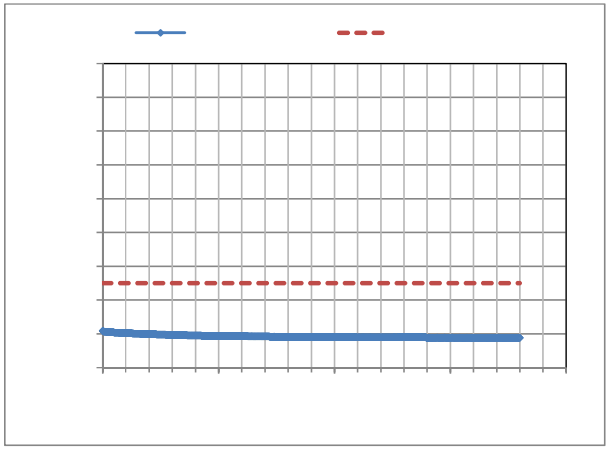
**Adjust slope of line to estimate K**




| | Elapsed time | Water Level | Draw-down |
|---|---|---|---|
| | Hr:Min:Sec | Meter | Meter |
| Pre-start | 0:00:00.0 | 8.125 | |
| Final obs: | 1:00:00.0 | 8.12489 | 0.00011 |

**Reduced Dataset**

| Entry | | | |
|---|---|---|---|
| 1 | 0:00:01.0 | 7.913 | 0.212 |
| 91 | 0:01:31.0 | 7.959 | 0.166 |
| 181 | 0:03:01.0 | 7.978 | 0.147 |
| 271 | 0:04:31.0 | 7.991 | 0.134 |
| 361 | 0:06:01.0 | 8.004 | 0.121 |
| 451 | 0:07:31.0 | 8.016 | 0.109 |
| 541 | 0:09:01.0 | 8.026 | 0.099 |
| 631 | 0:10:31.0 | 8.037 | 0.088 |
| 721 | 0:12:01.0 | 8.045 | 0.080 |
| 811 | 0:13:31.0 | 8.053 | 0.072 |
| 901 | 0:15:01.0 | 8.059 | 0.066 |
| 991 | 0:16:31.0 | 8.064 | 0.061 |
| 1081 | 0:18:01.0 | 8.068 | 0.057 |
| 1171 | 0:19:31.0 | 8.071 | 0.054 |
| 1261 | 0:21:01.0 | 8.075 | 0.050 |
| 1351 | 0:22:31.0 | 8.077 | 0.048 |
| 1441 | 0:24:01.0 | 8.084 | 0.041 |
| 1531 | 0:25:31.0 | 8.087 | 0.038 |
| 1621 | 0:27:01.0 | 8.090 | 0.035 |
| 1711 | 0:28:31.0 | 8.094 | 0.032 |
| 1801 | 0:30:01.0 | 8.095 | 0.030 |
| 1891 | 0:31:31.0 | 8.098 | 0.027 |
| 1981 | 0:33:01.0 | 8.099 | 0.027 |
| 2071 | 0:34:31.0 | 8.101 | 0.024 |
| 2161 | 0:36:01.0 | 8.103 | 0.022 |
| 2251 | 0:37:31.0 | 8.104 | 0.022 |
| 2341 | 0:39:01.0 | 8.104 | 0.021 |
| 2431 | 0:40:31.0 | 8.106 | 0.019 |
| 2521 | 0:42:01.0 | 8.107 | 0.018 |
| 2611 | 0:43:31.0 | 8.098 | 0.027 |
| 2701 | 0:45:01.0 | 8.101 | 0.024 |
| 2791 | 0:46:31.0 | 8.112 | 0.013 |
| 2881 | 0:48:01.0 | 8.114 | 0.012 |
| 2971 | 0:49:31.0 | 8.114 | 0.012 |
| 3061 | 0:51:01.0 | 8.114 | 0.011 |
| 3151 | 0:52:31.0 | 8.115 | 0.010 |
| 3241 | 0:54:01.0 | 8.115 | 0.010 |
| 3331 | 0:55:31.0 | 8.116 | 0.009 |
| 3421 | 0:57:01.0 | 8.116 | 0.009 |
| 3511 | 0:58:31.0 | 8.116 | 0.009 |



**USEPA EPA/600/R-93/202, 1994**

| | |
|---|---|
| Check that intercept is at 00:00:00 | YES |
| Intercept of straight line on Y/Yo axis | 0.84 |
| Observed drawdown (m) | 0.2124 |
| Inferred drawdown for formation (m) | 0.1784 |
| Expected displacement based on slug volume (m) | 0.3333 |
| Vol. water recharged by filter pack (m3) | 0.0003 |
| Vol. filter pack that recharged water originated from (m3) | 0.0009 |
| Specific yield of filter pack (-) | 0.35 |
| Effective casing radius (m) | 0.034 |
| Effective casing diameter (m) | 0.068 |

**Butler, 1997**

| | |
|---|---|
| Effective casing radius (m) | 0.034 |
| Effective casing diameter (m) | 0.068 |

**Check significance of varying screen length during test**

| | |
|---|---|
| Was the water level always above top of screen? | No |
| Displacement (yo) as % of initial saturated screen length | 15% |

**REMARKS:**

Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted by URS from one developed by USGS
Changes copyright URS Infrastructure & Environment UK Ltd, 2014

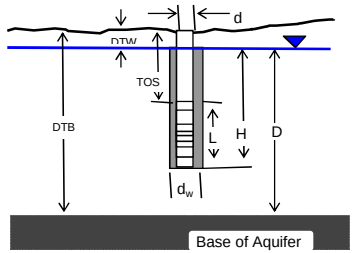
| | | | | | |
|---|---|---|---|---|---|
| **Site:** | **Whitemare Pool** | **Well ID:** | **MW102** | **Test No:** | **RHT 1** |
| | | | | **Date:** | **07/02/2020** |
| | | | | **Fieldwork by:** | **Georgia Bath** |
| | | | | **Processed by:** | **Sophie Doyle** |
| | | | | **Checked by:** | **Emma Peace** |
| | | | | **Test type (rising/falling):** | **Rising** |

No. of data points: 2182

| | Elapsed time | Water Level | Draw-down |
|---|---|---|---|
| | Hr:Min:Sec | Meter | Meter |
| Pre-start | 0:00:00.0 | 8.076 | |
| Final obs: | 0:36:22.0 | 8.07614 | -0.00014 |

## INPUT

| Well construction: | | |
|---|---|---|
| Drilling technique | Rotary / Percussive | |
| Bore diameter ($d_w$) | 0.101 | Meter |
| Casing diameter external | 0.063 | Meter |
| Casing diameter internal | 0.05 | Meter |
| Effective diameter ($d_c$) | 0.067 | Meter |
| Total screen length (L) | 3 | Meter |
| **Depths to:** | | |
| water level (DTW) | 8.076 | Meter |
| top of screen (TOS) | 6.5 | Meter |
| base of aquifer (DTB) | 9.5 | Meter |
| **'Slug' details:** | | |
| length | 0.643 | Meter |
| diameter | 0.036 | Meter |
| type: | 1 part slug | |
| **Geology and annular fill materials:** | | |
| across screen -- | Gravel | |
| above screen -- | Bentonite | |
| aquifer material -- | Fine-Grained Sandstone | |




## COMPUTED

| | | |
|---|---|---|
| $L_{wetted}$ | 1.424 | Meter |
| D = | 1.424 | Meter |
| H = | 1.424 | Meter |
| $L/r_w$ = | 28.20 | - |
| $y_{0\text{-DISPLACEMENT}}$ = | 0.30 | meter |
| $y_{0\text{-SLUG}}$ eff casing= | 0.18 | meter |
| $y_{0\text{-SLUG}}$ = | 0.33 | meter |
| Fully penetrate C = | 2.009 | |
| ln(Re/rw) = | 2.496 | |
| Re = | 2.01 | meter |
| Slope = | 0.000693 | $\log_{10}$/sec |
| $t_{90\%}$ recovery = | 1442 | sec |

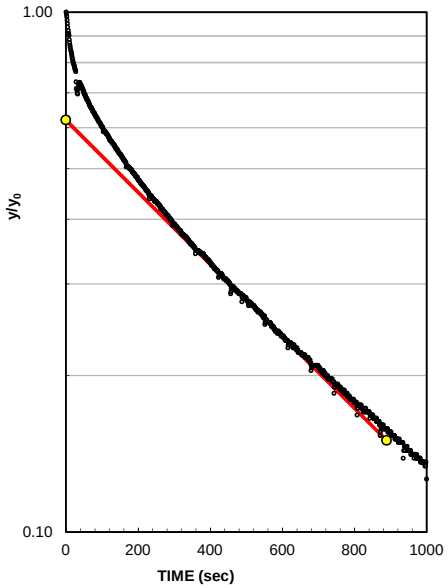
**Input is consistent.**

**K = 0.14 meter/day**

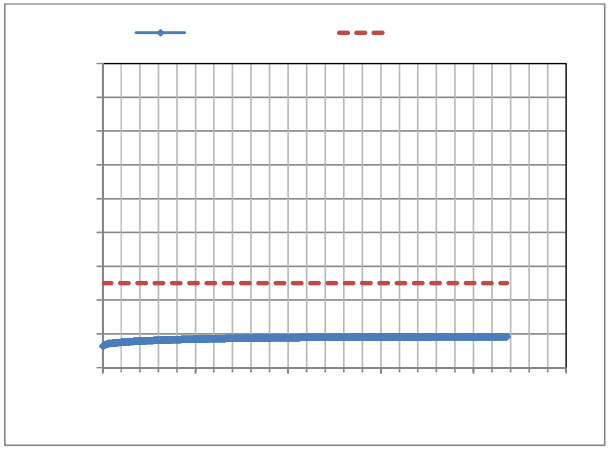
Observed slug discrepancy: 12%

Eff casing slug discrepancy: 47%

**Adjust slope of line to estimate K**




| Entry | Reduced Dataset | | |
|---|---|---|---|
| 1 | 0:00:01.0 | 8.371 | 0.295 |
| 55 | 0:00:55.0 | 8.279 | 0.203 |
| 109 | 0:01:49.0 | 8.250 | 0.174 |
| 163 | 0:02:43.0 | 8.229 | 0.153 |
| 217 | 0:03:37.0 | 8.212 | 0.136 |
| 271 | 0:04:31.0 | 8.198 | 0.122 |
| 325 | 0:05:25.0 | 8.186 | 0.110 |
| 379 | 0:06:19.0 | 8.177 | 0.101 |
| 433 | 0:07:13.0 | 8.168 | 0.092 |
| 487 | 0:08:07.0 | 8.161 | 0.085 |
| 541 | 0:09:01.0 | 8.154 | 0.078 |
| 595 | 0:09:55.0 | 8.147 | 0.071 |
| 649 | 0:10:49.0 | 8.141 | 0.065 |
| 703 | 0:11:43.0 | 8.137 | 0.061 |
| 757 | 0:12:37.0 | 8.132 | 0.056 |
| 811 | 0:13:31.0 | 8.128 | 0.052 |
| 865 | 0:14:25.0 | 8.124 | 0.048 |
| 919 | 0:15:19.0 | 8.121 | 0.045 |
| 973 | 0:16:13.0 | 8.118 | 0.042 |
| 1027 | 0:17:07.0 | 8.115 | 0.039 |
| 1081 | 0:18:01.0 | 8.111 | 0.035 |
| 1135 | 0:18:55.0 | 8.109 | 0.033 |
| 1189 | 0:19:49.0 | 8.108 | 0.032 |
| 1243 | 0:20:43.0 | 8.106 | 0.030 |
| 1297 | 0:21:37.0 | 8.104 | 0.028 |
| 1351 | 0:22:31.0 | 8.103 | 0.027 |
| 1405 | 0:23:25.0 | 8.101 | 0.025 |
| 1459 | 0:24:19.0 | 8.100 | 0.024 |
| 1513 | 0:25:13.0 | 8.098 | 0.021 |
| 1567 | 0:26:07.0 | 8.098 | 0.021 |
| 1621 | 0:27:01.0 | 8.096 | 0.020 |
| 1675 | 0:27:55.0 | 8.095 | 0.019 |
| 1729 | 0:28:49.0 | 8.094 | 0.018 |
| 1783 | 0:29:43.0 | 8.092 | 0.016 |
| 1837 | 0:30:37.0 | 8.092 | 0.016 |
| 1891 | 0:31:31.0 | 8.092 | 0.016 |
| 1945 | 0:32:25.0 | 8.091 | 0.015 |
| 1999 | 0:33:19.0 | 8.090 | 0.014 |
| 2053 | 0:34:13.0 | 8.089 | 0.013 |
| 2107 | 0:35:07.0 | 8.088 | 0.011 |



**USEPA EPA/600/R-93/202, 1994**

| | |
|---|---|
| Check that intercept is at 00:00:00 | YES |
| Intercept of straight line on Y/Yo axis | 0.62 |
| Observed drawdown (m) | 0.2950 |
| Inferred drawdown for formation (m) | 0.1829 |
| Expected displacement based on slug volume (m) | 0.3333 |
| Vol. water recharged by filter pack (m3) | 0.0003 |
| Vol. filter pack that recharged water originated from (m3) | 0.0009 |
| Specific yield of filter pack (-) | 0.33 |
| Effective casing radius (m) | 0.034 |
| Effective casing diameter (m) | 0.067 |

**Butler, 1997**

| | |
|---|---|
| Effective casing radius (m) | 0.034 |
| Effective casing diameter (m) | 0.067 |

**Check significance of varying screen length during test**

| | |
|---|---|
| Was the water level always above top of screen? | No |
| Displacement (yo) as % of initial saturated screen length | 21% |

**REMARKS:**

Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted by URS from one developed by USGS

Changes copyright URS Infrastructure & Environment UK Ltd, 2014

**Site:** Shell Whitemare Pool **Well ID:** MW109 **Test No:** RHT1

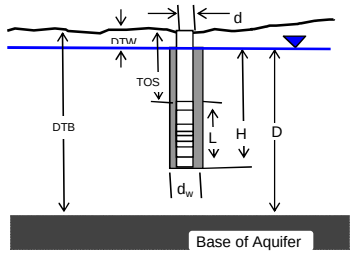
**Date:** 12/12/2019
**Fieldwork by:** LMcM
**Processed by:** LMcM / SD
**Checked by:** JL / EP
**Test type (rising/falling):** Rising

No. of data points: 1446

| | Elapsed time Hr:Min:Sec | Water Level Meter | Draw-down Meter |
|---|---|---|---|
| Pre-start | 0:00:00.0 | 6.98 | |
| Final obs: | #N/A | 7.4051 | -0.4251 |

## INPUT

| | | |
|---|---|---|
| **Well construction:** | | |
| Drilling technique | Percussive / Rotary | |
| Bore diameter ($d_w$) | 0.101 | Meter |
| Casing diameter external | 0.063 | Meter |
| Casing diameter internal | 0.05 | Meter |
| Effective diameter ($d_c$) | 0.065 | Meter |
| Total screen length (L) | 3 | Meter |
| **Depths to:** | | |
| water level (DTW) | 6.98 | Meter |
| top of screen (TOS) | 6.5 | Meter |
| base of aquifer (DTB) | 9.5 | Meter |
| **'Slug' details:** | | |
| length | 0.91 | Meter |
| diameter | 0.038 | Meter |
| type: | Bailer | |
| **Geology and annular fill materials:** | | |
| across screen -- | Gravel | |
| above screen -- | Bentonite | |
| aquifer material -- | Fine-Grained Sandstone | |




## COMPUTED

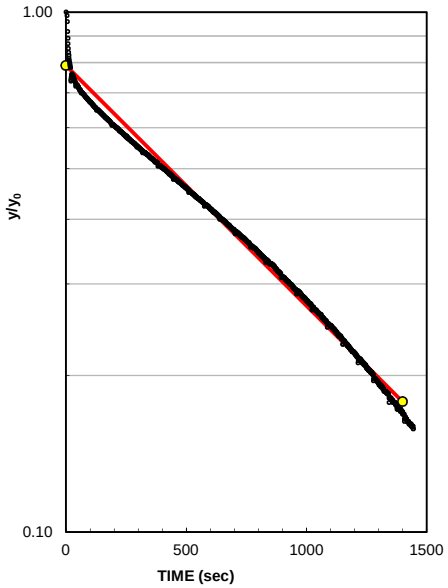
| | | |
|---|---|---|
| $L_{wetted}$ | 2.52 | Meter |
| D = | 2.52 | Meter |
| H = | 2.52 | Meter |
| $L/r_w$ = | 49.90 | - |
| $y_{0\text{-DISPLACEMENT}}$ = | 0.40 | meter |
| $y_{0\text{-SLUG}}$ eff casing= | 0.31 | meter |
| $y_{0\text{-SLUG}}$ = | 0.53 | meter |
| Fully penetrate C = | 2.750 | |
| ln(Re/rw) = | 2.972 | |
| Re = | 3.24 | meter |
| Slope = | 0.000462 | $\log_{10}$/sec |
| $t_{90\%}$ recovery = | 2163 | sec |

**Input is consistent.**

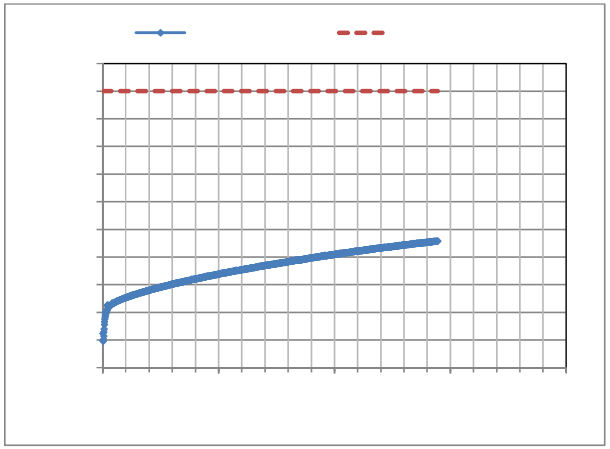
**K = 0.057 meter/day**

Observed slug discrepancy: 28%
Eff casing slug discrepancy: 24%

**Adjust slope of line to estimate K**




| Entry | Reduced Dataset | | |
|---|---|---|---|
| 1 | 0:00:01.0 | 7.377 | 0.397 |
| 37 | 0:00:37.0 | 7.273 | 0.293 |
| 73 | 0:01:13.0 | 7.256 | 0.276 |
| 109 | 0:01:49.0 | 7.245 | 0.265 |
| 145 | 0:02:25.0 | 7.234 | 0.254 |
| 181 | 0:03:01.0 | 7.225 | 0.245 |
| 217 | 0:03:37.0 | 7.217 | 0.237 |
| 253 | 0:04:13.0 | 7.209 | 0.229 |
| 289 | 0:04:49.0 | 7.202 | 0.222 |
| 325 | 0:05:25.0 | 7.194 | 0.214 |
| 361 | 0:06:01.0 | 7.187 | 0.207 |
| 397 | 0:06:37.0 | 7.180 | 0.200 |
| 433 | 0:07:13.0 | 7.174 | 0.194 |
| 469 | 0:07:49.0 | 7.167 | 0.187 |
| 505 | 0:08:25.0 | 7.162 | 0.182 |
| 541 | 0:09:01.0 | 7.155 | 0.175 |
| 577 | 0:09:37.0 | 7.149 | 0.169 |
| 613 | 0:10:13.0 | 7.144 | 0.164 |
| 649 | 0:10:49.0 | 7.139 | 0.159 |
| 685 | 0:11:25.0 | 7.134 | 0.154 |
| 721 | 0:12:01.0 | 7.129 | 0.149 |
| 757 | 0:12:37.0 | 7.123 | 0.143 |
| 793 | 0:13:13.0 | 7.118 | 0.138 |
| 829 | 0:13:49.0 | 7.113 | 0.133 |
| 865 | 0:14:25.0 | 7.109 | 0.129 |
| 901 | 0:15:01.0 | 7.103 | 0.123 |
| 937 | 0:15:37.0 | 7.099 | 0.119 |
| 973 | 0:16:13.0 | 7.095 | 0.115 |
| 1009 | 0:16:49.0 | 7.090 | 0.110 |
| 1045 | 0:17:25.0 | 7.085 | 0.105 |
| 1081 | 0:18:01.0 | 7.081 | 0.101 |
| 1117 | 0:18:37.0 | 7.078 | 0.098 |
| 1153 | 0:19:13.0 | 7.071 | 0.091 |
| 1189 | 0:19:49.0 | 7.069 | 0.089 |
| 1225 | 0:20:25.0 | 7.066 | 0.086 |
| 1261 | 0:21:01.0 | 7.061 | 0.081 |
| 1297 | 0:21:37.0 | 7.058 | 0.078 |
| 1333 | 0:22:13.0 | 7.054 | 0.074 |
| 1369 | 0:22:49.0 | 7.051 | 0.070 |
| 1405 | 0:23:25.0 | 7.047 | 0.067 |



**USEPA EPA/600/R-93/202, 1994**

| | |
|---|---|
| Check that intercept is at 00:00:00 | YES |
| Intercept of straight line on Y/Yo axis | 0.79 |
| Observed drawdown (m) | 0.3973 |
| Inferred drawdown for formation (m) | 0.3139 |
| Expected displacement based on slug volume (m) | 0.5256 |
| Vol. water recharged by filter pack (m3) | 0.0004 |
| Vol. filter pack that recharged water originated from (m3) | 0.0015 |
| Specific yield of filter pack (-) | 0.27 |
| Effective casing radius (m) | 0.032 |
| Effective casing diameter (m) | 0.065 |

**Butler, 1997**

| | |
|---|---|
| Effective casing radius (m) | 0.032 |
| Effective casing diameter (m) | 0.065 |

**Check significance of varying screen length during test**

| | |
|---|---|
| Was the water level always above top of screen? | #N/A |
| Displacement (yo) as % of initial saturated screen length | 16% |

**REMARKS:**

Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted by URS from one developed by USGS
Changes copyright URS Infrastructure & Environment UK Ltd, 2014

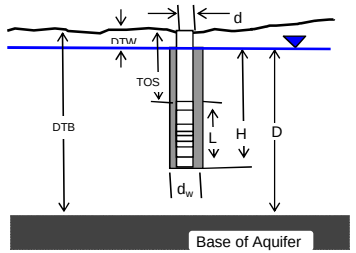
| | | | |
|---|---|---|---|
| **Site:** | **Shell Whitemare Pool** | **Well ID:** | **MW109** |
| **Test No:** | **RHT2** | | |
| **Date:** | **12/12/2019** | | |
| **Fieldwork by:** | **LMcM** | | |
| **Processed by:** | **LMcM / SD** | | |
| **Checked by:** | **JL / EP** | | |
| **Test type (rising/falling):** | **Rising** | | |

No. of data points: 1616

| | Elapsed time Hr:Min:Sec | Water Level Meter | Draw-down Meter |
|---|---|---|---|
| Pre-start | 0:00:00.0 | 6.986 | |
| Final obs: | #N/A | 7.4195 | -0.4335 |

## INPUT

| | | |
|---|---|---|
| Well construction: | | |
| Drilling technique | Percussive / Rotary | |
| Bore diameter ($d_w$) | 0.101 | Meter |
| Casing diameter external | 0.063 | Meter |
| Casing diameter internal | 0.05 | Meter |
| Effective diameter ($d_c$) | 0.066 | Meter |
| Total screen length (L) | 3 | Meter |
| Depths to: | | |
| water level (DTW) | 6.986 | Meter |
| top of screen (TOS) | 6.5 | Meter |
| base of aquifer (DTB) | 9.5 | Meter |
| 'Slug' details: | | |
| length | 0.91 | Meter |
| diameter | 0.038 | Meter |
| type: | Bailer | |
| Geology and annular fill materials: | | |
| across screen -- | Gravel | |
| above screen -- | Bentonite | |
| aquifer material -- | Fine-Grained Sandstone | |




## COMPUTED

| | | |
|---|---|---|
| $L_{wetted}$ | 2.514 | Meter |
| D = | 2.514 | Meter |
| H = | 2.514 | Meter |
| $L/r_w$ = | 49.78 | - |
| $y_{0\text{-DISPLACEMENT}}$ = | 0.40 | meter |
| $y_{0\text{-SLUG}}$ eff casing= | 0.31 | meter |
| $y_{0\text{-SLUG}}$ = | 0.53 | meter |
| Fully penetrate C = | 2.746 | |
| ln(Re/rw) = | 2.970 | |
| Re = | 3.23 | meter |
| Slope = | 0.000469 | $log_{10}$/sec |
| $t_{90\%}$ recovery = | 2130 | sec |

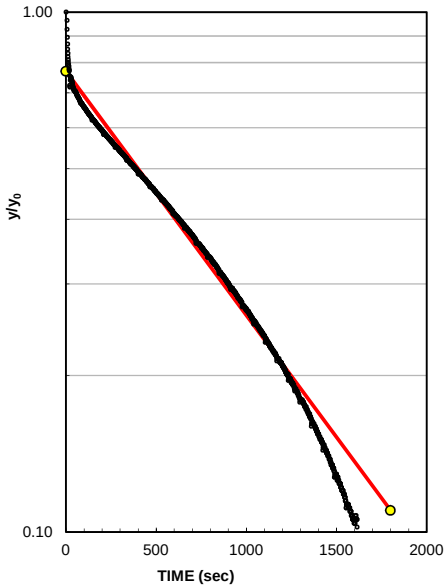
**Input is consistent.**

| | | |
|---|---|---|
| **K =** | **0.059** | **meter/day** |

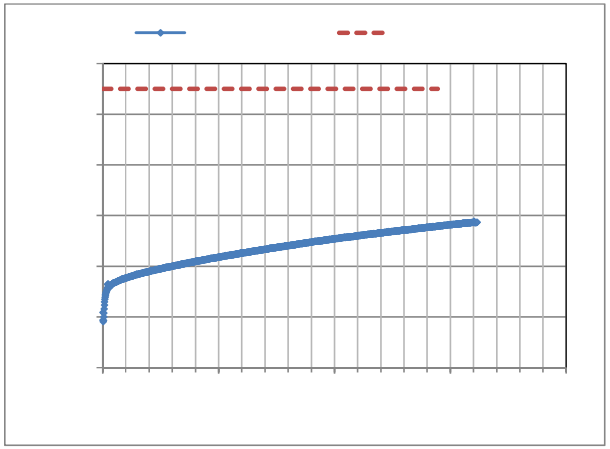
Observed slug discrepancy: 28%

Eff casing slug discrepancy: 26%

**Adjust slope of line to estimate K**




| Entry | Reduced Dataset | | |
|---|---|---|---|
| 1 | 0:00:01.0 | 7.383 | 0.396 |
| 41 | 0:00:41.0 | 7.270 | 0.284 |
| 81 | 0:01:21.0 | 7.253 | 0.267 |
| 121 | 0:02:01.0 | 7.241 | 0.255 |
| 161 | 0:02:41.0 | 7.230 | 0.244 |
| 201 | 0:03:21.0 | 7.221 | 0.235 |
| 241 | 0:04:01.0 | 7.212 | 0.226 |
| 281 | 0:04:41.0 | 7.205 | 0.219 |
| 321 | 0:05:21.0 | 7.197 | 0.211 |
| 361 | 0:06:01.0 | 7.189 | 0.203 |
| 401 | 0:06:41.0 | 7.182 | 0.196 |
| 441 | 0:07:21.0 | 7.175 | 0.189 |
| 481 | 0:08:01.0 | 7.168 | 0.182 |
| 521 | 0:08:41.0 | 7.161 | 0.175 |
| 561 | 0:09:21.0 | 7.155 | 0.169 |
| 601 | 0:10:01.0 | 7.148 | 0.162 |
| 641 | 0:10:41.0 | 7.143 | 0.157 |
| 681 | 0:11:21.0 | 7.137 | 0.151 |
| 721 | 0:12:01.0 | 7.131 | 0.145 |
| 761 | 0:12:41.0 | 7.125 | 0.139 |
| 801 | 0:13:21.0 | 7.119 | 0.133 |
| 841 | 0:14:01.0 | 7.113 | 0.127 |
| 881 | 0:14:41.0 | 7.108 | 0.122 |
| 921 | 0:15:21.0 | 7.103 | 0.117 |
| 961 | 0:16:01.0 | 7.098 | 0.112 |
| 1001 | 0:16:41.0 | 7.093 | 0.107 |
| 1041 | 0:17:21.0 | 7.087 | 0.101 |
| 1081 | 0:18:01.0 | 7.083 | 0.097 |
| 1121 | 0:18:41.0 | 7.078 | 0.092 |
| 1161 | 0:19:21.0 | 7.074 | 0.088 |
| 1201 | 0:20:01.0 | 7.069 | 0.082 |
| 1241 | 0:20:41.0 | 7.064 | 0.078 |
| 1281 | 0:21:21.0 | 7.060 | 0.074 |
| 1321 | 0:22:01.0 | 7.056 | 0.070 |
| 1361 | 0:22:41.0 | 7.051 | 0.065 |
| 1401 | 0:23:21.0 | 7.047 | 0.061 |
| 1441 | 0:24:01.0 | 7.043 | 0.057 |
| 1481 | 0:24:41.0 | 7.039 | 0.053 |
| 1521 | 0:25:21.0 | 7.035 | 0.049 |
| 1561 | 0:26:01.0 | 7.031 | 0.045 |



**USEPA EPA/600/R-93/202, 1994**

| | |
|---|---|
| Check that intercept is at 00:00:00 | YES |
| Intercept of straight line on Y/Yo axis | 0.77 |
| Observed drawdown (m) | 0.3965 |
| Inferred drawdown for formation (m) | 0.3053 |
| Expected displacement based on slug volume (m) | 0.5256 |
| Vol. water recharged by filter pack (m3) | 0.0004 |
| Vol. filter pack that recharged water originated from (m3) | 0.0015 |
| Specific yield of filter pack (-) | 0.29 |
| Effective casing radius (m) | 0.033 |
| Effective casing diameter (m) | 0.066 |

**Butler, 1997**

| | |
|---|---|
| Effective casing radius (m) | 0.033 |
| Effective casing diameter (m) | 0.066 |

**Check significance of varying screen length during test**

| | |
|---|---|
| Was the water level always above top of screen? | #N/A |
| Displacement (yo) as % of initial saturated screen length | 16% |

**REMARKS:**

Bouwer and Rice analysis of slug test, WRR 1976

Spreadsheet adapted by URS from one developed by USGS

Changes copyright URS Infrastructure & Environment UK Ltd, 2014

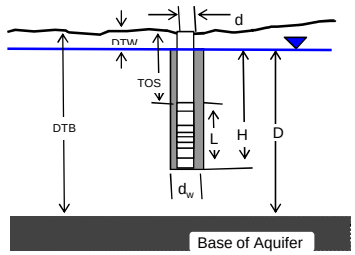
| | | | | | |
|---|---|---|---|---|---|
| **Site:** | **Shell Whitemare Pool** | **Well ID:** | **MW109** | **Test No:** | **RHT3** |
| | | | | **Date:** | **12/12/2019** |
| | | | | **Fieldwork by:** | **LMcM** |
| | | | | **Processed by:** | **LMcM / SD** |
| | | | | **Checked by:** | **JL / EP** |
| | | | | **Test type (rising/falling):** | **Rising** |

No. of data points: 1459

| | Elapsed time Hr:Min:Sec | Water Level Meter | Draw-down Meter |
|---|---|---|---|
| Pre-start | 0:00:00.0 | 6.988 | |
| Final obs: | #N/A | 7.0165 | -0.0285 |

## INPUT

| | | |
|---|---|---|
| **Well construction:** | | |
| Drilling technique | Percussive / Rotary | |
| Bore diameter ($d_w$) | 0.101 | Meter |
| Casing diameter external | 0.063 | Meter |
| Casing diameter internal | 0.05 | Meter |
| Effective diameter ($d_c$) | 0.068 | Meter |
| Total screen length (L) | 3 | Meter |
| **Depths to:** | | |
| water level (DTW) | 6.988 | Meter |
| top of screen (TOS) | 6.5 | Meter |
| base of aquifer (DTB) | 9.5 | Meter |
| **'Slug' details:** | | |
| length | 0.91 | Meter |
| diameter | 0.038 | Meter |
| type: | Bailer | |
| **Geology and annular fill materials:** | | |
| across screen -- | Gravel | |
| above screen -- | Bentonite | |
| aquifer material -- | Fine-Grained Sandstone | |




## COMPUTED

| | | |
|---|---|---|
| $L_{wetted}$ | 2.512 | Meter |
| D = | 2.512 | Meter |
| H = | 2.512 | Meter |
| $L/r_w$ = | 49.74 | - |
| $y_{0\text{-DISPLACEMENT}}$ = | 0.39 | meter |
| $y_{0\text{-SLUG}}$ eff casing= | 0.28 | meter |
| $y_{0\text{-SLUG}}$ = | 0.53 | meter |
| Fully penetrate C = | 2.744 | |
| ln(Re/rw) = | 2.970 | |
| Re = | 3.23 | meter |
| Slope = | 0.000485 | $log_{10}$/sec |
| $t_{90\%}$ recovery = | 2061 | sec |

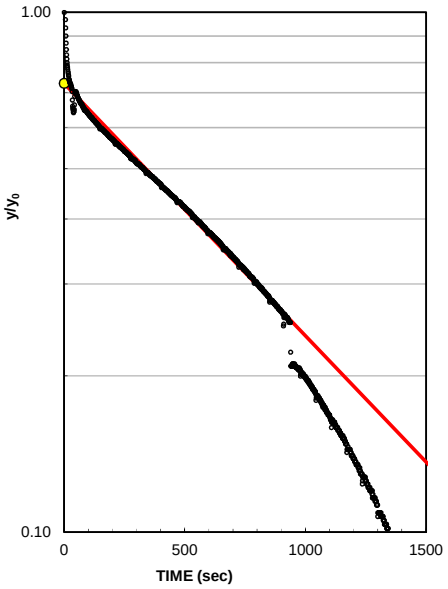
**Input is consistent.**

**K = 0.066 meter/day**

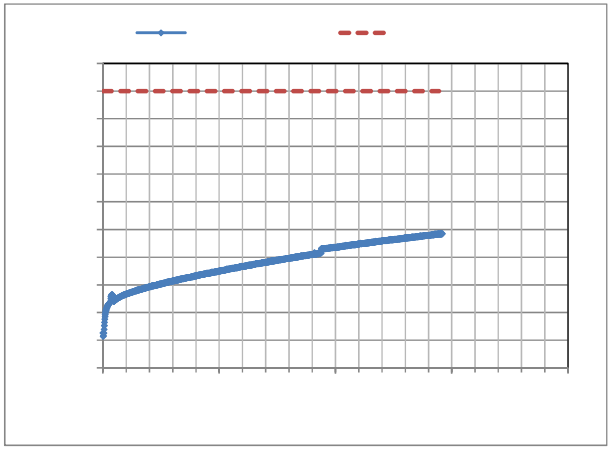
Observed slug discrepancy: 31%

Eff casing slug discrepancy: 30%

**Adjust slope of line to estimate K**




| Entry | Reduced Dataset | | |
|---|---|---|---|
| 1 | 0:00:01.0 | 7.373 | 0.385 |
| 37 | 0:00:37.0 | 7.239 | 0.251 |
| 73 | 0:01:13.0 | 7.244 | 0.256 |
| 109 | 0:01:49.0 | 7.231 | 0.243 |
| 145 | 0:02:25.0 | 7.221 | 0.233 |
| 181 | 0:03:01.0 | 7.212 | 0.224 |
| 217 | 0:03:37.0 | 7.204 | 0.216 |
| 253 | 0:04:13.0 | 7.196 | 0.208 |
| 289 | 0:04:49.0 | 7.189 | 0.201 |
| 325 | 0:05:25.0 | 7.182 | 0.194 |
| 361 | 0:06:01.0 | 7.175 | 0.187 |
| 397 | 0:06:37.0 | 7.168 | 0.180 |
| 433 | 0:07:13.0 | 7.162 | 0.174 |
| 469 | 0:07:49.0 | 7.155 | 0.167 |
| 505 | 0:08:25.0 | 7.150 | 0.162 |
| 541 | 0:09:01.0 | 7.143 | 0.155 |
| 577 | 0:09:37.0 | 7.138 | 0.150 |
| 613 | 0:10:13.0 | 7.132 | 0.144 |
| 649 | 0:10:49.0 | 7.126 | 0.138 |
| 685 | 0:11:25.0 | 7.121 | 0.133 |
| 721 | 0:12:01.0 | 7.116 | 0.128 |
| 757 | 0:12:37.0 | 7.110 | 0.122 |
| 793 | 0:13:13.0 | 7.105 | 0.117 |
| 829 | 0:13:49.0 | 7.100 | 0.112 |
| 865 | 0:14:25.0 | 7.095 | 0.107 |
| 901 | 0:15:01.0 | 7.091 | 0.103 |
| 937 | 0:15:37.0 | 7.086 | 0.098 |
| 973 | 0:16:13.0 | 7.067 | 0.079 |
| 1009 | 0:16:49.0 | 7.064 | 0.075 |
| 1045 | 0:17:25.0 | 7.058 | 0.070 |
| 1081 | 0:18:01.0 | 7.054 | 0.066 |
| 1117 | 0:18:37.0 | 7.051 | 0.063 |
| 1153 | 0:19:13.0 | 7.047 | 0.059 |
| 1189 | 0:19:49.0 | 7.043 | 0.055 |
| 1225 | 0:20:25.0 | 7.039 | 0.051 |
| 1261 | 0:21:01.0 | 7.035 | 0.047 |
| 1297 | 0:21:37.0 | 7.032 | 0.043 |
| 1333 | 0:22:13.0 | 7.028 | 0.040 |
| 1369 | 0:22:49.0 | 7.024 | 0.036 |
| 1405 | 0:23:25.0 | 7.020 | 0.032 |



**USEPA EPA/600/R-93/202, 1994**

| | |
|---|---|
| Check that intercept is at 00:00:00 | YES |
| Intercept of straight line on Y/Yo axis | 0.73 |
| Observed drawdown (m) | 0.3852 |
| Inferred drawdown for formation (m) | 0.2812 |
| Expected displacement based on slug volume (m) | 0.5256 |
| Vol. water recharged by filter pack (m3) | 0.0005 |
| Vol. filter pack that recharged water originated from (m3) | 0.0014 |
| Specific yield of filter pack (-) | 0.35 |
| Effective casing radius (m) | 0.034 |
| Effective casing diameter (m) | 0.068 |

**Butler, 1997**

| | |
|---|---|
| Effective casing radius (m) | 0.034 |
| Effective casing diameter (m) | 0.068 |

**Check significance of varying screen length during test**

| | |
|---|---|
| Was the water level always above top of screen? | #N/A |
| Displacement (yo) as % of initial saturated screen length | 15% |

**REMARKS:**

Bouwer and Rice analysis of slug test, WRR 1976
Spreadsheet adapted by URS from one developed by USGS
Changes copyright URS Infrastructure & Environment UK Ltd, 2014

# APPENDIX E STAGE 2 TABLES

| | | | 2015 GAC - Continued Petroleum Use | 2015 GAC - Commercial | Location | MW101 | | MW102 | | MW103 | MW104 | MW105 | | | MW106 | | MW107 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Average Depth (m) | 1 | 2.3 | 1 | 2.4 | 1.6 | 0.5 | 0.5 | 1.6 | 2.8 | 1.4 | 2.1 | 0.5 |
| | | | | | Date | 11/11/2019 | 22/11/2019 | 12/11/2019 | 28/11/2019 | 19/11/2019 | 11/11/2019 | 13/11/2019 | 27/11/2019 | 27/11/2019 | 26/11/2019 | 26/11/2019 | 12/11/2019 |
| | | | | | Sample Type | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal |
| | | Method Detection Limit | | | Lab Report Number | 530662 | 532862 | 530947 | 533642 | 532253 | 530662 | 531775 | 533642 | 533642 | 532862 | 532862 | 530662 |
| BTEX | | | | | | | | | | | | | | | | | |
| Benzene | mg/kg | 0.009 | 2.6[#1] | 12[#1] | | <0.009 | <0.009 | <0.009 | <0.009 | 0.0229 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 |
| Toluene | mg/kg | 0.007 | Sat[#1] | 410,000[#1] | | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 |
| Ethylbenzene | mg/kg | 0.004 | Sat[#1] | 150,000[#1] | | <0.004 | <0.004 | <0.004 | <0.004 | 0.0259 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 |
| Xylene (m & p) | mg/kg | 0.01 | | | | <0.01 | <0.01 | <0.01 | <0.01 | 0.0781 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Xylene (o) | mg/kg | 0.01 | Sat[#1] | 280,000[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | 0.0157 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Xylene Total | mg/kg | | 570[#1] | 260,000[#1] | | <0.02 | <0.02 | <0.02 | <0.02 | 0.0938 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Oxygenates | | | | | | | | | | | | | | | | | |
| Diisopropyl Ether | mg/kg | 0.001 | 35[#1] | 170[#1] | | <0.001 | <0.001 | <0.001 | <0.001 | 0.00718 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Ethyl Tert Butyl Ether | mg/kg | 0.001 | 270[#1] | 1,300[#1] | | <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 | 650[#1] | 3,100[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | 0.0179 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tert Amyl Methyl Ether | mg/kg | 0.01 | 17[#1] | 81[#1] | | <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 | 2,700[#1] | 13,000[#1] | | <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 | 0.05 | | | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| n-Hexane | mg/kg | 0.01 | 32[#1] | 160[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| PAH | | | | | | | | | | | | | | | | | |
| Acenaphthene | mg/kg | 0.008 | Sat[#1] | 110,000[#1] | | <0.008 | <0.008 | <0.008 | <0.008 | <0.008 | <0.008 | 0.0284 | <0.008 | <0.008 | <0.008 | <0.008 | 0.0223 |
| Acenaphthylene | mg/kg | 0.012 | Sat[#1] | 110,000[#1] | | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | 0.0276 |
| Anthracene | mg/kg | 0.016 | Sat[#1] | 550,000[#1] | | <0.016 | <0.016 | <0.016 | <0.016 | <0.016 | <0.016 | 0.129 | <0.016 | <0.016 | <0.016 | <0.016 | 0.0867 |
| Benzo(a)anthracene | mg/kg | 0.014 | Sat[#1] | 180[#1] | | 0.0276 | <0.014 | 0.047 | <0.014 | <0.014 | 0.0588 | 0.526 | <0.014 | <0.014 | <0.014 | <0.014 | 0.533 |
| Benzo(a)pyrene | mg/kg | 0.015 | Sat[#1] | 37[#1] | | 0.0246 | <0.015 | 0.0295 | <0.015 | <0.015 | 0.0566 | 0.378 | <0.015 | <0.015 | <0.015 | <0.015 | 0.469 |
| Benzo(b)fluoranthene | mg/kg | 0.015 | Sat[#1] | 47[#1] | | 0.0504 | 0.0264 | 0.0388 | <0.015 | <0.015 | 0.103 | 0.38 | <0.015 | <0.015 | <0.015 | <0.015 | 0.766 |
| Benzo(g,h,i)perylene | mg/kg | 0.024 | Sat[#1] | 4,100[#1] | | <0.024 | <0.024 | <0.024 | <0.024 | <0.024 | 0.05 | 0.246 | <0.024 | <0.024 | <0.024 | <0.024 | 0.39 |
| Benzo(k)fluoranthene | mg/kg | 0.014 | Sat[#1] | 1,200[#1] | | 0.0201 | <0.014 | <0.014 | <0.014 | <0.014 | 0.0444 | 0.21 | <0.014 | <0.014 | <0.014 | <0.014 | 0.312 |
| Chrysene | mg/kg | 0.01 | Sat[#1] | 370[#1] | | 0.0327 | 0.0139 | 0.0341 | <0.01 | <0.01 | 0.0681 | 0.389 | <0.01 | <0.01 | <0.01 | <0.01 | 0.515 |
| Dibenz(a,h)anthracene | mg/kg | 0.023 | Sat[#1] | 3.7[#1] | | <0.023 | <0.023 | <0.023 | <0.023 | <0.023 | <0.023 | 0.0593 | <0.023 | <0.023 | <0.023 | <0.023 | 0.0856 |
| Fluoranthene | mg/kg | 0.017 | Sat[#1] | 23,000[#1] | | 0.0501 | <0.017 | 0.0773 | <0.017 | <0.017 | 0.104 | 1.21 | <0.017 | <0.017 | <0.017 | <0.017 | 0.946 |
| Fluorene | mg/kg | 0.01 | Sat[#1] | 73,000[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.0258 | <0.01 | <0.01 | <0.01 | <0.01 | 0.024 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.018 | Sat[#1] | 530[#1] | | <0.018 | <0.018 | <0.018 | <0.018 | <0.018 | 0.0381 | 0.191 | <0.018 | <0.018 | <0.018 | <0.018 | 0.294 |
| Naphthalene | mg/kg | 0.009 | 19[#1] | 34,000[#1] | | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | 0.0109 |
| Phenanthrene | mg/kg | 0.015 | Sat[#1] | 23,000[#1] | | 0.035 | <0.015 | 0.0341 | <0.015 | <0.015 | 0.0432 | 0.578 | <0.015 | <0.015 | <0.015 | <0.015 | 0.342 |
| Pyrene | mg/kg | 0.015 | Sat[#1] | 55,000[#1] | | 0.0388 | <0.015 | 0.0623 | <0.015 | <0.015 | 0.0861 | 0.935 | <0.015 | <0.015 | <0.015 | <0.015 | 0.731 |
| PAHs (sum of 4) | mg/kg | | | | | 0.1125 | 0.0824 | 0.0948 | <0.071 | <0.071 | 0.2355 | 1.027 | <0.071 | <0.071 | <0.071 | <0.071 | 1.762 |
| PAH 16 Total | mg/kg | 0.118 | | | | 0.279 | <0.118 | 0.323 | <0.118 | <0.118 | 0.652 | 5.29 | <0.118 | <0.118 | <0.118 | <0.118 | 5.55 |
| Benzo(g,h,i)perylene + Indeno(1,2,3-cd)pyrene | mg/kg | | | | | <0.042 | <0.042 | <0.042 | <0.042 | <0.042 | 0.0881 | 0.437 | <0.042 | <0.042 | <0.042 | <0.042 | 0.684 |
| Coal tar (BaP as a surrogate) | mg/kg | | Sat[#1] | 16[#1] | | 0.0246 | <0.015 | 0.0295 | <0.015 | <0.015 | 0.0566 | 0.378 | <0.015 | <0.015 | <0.015 | <0.015 | 0.469 |
| TPH | | | | | | | | | | | | | | | | | |
| >EC5-EC7 Aromatics | mg/kg | 0.01 | Sat[#1] | 370,000[#1] | | <0.01 | <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 | Sat[#1] | 410,000[#1] | | <0.01 | <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 | 360[#1] | 34,000[#1] | | <0.01 | <0.01 | 0.0241 | <0.01 | 0.058 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >EC10-EC12 Aromatics | mg/kg | 1 | Sat[#1] | 38,000[#1] | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| >EC12-EC16 Aromatics | mg/kg | 1 | Sat[#1] | 38,000[#1] | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| >EC16-EC21 Aromatics | mg/kg | 1 | Sat[#1] | 28,000[#1] | | <1 | <1 | <1 | <1 | <1 | <1 | 3.92 | <1 | <1 | <1 | <1 | 4.92 |
| >EC21-EC35 Aromatics | mg/kg | 1 | Sat[#1] | 28,000[#1] | | 2.08 | <1 | 2 | <1 | 4.52 | 1.5 | 8.94 | <1 | 1.19 | <1 | 1.05 | 19.3 |
| >EC35-EC44 Aromatics | mg/kg | 1 | Sat[#1] | 28,000[#1] | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2.71 |
| >EC10-EC44 Aromatics | mg/kg | 5 | | | | <5 | <5 | <5 | <5 | 5.69 | <5 | 14 | <5 | <5 | <5 | <5 | 27 |
| >C5-C6 Aliphatics | mg/kg | 0.01 | Sat[#1] | 1,000,000[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | 0.0164 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >C6-C8 Aliphatics | mg/kg | 0.01 | Sat[#1] | 1,000,000[#1] | | <0.01 | <0.01 | 0.0254 | <0.01 | 0.0428 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >C8-C10 Aliphatics | mg/kg | 0.01 | Sat[#1] | 93,000[#1] | | <0.01 | <0.01 | 0.0356 | <0.01 | 0.0869 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >C10-C12 Aliphatics | mg/kg | 1 | Sat[#1] | 95,000[#1] | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| >C12-C16 Aliphatics | mg/kg | 1 | Sat[#1] | 95,000[#1] | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| >C16-C21 Aliphatics | mg/kg | 1 | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| >C21-C35 Aliphatics | mg/kg | 1 | | | | 1.28 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1.66 |
| >C35-C44 Aliphatics | mg/kg | 1 | Sat[#1] | 1,000,000[#1] | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| >C10-C44 Aliphatics | mg/kg | 5 | | | | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| >C10-C44 Aliphatics & Aromatics | mg/kg | 10 | | | | <10 | <10 | <10 | <10 | <10 | <10 | 14.9 | <10 | <10 | <10 | <10 | 29.1 |
| TPH Stage 2 HI - Human Health CPU | - | | | | | 0.00193 | 0.0019 | 0.00211 | 0.0019 | 0.00257 | 0.00191 | 0.00213 | 0.0019 | 0.0019 | 0.0019 | 0.0019 | 0.00217 |
| TPH Stage 2 HI - Human Health Commercial | - | | | | | - | - | - | - | - | - | - | - | - | - | - | - |
| SVOC | | | | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | mg/kg | 0.1 | 340[#1] | 5,300[#1] | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Bis(2-chloroisopropyl) ether | mg/kg | 0.1 | | | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Metals | | | | | | | | | | | | | | | | | |
| Arsenic | mg/kg | 0.6 | | 640[#1] | | 9.37 | 6.73 | 7.51 | 5.67 | 8.19 | 7.51 | 5.09 | 7 | 3.12 | 6.73 | 6.41 | 6.87 |
| Boron | mg/kg | 0.7 | | | | 7.38 | 6.1 | 4.61 | 7.71 | 4.79 | 4.81 | 6.39 | 8.85 | 6.33 | 5.03 | 6.36 | 8.35 |
| Cadmium | mg/kg | 0.02 | | 190[#1] | | <0.02 | <0.02 | <0.02 | 0.1 | <0.02 | <0.02 | 0.086 | 0.0446 | <0.02 | <0.02 | 0.052 | 0.0866 |
| Chromium (hexavalent) | mg/kg | 0.6 | | 33[#1] | | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 |
| Chromium (III+VI) | mg/kg | 0.9 | | | | 22.6 | 20.6 | 9.23 | 17.9 | 31.6 | 13.9 | 7.5 | 28.6 | 23.8 | 26.1 | 23.8 | 14.1 |
| Cobalt | mg/kg | 0.1 | | | | 19.8 | 13.3 | 4.07 | 13.9 | 10.2 | 9 | 3.08 | 16.5 | 21.9 | 47.5 | 15.4 | 8.45 |
| Copper | mg/kg | 1.4 | | 68,000[#1] | | 24.3 | 20 | 20.1 | 18.2 | 21 | 27 | 28.7 | 20.6 | 23.2 | 20.3 | 19.8 | 26.6 |
| Lead | mg/kg | 0.7 | | 2,300[#1] | | 48.3 | 19.2 | 55.1 | 20.2 | 19.3 | 39.2 | 51.8 | 18.8 | 3.59 | 25 | 16.7 | 54.5 |
| Mercury | mg/kg | 0.14 | | 1,100[#1] | | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 |
| Molybdenum | mg/kg | 0.1 | | | | 0.709 | 0.177 | 1.27 | 0.15 | <0.1 | 0.869 | 0.953 | 0.177 | <0.1 | 0.129 | 0.168 | 0.652 |
| Nickel | mg/kg | 0.2 | | 980[#1] | | 28.4 | 36 | 12 | 31.9 | 37.7 | 24 | 8.58 | 49.2 | 51.6 | 36 | 41 | 21 |
| Selenium | mg/kg | 1 | | 12,000[#1] | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Tin | mg/kg | 0.24 | | | | 1.95 | 0.562 | 3.24 | 0.837 | 0.764 | 2.28 | 1.04 | 0.61 | 0.547 | 0.644 | 0.617 | 3.16 |
| Zinc | mg/kg | 1.9 | | 730,000[#1] | | 77.8 | 59.1 | 62.6 | 57.5 | 57.1 | 82.7 | 109 | 59.2 | 32.3 | 71.7 | 58.6 | 84.1 |
| Asbestos | | | | | | | | | | | | | | | | | |
| Amosite Asbestos | - | | | | | 0 | - | 0 | - | - | 0 | 0 | - | - | - | - | - |
| Chrysotile Asbestos | - | | | | | 0 | - | 0 | - | - | 0 | 0 | - | - | - | - | - |
| Crocidoilite Asbestos | - | | | | | 0 | - | 0 | - | - | 0 | 0 | - | - | - | - | - |
| Fibrous Actinolite | - | | | | | 0 | - | 0 | - | - | 0 | 0 | - | - | - | - | - |
| Fibrous Anthophyllite | - | | | | | 0 | - | 0 | - | - | 0 | 0 | - | - | - | - | - |
| Fibrous Tremolite | - | | | | | 0 | - | 0 | - | - | 0 | 0 | - | - | - | - | - |
| Non-Asbestos Fibre | - | | | | | 0 | - | 0 | - | - | 1 | 0 | - | - | - | - | - |
| Misc | | | | | | | | | | | | | | | | | |
| Chloride | mg/kg | 5 | | | | - | - | - | - | - | 18.2 | - | - | - | - | - | - |
| Fraction Organic Carbon | - | 0.0002 | | | | 0.0172 | 0.0117 | 0.0185 | - | 0.00908 | - | - | - | 0.00296 | - | 0.00825 | 0.0329 |
| Moisture | % | | | | | 20 | 15 | 21 | 15 | 21 | 8.2 | 13 | 15 | 13 | 17 | 14 | 15 |
| Sulphate (soluble) | g/l | 0.004 | | | | - | - | - | - | - | 0.014 | 0.0163 | - | - | - | - | - |
| PCBs | | | | | | | | | | | | | | | | | |
| PCB 101 | mg/kg | 0.003 | | | | - | - | - | - | - | <0.003 | <0.003 | - | - | - | - | - |
| PCB 118 | mg/kg | 0.003 | | | | - | - | - | - | - | <0.003 | <0.003 | - | - | - | - | - |
| PCB 138 | mg/kg | 0.003 | | | | - | - | - | - | - | <0.003 | <0.003 | - | - | - | - | - |
| PCB 153 | mg/kg | 0.003 | | | | - | - | - | - | - | <0.003 | <0.003 | - | - | - | - | - |
| PCB 180 | mg/kg | 0.003 | | | | - | - | - | - | - | <0.003 | <0.003 | - | - | - | - | - |
| PCB 28 | mg/kg | 0.003 | | | | - | - | - | - | - | <0.003 | <0.003 | - | - | - | - | - |
| PCB 52 | mg/kg | 0.003 | | | | - | - | - | - | - | <0.003 | <0.003 | - | - | - | - | - |
| Total PCB 7 Congeners | mg/kg | 0.021 | | | | - | - | - | - | - | <0.021 | <0.021 | - | - | - | - | - |

Env Stds Comments
#1:Derived GAC for petrol filling stations

GAC: Generic Assessment Criteria
(blank): No assessment criteria available
- : Not analysed
HH GAC calculated using CLEA methodology with C4SL exposure scenarios, specifically for petrol filling stations
HH GAC based on soil properties for 'CLEA sand' and 1% SOM (0.58% TOC)
Sat: Hazard quotient at vapour saturation < 1

Key

| | |
|---|---|
| XXX | Exceedance of 2015 GAC - Continued Petroleum Use |
| XXX | Exceedance of 2015 GAC - Commercial |

| | | | 2015 GAC - Continued Petroleum Use | 2015 GAC - Commercial | Location | MW109 | | VP101 | VP102 | VP103 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Average Depth (m) | 2.4 | 3 | 0.5 | 1 | 0.5 |
| | | | | | Date | 19/11/2019 | 19/11/2019 | 11/11/2019 | 12/11/2019 | 13/11/2019 |
| | | | | | Sample Type | Normal | Normal | Normal | Normal | Normal |
| | | Method Detection Limit | | | Lab Report Number | 532253 | 532253 | 530662 | 530947 | 530947 |
| BTEX | | | | | | | | | | |
| Benzene | mg/kg | 0.009 | 2.6[#1] | 12[#1] | | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 |
| Toluene | mg/kg | 0.007 | Sat[#1] | 410,000[#1] | | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 |
| Ethylbenzene | mg/kg | 0.004 | Sat[#1] | 150,000[#1] | | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 |
| Xylene (m & p) | mg/kg | 0.01 | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Xylene (o) | mg/kg | 0.01 | Sat[#1] | 280,000[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Xylene Total | mg/kg | | 570[#1] | 260,000[#1] | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Oxygenates | | | | | | | | | | |
| Diisopropyl Ether | mg/kg | 0.001 | 35[#1] | 170[#1] | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Ethyl Tert Butyl Ether | mg/kg | 0.001 | 270[#1] | 1,300[#1] | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Methyl Tert Butyl Ether | mg/kg | 0.01 | 650[#1] | 3,100[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tert Amyl Methyl Ether | mg/kg | 0.01 | 17[#1] | 81[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tert Butyl Alcohol | mg/kg | 0.01 | 2,700[#1] | 13,000[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ethanol | mg/kg | 0.05 | | | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| n-Hexane | mg/kg | 0.01 | 32[#1] | 160[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| PAH | | | | | | | | | | |
| Acenaphthene | mg/kg | 0.008 | Sat[#1] | 110,000[#1] | | <0.008 | <0.008 | 0.0136 | <0.008 | <0.008 |
| Acenaphthylene | mg/kg | 0.012 | Sat[#1] | 110,000[#1] | | <0.012 | <0.012 | 0.0241 | <0.012 | <0.012 |
| Anthracene | mg/kg | 0.016 | Sat[#1] | 550,000[#1] | | <0.016 | <0.016 | 0.0397 | 0.0642 | <0.016 |
| Benzo(a)anthracene | mg/kg | 0.014 | Sat[#1] | 180[#1] | | <0.014 | <0.014 | 0.268 | 0.198 | 0.0276 |
| Benzo(a)pyrene | mg/kg | 0.015 | Sat[#1] | 37[#1] | | <0.015 | <0.015 | 0.238 | 0.112 | 0.0188 |
| Benzo(b)fluoranthene | mg/kg | 0.015 | Sat[#1] | 47[#1] | | 0.0198 | <0.015 | 0.432 | 0.127 | 0.0222 |
| Benzo(g,h,i)perylene | mg/kg | 0.024 | Sat[#1] | 4,100[#1] | | <0.024 | <0.024 | 0.204 | 0.0583 | <0.024 |
| Benzo(k)fluoranthene | mg/kg | 0.014 | Sat[#1] | 1,200[#1] | | <0.014 | <0.014 | 0.152 | 0.0579 | <0.014 |
| Chrysene | mg/kg | 0.01 | Sat[#1] | 370[#1] | | <0.01 | <0.01 | 0.273 | 0.138 | 0.0205 |
| Dibenz(a,h)anthracene | mg/kg | 0.023 | Sat[#1] | 3.7[#1] | | <0.023 | <0.023 | 0.044 | <0.023 | <0.023 |
| Fluoranthene | mg/kg | 0.017 | Sat[#1] | 23,000[#1] | | <0.017 | <0.017 | 0.491 | 0.455 | 0.0619 |
| Fluorene | mg/kg | 0.01 | Sat[#1] | 73,000[#1] | | <0.01 | <0.01 | 0.0161 | <0.01 | <0.01 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.018 | Sat[#1] | 530[#1] | | <0.018 | <0.018 | 0.157 | 0.0503 | <0.018 |
| Naphthalene | mg/kg | 0.009 | 19[#1] | 34,000[#1] | | <0.009 | <0.009 | 0.0485 | <0.009 | 0.0174 |
| Phenanthrene | mg/kg | 0.015 | Sat[#1] | 23,000[#1] | | <0.015 | <0.015 | 0.258 | 0.173 | 0.0357 |
| Pyrene | mg/kg | 0.015 | Sat[#1] | 55,000[#1] | | <0.015 | <0.015 | 0.389 | 0.348 | 0.049 |
| PAHs (sum of 4) | mg/kg | | | | | 0.0758 | <0.071 | 0.945 | 0.2935 | 0.0782 |
| PAH 16 Total | mg/kg | 0.118 | | | | <0.118 | <0.118 | 3.05 | 1.78 | 0.253 |
| Benzo(g,h,i)perylene + Indeno(1,2,3-cd)pyrene | mg/kg | | | | | <0.042 | <0.042 | 0.361 | 0.1086 | <0.042 |
| Coal tar (BaP as a surrogate) | mg/kg | | Sat[#1] | 16[#1] | | <0.015 | <0.015 | 0.238 | 0.112 | 0.0188 |
| TPH | | | | | | | | | | |
| >EC5-EC7 Aromatics | mg/kg | 0.01 | Sat[#1] | 370,000[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >EC7-EC8 Aromatics | mg/kg | 0.01 | Sat[#1] | 410,000[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >EC8-EC10 Aromatics | mg/kg | 0.01 | 360[#1] | 34,000[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | 0.0134 |
| >EC10-EC12 Aromatics | mg/kg | 1 | Sat[#1] | 38,000[#1] | | <1 | <1 | <1 | <1 | <1 |
| >EC12-EC16 Aromatics | mg/kg | 1 | Sat[#1] | 38,000[#1] | | <1 | <1 | <1 | <1 | <1 |
| >EC16-EC21 Aromatics | mg/kg | 1 | Sat[#1] | 28,000[#1] | | <1 | <1 | 3.84 | <1 | <1 |
| >EC21-EC35 Aromatics | mg/kg | 1 | Sat[#1] | 28,000[#1] | | 4.53 | 1.82 | 8.75 | <1 | 2.79 |
| >EC35-EC44 Aromatics | mg/kg | 1 | Sat[#1] | 28,000[#1] | | <1 | 1.29 | <1 | <1 | <1 |
| >EC10-EC44 Aromatics | mg/kg | 5 | | | | 5.85 | <5 | 14.4 | <5 | <5 |
| >C5-C6 Aliphatics | mg/kg | 0.01 | Sat[#1] | 1,000,000[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >C6-C8 Aliphatics | mg/kg | 0.01 | Sat[#1] | 1,000,000[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | 0.0179 |
| >C8-C10 Aliphatics | mg/kg | 0.01 | Sat[#1] | 93,000[#1] | | <0.01 | <0.01 | <0.01 | <0.01 | 0.0202 |
| >C10-C12 Aliphatics | mg/kg | 1 | Sat[#1] | 95,000[#1] | | <1 | <1 | <1 | <1 | <1 |
| >C12-C16 Aliphatics | mg/kg | 1 | Sat[#1] | 95,000[#1] | | <1 | <1 | <1 | <1 | 1.97 |
| >C16-C21 Aliphatics | mg/kg | 1 | | | | <1 | <1 | <1 | <1 | 10.6 |
| >C21-C35 Aliphatics | mg/kg | 1 | | | | <1 | <1 | 3 | <1 | 16.7 |
| >C35-C44 Aliphatics | mg/kg | 1 | Sat[#1] | 1,000,000[#1] | | <1 | <1 | <1 | <1 | 3.55 |
| >C10-C44 Aliphatics | mg/kg | 5 | | | | <5 | <5 | <5 | <5 | 32.8 |
| >C10-C44 Aliphatics & Aromatics | mg/kg | 10 | | | | <10 | <10 | 19.2 | <10 | 37 |
| TPH Stage 2 HI - Human Health CPU | - | | | | | 0.00202 | 0.00192 | 0.00213 | 0.0019 | 0.00215 |
| TPH Stage 2 HI - Human Health Commercial | - | | | | | - | - | - | - | - |
| SVOC | | | | | | | | | | |
| 2-Methylnaphthalene | mg/kg | 0.1 | 340[#1] | 5,300[#1] | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Bis(2-chloroisopropyl) ether | mg/kg | 0.1 | | | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Metals | | | | | | | | | | |
| Arsenic | mg/kg | 0.6 | | 640[#1] | | 6.27 | 1.9 | - | - | - |
| Boron | mg/kg | 0.7 | | | | 7.92 | 6.58 | - | - | - |
| Cadmium | mg/kg | 0.02 | | 190[#1] | | 0.0712 | <0.02 | - | - | - |
| Chromium (hexavalent) | mg/kg | 0.6 | | 33[#1] | | <0.6 | <0.6 | - | - | - |
| Chromium (III+VI) | mg/kg | 0.9 | | | | 28.7 | 31.9 | - | - | - |
| Cobalt | mg/kg | 0.1 | | | | 13.9 | 22.6 | - | - | - |
| Copper | mg/kg | 1.4 | | 68,000[#1] | | 24.7 | 32.6 | - | - | - |
| Lead | mg/kg | 0.7 | | 2,300[#1] | | 23.2 | 1.45 | - | - | - |
| Mercury | mg/kg | 0.14 | | 1,100[#1] | | <0.14 | <0.14 | - | - | - |
| Molybdenum | mg/kg | 0.1 | | | | <0.1 | <0.1 | - | - | - |
| Nickel | mg/kg | 0.2 | | 980[#1] | | 42.8 | 59.8 | - | - | - |
| Selenium | mg/kg | 1 | | 12,000[#1] | | <1 | <1 | - | - | - |
| Tin | mg/kg | 0.24 | | | | 1.43 | 0.6 | - | - | - |
| Zinc | mg/kg | 1.9 | | 730,000[#1] | | 77.8 | 58.9 | - | - | - |
| Asbestos | | | | | | | | | | |
| Amosite Asbestos | - | | | | | - | - | 0 | 0 | 0 |
| Chrysotile Asbestos | - | | | | | - | - | 0 | 0 | 0 |
| Crocidoilite Asbestos | - | | | | | - | - | 0 | 0 | 0 |
| Fibrous Actinolite | - | | | | | - | - | 0 | 0 | 0 |
| Fibrous Anthophyllite | - | | | | | - | - | 0 | 0 | 0 |
| Fibrous Tremolite | - | | | | | - | - | 0 | 0 | 0 |
| Non-Asbestos Fibre | - | | | | | - | - | 0 | 0 | 0 |
| Misc | | | | | | | | | | |
| Chloride | mg/kg | 5 | | | | - | - | - | - | - |
| Fraction Organic Carbon | - | 0.0002 | | | | 0.0126 | - | - | - | - |
| Moisture | % | | | | | 17 | 14 | 20 | 14 | 11 |
| Sulphate (soluble) | g/l | 0.004 | | | | - | - | - | - | - |
| PCBs | | | | | | | | | | |
| PCB 101 | mg/kg | 0.003 | | | | <0.003 | - | - | - | - |
| PCB 118 | mg/kg | 0.003 | | | | <0.003 | - | - | - | - |
| PCB 138 | mg/kg | 0.003 | | | | <0.003 | - | - | - | - |
| PCB 153 | mg/kg | 0.003 | | | | <0.003 | - | - | - | - |
| PCB 180 | mg/kg | 0.003 | | | | <0.003 | - | - | - | - |
| PCB 28 | mg/kg | 0.003 | | | | <0.003 | - | - | - | - |
| PCB 52 | mg/kg | 0.003 | | | | <0.003 | - | - | - | - |
| Total PCB 7 Congeners | mg/kg | 0.021 | | | | <0.021 | - | - | - | - |

Env Stds Comments
#1:Derived GAC for petrol filling stations

GAC: Generic Assessment Criteria
(blank): No assessment criteria available
- : Not analysed
HH GAC calculated using CLEA methodology with C4SL exposure scenarios, specifically for petrol filling stations
HH GAC based on soil properties for 'CLEA sand' and 1% SOM (0.58% TOC)
Sat: Hazard quotient at vapour saturation < 1

Key

| | |
|---|---|
| XXX | Exceedance of 2015 GAC - Continued Petroleum Use |
| XXX | Exceedance of 2015 GAC - Commercial |

| | | Method Detection Limit | 2015 GAC - Continued Petroleum Use | 2015 GAC - Commercial | Location | MW101 | | MW102 | | MW103 | | MW105 | MW106 | | MW109 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Well | - | | - | | - | | - | - | | - |
| | | | | | Date | 11/12/2019 | 06/02/2020 | 11/12/2019 | 06/02/2020 | 11/12/2019 | 05/02/2020 | 12/12/2019 | 11/12/2019 | 07/02/2020 | 12/12/2019 |
| | | | | | Sample Type | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal |
| | | | | | Lab Report Number | 535986 | 541873 | 535986 | 541873 | 535986 | 541873 | 535986 | 535986 | 541945 | 535986 |
| BTEX | | | | | | | | | | | | | | | |
| Benzene | µg/l | 1 | 22,000[#1] | 92,000[#1] | | <1 | <1 | 750 | 940 | <1 | <1 | <1 | 8.25 | <1 | <1 |
| Toluene | µg/l | 1 | Sat[#1] | Sat[#1] | | <1 | <1 | 69.2 | 181 | <1 | <1 | <1 | <1 | <1 | <1 |
| Ethylbenzene | µg/l | 1 | Sat[#1] | Sat[#1] | | <1 | <1 | 753 | 932 | <1 | <1 | <1 | 117 | <1 | <1 |
| Xylene (m & p) | µg/l | 1 | | | | <1 | <1 | 342 | 768 | <1 | <1 | <1 | 10.8 | 1 | <1 |
| Xylene (o) | µg/l | 1 | Sat[#1] | Sat[#1] | | <1 | <1 | 194 | 179 | <1 | <1 | <1 | 2.89 | <1 | <1 |
| Xylene Total | µg/l | | Sat[#1] | Sat[#1] | | <2 | <2 | 536 | 947 | <2 | <2 | <2 | 13.69 | 2 | <2 |
| Oxygenates | | | | | | | | | | | | | | | |
| Diisopropyl Ether | µg/l | 1 | 430,000[#1] | 1,800,000[#1] | | <1 | <1 | 4.81 | 7.47 | <1 | 1.55 | <1 | <1 | 1.75 | <1 |
| Ethyl Tert Butyl Ether | µg/l | 1 | 3,000,000[#1] | Sat[#1] | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Methyl Tert Butyl Ether | µg/l | 1 | 6,800,000[#1] | 29,000,000[#1] | | <1 | <1 | 25.8 | 30.8 | 8.19 | 16.4 | 3.18 | 1.02 | 9.99 | 1.9 |
| Tert Amyl Methyl Ether | µg/l | 1 | 200,000[#1] | 820,000[#1] | | <1 | <1 | <1 | <1 | <1 | 1.37 | <1 | <1 | <1 | <1 |
| Tert Butyl Alcohol | µg/l | 10 | 14,000,000[#1] | 68,000,000[#1] | | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Ethanol | µg/l | 50 | | | | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 |
| n-Hexane | µg/l | 2 | 17,000[#1] | Sat[#1] | | <2 | <2 | 5.75 | 9.1 | <2 | <2 | <2 | <2 | <2 | <2 |
| PAH | | | | | | | | | | | | | | | |
| Acenaphthene | µg/l | 0.005 | Sat[#1] | Sat[#1] | | <0.005 | <0.005 | 0.145 | 0.145 | <0.005 | <0.005 | <0.005 | 0.0218 | 0.0556 | <0.005 |
| Acenaphthylene | µg/l | 0.005 | Sat[#1] | Sat[#1] | | <0.005 | <0.005 | <0.005 | 0.0102 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Anthracene | µg/l | 0.005 | Sat[#1] | Sat[#1] | | <0.005 | <0.005 | 0.0219 | 0.021 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Benzo(a)anthracene | µg/l | 0.005 | Sat[#1] | Sat[#1] | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Benzo(a)pyrene | µg/l | 0.002 | Sat[#1] | Sat[#1] | | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.00549 | <0.002 | <0.002 | <0.002 | 0.00796 |
| Benzo(b)fluoranthene | µg/l | 0.005 | Sat[#1] | Sat[#1] | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.00812 | <0.005 | <0.005 | <0.005 | 0.013 |
| Benzo(g,h,i)perylene | µg/l | 0.005 | Sat[#1] | Sat[#1] | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Benzo(k)fluoranthene | µg/l | 0.005 | Sat[#1] | Sat[#1] | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.00634 |
| Chrysene | µg/l | 0.005 | Sat[#1] | Sat[#1] | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Dibenz(a,h)anthracene | µg/l | 0.005 | Sat[#1] | Sat[#1] | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Fluoranthene | µg/l | 0.005 | Sat[#1] | Sat[#1] | | <0.005 | <0.005 | <0.005 | 0.0139 | <0.005 | 0.00909 | <0.005 | <0.005 | 0.0068 | 0.0109 |
| Fluorene | µg/l | 0.005 | Sat[#1] | Sat[#1] | | <0.005 | <0.005 | 0.2 | 0.213 | <0.005 | <0.005 | <0.005 | 0.00937 | 0.0405 | <0.005 |
| Indeno(1,2,3-c,d)pyrene | µg/l | 0.005 | Sat[#1] | Sat[#1] | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Naphthalene | µg/l | 0.01 | 16,000[#1] | Sat[#1] | | <0.01 | <0.01 | 48.8 | 80.3 | <0.01 | <0.01 | <0.01 | 0.569 | 1.86 | <0.01 |
| Phenanthrene | µg/l | 0.005 | Sat[#1] | Sat[#1] | | <0.005 | <0.005 | 0.0725 | 0.0841 | <0.005 | <0.005 | <0.005 | <0.005 | 0.0113 | 0.0136 |
| Pyrene | µg/l | 0.005 | Sat[#1] | Sat[#1] | | <0.005 | <0.005 | <0.005 | 0.0119 | <0.005 | 0.0142 | <0.005 | 0.00598 | 0.00887 | 0.011 |
| PAHs (sum of 4) | µg/l | | | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02312 | <0.02 | <0.02 | <0.02 | 0.02934 |
| PAH 16 Total | µg/l | 0.082 | | | | <0.082 | <0.082 | 49.3 | 80.8 | <0.082 | <0.082 | <0.082 | 0.606 | 1.99 | <0.082 |
| Benzo(g,h,i)perylene + Indeno(1,2,3-cd)pyrene | µg/l | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Coal tar (BaP as a surrogate) | µg/l | | Sat[#1] | Sat[#1] | | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.00549 | <0.002 | <0.002 | <0.002 | 0.00796 |
| TPH | | | | | | | | | | | | | | | |
| >EC5-EC7 Aromatics | µg/l | 10 | Sat[#1] | Sat[#1] | | <10 | <10 | 688 | 904 | <10 | <10 | <10 | <10 | <10 | <10 |
| >EC7-EC8 Aromatics | µg/l | 10 | Sat[#1] | Sat[#1] | | <10 | <10 | 89 | 224 | <10 | <10 | <10 | <10 | <10 | <10 |
| >EC8-EC10 Aromatics | µg/l | 10 | Sat[#1] | Sat[#1] | | <10 | <10 | 1,780 | 2,280 | <10 | <10 | <10 | 518 | 135 | <10 |
| >EC10-EC12 Aromatics | µg/l | 10 | Sat[#1] | Sat[#1] | | <10 | <10 | 321 | 381 | <10 | <10 | <10 | 394 | 202 | <10 |
| >EC12-EC16 Aromatics | µg/l | 10 | Sat[#1] | Sat[#1] | | <10 | <10 | 32 | 53 | <10 | <10 | <10 | 51 | 25 | <10 |
| >EC16-EC21 Aromatics | µg/l | 10 | Sat[#1] | Sat[#1] | | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| >EC21-EC35 Aromatics | µg/l | 10 | Sat[#1] | Sat[#1] | | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| >C5-C6 Aliphatics | µg/l | 10 | Sat[#1] | | | <10 | <10 | 296 | 305 | <10 | <10 | <10 | 10 | 62 | <10 |
| >C6-C8 Aliphatics | µg/l | 10 | Sat[#1] | Sat[#1] | | <10 | <10 | 548 | 634 | <10 | <10 | <10 | 115 | 264 | <10 |
| >C8-C10 Aliphatics | µg/l | 10 | Sat[#1] | Sat[#1] | | <10 | <10 | 619 | 808 | <10 | <10 | <10 | 594 | 199 | <10 |
| >C10-C12 Aliphatics | µg/l | 10 | Sat[#1] | Sat[#1] | | <10 | <10 | 482 | 572 | <10 | <10 | <10 | 591 | 303 | <10 |
| >C12-C16 Aliphatics | µg/l | 10 | Sat[#1] | Sat[#1] | | <10 | <10 | 22 | <10 | <10 | <10 | <10 | 11 | <10 | <10 |
| >C16-C21 Aliphatics | µg/l | 10 | | | | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| >C21-C35 Aliphatics | µg/l | 10 | | | | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| >C5-C35 Aliphatics & Aromatics | µg/l | 10 | | | | <10 | <10 | 4,870 | 6,160 | <10 | <10 | <10 | 2,290 | 1,190 | <10 |
| TPH Stage 2 HI - Human Health CPU | - | | | | | 0.00489 | 0.00489 | 0.09352 | 0.09674 | 0.00489 | 0.00489 | 0.00489 | 0.08315 | 0.004481 | 0.00489 |
| TPH Stage 2 HI - Human Health Commercial | - | | | | | 0.00117 | 0.00117 | 0.02245 | 0.02323 | 0.00117 | 0.00117 | 0.00117 | 0.01997 | 0.01076 | 0.00117 |
| SVOC | | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | µg/l | 1 | Sat[#1] | Sat[#1] | | <1 | <1 | 8.84 | 8.09 | <1 | <10 | <1 | <2 | <10 | <4 |
| Metals | | | | | | | | | | | | | | | |
| Arsenic (Filtered) | µg/l | 0.5 | | | | 0.557 | 0.986 | 2.61 | 6.64 | 0.654 | 1.38 | <0.5 | 17.4 | 21.6 | 0.52 |
| Boron (Filtered) | µg/l | 10 | | | | 92 | 86.6 | 92.6 | 93.6 | 52.2 | 49.4 | 60.3 | 86 | 99.5 | 62 |
| Cadmium (Filtered) | µg/l | 0.08 | | | | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |
| Chromium (hexavalent) (Filtered) | µg/l | 30 | | | | <30 | <30 | <30 | <30 | <30 | <30 | <30 | <30 | <30 | <30 |
| Chromium (III+VI) (Filtered) | µg/l | 1 | | | | <1 | <1 | <1 | <1 | 2.94 | 2.02 | <1 | <1 | <1 | <1 |
| Cobalt (Filtered) | µg/l | 0.5 | | | | 0.622 | <0.5 | 1.36 | 2.79 | <0.5 | 1.62 | 0.683 | 6.13 | 5.27 | 3.25 |
| Copper (Filtered) | µg/l | 0.3 | | | | 1.55 | 5.77 | <0.3 | 1.11 | 3.03 | 2.37 | 1.04 | <0.3 | 0.69 | 1.28 |
| Lead (Filtered) | µg/l | 0.2 | | | | <0.2 | 0.287 | <0.2 | 0.679 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 0.401 |
| Mercury (Filtered) | µg/l | 0.01 | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Molybdenum (Filtered) | µg/l | 3 | | | | <3 | <3 | <3 | 11.3 | 4.06 | 3.36 | <3 | <3 | <3 | <3 |
| Nickel (Filtered) | µg/l | 0.4 | | | | 2.93 | 2.21 | 2.79 | 3.55 | 1.79 | 2 | 3.18 | 5.82 | 5 | 6.28 |
| Selenium (Filtered) | µg/l | 1 | | | | 1.28 | <1 | <1 | <1 | 1.19 | 1.05 | <1 | <1 | <1 | <1 |
| Tin (Filtered) | µg/l | 1 | | | | <1 | <1 | <1 | 3.51 | <1 | <1 | <1 | <1 | <1 | <1 |
| Zinc (Filtered) | µg/l | 1 | | | | 2.87 | 4.34 | 1.95 | 5.1 | 4.83 | 4.31 | 2.93 | 3.62 | 11 | 5.6 |

Env Stds Comments
#1:Derived GAC for petrol filling stations

GAC: Generic Assessment Criteria
(blank): No assessment criteria available
Sat: Unacceptable risk not achieved due to calculated saturation of vapour pathway
HH GAC calculated using CLEA methodology with C4SL exposure scenarios, specifically for petrol filling stations
HH GAC based on soil properties for 'CLEA sand' and 1% SOM (0.58% TOC)
Sat: Hazard quotient at vapour saturation < 1

Key

| | |
|---|---|
| XXX | Exceedance of 2015 GAC - Continued Petroleum Use |
| XXX | Exceedance of 2015 GAC - Commercial |

| | | Method Detection Limit | 2017 GAC - CW (EN/WA) DWS | Location | Active | Static |
|---|---|---|---|---|---|---|
| | | | | Well | - | - |
| | | | | Date | 10/12/2019 | 10/12/2019 |
| | | | | Sample Type | Normal | Normal |
| | | | | Lab Report Number | 535622 | 535622 |
| BTEX | | | | | | |
| Benzene | µg/l | 1 | 1 #1 | | <1 | <1 |
| Toluene | µg/l | 1 | 700 #2 | | <1 | <1 |
| Ethylbenzene | µg/l | 1 | 300 #2 | | <1 | <1 |
| Xylene (m & p) | µg/l | 1 | | | <1 | <1 |
| Xylene (o) | µg/l | 1 | | | <1 | <1 |
| Xylene Total | µg/l | | 500 #2 | | <2 | <2 |
| Oxygenates | | | | | | |
| Diisopropyl Ether | µg/l | 1 | 0.8 #3 | | <1 | <1 |
| Ethyl Tert Butyl Ether | µg/l | 1 | 13 #4 | | <1 | <1 |
| Methyl Tert Butyl Ether | µg/l | 1 | 20 #5 | | <1 | <1 |
| Tert Amyl Methyl Ether | µg/l | 1 | 130 #6 | | <1 | <1 |
| Tert Butyl Alcohol | µg/l | 10 | 1,300 #7 | | <10 | <10 |
| Ethanol | µg/l | 50 | | | <50 | <50 |
| n-Hexane | µg/l | 2 | 310 #8 | | <2 | <2 |
| PAH | | | | | | |
| Acenaphthene | µg/l | 0.005 | | | <0.005 | <0.005 |
| Acenaphthylene | µg/l | 0.005 | | | <0.005 | <0.005 |
| Anthracene | µg/l | 0.005 | | | <0.005 | <0.005 |
| Benzo(a)anthracene | µg/l | 0.005 | | | <0.005 | <0.005 |
| Benzo(a)pyrene | µg/l | 0.002 | 0.01 #9 | | <0.002 | <0.002 |
| Benzo(b)fluoranthene | µg/l | 0.005 | | | <0.005 | <0.005 |
| Benzo(g,h,i)perylene | µg/l | 0.005 | | | <0.005 | <0.005 |
| Benzo(k)fluoranthene | µg/l | 0.005 | | | <0.005 | <0.005 |
| Chrysene | µg/l | 0.005 | | | <0.005 | <0.005 |
| Dibenz(a,h)anthracene | µg/l | 0.005 | | | <0.005 | <0.005 |
| Fluoranthene | µg/l | 0.005 | 4 #2 | | <0.005 | 0.00654 |
| Fluorene | µg/l | 0.005 | | | <0.005 | <0.005 |
| Indeno(1,2,3-c,d)pyrene | µg/l | 0.005 | | | <0.005 | <0.005 |
| Naphthalene | µg/l | 0.01 | 150 #8 | | <0.01 | <0.01 |
| Phenanthrene | µg/l | 0.005 | | | <0.005 | 0.0105 |
| Pyrene | µg/l | 0.005 | | | <0.005 | <0.005 |
| PAHs (sum of 4) | µg/l | | 0.1 #1 | | <0.02 | <0.02 |
| PAH 16 Total | µg/l | 0.082 | | | <0.082 | <0.082 |
| Benzo(g,h,i)perylene + Indeno(1,2,3-cd)pyrene | µg/l | | | | <0.01 | <0.01 |
| Coal tar (BaP as a surrogate) | µg/l | | | | <0.002 | <0.002 |
| TPH | | | | | | |
| >EC5-EC7 Aromatics | µg/l | 10 | 1 #10 | | <10 | <10 |
| >EC7-EC8 Aromatics | µg/l | 10 | 700 #2 | | <10 | <10 |
| >EC8-EC10 Aromatics | µg/l | 10 | 300 #11 | | <10 | <10 |
| >EC10-EC12 Aromatics | µg/l | 10 | 90 #11 | | <10 | <10 |
| >EC12-EC16 Aromatics | µg/l | 10 | 90 #11 | | <10 | <10 |
| >EC16-EC21 Aromatics | µg/l | 10 | 90 #11 | | <10 | <10 |
| >EC21-EC35 Aromatics | µg/l | 10 | 90 #11 | | <10 | <10 |
| >C5-C6 Aliphatics | µg/l | 10 | 15,000 #11 | | <10 | <10 |
| >C6-C8 Aliphatics | µg/l | 10 | 15,000 #11 | | <10 | <10 |
| >C8-C10 Aliphatics | µg/l | 10 | 300 #11 | | <10 | <10 |
| >C10-C12 Aliphatics | µg/l | 10 | 300 #11 | | <10 | <10 |
| >C12-C16 Aliphatics | µg/l | 10 | 300 #11 | | <10 | <10 |
| >C16-C21 Aliphatics | µg/l | 10 | 300 #11 | | <10 | <10 |
| >C21-C35 Aliphatics | µg/l | 10 | | | <10 | <10 |
| >C5-C35 Aliphatics & Aromatics | µg/l | 10 | | | <10 | <10 |
| SVOC | | | | | | |
| 2-Methylnaphthalene | µg/l | 1 | 28 #8 | | <1 | <1 |
| Metals | | | | | | |
| Arsenic (Filtered) | µg/l | 0.5 | 10 #1 | | <0.5 | <0.5 |
| Boron (Filtered) | µg/l | 10 | 1,000 #1 | | <10 | <10 |
| Cadmium (Filtered) | µg/l | 0.08 | 5 #1 | | <0.08 | <0.08 |
| Chromium (hexavalent) (Filtered) | µg/l | 30 | | | <30 | <30 |
| Chromium (III+VI) (Filtered) | µg/l | 1 | 50 #1 | | <1 | <1 |
| Cobalt (Filtered) | µg/l | 0.5 | | | <0.5 | <0.5 |
| Copper (Filtered) | µg/l | 0.3 | 2,000 #1 | | 8.36 | 15.7 |
| Lead (Filtered) | µg/l | 0.2 | 10 #1 | | <0.2 | <0.2 |
| Mercury (Filtered) | µg/l | 0.01 | 1 #1 | | <0.01 | <0.01 |
| Molybdenum (Filtered) | µg/l | 3 | 70 #2 | | <3 | <3 |
| Nickel (Filtered) | µg/l | 0.4 | 20 #1 | | 1.53 | 1.45 |
| Selenium (Filtered) | µg/l | 1 | 10 #1 | | <1 | <1 |
| Tin (Filtered) | µg/l | 1 | | | <1 | <1 |
| Zinc (Filtered) | µg/l | 1 | 3,000 #2 | | 7.57 | 14.2 |

Env Stds Comments
#1:WS Regs 2016 (Eng/Wal)
#2:WHO DWG 2017
#3:Odour - Amoore and Hautala, 1983,
#4:Odour - Health Effects Institute (1996)
#5:USEPA 1997
#6:Taste - API (1993)
#7:URS dervied using API (2005) RfD & WHO DWG
#8:Shell RBSL (2014)
#9:WS Regs 2010 (Eng/Wal)
#10:WS Regs 2016 (Eng/Wal) for benzene
#11:WHO Petroleum In DW 2008

Key
XXX Exceedance of 2017 GAC - CW (EN/WA) DWS

| | | Method Detection Limit | 2015 GAC - Continued Petroleum Use | 2015 GAC - Commercial | Location | VP101 | VP102 | VP103 |
|---|---|---|---|---|---|---|---|---|
| | | | | | Well | - | - | - |
| | | | | | Date | 10/12/2019 | 11/12/2019 | 10/12/2019 |
| | | | | | Sample Type | Normal | Normal | Normal |
| | | | | | Lab Report Number | 535622 | 535622 | 535622 |
| BTEX | | | | | | | | |
| Benzene | mg/m3 | 0.00667 | 48[#1] | 230[#1] | | 0.01 | 0.0116 | <0.00667 |
| Toluene | mg/m3 | | 50,000[#1] | Sat[#1] | | 0.0337 | 0.0408 | 0.223 |
| Ethylbenzene | mg/m3 | | 2,700[#1] | 13,000[#1] | | 0.0372 | 0.0137 | 0.0232 |
| Xylene (m & p) | mg/m3 | | | | | 0.128 | 0.0487 | 0.0815 |
| Xylene (o) | mg/m3 | | 2,200[#1] | 11,000[#1] | | 0.0493 | 0.0179 | 0.0319 |
| Xylene Total | mg/m3 | | 2,200[#1] | 11,000[#1] | | 0.1773 | 0.0666 | 0.1134 |
| Oxygenates | | | | | | | | |
| Diisopropyl Ether | mg/m3 | 0.0133 | 4,300[#1] | 21,000[#1] | | <0.0133 | <0.0133 | <0.0133 |
| Ethyl Tert Butyl Ether | mg/m3 | 0.0133 | 20,000[#1] | 99,000[#1] | | <0.0133 | <0.0133 | <0.0133 |
| Methyl Tert Butyl Ether | mg/m3 | 0.0133 | 26,000[#1] | 130,000[#1] | | <0.0133 | <0.0133 | 0.0173 |
| Tert Amyl Methyl Ether | mg/m3 | 0.0133 | 2,000[#1] | 9,800[#1] | | <0.0133 | <0.0133 | <0.0133 |
| n-Hexane | mg/m3 | | 6,500[#1] | 32,000[#1] | | 0.0382 | 0.0179 | 0.185 |
| PAH | | | | | | | | |
| Naphthalene | mg/m3 | 0.00533 | 31[#1] | Sat[#1] | | <0.00533 | <0.00533 | <0.00533 |
| SVOC | | | | | | | | |
| 1-Methylnaphthalene | mg/m3 | 0.0107 | 91[#1] | Sat[#1] | | <0.0107 | <0.0107 | <0.0107 |
| Gas VOC | | | | | | | | |
| Decane | mg/m3 | | | | | 0.22 | 0.0818 | 0.131 |
| Dodecane | mg/m3 | 0.008 | | | | <0.008 | <0.008 | <0.008 |
| Octane | mg/m3 | | | | | 0.0185 | 0.00713 | 0.0128 |
| GRO_C6-C12 | mg/m3 | | | | | 12.8 | 5.7 | 8.55 |
| Other | | | | | | | | |
| 1,2,3-trimethylbenzene | mg/m3 | 0.008 | | | | 0.0123 | <0.008 | 0.00883 |

Env Stds Comments
#1:URS derived GAC for petrol filling stations

GAC: Generic Assessment Criteria
(blank): No assessment criteria available
Sat: Unacceptable risk not achieved due to calculated saturation of vapour pathway
HH GAC calculated using CLEA methodology with C4SL exposure scenarios, specifically for petrol filling stations
HH GAC based on soil properties for 'CLEA sand' and 1% SOM (0.58% TOC)
Sat: Hazard quotient at vapour saturation < 1

Key

| | |
|---|---|
| XXX | Exceedance of 2015 GAC - Continued Petroleum Use |
| XXX | Exceedance of 2015 GAC - Commercial |

| | | | 2017 GAC - CW (EN/WA) DWS - 1% TOC | 2016 GAC - CW (EN/WA) EQS (Fresh) - 1% TOC | Location | MW101 | | MW102 | | MW103 | MW104 | MW105 | | | MW106 | | MW107 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Average Depth (m) | 1 | 2.3 | 1 | 2.4 | 1.6 | 0.5 | 0.5 | 1.6 | 2.8 | 1.4 | 2.1 | 0.5 |
| | | | | | Date | 11/11/2019 | 22/11/2019 | 12/11/2019 | 28/11/2019 | 19/11/2019 | 11/11/2019 | 13/11/2019 | 27/11/2019 | 27/11/2019 | 26/11/2019 | 26/11/2019 | 12/11/2019 |
| | | | | | Sample Type | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal |
| | | Method Detection Limit | | | Lab Report Number | 530662 | 532862 | 530947 | 533642 | 532253 | 530662 | 531775 | 533642 | 533642 | 532862 | 532862 | 530662 |
| BTEX | | | | | | | | | | | | | | | | | |
| Benzene | mg/kg | 0.009 | 0.0007[#1] | 0.0073[#2] | | <0.009 | <0.009 | <0.009 | <0.009 | 0.0229 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 |
| Toluene | mg/kg | 0.007 | 1.4672[#3] | 0.155[#2] | | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 |
| Ethylbenzene | mg/kg | 0.004 | 1.3572[#3] | 0.0905[#4] | | <0.004 | <0.004 | <0.004 | <0.004 | 0.0259 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 |
| Xylene (m & p) | mg/kg | 0.01 | | | | <0.01 | <0.01 | <0.01 | <0.01 | 0.0781 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Xylene (o) | mg/kg | 0.01 | | | | <0.01 | <0.01 | <0.01 | <0.01 | 0.0157 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Xylene Total | mg/kg | | 2.2944[#8] | 0.1377[#4] | | <0.02 | <0.02 | <0.02 | <0.02 | 0.0938 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Oxygenates | | | | | | | | | | | | | | | | | |
| Diisopropyl Ether | mg/kg | 0.001 | 0.0004[#6] | 0.0882[#6] | | <0.001 | <0.001 | <0.001 | <0.001 | 0.00718 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Ethyl Tert Butyl Ether | mg/kg | 0.001 | 0.0065[#7] | 0.2559[#6] | | <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 | 0.0076[#6] | 1.9436[#6] | | <0.01 | <0.01 | <0.01 | <0.01 | 0.0179 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tert Amyl Methyl Ether | mg/kg | 0.01 | 0.0656[#6] | 0.2573[#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 |
| Tert Butyl Alcohol | mg/kg | 0.01 | 0.6701[#10] | 0.5933[#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 |
| Ethanol | mg/kg | 0.05 | | | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| n-Hexane | mg/kg | 0.01 | 3.1198[#11] | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| PAH | | | | | | | | | | | | | | | | | |
| Acenaphthene | mg/kg | 0.008 | | | | <0.008 | <0.008 | <0.008 | <0.008 | <0.008 | <0.008 | 0.0284 | <0.008 | <0.008 | <0.008 | <0.008 | 0.0223 |
| Acenaphthylene | mg/kg | 0.012 | | | | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | <0.012 | 0.0276 |
| Anthracene | mg/kg | 0.016 | | 0.0056[#2] | | <0.016 | <0.016 | <0.016 | <0.016 | <0.016 | <0.016 | 0.129 | <0.016 | <0.016 | <0.016 | <0.016 | 0.0867 |
| Benzo(a)anthracene | mg/kg | 0.014 | | | | 0.0276 | <0.014 | 0.047 | <0.014 | <0.014 | 0.0588 | 0.526 | <0.014 | <0.014 | <0.014 | <0.014 | 0.533 |
| Benzo(a)pyrene | mg/kg | 0.015 | 0.0129[#12] | 0.000219[#2] | | 0.0246 | <0.015 | 0.0295 | <0.015 | <0.015 | 0.0566 | 0.378 | <0.015 | <0.015 | <0.015 | <0.015 | 0.469 |
| Benzo(b)fluoranthene | mg/kg | 0.015 | | 0.0178[#2] | | 0.0504 | 0.0264 | 0.0388 | <0.015 | <0.015 | 0.103 | 0.38 | <0.015 | <0.015 | <0.015 | <0.015 | 0.766 |
| Benzo(g,h,i)perylene | mg/kg | 0.024 | | 0.0342[#2] | | <0.024 | <0.024 | <0.024 | <0.024 | <0.024 | 0.05 | 0.246 | <0.024 | <0.024 | <0.024 | <0.024 | 0.39 |
| Benzo(k)fluoranthene | mg/kg | 0.014 | | 0.0251[#2] | | 0.0201 | <0.014 | <0.014 | <0.014 | <0.014 | 0.0444 | 0.21 | <0.014 | <0.014 | <0.014 | <0.014 | 0.312 |
| Chrysene | mg/kg | 0.01 | | | | 0.0327 | 0.0139 | 0.0341 | <0.01 | <0.01 | 0.0681 | 0.389 | <0.01 | <0.01 | <0.01 | <0.01 | 0.515 |
| Dibenz(a,h)anthracene | mg/kg | 0.023 | | | | <0.023 | <0.023 | <0.023 | <0.023 | <0.023 | <0.023 | 0.0593 | <0.023 | <0.023 | <0.023 | <0.023 | 0.0856 |
| Fluoranthene | mg/kg | 0.017 | 0.73[#3] | 0.00115[#2] | | 0.0501 | <0.017 | 0.0773 | <0.017 | <0.017 | 0.104 | 1.21 | <0.017 | <0.017 | <0.017 | <0.017 | 0.946 |
| Fluorene | mg/kg | 0.01 | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 0.0258 | <0.01 | <0.01 | <0.01 | <0.01 | 0.024 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.018 | | | | <0.018 | <0.018 | <0.018 | <0.018 | <0.018 | 0.0381 | 0.191 | <0.018 | <0.018 | <0.018 | <0.018 | 0.294 |
| Naphthalene | mg/kg | 0.009 | 0.9746[#11] | 0.013[#2] | | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 | 0.0109 |
| Phenanthrene | mg/kg | 0.015 | | | | 0.035 | <0.015 | 0.0341 | <0.015 | <0.015 | 0.0432 | 0.578 | <0.015 | <0.015 | <0.015 | <0.015 | 0.342 |
| Pyrene | mg/kg | 0.015 | | | | 0.0388 | <0.015 | 0.0623 | <0.015 | <0.015 | 0.0861 | 0.935 | <0.015 | <0.015 | <0.015 | <0.015 | 0.731 |
| PAHs (sum of 4) | mg/kg | | 0.0871[#1] | | | 0.1125 | 0.0824 | 0.0948 | <0.071 | <0.071 | 0.2355 | 1.027 | <0.071 | <0.071 | <0.071 | <0.071 | 1.762 |
| PAH 16 Total | mg/kg | 0.118 | | | | 0.279 | <0.118 | 0.323 | <0.118 | <0.118 | 0.652 | 5.29 | <0.118 | <0.118 | <0.118 | <0.118 | 5.55 |
| Benzo(g,h,i)perylene + Indeno(1,2,3-cd)pyrene | mg/kg | | | | | <0.042 | <0.042 | <0.042 | <0.042 | <0.042 | 0.0881 | 0.437 | <0.042 | <0.042 | <0.042 | <0.042 | 0.684 |
| Coal tar (BaP as a surrogate) | mg/kg | | | | | 0.0246 | <0.015 | 0.0295 | <0.015 | <0.015 | 0.0566 | 0.378 | <0.015 | <0.015 | <0.015 | <0.015 | 0.469 |
| TPH | | | | | | | | | | | | | | | | | |
| >EC5-EC7 Aromatics | mg/kg | 0.01 | 0.0007[#13] | 0.0073[#2] | | <0.01 | <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 | 1.4672[#14] | 0.155[#2] | | <0.01 | <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 | 4.776[#15] | | | <0.01 | <0.01 | 0.0241 | <0.01 | 0.058 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >EC10-EC12 Aromatics | mg/kg | 1 | 2.2651[#15] | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| >EC12-EC16 Aromatics | mg/kg | 1 | 4.5145[#15] | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| >EC16-EC21 Aromatics | mg/kg | 1 | 12.7165[#15] | | | <1 | <1 | <1 | <1 | <1 | <1 | 3.92 | <1 | <1 | <1 | <1 | 4.92 |
| >EC21-EC35 Aromatics | mg/kg | 1 | Sat[#15] | | | 2.08 | <1 | 2 | <1 | 4.52 | 1.5 | 8.94 | <1 | 1.19 | <1 | 1.05 | 19.3 |
| >EC35-EC44 Aromatics | mg/kg | 1 | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 2.71 |
| >EC10-EC44 Aromatics | mg/kg | 5 | | | | <5 | <5 | <5 | <5 | 5.69 | <5 | 14 | <5 | <5 | <5 | <5 | 27 |
| >C5-C6 Aliphatics | mg/kg | 0.01 | 160.6343[#15] | | | <0.01 | <0.01 | <0.01 | <0.01 | 0.0164 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >C6-C8 Aliphatics | mg/kg | 0.01 | 620.4262[#15] | | | <0.01 | <0.01 | 0.0254 | <0.01 | 0.0428 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >C8-C10 Aliphatics | mg/kg | 0.01 | 92.1167[#15] | | | <0.01 | <0.01 | 0.0356 | <0.01 | 0.0869 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >C10-C12 Aliphatics | mg/kg | 1 | 721.9991[#15] | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| >C12-C16 Aliphatics | mg/kg | 1 | Sat[#15] | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| >C16-C21 Aliphatics | mg/kg | 1 | Sat[#15] | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| >C21-C35 Aliphatics | mg/kg | 1 | | | | 1.28 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 1.66 |
| >C35-C44 Aliphatics | mg/kg | 1 | | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| >C10-C44 Aliphatics | mg/kg | 5 | | | | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| >C10-C44 Aliphatics & Aromatics | mg/kg | 10 | | | | <10 | <10 | <10 | <10 | <10 | <10 | 14.9 | <10 | <10 | <10 | <10 | 29.1 |
| SVOC | | | | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | mg/kg | 0.1 | 0.6137[#11] | | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Bis(2-chloroisopropyl) ether | mg/kg | 0.1 | | | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Metals | | | | | | | | | | | | | | | | | |
| Arsenic | mg/kg | 0.6 | 5[#1] | 25[#2] | | 9.37 | 6.73 | 7.51 | 5.67 | 8.19 | 7.51 | 5.09 | 7 | 3.12 | 6.73 | 6.41 | 6.87 |
| Boron | mg/kg | 0.7 | 10[#1] | 20[#4] | | 7.38 | 6.1 | 4.61 | 7.71 | 4.79 | 4.81 | 6.39 | 8.85 | 6.33 | 5.03 | 6.36 | 8.35 |
| Cadmium | mg/kg | 0.02 | 0.5[#1] | 0.008[#2] | | <0.02 | <0.02 | <0.02 | 0.1 | <0.02 | <0.02 | 0.086 | 0.0446 | <0.02 | <0.02 | 0.052 | 0.0866 |
| Chromium (hexavalent) | mg/kg | 0.6 | | 0.0612[#2] | | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 | <0.6 |
| Chromium (III+VI) | mg/kg | 0.9 | 0.9[#1] | | | 22.6 | 20.6 | 9.23 | 17.9 | 31.6 | 13.9 | 7.5 | 28.6 | 23.8 | 26.1 | 23.8 | 14.1 |
| Cobalt | mg/kg | 0.1 | | 0.135[#4] | | 19.8 | 13.3 | 4.07 | 13.9 | 10.2 | 9 | 3.08 | 16.5 | 21.9 | 47.5 | 15.4 | 8.45 |
| Copper | mg/kg | 1.4 | 200[#1] | 0.1[#2] | | 24.3 | 20 | 20.1 | 18.2 | 21 | 27 | 28.7 | 20.6 | 23.2 | 20.3 | 19.8 | 26.6 |
| Lead | mg/kg | 0.7 | 26.9[#1] | 3.5[#2] | | 48.3 | 19.2 | 55.1 | 20.2 | 19.3 | 39.2 | 51.8 | 18.8 | 3.59 | 25 | 16.7 | 54.5 |
| Mercury | mg/kg | 0.14 | 0.5[#1] | 0.035[#2] | | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 |
| Molybdenum | mg/kg | 0.1 | 1.4[#3] | | | 0.709 | 0.177 | 1.27 | 0.15 | <0.1 | 0.869 | 0.953 | 0.177 | <0.1 | 0.129 | 0.168 | 0.652 |
| Nickel | mg/kg | 0.2 | 10[#1] | 2[#2] | | 28.4 | 36 | 12 | 31.9 | 37.7 | 24 | 8.58 | 49.2 | 51.6 | 36 | 41 | 21 |
| Selenium | mg/kg | 1 | 0.5[#1] | | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Tin | mg/kg | 0.24 | | 6.25[#4] | | 1.95 | 0.562 | 3.24 | 0.837 | 0.764 | 2.28 | 1.04 | 0.61 | 0.547 | 0.644 | 0.617 | 3.16 |
| Zinc | mg/kg | 1.9 | 114[#3] | 0.414[#2] | | 77.8 | 59.1 | 62.6 | 57.5 | 57.1 | 82.7 | 109 | 59.2 | 32.3 | 71.7 | 58.6 | 84.1 |
| Asbestos | | | | | | | | | | | | | | | | | |
| Amosite Asbestos | - | | | | | 0 | - | 0 | - | - | 0 | 0 | - | - | - | - | - |
| Chrysotile Asbestos | - | | | | | 0 | - | 0 | - | - | 0 | 0 | - | - | - | - | - |
| Crocidolilite Asbestos | - | | | | | 0 | - | 0 | - | - | 0 | 0 | - | - | - | - | - |
| Fibrous Actinolite | - | | | | | 0 | - | 0 | - | - | 0 | 0 | - | - | - | - | - |
| Fibrous Anthophyllite | - | | | | | 0 | - | 0 | - | - | 0 | 0 | - | - | - | - | - |
| Fibrous Tremolite | - | | | | | 0 | - | 0 | - | - | 0 | 0 | - | - | - | - | - |
| Non-Asbestos Fibre | - | | | | | 0 | - | 0 | - | - | 1 | 0 | - | - | - | - | - |
| Misc | | | | | | | | | | | | | | | | | |
| Chloride | mg/kg | 5 | | | | - | - | - | - | - | 18.2 | - | - | - | - | - | - |
| Fraction Organic Carbon | - | 0.0002 | | | | 0.0172 | 0.0117 | 0.0185 | - | 0.00908 | - | - | - | 0.00296 | - | 0.00825 | 0.0329 |
| Moisture | % | | | | | 20 | 15 | 21 | 15 | 21 | 8.2 | 13 | 15 | 13 | 17 | 14 | 15 |
| Sulphate (soluble) | g/l | 0.004 | | | | - | - | - | - | - | 0.014 | 0.0163 | - | - | - | - | - |
| PCBs | | | | | | | | | | | | | | | | | |
| PCB 101 | mg/kg | 0.003 | | | | - | - | - | - | - | <0.003 | <0.003 | - | - | - | - | - |
| PCB 118 | mg/kg | 0.003 | | | | - | - | - | - | - | <0.003 | <0.003 | - | - | - | - | - |
| PCB 138 | mg/kg | 0.003 | | | | - | - | - | - | - | <0.003 | <0.003 | - | - | - | - | - |
| PCB 153 | mg/kg | 0.003 | | | | - | - | - | - | - | <0.003 | <0.003 | - | - | - | - | - |
| PCB 180 | mg/kg | 0.003 | | | | - | - | - | - | - | <0.003 | <0.003 | - | - | - | - | - |
| PCB 28 | mg/kg | 0.003 | | | | - | - | - | - | - | <0.003 | <0.003 | - | - | - | - | - |
| PCB 52 | mg/kg | 0.003 | | | | - | - | - | - | - | <0.003 | <0.003 | - | - | - | - | - |
| Total PCB 7 Congeners | mg/kg | 0.021 | | | | - | - | - | - | - | <0.021 | <0.021 | - | - | - | - | - |

Env Stds Comments
#1:WS Regs 2016 (Eng./Wal)
#2:WFD England/Wales. 2015 -EQS
#3:WHO DWG 2017
#4:SEPA_EQS WAT-SG-53 2014
#5:Odour - Amoore and Hautala, 1983,
#6:PNEC derived for EU REACH registration dossiers
#7:Odour - Health Effects Institute (1996)
#8:USEPA 1997
#9:Taste - API (1993)
#10:URS derived using API (2005) RfD & WHO DWG
#11:Shell RBSL (2014)
#12:WS Regs 2010 (Eng./Wal)
#13:WS Regs 2016 (Eng./Wal) for benzene
#14:WHO DWG 2017
#15:WHO Petroleum In DW 2008

GAC: Generic Assessment Criteria
(blank): No assessment criteria available
- : Not analysed
CW: Controlled Waters
EQS: Environmental Quality Standard
Soil CW/WE GAC calculated using EA RTM methodology
Soil CW/WE GAC based on soil properties for sand and either low TOC (0.2%) or high TOC (1%)

Key
XXX Exceedance of 2017 GAC - CW (EN/WA) DWS - 1% TOC
XXX Exceedance of 2016 GAC - CW (EN/WA) EQS (Fresh) - 1% TOC

| | | | 2017 GAC - CW (EN/WA) DWS - 1% TOC | 2016 GAC - CW (EN/WA) EQS (Fresh) - 1% TOC | Location | MW109 | | VP101 | VP102 | VP103 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Average Depth (m) | 2.4 | 3 | 0.5 | 1 | 0.5 |
| | | | | | Date | 19/11/2019 | 19/11/2019 | 11/11/2019 | 12/11/2019 | 13/11/2019 |
| | | | | | Sample Type | Normal | Normal | Normal | Normal | Normal |
| | | Method Detection Limit | | | Lab Report Number | 532253 | 532253 | 530662 | 530947 | 530947 |
| BTEX | | | | | | | | | | |
| Benzene | mg/kg | 0.009 | 0.0007[#1] | 0.0073[#2] | | <0.009 | <0.009 | <0.009 | <0.009 | <0.009 |
| Toluene | mg/kg | 0.007 | 1.4672[#3] | 0.155[#2] | | <0.007 | <0.007 | <0.007 | <0.007 | <0.007 |
| Ethylbenzene | mg/kg | 0.004 | 1.3572[#3] | 0.0905[#4] | | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 |
| Xylene (m & p) | mg/kg | 0.01 | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Xylene (o) | mg/kg | 0.01 | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Xylene Total | mg/kg | | 2.2944[#8] | 0.1377[#4] | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 |
| Oxygenates | | | | | | | | | | |
| Diisopropyl Ether | mg/kg | 0.001 | 0.0004[#6] | 0.0882[#6] | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Ethyl Tert Butyl Ether | mg/kg | 0.001 | 0.0065[#7] | 0.2559[#6] | | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |
| Methyl Tert Butyl Ether | mg/kg | 0.01 | 0.0076[#8] | 1.9438[#6] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tert Amyl Methyl Ether | mg/kg | 0.01 | 0.0656[#8] | 0.2573[#6] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Tert Butyl Alcohol | mg/kg | 0.01 | 0.6701[#13] | 0.5933[#6] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Ethanol | mg/kg | 0.05 | | | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| n-Hexane | mg/kg | 0.01 | 3.3198[#11] | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| PAH | | | | | | | | | | |
| Acenaphthene | mg/kg | 0.008 | | | | <0.008 | <0.008 | 0.0136 | <0.008 | <0.008 |
| Acenaphthylene | mg/kg | 0.012 | | | | <0.012 | <0.012 | 0.0241 | <0.012 | <0.012 |
| Anthracene | mg/kg | 0.016 | | 0.0056[#2] | | <0.016 | <0.016 | 0.0397 | 0.0642 | <0.016 |
| Benzo(a)anthracene | mg/kg | 0.014 | | | | <0.014 | <0.014 | 0.268 | 0.198 | 0.0276 |
| Benzo(a)pyrene | mg/kg | 0.015 | 0.0129[#12] | 0.000219[#2] | | <0.015 | <0.015 | 0.238 | 0.112 | 0.0188 |
| Benzo(b)fluoranthene | mg/kg | 0.015 | | 0.0178[#2] | | 0.0198 | <0.015 | 0.432 | 0.127 | 0.0222 |
| Benzo(g,h,i)perylene | mg/kg | 0.024 | | 0.0342[#2] | | <0.024 | <0.024 | 0.204 | 0.0583 | <0.024 |
| Benzo(k)fluoranthene | mg/kg | 0.014 | | 0.0251[#2] | | <0.014 | <0.014 | 0.152 | 0.0579 | <0.014 |
| Chrysene | mg/kg | 0.01 | | | | <0.01 | <0.01 | 0.273 | 0.138 | 0.0205 |
| Dibenz(a,h)anthracene | mg/kg | 0.023 | | | | <0.023 | <0.023 | 0.044 | <0.023 | <0.023 |
| Fluoranthene | mg/kg | 0.017 | 0.73[#3] | 0.00115[#2] | | <0.017 | <0.017 | 0.491 | 0.455 | 0.0619 |
| Fluorene | mg/kg | 0.01 | | | | <0.01 | <0.01 | 0.0161 | <0.01 | <0.01 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.018 | | | | <0.018 | <0.018 | 0.157 | 0.0503 | <0.018 |
| Naphthalene | mg/kg | 0.009 | 0.9746[#11] | 0.013[#2] | | <0.009 | <0.009 | 0.0485 | <0.009 | 0.0174 |
| Phenanthrene | mg/kg | 0.015 | | | | <0.015 | <0.015 | 0.258 | 0.173 | 0.0357 |
| Pyrene | mg/kg | 0.015 | | | | <0.015 | <0.015 | 0.389 | 0.348 | 0.049 |
| PAHs (sum of 4) | mg/kg | | 0.0871[#1] | | | 0.0758 | <0.071 | 0.945 | 0.2935 | 0.0782 |
| PAH 16 Total | mg/kg | 0.118 | | | | <0.118 | <0.118 | 3.05 | 1.78 | 0.253 |
| Benzo(g,h,i)perylene + Indeno(1,2,3-cd)pyrene | mg/kg | | | | | <0.042 | <0.042 | 0.361 | 0.1086 | <0.042 |
| Coal tar (BaP as a surrogate) | mg/kg | | | | | <0.015 | <0.015 | 0.238 | 0.112 | 0.0188 |
| TPH | | | | | | | | | | |
| >EC5-EC7 Aromatics | mg/kg | 0.01 | 0.0007[#13] | 0.0073[#2] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >EC7-EC8 Aromatics | mg/kg | 0.01 | 1.4672[#14] | 0.155[#2] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >EC8-EC10 Aromatics | mg/kg | 0.01 | 4.776[#15] | | | <0.01 | <0.01 | <0.01 | <0.01 | 0.0134 |
| >EC10-EC12 Aromatics | mg/kg | 1 | 2.2651[#15] | | | <1 | <1 | <1 | <1 | <1 |
| >EC12-EC16 Aromatics | mg/kg | 1 | 4.5145[#15] | | | <1 | <1 | <1 | <1 | <1 |
| >EC16-EC21 Aromatics | mg/kg | 1 | 12.7165[#15] | | | <1 | <1 | 3.84 | <1 | <1 |
| >EC21-EC35 Aromatics | mg/kg | 1 | Sat[#15] | | | 4.53 | 1.82 | 8.75 | <1 | 2.79 |
| >EC35-EC44 Aromatics | mg/kg | 1 | | | | <1 | 1.29 | <1 | <1 | <1 |
| >EC10-EC44 Aromatics | mg/kg | 5 | | | | 5.85 | <5 | 14.4 | <5 | <5 |
| >C5-C6 Aliphatics | mg/kg | 0.01 | 160.6343[#15] | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| >C6-C8 Aliphatics | mg/kg | 0.01 | 620.4262[#15] | | | <0.01 | <0.01 | <0.01 | <0.01 | 0.0179 |
| >C8-C10 Aliphatics | mg/kg | 0.01 | 92.1167[#15] | | | <0.01 | <0.01 | <0.01 | <0.01 | 0.0202 |
| >C10-C12 Aliphatics | mg/kg | 1 | 721.9991[#15] | | | <1 | <1 | <1 | <1 | <1 |
| >C12-C16 Aliphatics | mg/kg | 1 | Sat[#15] | | | <1 | <1 | <1 | <1 | 1.97 |
| >C16-C21 Aliphatics | mg/kg | 1 | Sat[#15] | | | <1 | <1 | <1 | <1 | 10.6 |
| >C21-C35 Aliphatics | mg/kg | 1 | | | | <1 | <1 | 3 | <1 | 16.7 |
| >C35-C44 Aliphatics | mg/kg | 1 | | | | <1 | <1 | <1 | <1 | 3.55 |
| >C10-C44 Aliphatics | mg/kg | 5 | | | | <5 | <5 | <5 | <5 | 32.8 |
| >C10-C44 Aliphatics & Aromatics | mg/kg | 10 | | | | <10 | <10 | 19.2 | <10 | 37 |
| SVOC | | | | | | | | | | |
| 2-Methylnaphthalene | mg/kg | 0.1 | 0.6137[#11] | | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Bis(2-chloroisopropyl) ether | mg/kg | 0.1 | | | | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Metals | | | | | | | | | | |
| Arsenic | mg/kg | 0.6 | 5[#1] | 25[#2] | | 6.27 | 1.9 | - | - | - |
| Boron | mg/kg | 0.7 | 10[#1] | 20[#4] | | 7.92 | 6.58 | - | - | - |
| Cadmium | mg/kg | 0.02 | 0.5[#1] | 0.008[#2] | | 0.0712 | <0.02 | - | - | - |
| Chromium (hexavalent) | mg/kg | 0.6 | | 0.0612[#2] | | <0.6 | <0.6 | - | - | - |
| Chromium (III+VI) | mg/kg | 0.9 | 0.9[#1] | | | 28.7 | 31.9 | - | - | - |
| Cobalt | mg/kg | 0.1 | | 0.135[#4] | | 13.9 | 22.6 | - | - | - |
| Copper | mg/kg | 1.4 | 200[#1] | 0.1[#2] | | 24.7 | 32.6 | - | - | - |
| Lead | mg/kg | 0.7 | 26.9[#1] | 3.5[#2] | | 23.2 | 1.45 | - | - | - |
| Mercury | mg/kg | 0.14 | 0.5[#1] | 0.035[#2] | | <0.14 | <0.14 | - | - | - |
| Molybdenum | mg/kg | 0.1 | 1.4[#3] | | | <0.1 | <0.1 | - | - | - |
| Nickel | mg/kg | 0.2 | 10[#1] | 2[#2] | | 42.8 | 59.8 | - | - | - |
| Selenium | mg/kg | 1 | 0.5[#1] | | | <1 | <1 | - | - | - |
| Tin | mg/kg | 0.24 | | 6.25[#4] | | 1.43 | 0.6 | - | - | - |
| Zinc | mg/kg | 1.9 | 114[#3] | 0.414[#2] | | 77.8 | 58.9 | - | - | - |
| Asbestos | | | | | | | | | | |
| Amosite Asbestos | - | | | | | - | - | 0 | 0 | 0 |
| Chrysotile Asbestos | - | | | | | - | - | 0 | 0 | 0 |
| Crocidolilite Asbestos | - | | | | | - | - | 0 | 0 | 0 |
| Fibrous Actinolite | - | | | | | - | - | 0 | 0 | 0 |
| Fibrous Anthophyllite | - | | | | | - | - | 0 | 0 | 0 |
| Fibrous Tremolite | - | | | | | - | - | 0 | 0 | 0 |
| Non-Asbestos Fibre | - | | | | | - | - | 0 | 0 | 0 |
| Misc | | | | | | | | | | |
| Chloride | mg/kg | 5 | | | | - | - | - | - | - |
| Fraction Organic Carbon | - | 0.0002 | | | | 0.0126 | - | - | - | - |
| Moisture | % | | | | | 17 | 14 | 20 | 14 | 11 |
| Sulphate (soluble) | g/l | 0.004 | | | | - | - | - | - | - |
| PCBs | | | | | | | | | | |
| PCB 101 | mg/kg | 0.003 | | | | <0.003 | - | - | - | - |
| PCB 118 | mg/kg | 0.003 | | | | <0.003 | - | - | - | - |
| PCB 138 | mg/kg | 0.003 | | | | <0.003 | - | - | - | - |
| PCB 153 | mg/kg | 0.003 | | | | <0.003 | - | - | - | - |
| PCB 180 | mg/kg | 0.003 | | | | <0.003 | - | - | - | - |
| PCB 28 | mg/kg | 0.003 | | | | <0.003 | - | - | - | - |
| PCB 52 | mg/kg | 0.003 | | | | <0.003 | - | - | - | - |
| Total PCB 7 Congeners | mg/kg | 0.021 | | | | <0.021 | - | - | - | - |

Env Stds Comments
#1:WS Regs 2016 (Eng./Wal)
#2:WFD England/Wales. 2015 -EQS
#3:WHO DWG 2017
#4:SEPA_EQS WAT-SG-53 2014
#5:Odour - Amoore and Hautala, 1983,
#6:PNEC derived for EU REACH registration dossiers
#7:Odour - Health Effects Institute (1996)
#8:USEPA 1997
#9:Taste - API (1993)
#10:URS dervied using API (2005) RfD & WHO DWG
#11:Shell RBSL (2014)
#12:WS Regs 2010 (Eng./Wal)
#13:WS Regs 2016 (Eng./Wal) for benzene
#14:WHO DWG 2017
#15:WHO Petroleum In DW 2008

GAC: Generic Assessment Criteria
(blank): No assessment criteria available
- : Not analysed
CW: Controlled Waters
EQS: Environmental Quality Standard
Soil CW/WE GAC calculated using EA RTM methodology
Soil CW/WE GAC based on soil properties for sand and either low TOC (0.2%) or high TOC (1%)

Key
XXX Exceedance of 2017 GAC - CW (EN/WA) DWS - 1% TOC
XXX Exceedance of 2016 GAC - CW (EN/WA) EQS (Fresh) - 1% TOC

| | | Method Detection Limit | 2017 GAC - CW (EN/WA) DWS | 2016 GAC - CW (EN/WA) EQS (Fresh) | Location | MW101 | | MW102 | | MW103 | | MW105 | MW106 | | MW109 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Well | - | | - | | - | | - | - | | - |
| | | | | | Date | 11/12/2019 | 06/02/2020 | 11/12/2019 | 06/02/2020 | 11/12/2019 | 05/02/2020 | 12/12/2019 | 11/12/2019 | 07/02/2020 | 12/12/2019 |
| | | | | | Sample Type | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal | Normal |
| | | | | | Lab Report Number | 535986 | 541873 | 535986 | 541873 | 535986 | 541873 | 535986 | 535986 | 541945 | 535986 |
| BTEX | | | | | | | | | | | | | | | |
| Benzene | µg/l | 1 | 1[#1] | 10[#2] | | <1 | <1 | 750 | 940 | <1 | <1 | <1 | 8.25 | <1 | <1 |
| Toluene | µg/l | 1 | 700[#3] | 74[#2] | | <1 | <1 | 69.2 | 181 | <1 | <1 | <1 | <1 | <1 | <1 |
| Ethylbenzene | µg/l | 1 | 300[#3] | 20[#4] | | <1 | <1 | 753 | 932 | <1 | <1 | <1 | 117 | <1 | <1 |
| Xylene (m & p) | µg/l | 1 | | | | <1 | <1 | 342 | 768 | <1 | <1 | <1 | 10.8 | 1 | <1 |
| Xylene (o) | µg/l | 1 | | | | <1 | <1 | 194 | 179 | <1 | <1 | <1 | 2.89 | <1 | <1 |
| Xylene Total | µg/l | | 500[#3] | 30[#4] | | <2 | <2 | 536 | 947 | <2 | <2 | <2 | 13.69 | 2 | <2 |
| Oxygenates | | | | | | | | | | | | | | | |
| Diisopropyl Ether | µg/l | 1 | 0.8[#5] | 190[#6] | | <1 | <1 | 4.81 | 7.47 | <1 | 1.55 | <1 | <1 | 1.75 | <1 |
| Ethyl Tert Butyl Ether | µg/l | 1 | 13[#7] | 510[#6] | | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Methyl Tert Butyl Ether | µg/l | 1 | 20[#8] | 5,100[#6] | | <1 | <1 | 25.8 | 30.8 | 8.19 | 16.4 | 3.18 | 1.02 | 9.99 | 1.9 |
| Tert Amyl Methyl Ether | µg/l | 1 | 130[#9] | 510[#6] | | <1 | <1 | <1 | <1 | <1 | 1.37 | <1 | <1 | <1 | <1 |
| Tert Butyl Alcohol | µg/l | 10 | 1,300[#10] | 6,640[#6] | | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| Ethanol | µg/l | 50 | | | | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 |
| n-Hexane | µg/l | 2 | 310[#11] | | | <2 | <2 | 5.75 | 9.1 | <2 | <2 | <2 | <2 | <2 | <2 |
| PAH | | | | | | | | | | | | | | | |
| Acenaphthene | µg/l | 0.005 | | | | <0.005 | <0.005 | 0.145 | 0.145 | <0.005 | <0.005 | <0.005 | 0.0218 | 0.0556 | <0.005 |
| Acenaphthylene | µg/l | 0.005 | | | | <0.005 | <0.005 | <0.005 | 0.0102 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Anthracene | µg/l | 0.005 | | 0.1[#2] | | <0.005 | <0.005 | 0.0219 | 0.021 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Benzo(a)anthracene | µg/l | 0.005 | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Benzo(a)pyrene | µg/l | 0.002 | 0.01[#12] | 0.00017[#2] | | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.00549 | <0.002 | <0.002 | <0.002 | 0.00796 |
| Benzo(b)fluoranthene | µg/l | 0.005 | | 0.017[#2] | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.00812 | <0.005 | <0.005 | <0.005 | 0.013 |
| Benzo(g,h,i)perylene | µg/l | 0.005 | | 0.0082[#2] | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Benzo(k)fluoranthene | µg/l | 0.005 | | 0.017[#2] | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | 0.00634 |
| Chrysene | µg/l | 0.005 | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Dibenz(a,h)anthracene | µg/l | 0.005 | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Fluoranthene | µg/l | 0.005 | 4[#3] | 0.0063[#2] | | <0.005 | <0.005 | <0.005 | 0.0139 | <0.005 | 0.00909 | <0.005 | <0.005 | 0.0068 | 0.0109 |
| Fluorene | µg/l | 0.005 | | | | <0.005 | <0.005 | 0.2 | 0.213 | <0.005 | <0.005 | <0.005 | 0.00937 | 0.0405 | <0.005 |
| Indeno(1,2,3-c,d)pyrene | µg/l | 0.005 | | | | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| Naphthalene | µg/l | 0.01 | 150[#11] | 2[#2] | | <0.01 | <0.01 | 48.8 | 80.3 | <0.01 | <0.01 | <0.01 | 0.569 | 1.86 | <0.01 |
| Phenanthrene | µg/l | 0.005 | | | | <0.005 | <0.005 | 0.0725 | 0.0841 | <0.005 | <0.005 | <0.005 | <0.005 | 0.0113 | 0.0136 |
| Pyrene | µg/l | 0.005 | | | | <0.005 | <0.005 | <0.005 | 0.0119 | <0.005 | 0.0142 | <0.005 | 0.00598 | 0.00887 | 0.011 |
| PAHs (sum of 4) | µg/l | | 0.1[#1] | | | <0.02 | <0.02 | <0.02 | <0.02 | <0.02 | 0.02312 | <0.02 | <0.02 | <0.02 | 0.02934 |
| PAH 16 Total | µg/l | 0.082 | | | | <0.082 | <0.082 | 49.3 | 80.8 | <0.082 | <0.082 | <0.082 | 0.606 | 1.99 | <0.082 |
| Benzo(g,h,i)perylene + Indeno(1.2.3-cd)pyrene | µg/l | | | | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Coal tar (BaP as a surrogate) | µg/l | | | | | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.00549 | <0.002 | <0.002 | <0.002 | 0.00796 |
| TPH | | | | | | | | | | | | | | | |
| >EC5-EC7 Aromatics | µg/l | 10 | 1[#13] | 10[#2] | | <10 | <10 | 688 | 904 | <10 | <10 | <10 | <10 | <10 | <10 |
| >EC7-EC8 Aromatics | µg/l | 10 | 700[#3] | 74[#2] | | <10 | <10 | 89 | 224 | <10 | <10 | <10 | <10 | <10 | <10 |
| >EC8-EC10 Aromatics | µg/l | 10 | 300[#14] | | | <10 | <10 | 1,780 | 2,280 | <10 | <10 | <10 | 518 | 135 | <10 |
| >EC10-EC12 Aromatics | µg/l | 10 | 90[#14] | | | <10 | <10 | 321 | 381 | <10 | <10 | <10 | 394 | 202 | <10 |
| >EC12-EC16 Aromatics | µg/l | 10 | 90[#14] | | | <10 | <10 | 32 | 53 | <10 | <10 | <10 | 51 | 25 | <10 |
| >EC16-EC21 Aromatics | µg/l | 10 | 90[#14] | | | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| >EC21-EC35 Aromatics | µg/l | 10 | 90[#14] | | | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| >C5-C6 Aliphatics | µg/l | 10 | 15,000[#14] | | | <10 | <10 | 296 | 305 | <10 | <10 | <10 | 10 | 62 | <10 |
| >C6-C8 Aliphatics | µg/l | 10 | 15,000[#14] | | | <10 | <10 | 548 | 634 | <10 | <10 | <10 | 115 | 264 | <10 |
| >C8-C10 Aliphatics | µg/l | 10 | 300[#14] | | | <10 | <10 | 619 | 808 | <10 | <10 | <10 | 594 | 199 | <10 |
| >C10-C12 Aliphatics | µg/l | 10 | 300[#14] | | | <10 | <10 | 482 | 572 | <10 | <10 | <10 | 591 | 303 | <10 |
| >C12-C16 Aliphatics | µg/l | 10 | 300[#14] | | | <10 | <10 | 22 | <10 | <10 | <10 | <10 | 11 | <10 | <10 |
| >C16-C21 Aliphatics | µg/l | 10 | 300[#14] | | | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| >C21-C35 Aliphatics | µg/l | 10 | | | | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| >C5-C35 Aliphatics & Aromatics | µg/l | 10 | | | | <10 | <10 | 4,870 | 6,160 | <10 | <10 | <10 | 2,290 | 1,190 | <10 |
| SVOC | | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | µg/l | 1 | 28[#11] | | | <1 | <1 | 8.84 | 8.09 | <1 | <1 | <1 | <2 | <10 | <4 |
| Metals | | | | | | | | | | | | | | | |
| Arsenic (Filtered) | µg/l | 0.5 | 10[#1] | 50[#2] | | 0.557 | 0.986 | 2.61 | 6.64 | 0.654 | 1.38 | <0.5 | 17.4 | 21.6 | 0.52 |
| Boron (Filtered) | µg/l | 10 | 1,000[#1] | 2,000[#4] | | 92 | 86.6 | 92.6 | 93.6 | 52.2 | 49.4 | 60.3 | 86 | 99.5 | 62 |
| Cadmium (Filtered) | µg/l | 0.08 | 5[#1] | 0.08[#2] | | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |
| Chromium (hexavalent) (Filtered) | µg/l | 30 | | 3.4[#2] | | <30 | <30 | <30 | <30 | <30 | <30 | <30 | <30 | <30 | <30 |
| Chromium (III+VI) (Filtered) | µg/l | 1 | 50[#1] | | | <1 | <1 | <1 | <1 | 2.94 | 2.02 | <1 | <1 | <1 | <1 |
| Cobalt (Filtered) | µg/l | 0.5 | 3[#4] | | | 0.622 | <0.5 | 1.36 | 2.79 | <0.5 | 1.62 | 0.683 | 6.13 | 5.27 | 3.26 |
| Copper (Filtered) | µg/l | 0.3 | 2,000[#1] | 1[#2] | | 1.55 | 5.77 | <0.3 | 1.11 | 3.03 | 2.37 | 1.04 | <0.3 | 0.69 | 1.28 |
| Lead (Filtered) | µg/l | 0.2 | 10[#1] | 1.2[#2] | | <0.2 | 0.287 | <0.2 | 0.679 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 0.401 |
| Mercury (Filtered) | µg/l | 0.01 | 1[#1] | 0.07[#2] | | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Molybdenum (Filtered) | µg/l | 3 | 70[#3] | | | <3 | <3 | <3 | 11.3 | 4.06 | 3.36 | <3 | <3 | <3 | <3 |
| Nickel (Filtered) | µg/l | 0.4 | 20[#1] | 4[#2] | | 2.93 | 2.21 | 2.79 | 3.55 | 1.79 | 2 | 3.18 | 5 | 5.82 | 6.28 |
| Selenium (Filtered) | µg/l | 1 | 10[#1] | | | 1.28 | <1 | <1 | <1 | 1.19 | 1.05 | <1 | <1 | <1 | <1 |
| Tin (Filtered) | µg/l | 1 | | 25[#4] | | <1 | <1 | <1 | 3.51 | <1 | <1 | <1 | <1 | <1 | <1 |
| Zinc (Filtered) | µg/l | 1 | 3,000[#3] | 10.9[#2] | | 2.87 | 4.34 | 1.95 | 5.1 | 4.83 | 4.31 | 2.93 | 3.62 | 11 | 5.6 |

Env Stds Comments
#1:WS Regs 2016 (Eng/Wal)
#2:WFD England/Wales. 2015 -EQS
#3:WHO DWG 2017
#4:SEPA_EQS WAT-SG-53 2014
#5:Odour - Amoore and Hautala, 1983,
#6:PNEC derived for EU REACH registration dossiers
#7:Odour - Health Effects Institute (1996)
#8:USEPA 1997
#9:Taste - API (1993)
#10:URS dervied using API (2005) RfD & WHO DWG
#11:Shell RBSL (2014)
#12:WS Regs 2010 (Eng/Wal)
#13:WS Regs 2016 (Eng/Wal) for benzene
#14:WHO Petroleum In DW 2008

GAC: Generic Assessment Criteria
(blank): No assessment criteria available
CW: Controlled Waters
EQS: Environmental Quality Standard
Soil CW/WE GAC calculated using EA RTM methodology
Soil CW/WE GAC based on soil properties for sand and either low TOC (0.2%) or high TOC (1%)

Key

| | |
|---|---|
| XXX | Exceedance of 2017 GAC - CW (EN/WA) DWS |
| XXX | Exceedance of 2016 GAC - CW (EN/WA) EQS (Fresh) |

# APPENDIX F LABORATORY ANALYTICAL RESULTS CERTIFICATES

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

AECOM
Bridgewater House
4th Floor
Whitworth Street,
Manchester
Lancashire
M1 6LT

**Attention:** Laura McMurtry

# CERTIFICATE OF ANALYSIS

| | |
|---|---|
| **Date of report Generation:** | 22 November 2019 |
| **Customer:** | AECOM |
| **Sample Delivery Group (SDG):** | 191115-8 |
| **Your Reference:** | 60608750 |
| **Location:** | Shell Whitemare Pool |
| **Report No:** | 530947 |

**This report has been revised and directly supersedes 530748 in its entirety.**

We received 3 samples on Thursday November 14, 2019 and 3 of these samples were scheduled for analysis which was completed on Friday November 22, 2019. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

[redacted]

**Sonia McWhan**

Operations Manager

ALS Life Sciences Limited. ALS Life Sciences Limited registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## Received Sample Overview

| Lab Sample No(s) | Customer Sample Ref. | AGS Ref. | Depth (m) | Sampled Date |
|---|---|---|---|---|
| 21147485 | MW102 | | 1.00 | 12/11/2019 |
| 21147486 | VP102 | | 1.00 | 12/11/2019 |
| 21147487 | VP103 | | 0.50 | 13/11/2019 |

**Maximum Sample/Coolbox Temperature (°C) : 10.4**

**ISO5667-3 Water quality - Sampling - Part3 -**
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

**Only received samples which have had analysis scheduled will be shown on the following pages.**

Validated

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

**Results Legend**

- X — Test
- N — No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lab Sample No(s)** | | | 21147485 | | | 21147486 | | | 21147487 | |
| **Customer Sample Reference** | | | MW102 | | | VP102 | | | VP103 | |
| **AGS Reference** | | | | | | | | | | |
| **Depth (m)** | | | 1.00 | | | 1.00 | | | 0.50 | |
| **Container** | | | 1kg TUB with Handle (ALE260) | 250g Amber Jar (ALE210) | 60g VOC (ALE215) | 1kg TUB with Handle (ALE260) | 250g Amber Jar (ALE210) | 60g VOC (ALE215) | 250g Amber Jar (ALE210) | 60g VOC (ALE215) |
| **Sample Type** | | | S | S | S | S | S | S | S | S |
| Asbestos ID in Solid Samples | All | NDPs: 0 Tests: 3 | X | | | X | | | X | |
| EPH CWG GC (S) | All | NDPs: 0 Tests: 3 | | X | | | X | | X | |
| GRO by GC-FID (S) | All | NDPs: 0 Tests: 3 | | | X | | | X | | X |
| Hexavalent Chromium (s) | All | NDPs: 0 Tests: 1 | | X | | | | | | |
| Metals in solid samples by OES | All | NDPs: 0 Tests: 1 | | X | | | | | | |
| n-Hexane in Solids | All | NDPs: 0 Tests: 3 | | | X | | | X | | X |
| Oxygenates (S) | All | NDPs: 0 Tests: 3 | | | X | | | X | | X |
| PAH by GCMS | All | NDPs: 0 Tests: 3 | | X | | | X | | X | |
| Sample description | All | NDPs: 0 Tests: 3 | | X | | | X | | X | |
| Semi Volatile Organic Compounds | All | NDPs: 0 Tests: 3 | | X | | | X | | X | |
| Total Organic Carbon | All | NDPs: 0 Tests: 1 | | X | | | | | | |
| VOC MS (S) | All | NDPs: 0 Tests: 3 | | | X | | | X | | X |

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

# Sample Descriptions

## Grain Sizes

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **very fine** | <0.063mm | **fine** | 0.063mm - 0.1mm | **medium** | 0.1mm - 2mm | **coarse** | 2mm - 10mm | **very coarse** | >10mm |

| Lab Sample No(s) | Customer Sample Ref. | Depth (m) | Colour | Description | Inclusions | Inclusions 2 |
|---|---|---|---|---|---|---|
| 21147485 | MW102 | 1.00 | Dark Brown | Sandy Silt Loam | Crushed Brick | Stones |
| 21147486 | VP102 | 1.00 | Dark Brown | Sandy Silt Loam | Stones | None |
| 21147487 | VP103 | 0.50 | Light Brown | Clay Loam | Stones | Vegetation |

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

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

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

Validated

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

| Results Legend | |
|---|---|
| # | ISO17025 accredited. |
| M | *m*CERTS accredited. |
| aq | Aqueous / settled sample. |
| diss.filt | Dissolved / filtered sample. |
| tot.unfilt | Total / unfiltered sample. |
| * | Subcontracted - refer to subcontractor report for accreditation status. |
| ** | % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery |
| (F) | Trigger breach confirmed |
| 1-3+5@ | Sample deviation (see appendix) |

| Component | LOD/Units | Method | Customer Sample Ref. | MW102 | VP102 | VP103 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Depth (m) | 1.00 | 1.00 | 0.50 | | | |
| | | | Sample Type | Soil/Solid (S) | Soil/Solid (S) | Soil/Solid (S) | | | |
| | | | Date Sampled | 12/11/2019 | 12/11/2019 | 13/11/2019 | | | |
| | | | Sampled Time | . | . | . | | | |
| | | | Date Received | 14/11/2019 | 14/11/2019 | 14/11/2019 | | | |
| | | | SDG Ref | 191115-8 | 191115-8 | 191115-8 | | | |
| | | | Lab Sample No.(s) | 21147485 | 21147486 | 21147487 | | | |
| | | | AGS Reference | | | | | | |
| Moisture Content Ratio (% of as received sample) | % | PM024 | | 21 | 14 | 11 | | | |
| Fraction Organic Carbon Low | <0.0002 | TM132 | | 0.0185 # | | | | | |
| Chromium, Hexavalent | <0.6 mg/kg | TM151 | | <0.6 # | | | | | |
| Arsenic | <0.6 mg/kg | TM181 | | 7.51 M | | | | | |
| Boron | <0.7 mg/kg | TM181 | | 4.61 # | | | | | |
| Cadmium | <0.02 mg/kg | TM181 | | <0.02 M | | | | | |
| Chromium | <0.9 mg/kg | TM181 | | 9.23 M | | | | | |
| Cobalt | <0.1 mg/kg | TM181 | | 4.07 M | | | | | |
| Copper | <1.4 mg/kg | TM181 | | 20.1 M | | | | | |
| Lead | <0.7 mg/kg | TM181 | | 55.1 M | | | | | |
| Mercury | <0.14 mg/kg | TM181 | | <0.14 M | | | | | |
| Molybdenum | <0.1 mg/kg | TM181 | | 1.27 # | | | | | |
| Nickel | <0.2 mg/kg | TM181 | | 12 M | | | | | |
| Selenium | <1 mg/kg | TM181 | | <1 # | | | | | |
| Tin | <0.24 mg/kg | TM181 | | 3.24 # | | | | | |
| Zinc | <1.9 mg/kg | TM181 | | 62.6 M | | | | | |
| Bromofluorobenzene** | % | TM288 | | 88.1 | 86.3 | 107 | | | |
| Ethanol | <50 µg/kg | TM288 | | <50 | <50 | <50 | | | |
| tert Butanol | <10 µg/kg | TM288 | | <10 | <10 | <10 | | | |
| Diisopropyl ether | <1 µg/kg | TM288 | | <1 | <1 | <1 | | | |
| tert-butyl ethyl ether | <1 µg/kg | TM288 | | <1 | <1 | <1 | | | |
| n-Hexane | <10 µg/kg | TM336 | | <10 | <10 | <10 | | | |

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## EPH CWG GC (S)

**Results Legend**

| | |
|---|---|
| # | ISO17025 accredited. |
| M | *m*CERTS accredited. |
| aq | Aqueous / settled sample. |
| diss.filt | Dissolved / filtered sample. |
| tot.unfilt | Total / unfiltered sample. |
| * | Subcontracted - refer to subcontractor report for accreditation status. |
| ** | % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery |
| (F) | Trigger breach confirmed |
| 1-3+5@ | Sample deviation (see appendix) |

| Component | LOD/Units | Method | Customer Sample Ref. | MW102 | VP102 | VP103 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Depth (m) | 1.00 | 1.00 | 0.50 | | | |
| | | | Sample Type | Soil/Solid (S) | Soil/Solid (S) | Soil/Solid (S) | | | |
| | | | Date Sampled | 12/11/2019 | 12/11/2019 | 13/11/2019 | | | |
| | | | Sampled Time | . | . | . | | | |
| | | | Date Received | 14/11/2019 | 14/11/2019 | 14/11/2019 | | | |
| | | | SDG Ref | 191115-8 | 191115-8 | 191115-8 | | | |
| | | | Lab Sample No.(s) | 21147485 | 21147486 | 21147487 | | | |
| | | | AGS Reference | | | | | | |
| Aliphatics >C10-C12 | <1000 µg/kg | TM414 | | <1000 | <1000 | <1000 | | | |
| Aliphatics >C12-C16 | <1000 µg/kg | TM414 | | <1000 | <1000 | 1970 | | | |
| Aliphatics >C16-C21 | <1000 µg/kg | TM414 | | <1000 | <1000 | 10600 | | | |
| Aliphatics >C21-C35 | <1000 µg/kg | TM414 | | <1000 | <1000 | 16700 | | | |
| Aliphatics >C35-C44 | <1000 µg/kg | TM414 | | <1000 | <1000 | 3550 | | | |
| Total Aliphatics >C10-C44 | <5000 µg/kg | TM414 | | <5000 | <5000 | 32800 | | | |
| Total Aliphatics & Aromatics >C10-C44 | <10000 µg/kg | TM414 | | <10000 | <10000 | 37000 | | | |
| Aromatics > EC10-EC12 | <1000 µg/kg | TM414 | | <1000 | <1000 | <1000 | | | |
| Aromatics > EC12-EC16 | <1000 µg/kg | TM414 | | <1000 | <1000 | <1000 | | | |
| Aromatics > EC16-EC21 | <1000 µg/kg | TM414 | | <1000 | <1000 | <1000 | | | |
| Aromatics > EC21-EC35 | <1000 µg/kg | TM414 | | 2000 | <1000 | 2790 | | | |
| Aromatics >EC35-EC44 | <1000 µg/kg | TM414 | | <1000 | <1000 | <1000 | | | |
| Total Aromatics > EC10-EC44 | <5000 µg/kg | TM414 | | <5000 | <5000 | <5000 | | | |

Validated

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## GRO by GC-FID (S)

**Results Legend**

| | |
|---|---|
| # | ISO17025 accredited. |
| M | *m*CERTS accredited. |
| aq | Aqueous / settled sample. |
| diss.filt | Dissolved / filtered sample. |
| tot.unfilt | Total / unfiltered sample. |
| * | Subcontracted - refer to subcontractor report for accreditation status. |
| ** | % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery |
| (F) | Trigger breach confirmed |
| 1-3+5@ | Sample deviation (see appendix) |

| Component | LOD/Units | Method | Customer Sample Ref. | MW102 | VP102 | VP103 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Depth (m) | 1.00 | 1.00 | 0.50 | | | |
| | | | Sample Type | Soil/Solid (S) | Soil/Solid (S) | Soil/Solid (S) | | | |
| | | | Date Sampled | 12/11/2019 | 12/11/2019 | 13/11/2019 | | | |
| | | | Sampled Time | . | . | . | | | |
| | | | Date Received | 14/11/2019 | 14/11/2019 | 14/11/2019 | | | |
| | | | SDG Ref | 191115-8 | 191115-8 | 191115-8 | | | |
| | | | Lab Sample No.(s) | 21147485 | 21147486 | 21147487 | | | |
| | | | AGS Reference | | | | | | |
| GRO Surrogate % recovery** | % | TM089 | | 107 | 101 | 92.6 | | | |
| Aliphatics >C5-C6 | <10 µg/kg | TM089 | | <10 | <10 | <10 | | | |
| Aliphatics >C6-C8 | <10 µg/kg | TM089 | | 25.4 | <10 | 17.9 | | | |
| Aliphatics >C8-C10 | <10 µg/kg | TM089 | | 35.6 | <10 | 20.2 | | | |
| Aromatics >EC5-EC7 | <10 µg/kg | TM089 | | <10 | <10 | <10 | | | |
| Aromatics >EC7-EC8 | <10 µg/kg | TM089 | | <10 | <10 | <10 | | | |
| Aromatics >EC8-EC10 | <10 µg/kg | TM089 | | 24.1 | <10 | 13.4 | | | |

Validated

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## PAH by GCMS

**Results Legend**

| | |
|---|---|
| # | ISO17025 accredited. |
| M | *m*CERTS accredited. |
| aq | Aqueous / settled sample. |
| diss.filt | Dissolved / filtered sample. |
| tot.unfilt | Total / unfiltered sample. |
| * | Subcontracted - refer to subcontractor report for accreditation status. |
| ** | % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery |
| (F) | Trigger breach confirmed |
| 1-3+5@ | Sample deviation (see appendix) |

| Component | LOD/Units | Method | Customer Sample Ref. | MW102 | VP102 | VP103 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Depth (m) | 1.00 | 1.00 | 0.50 | | | |
| | | | Sample Type | Soil/Solid (S) | Soil/Solid (S) | Soil/Solid (S) | | | |
| | | | Date Sampled | 12/11/2019 | 12/11/2019 | 13/11/2019 | | | |
| | | | Sampled Time | . | . | . | | | |
| | | | Date Received | 14/11/2019 | 14/11/2019 | 14/11/2019 | | | |
| | | | SDG Ref | 191115-8 | 191115-8 | 191115-8 | | | |
| | | | Lab Sample No.(s) | 21147485 | 21147486 | 21147487 | | | |
| | | | AGS Reference | | | | | | |
| Naphthalene-d8 % recovery** | % | TM218 | | 87.8 | 89.5 | 83.6 | | | |
| Acenaphthene-d10 % recovery** | % | TM218 | | 86.1 | 88.2 | 86.6 | | | |
| Phenanthrene-d10 % recovery** | % | TM218 | | 88.2 | 88.1 | 80.9 | | | |
| Chrysene-d12 % recovery** | % | TM218 | | 82.6 | 83.2 | 73.9 | | | |
| Perylene-d12 % recovery** | % | TM218 | | 76.1 | 76.6 | 82.4 | | | |
| Naphthalene | <9 µg/kg | TM218 | | <9 M | <9 M | 17.4 M | | | |
| Acenaphthylene | <12 µg/kg | TM218 | | <12 M | <12 M | <12 M | | | |
| Acenaphthene | <8 µg/kg | TM218 | | <8 M | <8 M | <8 M | | | |
| Fluorene | <10 µg/kg | TM218 | | <10 M | <10 M | <10 M | | | |
| Phenanthrene | <15 µg/kg | TM218 | | 34.1 M | 173 M | 35.7 M | | | |
| Anthracene | <16 µg/kg | TM218 | | <16 M | 64.2 M | <16 M | | | |
| Fluoranthene | <17 µg/kg | TM218 | | 77.3 M | 455 M | 61.9 M | | | |
| Pyrene | <15 µg/kg | TM218 | | 62.3 M | 348 M | 49 M | | | |
| Benz(a)anthracene | <14 µg/kg | TM218 | | 47 M | 198 M | 27.6 M | | | |
| Chrysene | <10 µg/kg | TM218 | | 34.1 M | 138 M | 20.5 M | | | |
| Benzo(b)fluoranthene | <15 µg/kg | TM218 | | 38.8 M | 127 M | 22.2 M | | | |
| Benzo(k)fluoranthene | <14 µg/kg | TM218 | | <14 M | 57.9 M | <14 M | | | |
| Benzo(a)pyrene | <15 µg/kg | TM218 | | 29.5 M | 112 M | 18.8 M | | | |
| Indeno(1,2,3-cd)pyrene | <18 µg/kg | TM218 | | <18 M | 50.3 M | <18 M | | | |
| Dibenzo(a,h)anthracene | <23 µg/kg | TM218 | | <23 M | <23 M | <23 M | | | |
| Benzo(g,h,i)perylene | <24 µg/kg | TM218 | | <24 M | 58.3 M | <24 M | | | |
| PAH, Total Detected USEPA 16 | <118 µg/kg | TM218 | | 323 | 1780 | 253 | | | |

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## Semi Volatile Organic Compounds

**Results Legend**

| | |
|---|---|
| # | ISO17025 accredited. |
| M | *m*CERTS accredited. |
| aq | Aqueous / settled sample. |
| diss.filt | Dissolved / filtered sample. |
| tot.unfilt | Total / unfiltered sample. |
| * | Subcontracted - refer to subcontractor report for accreditation status. |
| ** | % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery |
| (F) | Trigger breach confirmed |
| 1-3+5@ | Sample deviation (see appendix) |

| Component | LOD/Units | Method | Customer Sample Ref. | MW102 | VP102 | VP103 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Depth (m) | 1.00 | 1.00 | 0.50 | | | |
| | | | Sample Type | Soil/Solid (S) | Soil/Solid (S) | Soil/Solid (S) | | | |
| | | | Date Sampled | 12/11/2019 | 12/11/2019 | 13/11/2019 | | | |
| | | | Sampled Time | . | . | . | | | |
| | | | Date Received | 14/11/2019 | 14/11/2019 | 14/11/2019 | | | |
| | | | SDG Ref | 191115-8 | 191115-8 | 191115-8 | | | |
| | | | Lab Sample No.(s) | 21147485 | 21147486 | 21147487 | | | |
| | | | AGS Reference | | | | | | |
| 2-Methylnaphthalene | <100 µg/kg | TM157 | | <100 | <100 | <100 | | | |
| Bis(2-chloroisopropyl) ether | <100 µg/kg | TM157 | | <100 | <100 | <100 | | | |

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## VOC MS (S)

**Results Legend**

| | |
|---|---|
| # | ISO17025 accredited. |
| M | *m*CERTS accredited. |
| aq | Aqueous / settled sample. |
| diss.filt | Dissolved / filtered sample. |
| tot.unfilt | Total / unfiltered sample. |
| * | Subcontracted - refer to subcontractor report for accreditation status. |
| ** | % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery |
| (F) | Trigger breach confirmed |
| 1-3+5@ | Sample deviation (see appendix) |

| Component | LOD/Units | Method | Customer Sample Ref. | MW102 | VP102 | VP103 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Depth (m) | 1.00 | 1.00 | 0.50 | | | |
| | | | Sample Type | Soil/Solid (S) | Soil/Solid (S) | Soil/Solid (S) | | | |
| | | | Date Sampled | 12/11/2019 | 12/11/2019 | 13/11/2019 | | | |
| | | | Sampled Time | . | . | . | | | |
| | | | Date Received | 14/11/2019 | 14/11/2019 | 14/11/2019 | | | |
| | | | SDG Ref | 191115-8 | 191115-8 | 191115-8 | | | |
| | | | Lab Sample No.(s) | 21147485 | 21147486 | 21147487 | | | |
| | | | AGS Reference | | | | | | |
| Toluene-d8** | % | TM116 | | 94.4 | 97.3 | 98.5 | | | |
| Methyl Tertiary Butyl Ether | <10 µg/kg | TM116 | | <10 M | <10 M | <10 M | | | |
| Benzene | <9 µg/kg | TM116 | | <9 M | <9 M | <9 M | | | |
| Toluene | <7 µg/kg | TM116 | | <7 M | <7 M | <7 M | | | |
| Ethylbenzene | <4 µg/kg | TM116 | | <4 M | <4 M | <4 M | | | |
| p/m-Xylene | <10 µg/kg | TM116 | | <10 # | <10 # | <10 # | | | |
| o-Xylene | <10 µg/kg | TM116 | | <10 M | <10 M | <10 M | | | |
| Tert-amyl methyl ether | <10 µg/kg | TM116 | | <10 # | <10 # | <10 # | | | |

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## Asbestos Identification - Solid Samples

**Results Legend**

| | |
|---|---|
| # | ISO17025 accredited. |
| M | *m*CERTS accredited. |
| * | Subcontracted test. |
| (F) | Trigger breach confirmed |
| 1-5&♦§@ | Sample deviation (see appendix) |

| | | Date of Analysis | Analysed By | Comments | Amosite (Brown) Asbestos | Chrysotile (White) Asbestos | Crocidolite (Blue) Asbestos | Fibrous Actinolite | Fibrous Anthophyllite | Fibrous Tremolite | Non-Asbestos Fibre |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cust. Sample Ref.<br>Depth (m)<br>Sample Type<br>Date Sampled<br>Date Receieved<br>SDG<br>Original Sample<br>Method Number | MW102<br>1.00<br>SOLID<br>12/11/2019 00:00:00<br>14/11/2019 08:30:00<br>191115-8<br>21147485<br>TM048 | 21/11/19 | Andrzej Ferfecki | - | Not Detected (#) | Not Detected (#) | Not Detected (#) | Not Detected (#) | Not Detected (#) | Not Detected (#) | Not Detected |
| Cust. Sample Ref.<br>Depth (m)<br>Sample Type<br>Date Sampled<br>Date Receieved<br>SDG<br>Original Sample<br>Method Number | VP102<br>1.00<br>SOLID<br>12/11/2019 00:00:00<br>14/11/2019 08:30:00<br>191115-8<br>21147486<br>TM048 | 20/11/2019 | James Richards | - | Not Detected (#) | Not Detected (#) | Not Detected (#) | Not Detected (#) | Not Detected (#) | Not Detected (#) | Not Detected |
| Cust. Sample Ref.<br>Depth (m)<br>Sample Type<br>Date Sampled<br>Date Receieved<br>SDG<br>Original Sample<br>Method Number | VP103<br>0.50<br>SOLID<br>13/11/2019 00:00:00<br>14/11/2019 08:30:00<br>191115-8<br>21147487<br>TM048 | 21/11/2019 | Marcin Magdziarek | - | Not Detected (#) | Not Detected (#) | Not Detected (#) | Not Detected (#) | Not Detected (#) | Not Detected (#) | Not Detected |

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## Table of Results - Appendix

| Method No | Reference | Description |
|---|---|---|
| PM024 | Modified BS 1377 | Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material |
| TM048 | HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures | Identification of Asbestos in Bulk Material |
| TM089 | Modified: US EPA Methods 8020 & 602 | Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12) |
| TM116 | Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602 | Determination of Volatile Organic Compounds by Headspace / GC-MS |
| TM132 | In - house Method | ELTRA CS800 Operators Guide |
| TM151 | Method 3500D, AWWA/APHA, 20th Ed., 1999 | Determination of Hexavalent Chromium using Kone analyser |
| TM157 | HP 6890 Gas Chromatograph (GC) system and HP 5973 Mass Selective Detector (MSD). | Determination of SVOC in Soils by GC-MS extracted by sonication in DCM/Acetone |
| TM181 | US EPA Method 6010B | Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES |
| TM218 | Shaker extraction - EPA method 3546. | The determination of PAH in soil samples by GC-MS |
| TM288 | | Determination of Oxygenates in Soils by Headspace/GC-MS |
| TM336 | | |
| TM414 | Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria | Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID |

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## Test Completion Dates

| Lab Sample No(s) | 21147485 | 21147486 | 21147487 |
|---|---|---|---|
| **Customer Sample Ref.** | MW102 | VP102 | VP103 |
| **AGS Ref.** | | | |
| **Depth** | 1.00 | 1.00 | 0.50 |
| **Type** | Soil/Solid (S) | Soil/Solid (S) | Soil/Solid (S) |
| Asbestos ID in Solid Samples | 21-Nov-2019 | 20-Nov-2019 | 21-Nov-2019 |
| EPH CWG GC (S) | 20-Nov-2019 | 20-Nov-2019 | 20-Nov-2019 |
| GRO by GC-FID (S) | 20-Nov-2019 | 20-Nov-2019 | 22-Nov-2019 |
| Hexavalent Chromium (s) | 22-Nov-2019 | | |
| Metals in solid samples by OES | 22-Nov-2019 | | |
| n-Hexane in Solids | 19-Nov-2019 | 19-Nov-2019 | 19-Nov-2019 |
| Oxygenates (S) | 19-Nov-2019 | 19-Nov-2019 | 19-Nov-2019 |
| PAH by GCMS | 22-Nov-2019 | 22-Nov-2019 | 21-Nov-2019 |
| Sample description | 15-Nov-2019 | 15-Nov-2019 | 15-Nov-2019 |
| Semi Volatile Organic Compounds | 22-Nov-2019 | 20-Nov-2019 | 22-Nov-2019 |
| Total Organic Carbon | 22-Nov-2019 | | |
| VOC MS (S) | 20-Nov-2019 | 19-Nov-2019 | 19-Nov-2019 |

# ASSOCIATED AQC DATA

## EPH CWG GC (S)

| Component | Method Code | QC 2143 | QC 2136 |
|---|---|---|---|
| EPH >C8-C40 Raw | TM414 | **99.31** 77.66 : 104.66 | **96.16** 77.66 : 104.66 |
| Total Aliphatics Raw | TM414 | **110.06** 84.39 : 115.61 | **104.7** 84.39 : 115.61 |
| Total Aromatics Raw | TM414 | **98.36** 81.11 : 118.89 | **112.89** 81.11 : 118.89 |

## GRO by GC-FID (S)

| Component | Method Code | QC 2161 | QC 2159 |
|---|---|---|---|
| QC | TM089 | **96.27** 72.28 : 114.54 | **95.69** 70.75 : 114.19 |

## Hexavalent Chromium (s)

| Component | Method Code | QC 2128 |
|---|---|---|
| Hexavalent Chromium | TM151 | **104.0** 90.20 : 107.00 |

## Metals in solid samples by OES

| Component | Method Code | QC 2131 |
|---|---|---|
| Aluminium | TM181 | **87.08** 77.84 : 119.01 |
| Antimony | TM181 | **85.77** 84.28 : 107.67 |
| Arsenic | TM181 | **96.22** 87.05 : 109.36 |
| Barium | TM181 | **89.08** 82.49 : 109.34 |
| Beryllium | TM181 | **92.91** 85.44 : 109.61 |
| Boron | TM181 | **85.96** 73.51 : 104.66 |
| Cadmium | TM181 | **88.48** 81.46 : 106.43 |
| Chromium | TM181 | **87.42** 82.26 : 104.55 |
| Cobalt | TM181 | **86.16** 86.54 : 106.87 |
| Copper | TM181 | **92.25** 82.40 : 105.45 |
| Iron | TM181 | **87.3** 82.95 : 110.58 |
| Lead | TM181 | **86.71** 78.24 : 104.05 |

## Metals in solid samples by OES

| | | QC 2131 |
|---|---|---|
| Manganese | TM181 | **103.06**<br>94.29 : 119.51 |
| Mercury | TM181 | **91.06**<br>83.74 : 105.34 |
| Molybdenum | TM181 | **91.36**<br>87.11 : 106.87 |
| Nickel | TM181 | **86.8**<br>81.92 : 102.18 |
| Phosphorus | TM181 | **109.29**<br>94.56 : 124.28 |
| Selenium | TM181 | **95.69**<br>86.28 : 110.48 |
| Strontium | TM181 | **85.3**<br>79.13 : 102.79 |
| Thallium | TM181 | **91.59**<br>82.94 : 111.86 |
| Tin | TM181 | **93.92**<br>90.25 : 108.86 |
| Titanium | TM181 | **77.1**<br>66.23 : 102.06 |
| Vanadium | TM181 | **88.28**<br>86.37 : 107.94 |
| Zinc | TM181 | **94.05**<br>84.68 : 113.99 |

## n-Hexane in Solids

| Component | Method Code | QC 2184 |
|---|---|---|
| n_Hexane Raw | TM336 | **82.45**<br>57.88 : 118.80 |

## Oxygenates (S)

| Component | Method Code | QC 2122 |
|---|---|---|
| Diisopropyl ether raw | TM288 | **92.0**<br>81.18 : 116.31 |
| Ethanol raw | TM288 | **110.0**<br>66.44 : 128.38 |
| tert Butanol raw | TM288 | **103.5**<br>84.60 : 113.24 |
| tert-amyl methyl ether raw | TM288 | **99.5**<br>84.97 : 116.53 |
| tert-butyl ethyl ether raw | TM288 | **93.5**<br>84.60 : 113.55 |
| tert-butyl methyl ether raw | TM288 | **98.75**<br>84.11 : 114.26 |

## PAH by GCMS

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## PAH by GCMS

| Component | Method Code | QC 2172 | QC 2132 |
|---|---|---|---|
| Acenaphthene | TM218 | **98.0** 76.79 : 103.90 | **96.5** 76.79 : 103.90 |
| Acenaphthylene | TM218 | **97.0** 78.40 : 108.66 | **95.5** 78.40 : 108.66 |
| Anthracene | TM218 | **102.5** 76.15 : 110.07 | **91.5** 76.15 : 110.07 |
| Benz(a)anthracene | TM218 | **117.5** 73.77 : 119.26 | **93.5** 73.77 : 119.26 |
| Benzo(a)pyrene | TM218 | **99.5** 73.20 : 114.18 | **99.5** 73.20 : 114.18 |
| Benzo(b)fluoranthene | TM218 | **100.5** 75.36 : 117.58 | **94.5** 75.36 : 117.58 |
| Benzo(ghi)perylene | TM218 | **91.5** 70.73 : 116.12 | **102.0** 70.73 : 116.12 |
| Benzo(k)fluoranthene | TM218 | **103.5** 75.98 : 116.59 | **99.0** 75.98 : 116.59 |
| Chrysene | TM218 | **110.5** 74.82 : 114.18 | **90.5** 74.82 : 114.18 |
| Dibenzo(ah)anthracene | TM218 | **93.0** 69.17 : 115.30 | **99.5** 69.17 : 115.30 |
| Fluoranthene | TM218 | **105.0** 75.88 : 112.84 | **87.5** 75.88 : 112.84 |
| Fluorene | TM218 | **99.0** 78.50 : 114.02 | **97.5** 78.50 : 114.02 |
| Indeno(123cd)pyrene | TM218 | **97.0** 70.26 : 117.95 | **94.0** 70.26 : 117.95 |
| Naphthalene | TM218 | **91.5** 75.24 : 111.26 | **91.0** 75.24 : 111.26 |
| Phenanthrene | TM218 | **104.0** 77.07 : 107.43 | **92.0** 77.07 : 107.43 |
| Pyrene | TM218 | **102.0** 78.74 : 112.56 | **87.0** 78.74 : 112.56 |

## Semi Volatile Organic Compounds

| Component | Method Code | QC 2125 | QC 2179 |
|---|---|---|---|
| 4-Bromophenylphenylether (Soil) | TM157 | **97.5** 66.75 : 125.25 | **101.0** 66.75 : 125.25 |
| Benzo(a)anthracene (Soil) | TM157 | **103.0** 67.40 : 120.50 | **103.0** 67.40 : 120.50 |
| Hexachlorobutadiene (Soil) | TM157 | **93.0** 68.25 : 126.75 | **94.5** 68.25 : 126.75 |
| Naphthalene (Soil) | TM157 | **92.0** 67.55 : 125.45 | **94.5** 67.55 : 125.45 |
| Nitrobenzene (Soil) | TM157 | **88.0** 66.50 : 123.50 | **93.0** 66.50 : 123.50 |
| Phenol (Soil) | TM157 | **94.5** 69.92 : 114.02 | **93.5** 69.92 : 114.02 |

## Total Organic Carbon

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## Total Organic Carbon

| Component | Method Code | QC 2147 |
|---|---|---|
| Total Organic Carbon | TM132 | **89.84**<br>83.80 : 116.60 |

## VOC MS (S)

| Component | Method Code | QC 2102 | QC 2163 |
|---|---|---|---|
| 1,1,1,2-tetrachloroethane | TM116 | **92.2**<br>77.56 : 115.55 | **101.4**<br>77.47 : 121.29 |
| 1,1,1-Trichloroethane | TM116 | **90.6**<br>73.73 : 118.05 | **101.8**<br>88.88 : 119.66 |
| 1,1,2-Trichloroethane | TM116 | **92.8**<br>77.12 : 116.04 | **107.4**<br>75.16 : 112.70 |
| 1,1-Dichloroethane | TM116 | **96.2**<br>74.46 : 129.15 | **101.2**<br>77.84 : 124.12 |
| 1,2-Dichloroethane | TM116 | **97.8**<br>92.38 : 131.65 | **116.4**<br>86.58 : 129.62 |
| 1,4-Dichlorobenzene | TM116 | **98.0**<br>72.76 : 126.34 | **96.0**<br>82.59 : 123.23 |
| 2-Chlorotoluene | TM116 | **94.8**<br>81.66 : 118.02 | **93.0**<br>66.81 : 118.43 |
| 4-Chlorotoluene | TM116 | **92.6**<br>66.90 : 112.46 | **93.2**<br>65.88 : 114.76 |
| Benzene | TM116 | **95.0**<br>89.71 : 111.93 | **99.4**<br>93.16 : 123.63 |
| Carbon Disulphide | TM116 | **89.2**<br>74.91 : 122.14 | **84.4**<br>75.11 : 124.81 |
| Carbontetrachloride | TM116 | **98.8**<br>80.31 : 124.50 | **103.4**<br>82.35 : 126.46 |
| Chlorobenzene | TM116 | **97.8**<br>86.73 : 118.34 | **98.6**<br>82.88 : 122.42 |
| Chloroform | TM116 | **98.2**<br>87.40 : 122.49 | **106.4**<br>82.52 : 123.25 |
| Chloromethane | TM116 | **89.4**<br>65.05 : 142.63 | **76.6**<br>55.37 : 133.35 |
| Cis-1,2-Dichloroethene | TM116 | **92.6**<br>80.67 : 126.72 | **102.0**<br>78.27 : 128.90 |
| Dibromomethane | TM116 | **94.4**<br>67.80 : 121.75 | **112.2**<br>77.47 : 121.29 |
| Dichloromethane | TM116 | **98.0**<br>81.11 : 133.25 | **108.8**<br>81.68 : 125.21 |
| Ethylbenzene | TM116 | **91.0**<br>75.92 : 110.41 | **91.8**<br>83.56 : 122.99 |
| Hexachlorobutadiene | TM116 | **56.6**<br>12.82 : 152.73 | **74.4**<br>7.32 : 139.00 |
| Isopropylbenzene | TM116 | **85.6**<br>54.21 : 117.17 | **85.0**<br>52.15 : 132.52 |
| Naphthalene | TM116 | **102.4**<br>80.86 : 128.81 | **93.8**<br>79.29 : 125.59 |
| o-Xylene | TM116 | **90.0**<br>69.99 : 108.74 | **93.4**<br>68.16 : 107.61 |

## VOC MS (S)

| | | QC 2102 | QC 2163 |
|---|---|---|---|
| p/m-Xylene | TM116 | **89.7**<br>68.32 : 108.91 | **91.1**<br>77.41 : 112.71 |
| Sec-Butylbenzene | TM116 | **76.8**<br>44.91 : 118.40 | **84.4**<br>44.71 : 117.87 |
| Tetrachloroethene | TM116 | **99.8**<br>76.95 : 121.02 | **97.0**<br>81.43 : 126.65 |
| Toluene | TM116 | **90.6**<br>74.24 : 107.42 | **96.8**<br>87.82 : 116.21 |
| Trichloroethene | TM116 | **93.2**<br>77.61 : 111.54 | **97.8**<br>79.80 : 112.33 |
| Trichlorofluoromethane | TM116 | **101.0**<br>84.55 : 133.27 | **102.2**<br>80.52 : 132.12 |
| Vinyl Chloride | TM116 | **98.4**<br>70.29 : 138.58 | **89.0**<br>58.08 : 128.58 |

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.
The figure detailed is the percentage recovery result for the AQC.
The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.

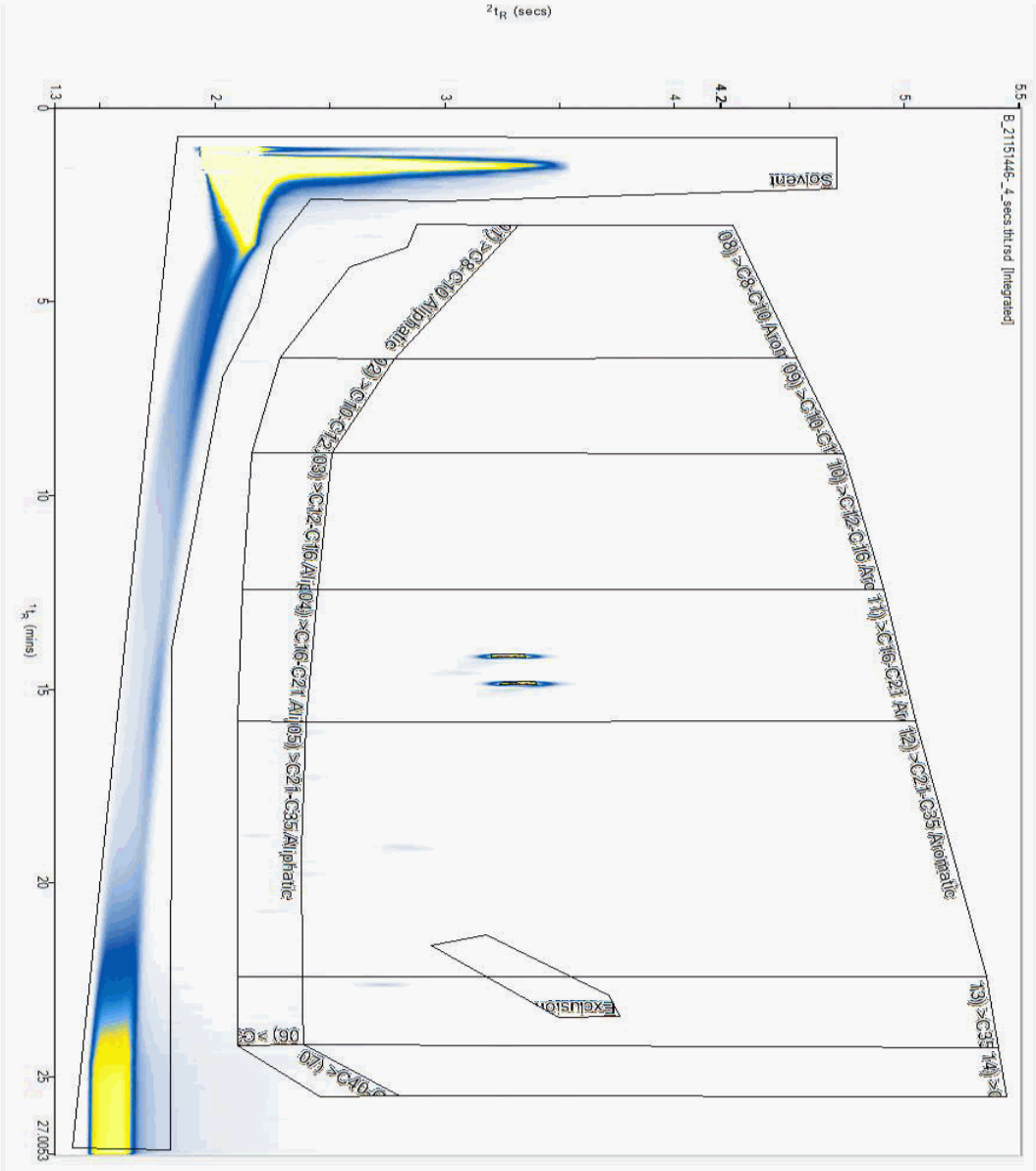
# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## Chromatogram

**Analysis:** EPH CWG GC (S) **Sample No :** 21151446 **Depth :** 1.00
**Sample ID :** VP102

```
   ChromSpace LIMS export
  Current batch
Sample Identity:  B_21151446-_4_secs.tht
Date Acquired  :  20/11/19 01:12:57
Units          :  ppm
Dilution       :  0
CF             :
Multiplier     :
```



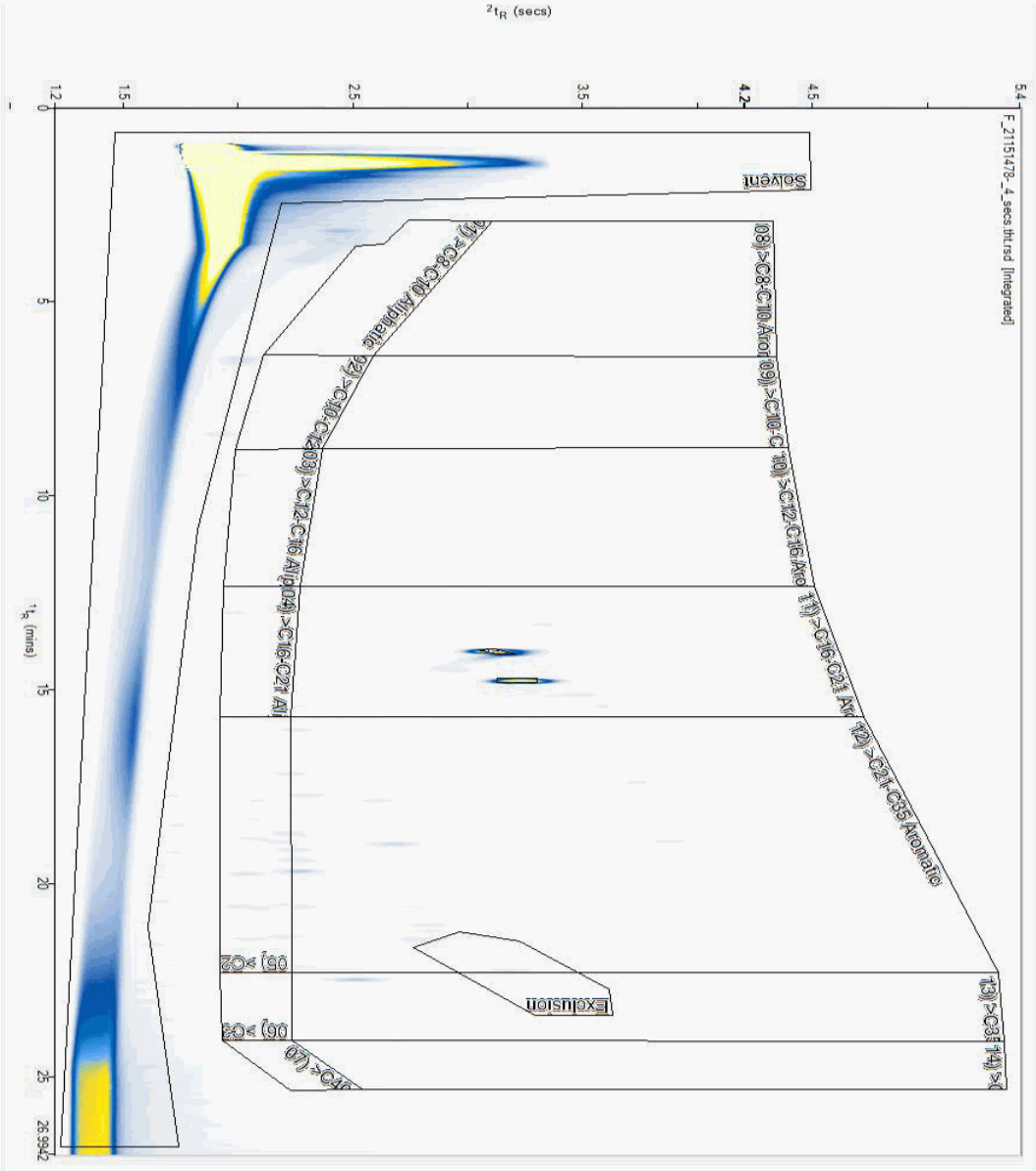
# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## Chromatogram

**Analysis:** EPH CWG GC (S) **Sample No :** 21151478 **Depth :** 1.00
**Sample ID :** MW102

```
   ChromSpace LIMS export
  Current batch
Sample Identity:  F_21151478-_4_secs.tht
Date Acquired  :  20/11/19 04:44:08
Units          :  ppm
Dilution       :  0
CF             :
Multiplier     :
```



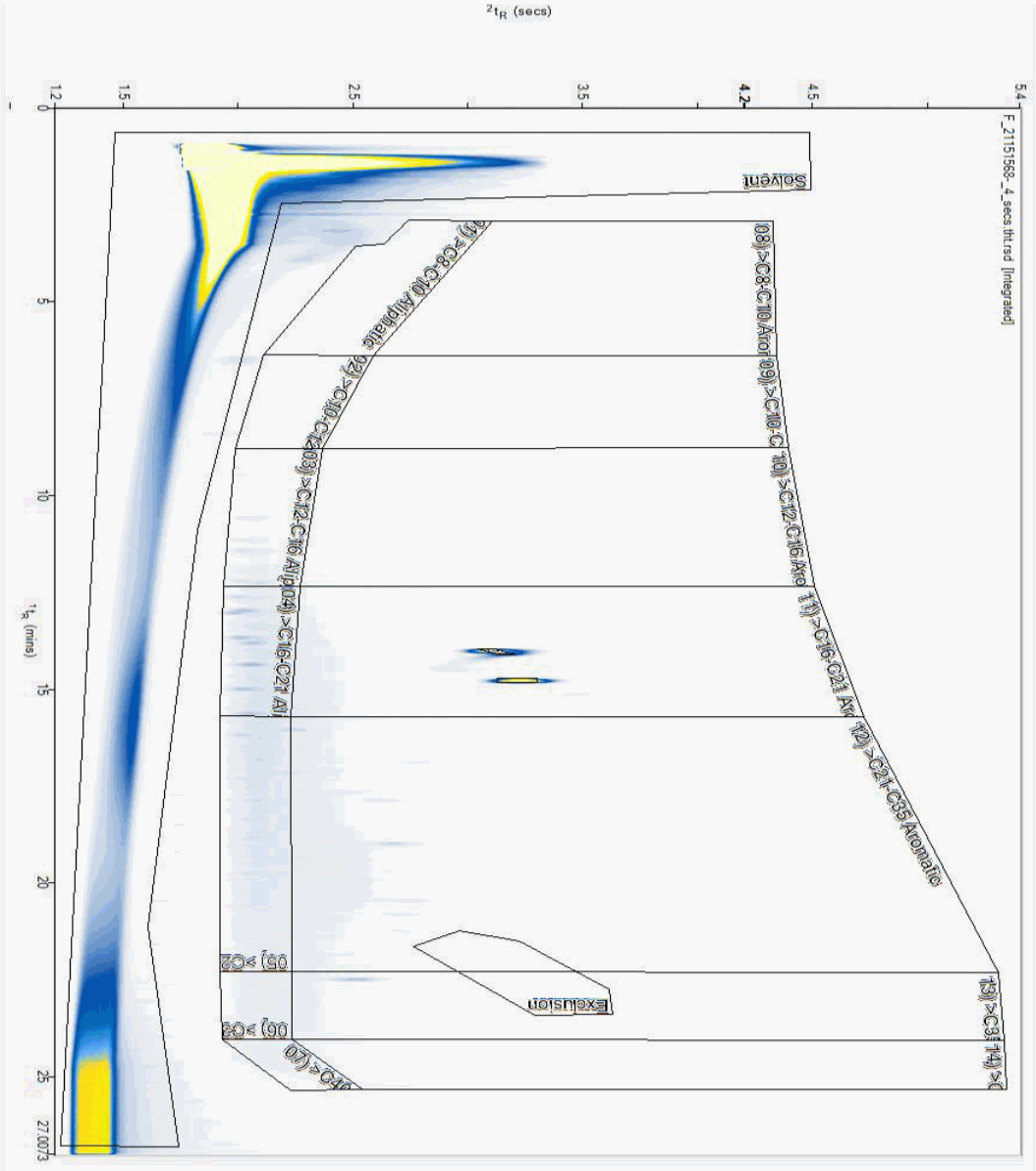
# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## Chromatogram

**Analysis:** EPH CWG GC (S) **Sample No :** 21151568 **Sample ID :** VP103 **Depth :** 0.50

```
ChromSpace LIMS export
Current batch
Sample Identity:  F_21151568-_4_secs.tht
Date Acquired  :  20/11/19 05:44:25
Units          :  ppm
Dilution       :  0
CF             :
Multiplier     :
```



# CERTIFICATE OF ANALYSIS

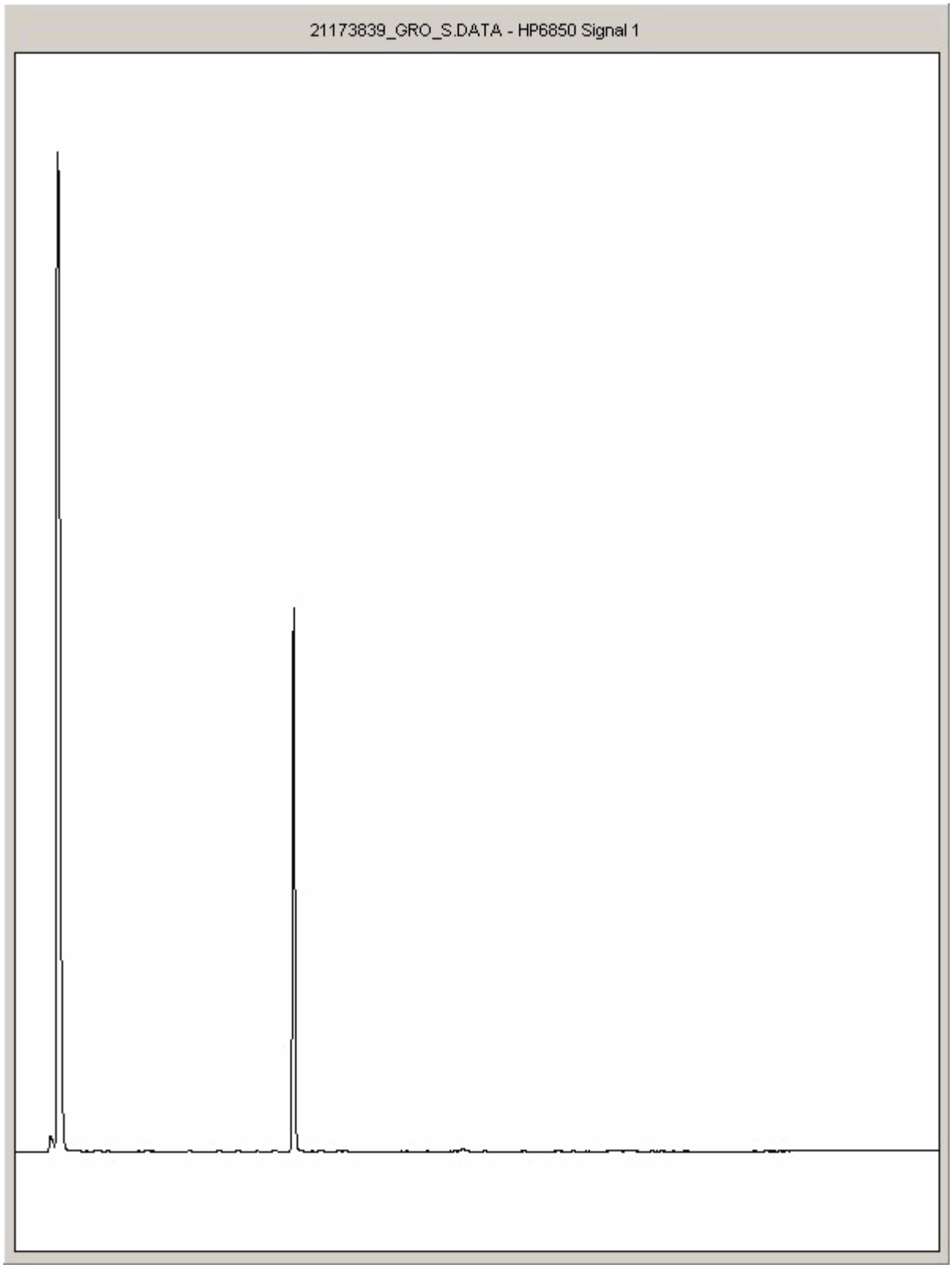
| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## Chromatogram

**Analysis:** GRO by GC-FID (S)

**Sample No :** 21173839
**Sample ID :** MW102

**Depth :** 1.00



# CERTIFICATE OF ANALYSIS

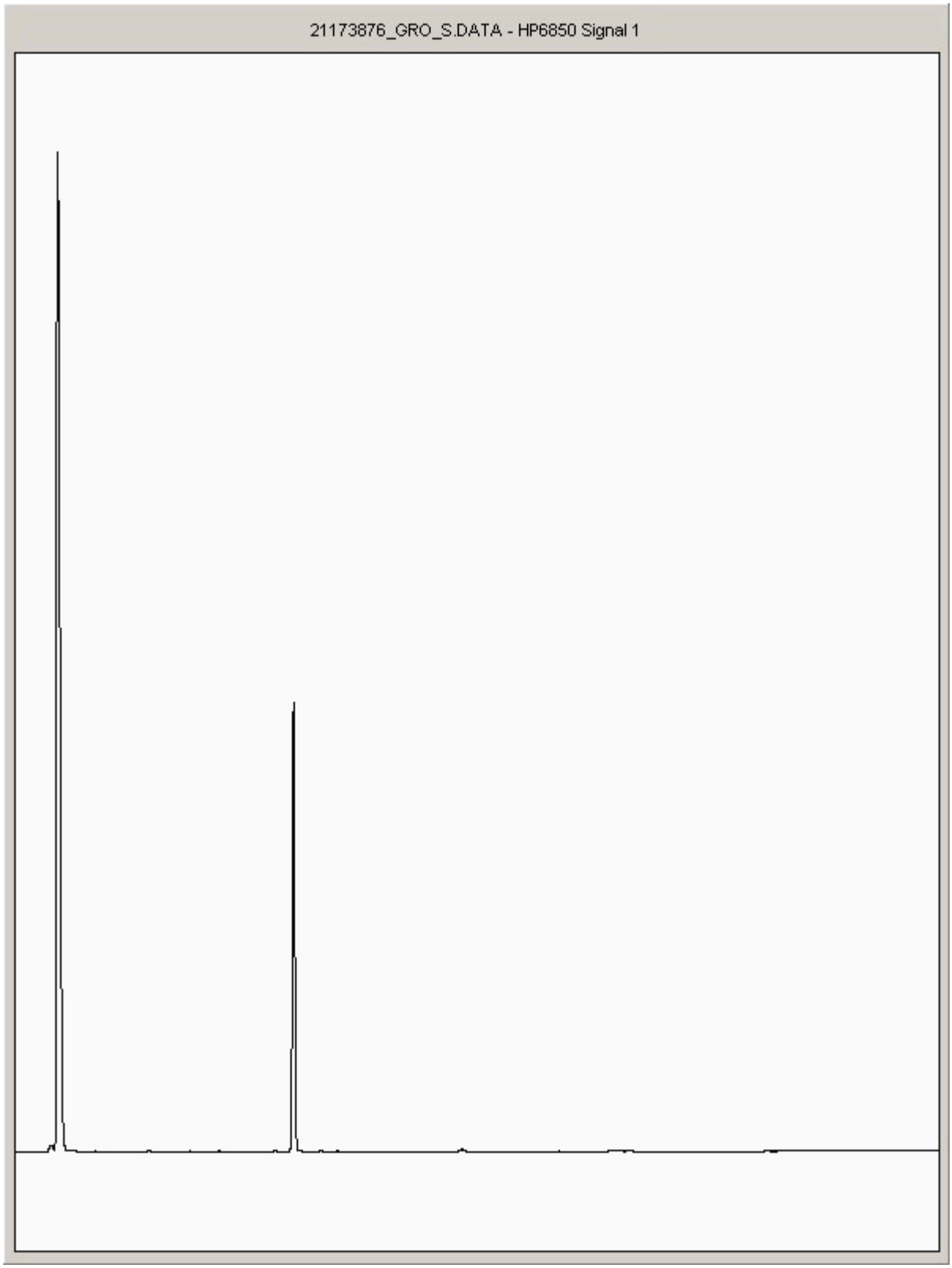
| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## Chromatogram

**Analysis:** GRO by GC-FID (S)

**Sample No :** 21173876
**Sample ID :** VP102

**Depth :** 1.00



# CERTIFICATE OF ANALYSIS

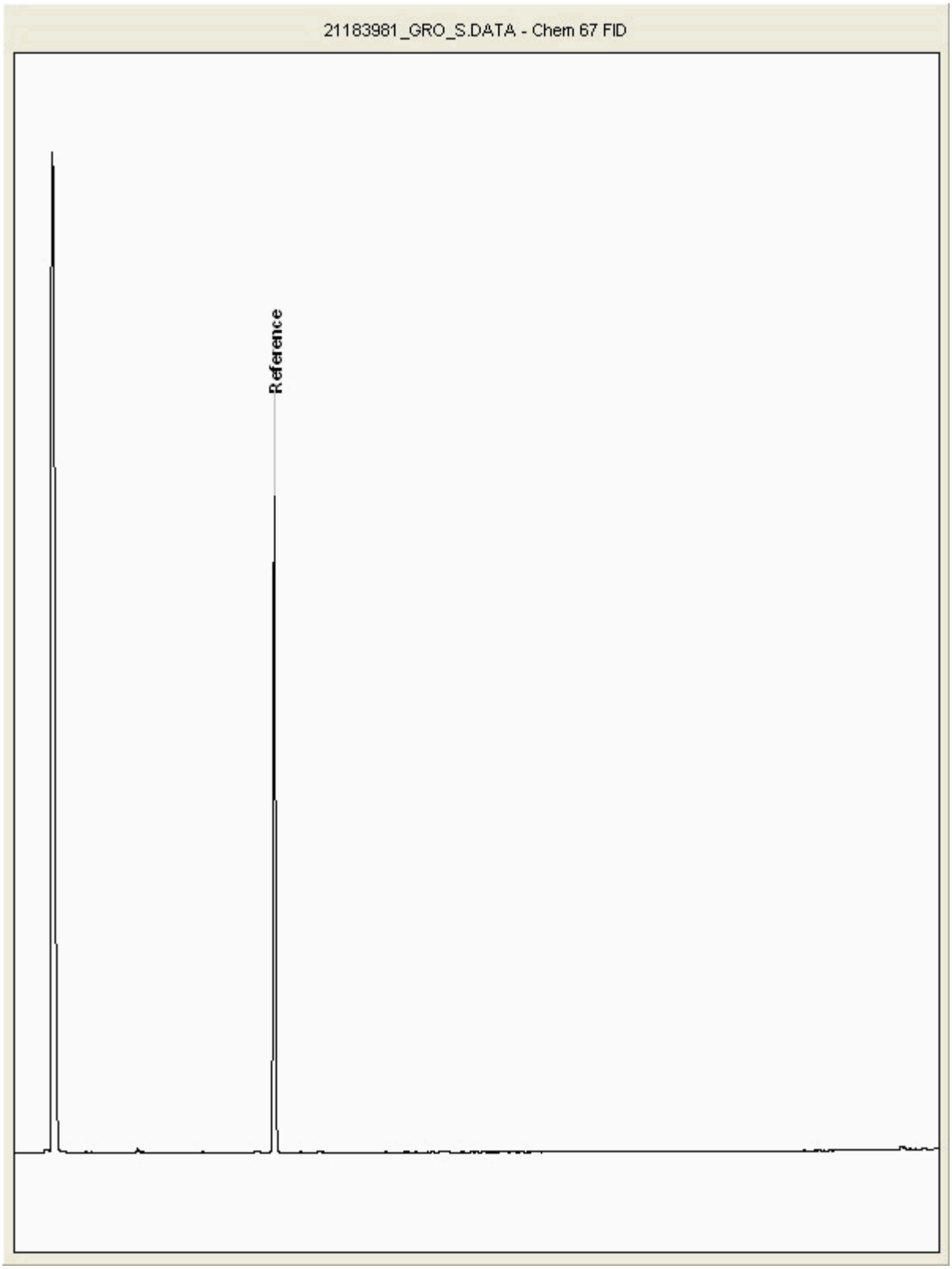
| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-8 | **Client Reference:** | 60608750 | **Report Number:** | 530947 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530748 |

## Chromatogram

**Analysis:** GRO by GC-FID (S)

**Sample No :** 21183981
**Sample ID :** VP103

**Depth :** 0.50



# Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

| | |
|---|---|
| 1 | **Container with Headspace provided for volatiles analysis** |
| 2 | **Incorrect container received** |
| 3 | **Deviation from method** |
| § | **Sampled on date not provided** |
| ♦ | **Sample holding time exceeded in laboratory** |
| @ | **Sample holding time exceeded due to late arrival of instructions or samples** |

19. **Asbestos**

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

**Identification of Asbestos in Bulk Materials & Soils**

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

| Asbestos Type | Common Name |
|---|---|
| Chrysotile | White Asbestos |
| Amosite | Brown Asbestos |
| Crocidolite | Blue Asbestos |
| Fibrous Actinolite | - |
| Fibrous Anthophyllite | - |
| Fibrous Tremolite | - |

**Visual Estimation Of Fibre Content**

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

**Respirable Fibres**

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2107).*

**Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.**

**The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.**

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

Aecom
1 New York Street
Manchester
M1 4HD

**Attention:** Sophie Doyle

# CERTIFICATE OF ANALYSIS

| | |
|---|---|
| **Date of report Generation:** | 28 November 2019 |
| **Customer:** | Aecom |
| **Sample Delivery Group (SDG):** | 191115-83 |
| **Your Reference:** | |
| **Location:** | Shell Whitemare Pool |
| **Report No:** | 531775 |

**This report has been revised and directly supersedes 530906 in its entirety.**

We received 1 sample on Friday November 15, 2019 and 1 of these samples were scheduled for analysis which was completed on Thursday November 28, 2019. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

[redacted]

**Sonia McWhan**

Operations Manager

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-83 | **Client Reference:** | | **Report Number:** | 531775 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530906 |

## Received Sample Overview

| Lab Sample No(s) | Customer Sample Ref. | AGS Ref. | Depth (m) | Sampled Date |
|---|---|---|---|---|
| 21151158 | MW105 | | 0.50 | 13/11/2019 |

**Maximum Sample/Coolbox Temperature (°C) :** **8.2**

**ISO5667-3 Water quality - Sampling - Part3 -**

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

**Only received samples which have had analysis scheduled will be shown on the following pages.**

Validated

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-83 | **Client Reference:** | | **Report Number:** | 531775 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530906 |

**Results Legend**

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

| | | | | | |
|---|---|---|---|---|---|
| **Lab Sample No(s)** | | | 21151158 | | |
| **Customer Sample Reference** | | | MW105 | | |
| **AGS Reference** | | | | | |
| **Depth (m)** | | | 0.50 | | |
| **Container** | | | 1kg TUB with Handle (ALE260) | 250g Amber Jar (ALE210) | 60g VOC (ALE215) |
| **Sample Type** | | | S | S | S |
| Anions by Kone (soil) | All | NDPs: 0 Tests: 1 | | X | |
| Asbestos ID in Solid Samples | All | NDPs: 0 Tests: 1 | X | | |
| EPH CWG GC (S) | All | NDPs: 0 Tests: 1 | | X | |
| GRO by GC-FID (S) | All | NDPs: 0 Tests: 1 | | | X |
| Hexavalent Chromium (s) | All | NDPs: 0 Tests: 1 | | X | |
| Metals in solid samples by OES | All | NDPs: 0 Tests: 1 | | X | |
| n-Hexane in Solids | All | NDPs: 0 Tests: 1 | | | X |
| Oxygenates (S) | All | NDPs: 0 Tests: 1 | | | X |
| PAH by GCMS | All | NDPs: 0 Tests: 1 | | X | |
| PCBs by GCMS | All | NDPs: 0 Tests: 1 | | X | |
| Sample description | All | NDPs: 0 Tests: 1 | | X | |
| Semi Volatile Organic Compounds | All | NDPs: 0 Tests: 1 | | X | |
| VOC MS (S) | All | NDPs: 0 Tests: 1 | | | X |

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-83 | **Client Reference:** | | **Report Number:** | 531775 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530906 |

## Sample Descriptions

### Grain Sizes

| very fine | <0.063mm | fine | 0.063mm - 0.1mm | medium | 0.1mm - 2mm | coarse | 2mm - 10mm | very coarse | >10mm |
|---|---|---|---|---|---|---|---|---|---|

| Lab Sample No(s) | Customer Sample Ref. | Depth (m) | Colour | Description | Inclusions | Inclusions 2 |
|---|---|---|---|---|---|---|
| 21151158 | MW105 | 0.50 | Dark Brown | Sandy Silt Loam | Stones | Crushed Brick |

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

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

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

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-83 | **Client Reference:** | | **Report Number:** | 531775 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530906 |

| Results Legend | |
|---|---|
| # | ISO17025 accredited. |
| M | mCERTS accredited. |
| aq | Aqueous / settled sample. |
| diss.filt | Dissolved / filtered sample. |
| tot.unfilt | Total / unfiltered sample. |
| * | Subcontracted - refer to subcontractor report for accreditation status. |
| ** | % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery |
| (F) | Trigger breach confirmed |
| 1-3+§@ | Sample deviation (see appendix) |

| Component | LOD/Units | Method | Customer Sample Ref. | Depth (m) | Sample Type | Date Sampled | Sample Time | Date Received | SDG Ref | Lab Sample No.(s) | AGS Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | MW105 | 0.50 | Soil/Solid (S) | 13/11/2019 | . | 15/11/2019 | 191115-83 | 21151158 | |
| Moisture Content Ratio (% of as received sample) | % | PM024 | 13 | | | | | | | | |
| Chromium, Hexavalent | <0.6 mg/kg | TM151 | <0.6 # | | | | | | | | |
| PCB congener 28 | <3 µg/kg | TM168 | <3 M | | | | | | | | |
| PCB congener 52 | <3 µg/kg | TM168 | <3 M | | | | | | | | |
| PCB congener 101 | <3 µg/kg | TM168 | <3 M | | | | | | | | |
| PCB congener 118 | <3 µg/kg | TM168 | <3 M | | | | | | | | |
| PCB congener 138 | <3 µg/kg | TM168 | <3 M | | | | | | | | |
| PCB congener 153 | <3 µg/kg | TM168 | <3 M | | | | | | | | |
| PCB congener 180 | <3 µg/kg | TM168 | <3 M | | | | | | | | |
| Sum of detected PCB 7 Congeners | <21 µg/kg | TM168 | <21 | | | | | | | | |
| Arsenic | <0.6 mg/kg | TM181 | 5.09 M | | | | | | | | |
| Boron | <0.7 mg/kg | TM181 | 6.39 # | | | | | | | | |
| Cadmium | <0.02 mg/kg | TM181 | 0.086 M | | | | | | | | |
| Chromium | <0.9 mg/kg | TM181 | 7.5 M | | | | | | | | |
| Cobalt | <0.1 mg/kg | TM181 | 3.08 M | | | | | | | | |
| Copper | <1.4 mg/kg | TM181 | 28.7 M | | | | | | | | |
| Lead | <0.7 mg/kg | TM181 | 51.8 M | | | | | | | | |
| Mercury | <0.14 mg/kg | TM181 | <0.14 M | | | | | | | | |
| Molybdenum | <0.1 mg/kg | TM181 | 0.953 # | | | | | | | | |
| Nickel | <0.2 mg/kg | TM181 | 8.58 M | | | | | | | | |
| Selenium | <1 mg/kg | TM181 | <1 # | | | | | | | | |
| Tin | <0.24 mg/kg | TM181 | 1.04 # | | | | | | | | |
| Zinc | <1.9 mg/kg | TM181 | 109 M | | | | | | | | |
| Water Soluble Sulphate as SO4 2:1 Extract | <0.004 g/l | TM243 | 0.0163 M | | | | | | | | |
| Chloride (soluble) | <5 mg/kg | TM243 | 24.4 M | | | | | | | | |
| Bromofluorobenzene** | % | TM288 | 85.3 | | | | | | | | |
| Ethanol | <50 µg/kg | TM288 | <50 | | | | | | | | |
| tert Butanol | <10 µg/kg | TM288 | <10 | | | | | | | | |
| Diisopropyl ether | <1 µg/kg | TM288 | <1 | | | | | | | | |
| tert-butyl ethyl ether | <1 µg/kg | TM288 | <1 | | | | | | | | |
| n-Hexane | <10 µg/kg | TM336 | <10 | | | | | | | | |

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-83 | **Client Reference:** | | **Report Number:** | 531775 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530906 |

## EPH CWG GC (S)

| Results Legend | |
|---|---|
| # | ISO17025 accredited. |
| M | mCERTS accredited. |
| aq | Aqueous / settled sample. |
| diss.filt | Dissolved / filtered sample. |
| tot.unfilt | Total / unfiltered sample. |
| * | Subcontracted - refer to subcontractor report for accreditation status. |
| ** | % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery |
| (F) | Trigger breach confirmed |
| 1-3+§@ | Sample deviation (see appendix) |

| Component | LOD/Units | Method | Customer Sample Ref. | Depth (m) | Sample Type | Date Sampled | Sample Time | Date Received | SDG Ref | Lab Sample No.(s) | AGS Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | MW105 | 0.50 | Soil/Solid (S) | 13/11/2019 | . | 15/11/2019 | 191115-83 | 21151158 | |
| Aliphatics >C10-C12 | <1000 µg/kg | TM414 | <1000 | | | | | | | | |
| Aliphatics >C12-C16 | <1000 µg/kg | TM414 | <1000 | | | | | | | | |
| Aliphatics >C16-C21 | <1000 µg/kg | TM414 | <1000 | | | | | | | | |
| Aliphatics >C21-C35 | <1000 µg/kg | TM414 | <1000 | | | | | | | | |
| Aliphatics >C35-C44 | <1000 µg/kg | TM414 | <1000 | | | | | | | | |
| Total Aliphatics >C10-C44 | <5000 µg/kg | TM414 | <5000 | | | | | | | | |
| Total Aliphatics & Aromatics >C10-C44 | <10000 µg/kg | TM414 | 14900 | | | | | | | | |
| Aromatics > EC10-EC12 | <1000 µg/kg | TM414 | <1000 | | | | | | | | |
| Aromatics > EC12-EC16 | <1000 µg/kg | TM414 | <1000 | | | | | | | | |
| Aromatics > EC16-EC21 | <1000 µg/kg | TM414 | 3920 | | | | | | | | |
| Aromatics > EC21-EC35 | <1000 µg/kg | TM414 | 8940 | | | | | | | | |
| Aromatics >EC35-EC44 | <1000 µg/kg | TM414 | <1000 | | | | | | | | |
| Total Aromatics > EC10-EC44 | <5000 µg/kg | TM414 | 14000 | | | | | | | | |

Validated

# CERTIFICATE OF ANALYSIS

| | | | | | |
|---|---|---|---|---|---|
| **SDG:** | 191115-83 | **Client Reference:** | | **Report Number:** | 531775 |
| **Location:** | Shell Whitemare Pool | **Order Number:** | 1382284 | **Superseded Report:** | 530906 |

## GRO by GC-FID (S)

| Results Legend | |
|---|---|
| # | ISO17025 accredited. |
| M | mCERTS accredited. |
| aq | Aqueous / settled sample. |
| diss.filt | Dissolved / filtered sample. |
| tot.unfilt | Total / unfiltered sample. |
| * | Subcontracted - refer to subcontractor report for accreditation status. |
| ** | % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery |
| (F) | Trigger breach confirmed |
| 1-3+§@ | Sample deviation (see appendix) |

| Component | LOD/Units | Method | Customer Sample Ref. | Depth (m) | Sample Type | Date Sampled | Sample Time | Date Received | SDG Ref | Lab Sample No.(s) | AGS Reference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | MW105 | 0.50 | Soil/Solid (S) | 13/11/2019 | . | 15/11/2019 | 191115-83 | 21151158 | |
| GRO Surrogate % recovery** | % | TM089 | 142 3 | | | | | | | | |
| Aliphatics >C5-C6 | <10 µg/kg | TM089 | <10 3 | | | | | | | | |
| Aliphatics >C6-C8 | <10 µg/kg | TM089 | <10 3 | | | | | | | | |
| Aliphatics >C8-C10 | <10 µg/kg | TM089 | <10 3 | | | | | | | | |
| Aromatics >EC5-EC7 | <10 µg/kg | TM089 | <10 3 | | | | | | | | |
| Aromatics >EC7-EC8 | <10 µg/kg | TM089 | <10 3 | | | | | | | | |
| Aromatics >EC8-EC10 | <10 µg/kg | TM089 | <10 3 | | | | | | | | |