M54 to M6 Link Road

TR010054

Volume 6

6.3 Environmental Statement

Appendices

Appendix 13.6 Sediment Sampling of Lower Pool

Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

January 2020

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M54 to M6 Link Road

Development Consent Order 202[ ]

6.3 Environmental Statement Appendices

Appendix 13.6 Sediment Sampling of Lower Pool

Regulation Number	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010054
Application Document Reference	6.3
Author	M54 to M6 Link Road Project Team and Highways England

Version	**Date**	**Status of Version**
1	January 2020	DCO Application

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1 Introduction

1.1 Purpose of this document

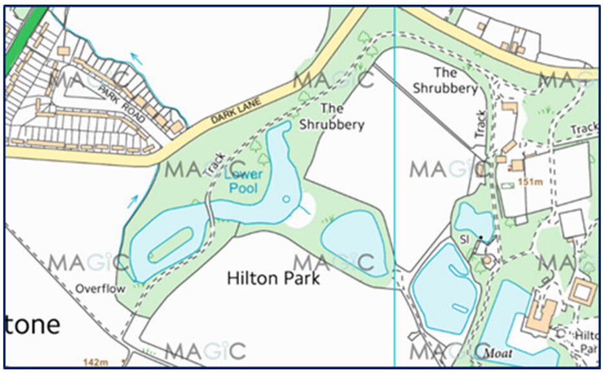
1.1.1 Highways England is developing a link road between the M54 and M6 to provide a link between Junction 1 of the M54, M6 North and the A460 to Cannock. The M54 to M6 Link Road (herein referred to as 'the Scheme') aims to reduce congestion on local and regional routes, particularly the A449 and A460 and deliver improved transport links to encourage the development of the surrounding area.

1.1.2 The Scheme would intercept an area of ponds to the west of Hilton Hall, and would require the partial loss of the most westerly pond known as Lower Pool (NGR SJ 94788 05360), through which a small watercourse flows (described as 'Watercourse 3' in Environmental Statement (ES) Chapter 13: Road Drainage and the Water Environment [TR010054/APP/6.1]). The proposed works may require removal of potentially contaminated sediments for re-use or disposal, and could also mobilise sediments into the water column, potentially having an adverse impact on downstream receptors.

1.1.3 An understanding of the water depth and quality of pond sediments is therefore required to inform the Scheme design and any removal, reuse or disposal of pond sediments. An investigation of sediment quality and quantity has been undertaken to inform the development of the Scheme, and the impact assessments within the ES and Water Framework Directive (WFD) assessments. The findings of the investigation are outlined within this document.

1.2 Background

1.2.1 The Scheme would intercept Lower Pool to the west of Hilton Hall as shown in Image 1a and 1b.



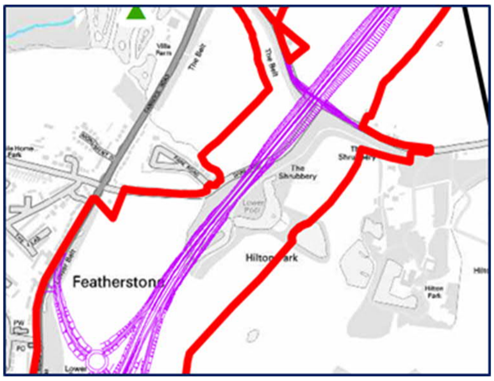


Image 1a (left) Location of Lower Pool between Dark Lane and Hilton Hall. Image 1b (right) The Scheme crossing of Lower Pool.

1.2.2 Ponds are typically defined as waterbodies less than 2 hectares (ha) in area and holding water more than four months of the year. Although Lower Pool is a permanent feature, and exhibits many characteristics of a small lake, its area is significantly less than 2 ha and thus it has been described as a pond in this study.

1.2.3 There is potential for the significant loss of area from the southern basin of Lower Pool as a result of the Scheme. Furthermore, the construction of the Scheme in this area would impact on a wider footprint to that of the immediate Scheme footprint and would require the removal of unsuitable sediment (e.g. soft and wet pond sediments) to ensure the road is constructed on suitably supportive ground.

1.2.4 Lower Pool is an online waterbody through which Watercourse 3 flows (see ES Chapter 13: Road Drainage and the Water Environment [TR010054/APP/6.1]). There is therefore potential for contaminants to be mobilised downstream into Watercourse 3, which is a tributary of the WFD designated Saredon Brook. There is also the potential for the works to adversely impact the remainder of Lower Pool waterbody (medium importance in line with the Design Manual for Roads and Bridges LA 113, refer to ES Chapter 13: Road Drainage and the Water Environment [TR010054/APP/6.1]).

1.3 Proposed works

1.3.1 The affected southern basin of Lower Pool would need to be dammed off from the remaining pond. Water in the affected basin could then be pumped out either to Watercourse 3 or allowed to infiltrate to ground (with permission possibly required from the Environment Agency and Lead Local Flood Authority (LLFA)). Despite overflowing to Watercourse 3 currently, if the water is to be pumped out to Watercourse 3, it may be necessary to undertake further assessments to ensure the increased rate of discharge does not lead to adverse impacts. These may include:

- water quality sampling and analysis to ensure that an increased discharge from the pond is not going to have any adverse impact on Watercourse 3;
- further ecological surveys to check for the presence of any non-native invasive species; and
- determination of a suitable rate of discharge to be agreed with the LLFA that does not increase flood risk (including over-pumping from the unaffected basin to ensure it does not overflow into the works).

1.3.2 The Outline Environmental Management Plan (OEMP) [TR010054/APP/6.11] details the measures that would be undertaken during construction to mitigate temporary effects on the water environment. This includes a range of measures to mitigate potential impacts on the water environment, which accord with legal compliance and good practice guidance when working with or around sensitive water resources. Such measures include relevant water environment mitigation measures as taken from applicable Guidance for Pollution Prevention (GPP) documents (Ref 13.45). The measures detailed within the OEMP [TR010054/APP/6.11] would be developed into a Construction Environmental Management Plan (CEMP) which would be implemented by the selected construction contractor. These measures broadly focus on managing the risk of pollution to surface waters and groundwater environment; measures to control the storage, handling and disposal of substances during construction. Measures relating to the control of small or more significant spillages are included in the Outline Water Management Plan (OWMP).

1.3.3 The methodology for works within Lower Pool would be developed during the detailed design stage of the works, and would include best practice measures to be outlined within the OEMP, and which includes an OWMP. These would ensure the area of pool to be lost would have any fish removed from the pond before construction activities begin, and measures would be put in place to ensure no sediment plumes or contaminated water (i.e. during dewatering) are released downstream as far as is practicable. Surveys of Lower Pool has confirmed the presence of populations of carp and ghost carp. Therefore, the use of fish rescue procedures would be required. Canadian pondweed, a non-native invasive macrophyte is also believed to be present, and measures to minimise the risk of its spread would be required.

1.3.4 During the development of the methodology at detailed design stage, the following should be considered for inclusion. It would be advisable that following fish rescue, and ensuring no species are located in the western pool, the construction of the new weir is constructed. This would allow the maintenance of water levels within the remaining portion of Lower Pool to be maintained.

1.3.5 Once the south-eastern basin has been dewatered, the sediment would need to be removed for re-use within the Scheme or disposed of in accordance with the prevailing waste legislation applying in England. It is expected that some of the pond sediment would require action to reduce its water content, which could be achieved by a number of means (e.g. silt tubes, mechanical, mixing with other ‘dry’ materials). If disposal is required then the waste would need to be correctly classified based on its potential contaminant content.

2 Approach and Methodology

2.1 Site walkover

2.1.1 A walkover survey of Lower Pool and immediate surroundings was carried out on 4th June 2019. This focused on identifying access routes to Lower Pool, establishing the nature of the existing land use, and identifying drainage and water features within the site.

2.2 Pond sediment investigation

2.2.1 There is no previous sediment data available from Lower Pool, either in terms of quantity or quality. As such, the pond sediment investigation has been designed to cover both the south-eastern and north-western halves of the pool, which are separated by a footbridge. Hereafter these are referred to as the East Pool and West Pool.

2.2.2 A sediment thickness, water depth and sediment sampling survey was undertaken from a small Typhoon inflatable boat manned by two qualified Water Scientists. Sampling was undertaken with the boat attached to a rope transect installed across the pond and firmly attached in two places using tree trunks and fishing platforms on the bankside. Data was collected from a single transect across the East Pool and West Pool. A further 12 spot samples were also completed covering a mixture of littoral and pelagic locations across the two sections of Lower Pool.

2.2.3 The following specific tasks were undertaken:

- Water depth was recorded at 2 m intervals along each transect and at each spot location using a weighted measuring tape lowered from the side of the boat.
- Sediment thickness and sediment stratigraphy was determined at 2 m intervals across the two transects and all spot locations using a 3 cm gouge corer.
- Sediment core stratigraphy was recorded using the Troels-Smith description scheme (1955), which is commonly applied to lake sediments, and a representative photograph collected.

2.2.4 Furthermore, three sediment samples were collected for physicochemical analyses using the gouge auger. The first was a bulk sample with a mix of organic and minerogenic sediments obtained from across the East Pool transect. The second was a sample of predominantly organic sediment from across West Pool transect, and the third was predominantly minerogenic sediment collected across West Pool transect. To create bulk samples, sediment obtained using the gouge auger was collected in a clean bucket and thoroughly mixed with a stirring rod to produce a bulk sample that was then placed in laboratory provided jars and containers.

2.2.5 Samples were sent to the laboratories of Element Materials Technology for analysis. Chemical tests were undertaken on dry soils and leachates, with the leachate test being carried out using an acid and a water matrix of controlled pH. The leachate analysis was undertaken at a 10:1 ratio, dictated by the water content of the samples. For analysis of Total Petroleum Hydrocarbons, samples were subject to two rounds of acid silica clean-up to remove any potential natural organics (i.e. humic acids).

2.2.6 The following broad parameters were analysed:

- physicochemical parameters (e.g. pH);
- particle size distribution, bulk density, % water/organic/dry solids content;
- total and dissolved metals;
- major non-metal ions;
- polycyclic aromatic hydrocarbons;
- volatile organic compounds;
- extractable / volatile aliphatic and aromatic hydrocarbons (speciated);
- phenols; and
- leachate tests including ammoniacal nitrogen.

2.2.7 Full details of the raw analytical results are presented in Annex A with results summarised in Section 3 of this appendix.

2.3 Limitations and Assumptions

2.3.1 The following assumptions and limitations were encountered during the sediment quality investigation at Lower Pool:

- Bulk sediment samples were tested. There may be variation in sediment quality spatially and with depth, and although the spot samples were designed to provide spatial data, further investigation would be required to determine any variance in sediment chemical quality across the West Pool.
- Due to the moisture content of the samples a 10:1 ratio was used for leachate analysis. In addition, the laboratory was unable to undertake any sediment oxygen demand analysis.
- Due to an issue with the inflatable boat, followed by land access constraints, the spot sampling was undertaken on two occasions over a month apart, on 15 August 2019 and 16 September 2019. However, all sediment sampling was undertaken on the same day in September.

2.3.2 Please refer to laboratory results sheets in Annex A for details of specific analytical constraints.

3 Results

3.1 Pond Characteristics

3.1.1 Lower Pool is approximately 11,450 m^2 in area, with a maximum length of approximately 370 m, and maximum width of approximately 45 m (See Figure 1 and Photos 1 and 2). The maximum recorded water depth during the site visit on 16 September 2019 was 1.85 m. Lower Pool is thought to be an artificial 'ornamental pool', created within the grounds of Hilton Park, which dates to 1745. Online maps show that the pond has been present since at least 1884.


Photo 1 (left) Lower Pool - East, and Photo 2 (right) Lower Pool – West

3.1.2 Lower Pool is online with the unnamed Watercourse 3, which flows into the pond on its eastern side at NGR SJ 94860 05347, and leaves from the outlet at the south-western extent of the pond at SJ 94646 05240 (see Figure 1). The inlet is a small channel of approximately 0.5 m width and was only 4-5 cm deep when observed on 16 September 2019. The channel is not well formed and the bed consisted of a mix of fine sediment and some fine gravel (up to 5 mm diameter) (see Photo 3). Water levels in the pond were too low to be overflowing from the outlet during the same site visit in September (see Photo 4).


Photo 3 (left) Watercourse 4 inlet to Lower Pool. Photo 4 (right) Watercourse 3 outlet from Lower Pool.

3.1.3 Much of the perimeter of Lower Pool is surrounded by dense and often overhanging deciduous trees (Photos 1 and 2), and so the organic load from seasonal leaf fall was expected to be considerable. The pond also has several small islands connected by small wooden bridges, with one main footbridge separating Lower Pool into the East and West sections. There are platforms for fishing located intermittently all around the waterbody, and a pump was seen to be spraying into the waterbody during the June site walkover, presumably to provide oxygenation of the water.

3.1.4 Fish observed during the site visits include numerous common carp and ghost carp (*Cyprinus carpio*). During the June site visit, numerous deceased carp were noted lying along the banks of Lower Pool. It was not known whether these had been caught through angling or had been deceased due to conditions in the waterbody. Submerged and floating macrophytes are widespread within the pool, with a species thought to be Canadian pond weed (*Elodea canadensis*) being extremely thick throughout the large majority of the waterbody (see Photos 5 and 6). The abundant macrophytes could contribute to potentially low dissolved oxygen concentrations during the night and early morning periods when compensatory photosynthesis is not occurring at the same time as floral and faunal respiration, which may have adverse impacts on the fish.


Photo 5 (left) and Photo 6 (right) Excessive macrophyte growth in Lower Pool.

3.1.5 Water depths were recorded at 2 m intervals along a 20 m transect across East Pool, and a 28 m transect across West Pool. Water depths associated with both transects are shown in full in Figure 1.

3.1.6 For East Pool maximum water depth was 1.25 m near the northern bank, generally shallowing to 0.74 m approximately 2 m from the southern extent of the transect.

3.1.7 The West Pool transect had a maximum depth of 1.59 m, within the northern half of the transect, again showing a general shallowing trend towards the south bank. Minimum water levels were recorded 2 m from the south bank with 0.35 m depth.

3.1.8 Water depths recorded at the spot sample locations were in a similar range, with a slightly deeper maximum of 1.85 m recorded at West Pool (point 7 on Figure 1), but this time in the pelagic zone. Minimum water levels from the spot samples were at point 8 (1.00 m), in the littoral zone to the south of West Pool (see map in Figure 1).

3.1.9 The pond width to depth ratio for the pond is large (24:3), and so it is unlikely that this waterbody ever experiences any thermal stratification and the water column is expected to be well mixed all year round.

3.2 Sediment properties

3.2.1 Relatively thin deposits of an organic rich, very wet, unconsolidated dark green / black sediment ('gyttja') were present across much of Lower Pool, overlying orange minerogenic sediment (see Figure 1). This gyttja frequently contained poorly decomposed organic detritus and larger fragments, particularly leaf matter from surrounding trees. The minerogenic sediments recorded were dominated by stiff clay, with varying amounts of sand and gravel also prevalent across the basin. Based on exposures of soil around the pond, this minerogenic sediment appears to represent the original lake bed.

3.2.2 The East and West transects shown in Figure 1 indicate the varying depth of organic sediment that was recorded across Lower Pool. Detailed stratigraphic plots are provided in Figure 2, using the Troels-Smith description symbology.

3.2.3 East Pool transect had maximum organic sediment depths of approximately 12 cm towards the north bank of the pond, declining significantly towards the south of the transect. Indeed, at core 9 towards the south bank no organic sediment was retrieved at all, and the orange minerogenic substrate could clearly be observed on the lake bed from the boat.

3.2.4 The West Pool transect followed a similar pattern with maximum organic sediment deposits of 33 cm at core 3 towards the north bank. Organic deposits then thinned considerably towards the south bank with no organic deposits recorded at all in cores 10-12. This is not thought to be down to poor retrieval during coring of the very wet and unconsolidated gyttja, as in the shallower locations the lack of organic sediment was clearly visible on the lake bed. Along both transects, thickest organic deposits were generally located in the deeper water areas as would be expected.

3.2.5 The spot samples recorded no organic sediment towards the centre of West Pool (point 12), whereas the thickest organic sediment accumulation of 42 cm was recorded at point 4, which was the most northerly position surveyed in the pond. The spot samples also indicate there is marked spatial variability across the pond, with little sign of an obvious pattern. Given the soft, unconsolidated nature of the thin organic sediments, it may be that bioturbation by the fish population causes disturbance and dispersal of the organic sediments, although water clarity was fairly good and the bed was often clearly visible.

3.2.6 The identified organic rich deposits would have formed mainly from the slow decomposition of leaves introduced annually each autumn from the dense woodland surrounding and overhanging the pond. The dense macrophytic vegetation in the water column would also contribute. Given both of these factors the relative paucity or organic rich sediments is somewhat surprising. The very high total phosphorous (390.8 ug/l) water quality sample suggests the pond is saturated with nutrients (although nitrate was very low), and with a chlorophyll a result of 17 ug/l and the excessive growth of one macrophyte species and action to improve pond dissolved oxygen levels, would suggest the pond is eutrophic. However, water clarity was good (secchi disk visible to almost 1 m) and there is a lack of organic sediment on the bed that you would expect in a more productive pond system.

3.2.7 Based on the average organic sediment depth of 0.08 m (averaged across 35 cores), the volume of organic sediment in Lower Pool is estimated to be only around 914 m^3. It is possible that the pond has been drained and de-silted in the recent past, although we have no anecdotal information of this occurring.

3.2.8 The bulk sediment samples (organic and minerogenic sediment mixed) in the East Pool had a natural moisture content of 29.3%, whereas when the organic sediment when separated in West Pool recorded a far larger natural moisture content of 222.6%, due to its unconsolidated nature. The separated minerogenic sediment in West Pool had a moisture content of 21.9%. Total organic carbon in the East Pool bulk sample was 0.64%, compared to 3.91% in West Pool upper organic sample, and 0.23% in West Pool minerogenic sample.

3.3 Sediment Quality

3.3.1 The Hazwaste Assessment online has flagged the three sediment samples as being ‘hazardous’ based on the aluminium and iron content. However, this assessment is based on a worst-case scenario for the various aluminium and iron species, further testing and analysis could result in the assessment of the sediments being classed as non-hazardous due to the metals being actually present as less hazardous species. It is required that further testing of these sediments is undertaken in advance of any pond sediments being worked so that their status can be fully determined and whether they are suitable for re-use on site or have to be disposed-off as waste.

3.3.2 Leachates from the samples were also analysed and compared with Waste Acceptance Criteria (WAC). An initial Hazwaste assessment has been carried out on the pond sediment samples. This flagged the sediment samples as being potentially hazardous based on the aluminium and iron content. However, this assessment is based on a worst-case scenario for the various aluminium and iron species. Further testing and analysis could result in the assessment of the sediments being classed as non-hazardous due to the metals being actually present as less hazardous species. Further testing of these sediments will be undertaken in advance of any pond sediments being worked so that their status can be fully determined, and whether they are suitable for re-use on site or have to be disposed-off as waste (refer to the OEMP [TR010054/APP/6.11]).

4 Summary

4.1.1 The Scheme alignment would intercept an area of ponds to the west of Hilton Hall, and requires the partial loss of the most westerly pond known as Lower Pool (NGR SJ 94788 05360). The proposed works may disturb pond sediments into the water column, thereby potentially having an adverse impact on water quality of the pond and any downstream receptors. An investigation of the water depth and quality of lake sediments has therefore been undertaken to inform the Scheme design and any removal and disposal of pond sediments.

4.1.2 The investigation has included measurement of water depths across two pond transects, sediment thickness surveys and recording of sediment stratigraphy. Sampling of sediment has been undertaken to better understand its quality and thereby inform re-use.

4.1.3 The surveys have revealed a maximum measured water depth of 1.85 m, with depth of Lower Pool generally greatest towards the northern bank of the pond. There is a relatively thin layer of dark brown unconsolidated organic sediment ('gytjja'), which varies in thickness. The average accumulation based on 35 cores was 0.08 m, with a maximum of 0.42 m and a minimum of 0.0 m where there is no organic layer over the minerogenic sediment. Based on the average organic sediment thickness there is a total volume of approximately 914 m^3. This is somewhat lower than was anticipated given the deciduous vegetation surrounding the pond which ordinarily would be expected to give a large organic loading each autumn as leaves are shed into the pond, and some water quality and pond observations suggesting the pond is anthropogenically enriched and eutrophic. The minerogenic sediment beneath the organic is orange in colour and dominated by stiff clay, with varying proportions of sand and gravel.

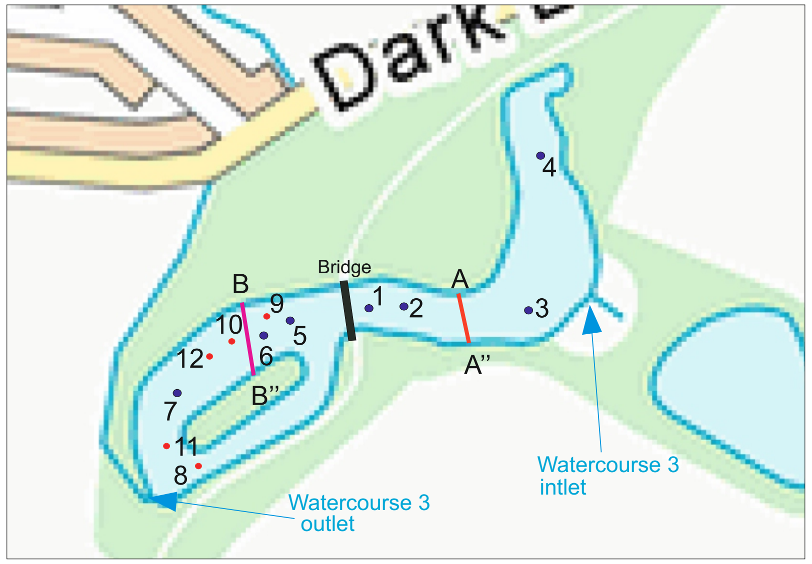
4.1.4 The solid and leachate sediment samples have been analysed against Hazwaste and WAC criteria to assess suitability for re-use and disposal.

4.1.5 The sediment samples are flagged as being potentially hazardous based on the aluminium and iron content in the Hazwaste assessment. Further testing of these sediments will be undertaken in advance of any pond sediments being worked so that their status can be fully determined, and whether they are suitable for re-use on site or have to be disposed-off as waste (refer to the OEMP [TR010054/APP/6.11]).

Figures

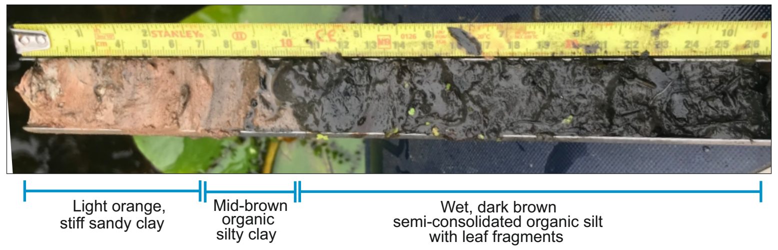
Note: The limits, including the height and depths of the Works, shown in the drawing, are not to be taken as limiting the obligations of the contactor under Contract

1. Plan overview of Lower Pool showing sampling locations

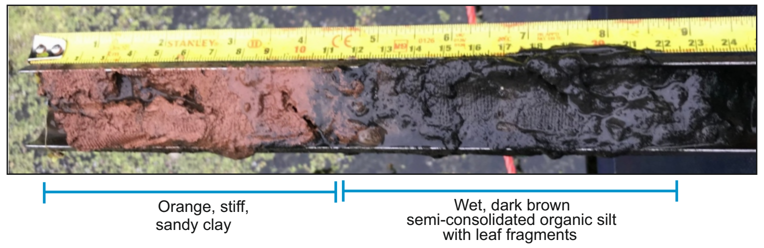


• Spot Sample 15-08-19 • Spot Sample 15-08-19
Eastern Pool Transect (A-A'') Western Pool Transect (B-B'')

3a. West Pool Spot Sample 8 Sediment Core



3. East Pool Transect (B-B') Sediment Core 1



4a. Lower Pool - East

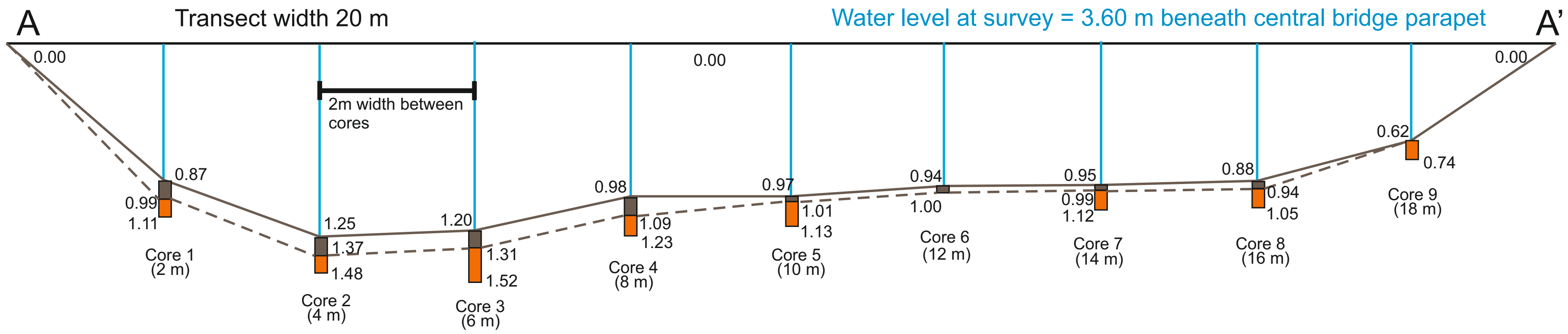
Image taken looking looking east from the central bridge

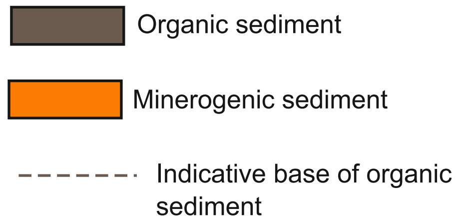
4b. Lower Pool - West

Image taken looking looking west from the central bridge

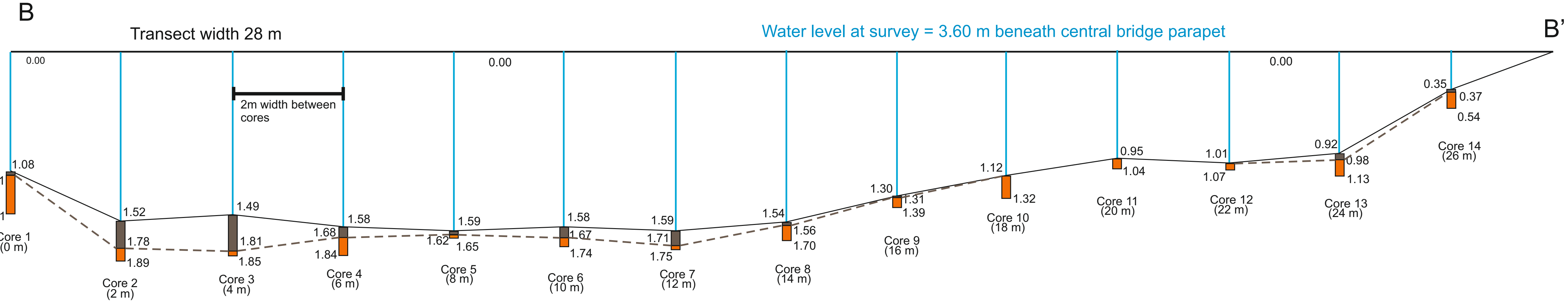
2. Cross sections for each lake transect

Lower Pool East:





Lower Pool West:



Notes

Samples for sediment analyses collected from (M1) Eastern Pool Transect - bulk sample from minerogenic and organic sediments from across the full transect.
(M2) Western Pool Transect - organic sample derived from sediments across the full transect.
(M3) Western Pool Transect - minerogenic sample derived from sediments across the full transect.

All depths given in metres (m).

Refer to Figure 1 for full details of sediment stratigraphy for all transects and spot samples

Lake Measure	Units	Value
Estimated Maximum Lake Length	m	370
Estimated Maximum Width	m	45
Estimated Surface Area	m^2	11,425
Maximum Water Depth (15/8/19)	m	1.85
Maximum Depth of Organic Sediment	m	0.42
Average Depth of Organic Sediment Based on 35 Cores	m	0.08
Maximum Estimate of Organic Sediment Volume (based on maximum depth recorded)	m^3	4,799
Estimate of Organic Sediment Volume (based on average depth across lake)	m^3	914
Lake Shape Factor	Ratio	8.2
Lake Width Depth Ratio	Ratio	24.3
Secchi Disk Depth (water clarity) - 16-09-19	m	0.98

Client: Highways England	Design: TJ	Drawn: TJ
Project: M54 to M6 Link Road	Chk'd: DH	App'd: OT
Title: Figure 1: Lower Pool Overview and Transects	Drawing Number: HE514465-ACM-EWE-M54_ZZ_ZZ_Z-DR-HD-0003	Version Number: P01 S3

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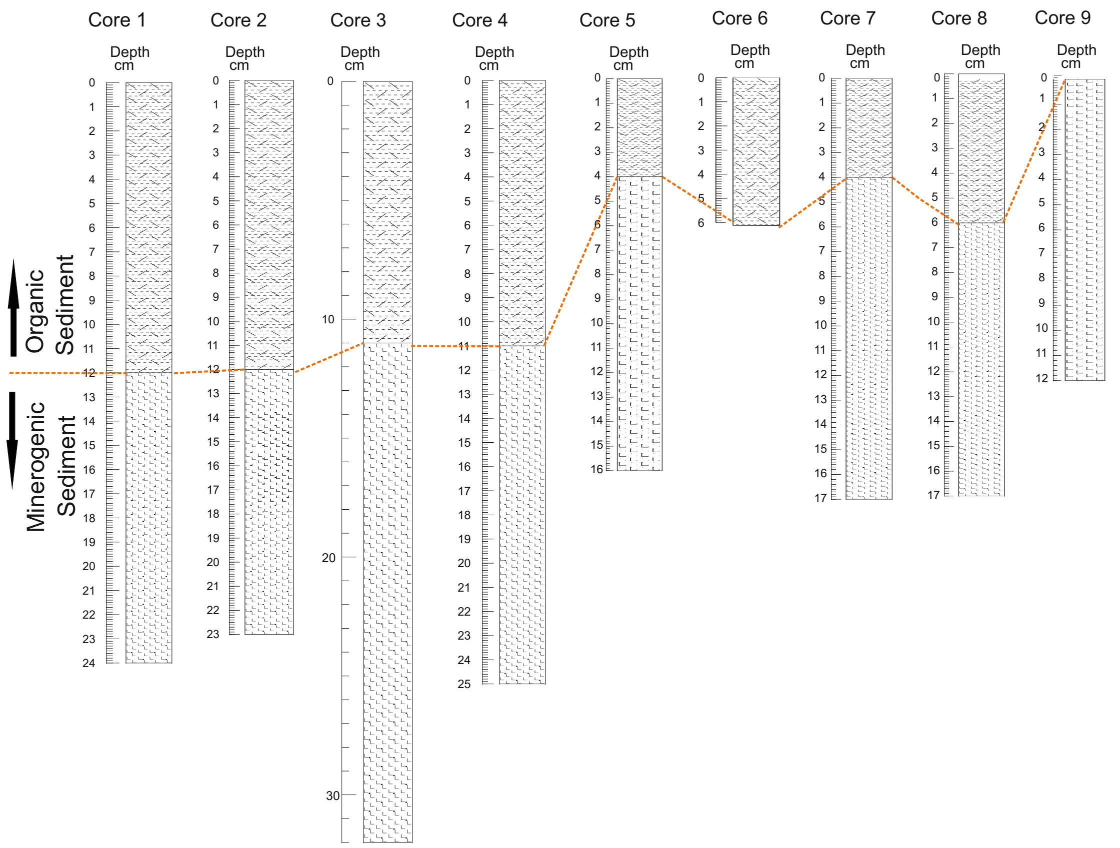
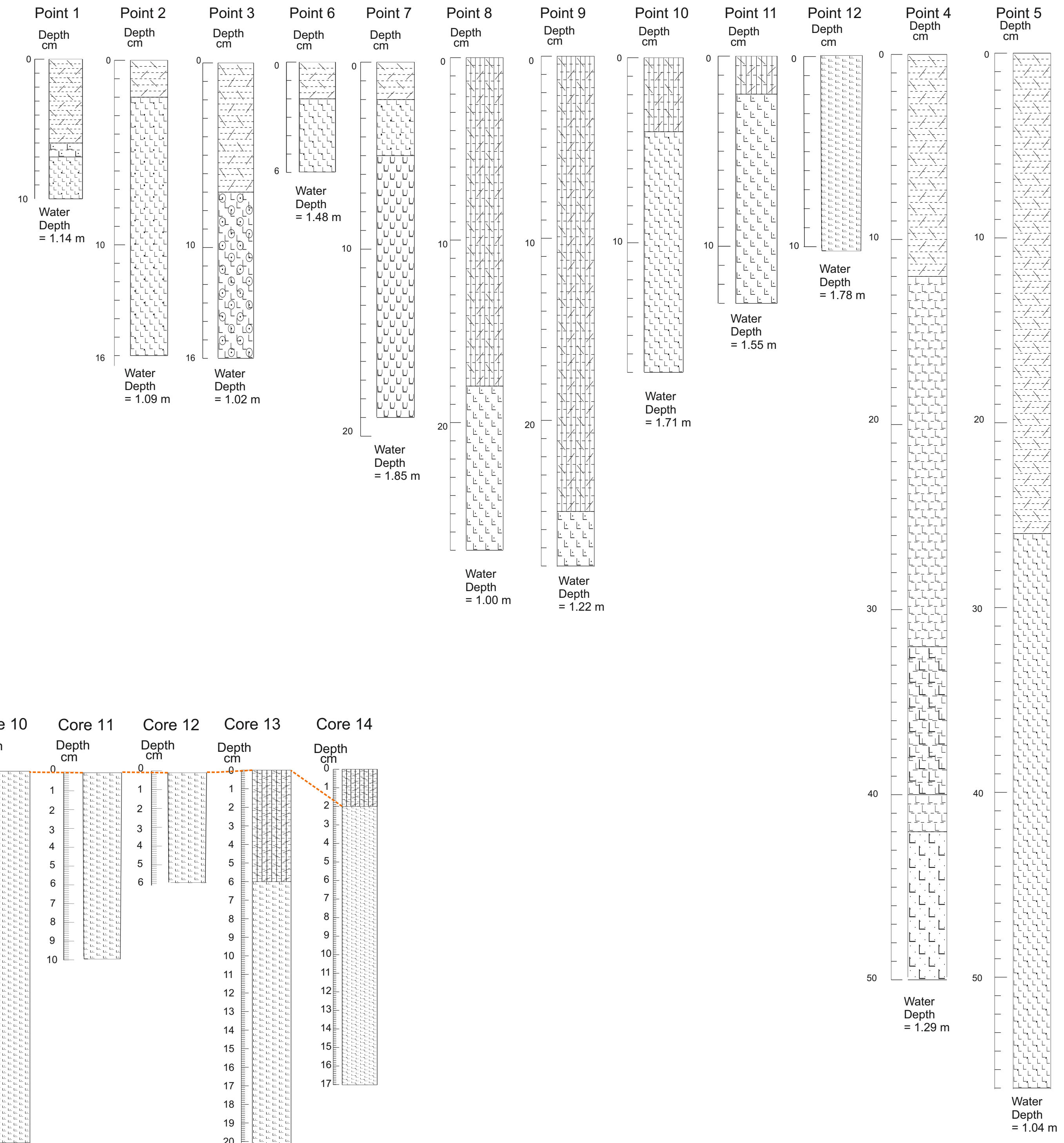
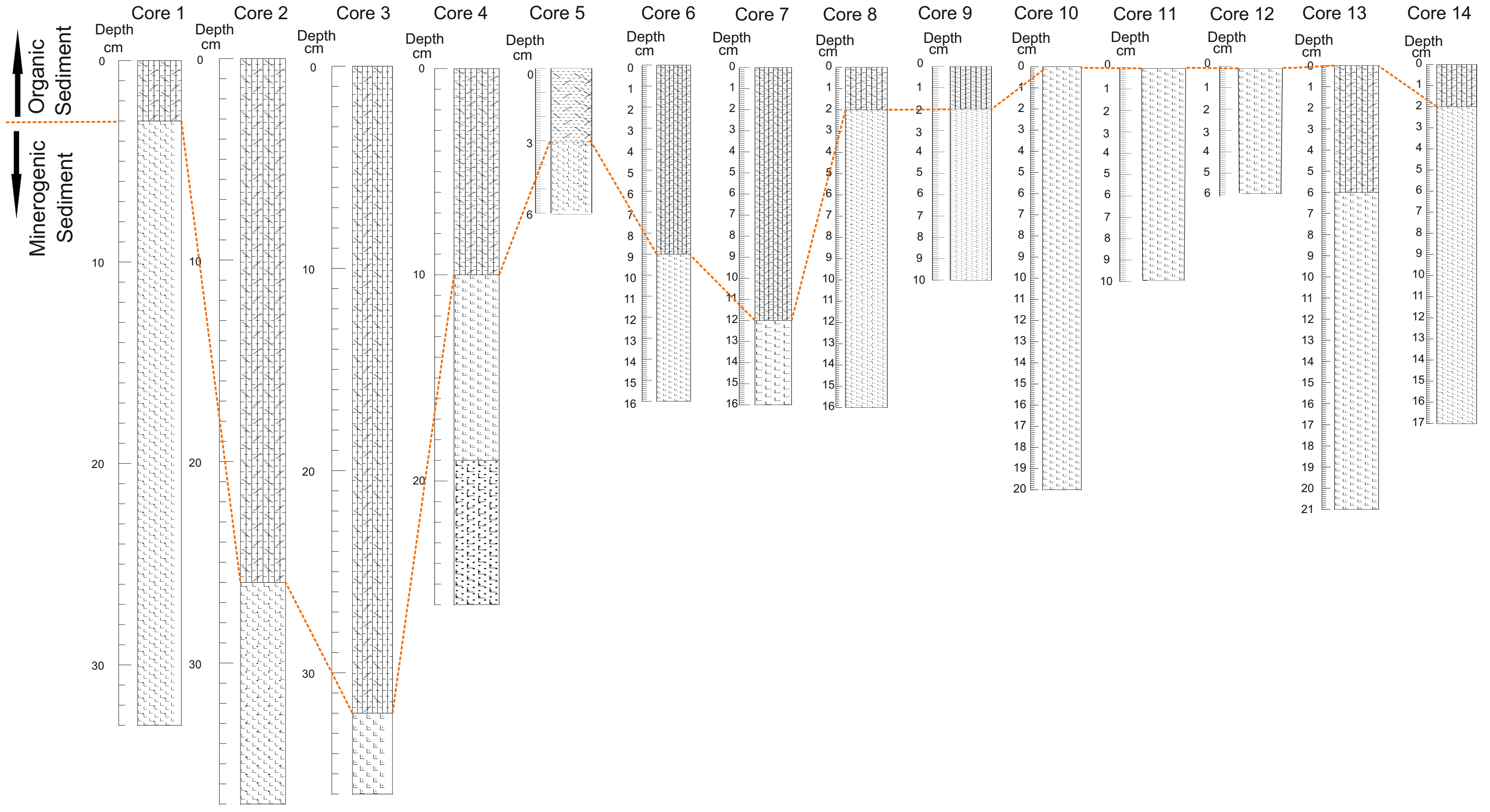
1. East Pool Transect - Core Sediment Stratigraphy



2. Spot Samples



1a. West Pool Transect - Core Sediment Stratigraphy



Note: The limits, including the height and depths of the Works, shown in the drawing, are not to be taken as limiting the obligations of the contactor under Contract

Notes

Samples for sediment analyses collected from (M1) Eastern Pool Transect - bulk sample from minerogenic and organic sediments from across the full transect.
(M2) Western Pool Transect - organic sample derived from sediments across the full transect.
(M3) Western Pool Transect - minerogenic sample derived from sediments across the full transect.

All depths are cm below bed level.

Refer to Figure 1 for locations of each core.

Legend for Sediment Logs

- Th - *Turfa herbacea* (herbaceous peat)
- Sh - *Substantia humosa* (disintegrated organic matter)
- Dg - *Detritus granosus*
- As - *Argilla steatodes* (clay)
- Ag - *Argilla granosa* (silt)
- Ga - *Grana arenosa* (fine sand)
- Gs *Grana suburralia* (coarse sand)
- Gg - *Grana glareosa* (gravel)

Larger/darker symbology reflects greater dominance of that component in the sediment

Lake Measure	Units	Value
Estimated Maximum Lake Length	m	370
Estimated Maximum Width	m	45
Estimated Surface Area	m^2	11,425
Maximum Water Depth (15/8/19)	m	1.85
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Lake Width Depth Ratio	Ratio	24.3
Secchi Disk Depth (water clarity) - 16-09-19	m	0.98

Client: Highways England

Project: M54 to M6 Link Road

Title: Figure 2: Lower Pool Core Stratigraphy

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Chk'd: DH		App'd: OT	
Drawing Number: HE514465-ACM-EWE-M54_ZZ_ZZ_Z-DR-HD-0004		Version Number: P01 S3	

Annex A: Laboratory Data Sheets

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Attention :	Tim Jones
Date :	27th September, 2019
Your reference :	M54
Our reference :	Test Report 19/15041 Batch 1
Location :	Lower Pool
Date samples received :	17th September, 2019
Status :	Interim report
Issue :	1

Three samples were received for analysis on 17th September, 2019 of which three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Simon Gomery BSc
Project Manager

Element Materials Technology

Client Name: AECOM
Reference: M54
Location: Lower Pool
Contact: Tim Jones
EMT Job No: 19/15041

Report : **Solid**

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-7	8-14	15-21	LOD/LOR	Units	Method No.
Sample ID	M1	M2	M3			
Depth	BULK	BULK	BULK			
COC No / misc						
Containers	V J T	V J T	V J T			
Sample Date	16/09/2019 11:00	16/09/2019 12:30	16/09/2019 12:30			
Sample Type	Clay	Clay	Clay			
Batch Number	1	1	1			
Date of Receipt	17/09/2019	17/09/2019	17/09/2019			
Aluminium	9678	14800	11940	<50	mg/kg	TM30/PM15
Antimony	2	3	2	<1	mg/kg	TM30/PM15
Arsenic #M	6.7	6.8	5.1	<0.5	mg/kg	TM30/PM15
Barium #M	86	117	86	<1	mg/kg	TM30/PM15
Cadmium #M	<0.1	0.5	<0.1	<0.1	mg/kg	TM30/PM15
Chromium #M	75.0	160.9	62.5	<0.5	mg/kg	TM30/PM15
Copper #M	17	30	19	<1	mg/kg	TM30/PM15
Iron	23620	22700	20130	<20	mg/kg	TM30/PM15
Lead #M	11	44	9	<5	mg/kg	TM30/PM15
Manganese #M	118	231	112	<1	mg/kg	TM30/PM15
Mercury #M	<0.1	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Molybdenum #M	3.5	5.4	3.4	<0.1	mg/kg	TM30/PM15
Nickel #M	19.9	22.7	19.3	<0.7	mg/kg	TM30/PM15
Phosphorus	147	475	101	<10	mg/kg	TM30/PM15
Selenium #M	<1	<1	<1	<1	mg/kg	TM30/PM15
Sodium	135	188	153	<5	mg/kg	TM30/PM15
Vanadium	29	35	29	<1	mg/kg	TM30/PM15
Zinc #M	40	177	28	<5	mg/kg	TM30/PM15
Methyl Tertiary Butyl Ether #M	<6	<6	<6	<6	ug/kg	TM15/PM10
Benzene #M	<5	<5	<5	<5	ug/kg	TM15/PM10
Toluene #M	<3	<3	<3	<3	ug/kg	TM15/PM10
Ethylbenzene #M	<3	<3	<3	<3	ug/kg	TM15/PM10
m/p-Xylene #M	<4	<4	<4	<4	ug/kg	TM15/PM10
o-Xylene #M	<4	<4	<4	<4	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	94	92	101	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	96	81	100	<0	%	TM15/PM10
TPH CWG						
Aliphatics						
>C5-C6 #M	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 #M	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21	<7	23	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35	<7	132	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	<19	155	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM16

Client Name: AECOM
Reference: M54
Location: Lower Pool
Contact: Tim Jones
EMT Job No: 19/15041

Report : Solid

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-7	8-14	15-21								LOD/LOR	Units	Method No.
Sample ID	M1	M2	M3										
Depth	BULK	BULK	BULK										
COC No / misc													
Containers	V J T	V J T	V J T										
Sample Date	16/09/2019 11:00	16/09/2019 12:30	16/09/2019 12:30										
Sample Type	Clay	Clay	Clay										
Batch Number	1	1	1										
Date of Receipt	17/09/2019	17/09/2019	17/09/2019										
TPH CWG													
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>EC8-EC10 #M	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>EC10-EC12	<0.2	<0.2 SV	<0.2								<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16	<4	<4 SV	<4								<4	mg/kg	TM5/PM8/PM16
>EC16-EC21	<7	<7 SV	<7								<7	mg/kg	TM5/PM8/PM16
>EC21-EC35	<7	200 SV	<7								<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35	<19	200 SV	<19								<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	<38	355 SV	<38								<38	mg/kg	TM5/TM36/PM8/PM12/PM16
PCB 28 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5								<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5								<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35								<35	ug/kg	TM17/PM8
Resorcinol	<0.01	<0.01	<0.01								<0.01	mg/kg	TM26/PM21
Catechol	<0.01	<0.01	<0.01								<0.01	mg/kg	TM26/PM21
Phenol #M	<0.01	<0.01	<0.01								<0.01	mg/kg	TM26/PM21
m/p-cresol #M	<0.02	0.06	<0.02								<0.02	mg/kg	TM26/PM21
o-cresol	<0.01	<0.01	<0.01								<0.01	mg/kg	TM26/PM21
Total cresols	<0.03	0.06	<0.03								<0.03	mg/kg	TM26/PM21
Xylenols #M	<0.06	<0.06	<0.06								<0.06	mg/kg	TM26/PM21
1-naphthol	<0.01	<0.01	<0.01								<0.01	mg/kg	TM26/PM21
2,3,5-trimethyl phenol #M	<0.01	<0.01	<0.01								<0.01	mg/kg	TM26/PM21
2-isopropylphenol #M	<0.01	<0.01	<0.01								<0.01	mg/kg	TM26/PM21
Total Speciated Phenols HPLC	<0.15	<0.15	<0.15								<0.15	mg/kg	TM26/PM21
Natural Moisture Content	29.3	222.6	21.9								<0.1	%	PM4/PM0
Ammoniacal Nitrogen as N	5.7	25.8	<0.6								<0.6	mg/kg	TM38/PM20
Chloride #M	27	67	17								<2	mg/kg	TM38/PM20
Fluoride	<0.3	<0.3	<0.3								<0.3	mg/kg	TM173/PM20
Hexavalent Chromium #	<0.3	<0.3	<0.3								<0.3	mg/kg	TM38/PM20
Nitrate as NO3	<2.5	<2.5	<2.5								<2.5	mg/kg	TM38/PM20
Nitrite as NO2	<0.05	<0.05	<0.05								<0.05	mg/kg	TM38/PM20
Ortho Phosphate as PO4	<0.3	<0.3	<0.3								<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #M	0.0371	0.1906	0.0081								<0.0015	g/l	TM38/PM20
Chromium III	75.0	160.9	62.5								<0.5	mg/kg	NONE/NONE

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Element Materials Technology

Client Name:	AECOM	**Report :**	**Solid**
Reference:	M54		
Location:	Lower Pool	**Solids:**	V=60g VOC jar, J=250g glass jar, T=plastic tub
Contact:	Tim Jones		
EMT Job No:	19/15041		

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-7	8-14	15-21	LOD/LOR	Units	Method No.
Sample ID	M1	M2	M3			
Depth	BULK	BULK	BULK			
COC No / misc						
Containers	V J T	V J T	V J T			
Sample Date	16/09/2019 11:00	16/09/2019 12:30	16/09/2019 12:30			
Sample Type	Clay	Clay	Clay			
Batch Number	1	1	1			
Date of Receipt	17/09/2019	17/09/2019	17/09/2019			
Inorganic Nitrogen	5.7	25.8	<2.5	<2.5	mg/kg	TM38/PM20
Total Cyanide #M	<0.5	<0.5	<0.5	<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	0.64	3.91	0.23	<0.02	%	TM21/PM24
% Passing 75mm				<0.0	% Passing	TM140/PM0
% Passing 63mm				<0.0	% Passing	TM140/PM0
% Passing 50mm				<0.0	% Passing	TM140/PM0
% Passing 37.5mm				<0.0	% Passing	TM140/PM0
% Passing 28mm				<0.0	% Passing	TM140/PM0
% Passing 20mm				<0.0	% Passing	TM140/PM0
% Passing 14mm				<0.0	% Passing	TM140/PM0
% Passing 10mm				<0.0	% Passing	TM140/PM0
% Passing 6.3mm				<0.0	% Passing	TM140/PM0
% Passing 5mm				<0.0	% Passing	TM140/PM0
% Passing 3.35mm				<0.0	% Passing	TM140/PM0
% Passing 2mm				<0.0	% Passing	TM140/PM0
% Passing 1.18mm				<0.0	% Passing	TM140/PM0
% Passing 600um				<0.0	% Passing	TM140/PM0
% Passing 425um				<0.0	% Passing	TM140/PM0
% Passing 300um				<0.0	% Passing	TM140/PM0
% Passing 212um				<0.0	% Passing	TM140/PM0
% Passing 150um				<0.0	% Passing	TM140/PM0
% Passing 63um				<0.0	% Passing	TM140/PM0
% Passing 20um				<0.0	% Passing	TM140/PM0
% Passing 6um				<0.0	% Passing	TM140/PM0
% Passing 2um				<0.0	% Passing	TM140/PM0
Cobbles				<0.0	%	TM140/PM0
Gravel				<0.0	%	TM140/PM0
Sand				<0.0	%	TM140/PM0
Silt				<0.0	%	TM140/PM0
Clay				<0.0	%	TM140/PM0
Sulphide	13	74	<10	<10	mg/kg	TM107/PM119
Loss on Ignition #	2.9	11.4	2.7	<1.0	%	TM22/PM0
Total Nitrogen	0.06	0.11	0.17	<0.01	%	TM38/TM125/PM20/PM0
Sample Type	Clay	Clay	Clay		None	PM13/PM0
Sample Colour	Medium Brown	Medium Brown	Medium Brown		None	PM13/PM0
Other Items	stones	sand and roots	sand		None	PM13/PM0
Moisture Content*	25.3	NDP	26.0		%	Subcontracted
Bulk Density*	1.74	NDP	1.73		mg/m3	Subcontracted
Dry Density*	1.39	NDP	1.37		mg/m3	Subcontracted

Client Name: AECOM
Reference: M54
Location: Lower Pool
Contact: Tim Jones
EMT Job No: 19/15041

Report : CEN 10:1 1 Batch

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-7	8-14	15-21	LOD/LOR	Units	Method No.
Sample ID	M1	M2	M3			
Depth	BULK	BULK	BULK			
COC No / misc						
Containers	V J T	V J T	V J T			
Sample Date	16/09/2019 11:00	16/09/2019 12:30	16/09/2019 12:30			
Sample Type	Clay	Clay	Clay			
Batch Number	1	1	1			
Date of Receipt	17/09/2019	17/09/2019	17/09/2019			
Dissolved Aluminium #	613	38	1951	<20	ug/l	TM30/PM14
Dissolved Antimony #	<2	<2	<2	<2	ug/l	TM30/PM14
Dissolved Arsenic #	<2.5	4.5	<2.5	<2.5	ug/l	TM30/PM14
Dissolved Barium #	77	98	19	<3	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5	ug/l	TM30/PM14
Dissolved Chromium #	<1.5	<1.5	1.7	<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	<7	ug/l	TM30/PM14
Dissolved Iron #	219	20	1464	<20	ug/l	TM30/PM14
Dissolved Lead #	<5	7	9	<5	ug/l	TM30/PM14
Dissolved Manganese #	6	481	46	<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1	ug/l	TM30/PM14
Dissolved Molybdenum #	<2	<2	<2	<2	ug/l	TM30/PM14
Dissolved Nickel #	<2	<2	<2	<2	ug/l	TM30/PM14
Dissolved Phosphorus #	<5	11	16	<5	ug/l	TM30/PM14
Dissolved Selenium #	<3	<3	<3	<3	ug/l	TM30/PM14
Dissolved Sodium #	1.1	3.9	0.8	<0.1	mg/l	TM30/PM14
Dissolved Vanadium #	2.8	<1.5	4.3	<1.5	ug/l	TM30/PM14
Dissolved Zinc #	3	4	5	<3	ug/l	TM30/PM14
Methyl Tertiary Butyl Ether	<0.1	<0.1	<0.1	<0.1	ug/l	TM15/PM69
Benzene	<0.5	<0.5	<0.5	<0.5	ug/l	TM15/PM69
Toluene	<5	<5	<5	<5	ug/l	TM15/PM69
Ethylbenzene	<1	<1	<1	<1	ug/l	TM15/PM69
m/p-Xylene	<2	<2	<2	<2	ug/l	TM15/PM69
o-Xylene	<1	<1	<1	<1	ug/l	TM15/PM69
Surrogate Recovery Toluene D8	109	114	112	<0	%	TM15/PM69
Surrogate Recovery 4-Bromofluorobenzene	112	113	111	<0	%	TM15/PM69
TPH CWG						
Aliphatics						
>C5-C6	<10	<10	<10	<10	ug/l	TM36/PM69
>C6-C8	<10	<10	<10	<10	ug/l	TM36/PM69
>C8-C10	<10	<10	<10	<10	ug/l	TM36/PM69
>C10-C12	<5	84	<5	<5	ug/l	TM5/PM16/PM30
>C12-C16	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>C16-C21	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
>C21-C35	<10	<10	<10	<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35	<10	84	<10	<10	ug/l	TM5/TM36/PM16/PM30/PM69

Client Name: AECOM
Reference: M54
Location: Lower Pool
Contact: Tim Jones
EMT Job No: 19/15041

Report : CEN 10:1 1 Batch

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-7	8-14	15-21										
Sample ID	M1	M2	M3										
Depth	BULK	BULK	BULK										
COC No / misc													
Containers	V J T	V J T	V J T										
Sample Date	16/09/2019 11:00	16/09/2019 12:30	16/09/2019 12:30										
Sample Type	Clay	Clay	Clay										
Batch Number	1	1	1										
Date of Receipt	17/09/2019	17/09/2019	17/09/2019								LOD/LOR	Units	Method No.
TPH CWG													
Aromatics													
>C5-EC7	<10	<10	<10								<10	ug/l	TM36/PM69
>EC7-EC8	<10	<10	<10								<10	ug/l	TM36/PM69
>EC8-EC10	<10	<10	<10								<10	ug/l	TM36/PM69
>EC10-EC12	<5	<5	<5								<5	ug/l	TM5/PM16/PM30
>EC12-EC16	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>EC16-EC21	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
>EC21-EC35	<10	<10	<10								<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35	<10	<10	<10								<10	ug/l	TM5/TM36/PM16/PM30/PM69
Total aliphatics and aromatics(C5-35)	<10	84	<10								<10	ug/l	TM5/TM36/PM16/PM30/PM69
PCB 28	<0.1	<0.1	<0.1								<0.1	ug/l	TM17/PM30
PCB 52	<0.1	<0.1	<0.1								<0.1	ug/l	TM17/PM30
PCB 101	<0.1	<0.1	<0.1								<0.1	ug/l	TM17/PM30
PCB 118	<0.1	<0.1	<0.1								<0.1	ug/l	TM17/PM30
PCB 138	<0.1	<0.1	<0.1								<0.1	ug/l	TM17/PM30
PCB 153	<0.1	<0.1	<0.1								<0.1	ug/l	TM17/PM30
PCB 180	<0.1	<0.1	<0.1								<0.1	ug/l	TM17/PM30
Total 7 PCBs	<0.7	<0.7	<0.7								<0.7	ug/l	TM17/PM30
Resorcinol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
Catechol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
Phenol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
m/p-cresol	<0.02	<0.02	<0.02								<0.02	mg/l	TM26/PM0
o-cresol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
Total cresols	<0.03	<0.03	<0.03								<0.03	mg/l	TM26/PM0
Xylenols	<0.06	<0.06	<0.06								<0.06	mg/l	TM26/PM0
1-naphthol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
2,3,5-trimethyl phenol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
2-isopropylphenol	<0.01	<0.01	<0.01								<0.01	mg/l	TM26/PM0
Total Speciated Phenols HPLC	<0.1	<0.1	<0.1								<0.1	mg/l	TM26/PM0
Fluoride	<0.3	<0.3	<0.3								<0.3	mg/l	TM173/PM0
Sulphate as SO4 #	5.5	11.8	4.3								<0.5	mg/l	TM38/PM0
Chloride #	0.9	4.6	0.7								<0.3	mg/l	TM38/PM0
Nitrate as NO3 #	0.3	0.4	0.3								<0.2	mg/l	TM38/PM0
Nitrite as NO2 #	<0.02	<0.02	<0.02								<0.02	mg/l	TM38/PM0
Ortho Phosphate as PO4 #	<0.06	<0.06	<0.06								<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N #	0.60	4.39	0.50								<0.03	mg/l	TM38/PM0
Inorganic Nitrogen	0.67	4.49	0.56								<0.05	mg/l	TM38/PM0
Total Cyanide #	<0.01	<0.01	<0.01								<0.01	mg/l	TM89/PM0

Element Materials Technology

Client Name: AECOM
Reference: M54
Location: Lower Pool
Contact: Tim Jones
EMT Job No: 19/15041

Report : **CEN 10:1 1 Batch**

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-7	8-14	15-21								LOD/LOR	Units	Method No.
Sample ID	M1	M2	M3										
Depth	BULK	BULK	BULK										
COC No / misc													
Containers	V J T	V J T	V J T										
Sample Date	16/09/2019 11:00	16/09/2019 12:30	16/09/2019 12:30										
Sample Type	Clay	Clay	Clay										
Batch Number	1	1	1										
Date of Receipt	17/09/2019	17/09/2019	17/09/2019										
Sulphide	<10	<10	<10								<10	ug/l	TM107/PM0
BOD (Shaken)	20	NDP	46								<1	mg/l	TM58/PM0
Dissolved Chromium III	<0.006	<0.006	<0.006								<0.006	mg/l	NONE/NONE
Dissolved Organic Carbon	4	8	7								<2	mg/l	TM60/PM0
Electrical Conductivity @25C	87	263	28								<2	uS/cm	TM76/PM0
Hexavalent Chromium	<0.006	<0.006	<0.006								<0.006	mg/l	TM38/PM0
pH	6.53	7.88	7.80								<0.01	pH units	TM73/PM0
Total Nitrogen	0.6	0.8	4.9								<0.5	mg/l	TM38/TM125/PM0

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Client Name: AECOM **SVOC Report :** **Solid**
Reference: M54
Location: Lower Pool
Contact: Tim Jones
EMT Job No: 19/15041

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-7	8-14	15-21	LOD/LOR	Units	Method No.
Sample ID	M1	M2	M3			
Depth	BULK	BULK	BULK			
COC No / misc						
Containers	V J T	V J T	V J T			
Sample Date	16/09/2019 11:00	16/09/2019 12:30	16/09/2019 12:30			
Sample Type	Clay	Clay	Clay			
Batch Number	1	1	1			
Date of Receipt	17/09/2019	17/09/2019	17/09/2019			
SVOC MS						
Phenols						
2-Chlorophenol #M	<10	<10	<10	<10	ug/kg	TM16/PM8
2-Methylphenol	<10	<10	<10	<10	ug/kg	TM16/PM8
2-Nitrophenol	<10	<10	<10	<10	ug/kg	TM16/PM8
2,4-Dichlorophenol #M	<10	<10	<10	<10	ug/kg	TM16/PM8
2,4-Dimethylphenol	<10	<10	<10	<10	ug/kg	TM16/PM8
2,4,5-Trichlorophenol	<10	<10	<10	<10	ug/kg	TM16/PM8
2,4,6-Trichlorophenol	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Chloro-3-methylphenol	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Methylphenol	<10	<10	<10	<10	ug/kg	TM16/PM8
4-Nitrophenol	<10	<10	<10	<10	ug/kg	TM16/PM8
Pentachlorophenol	<10	<10	<10	<10	ug/kg	TM16/PM8
Phenol #M	<10	<10	<10	<10	ug/kg	TM16/PM8
PAHs						
2-Chloronaphthalene #M	<10	<10	<10	<10	ug/kg	TM16/PM8
2-Methylnaphthalene #M	<10	<10	<10	<10	ug/kg	TM16/PM8
Naphthalene	<10	<10	<10	<10	ug/kg	TM16/PM8
Acenaphthylene	<10	<10	<10	<10	ug/kg	TM16/PM8
Acenaphthene	<10	<10	<10	<10	ug/kg	TM16/PM8
Fluorene	<10	<10	<10	<10	ug/kg	TM16/PM8
Phenanthrene #M	59	<10	<10	<10	ug/kg	TM16/PM8
Anthracene	<10	<10	<10	<10	ug/kg	TM16/PM8
Fluoranthene #M	48	<10	<10	<10	ug/kg	TM16/PM8
Pyrene #M	31	<10	<10	<10	ug/kg	TM16/PM8
Benzo(a)anthracene	44	<10	<10	<10	ug/kg	TM16/PM8
Chrysene	26	<10	<10	<10	ug/kg	TM16/PM8
Benzo(bk)fluoranthene	<10	<10	<10	<10	ug/kg	TM16/PM8
Benzo(a)pyrene	<10	<10	<10	<10	ug/kg	TM16/PM8
Indeno(123cd)pyrene	<10	<10	<10	<10	ug/kg	TM16/PM8
Dibenzo(ah)anthracene	<10	<10	<10	<10	ug/kg	TM16/PM8
Benzo(ghi)perylene	<10	<10	<10	<10	ug/kg	TM16/PM8
Benzo(b)fluoranthene	<10	<10	<10	<10	ug/kg	TM16/PM8
Benzo(k)fluoranthene	<10	<10	<10	<10	ug/kg	TM16/PM8
Phthalates						
Bis(2-ethylhexyl) phthalate	<100	<100	<100	<100	ug/kg	TM16/PM8
Butylbenzyl phthalate	<100	<100	<100	<100	ug/kg	TM16/PM8
Di-n-butyl phthalate	<100	<100	<100	<100	ug/kg	TM16/PM8
Di-n-Octyl phthalate	<100	<100	<100	<100	ug/kg	TM16/PM8
Diethyl phthalate	<100	<100	<100	<100	ug/kg	TM16/PM8
Dimethyl phthalate #M	<100	<100	<100	<100	ug/kg	TM16/PM8

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name:	AECOM	**SVOC Report :**	**Solid**
Reference:	M54		
Location:	Lower Pool		
Contact:	Tim Jones		
EMT Job No:	19/15041		

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-7	8-14	15-21								LOD/LOR	Units	Method No.
Sample ID	M1	M2	M3										
Depth	BULK	BULK	BULK										
COC No / misc													
Containers	V J T	V J T	V J T										
Sample Date	16/09/2019 11:00	16/09/2019 12:30	16/09/2019 12:30										
Sample Type	Clay	Clay	Clay										
Batch Number	1	1	1										
Date of Receipt	17/09/2019	17/09/2019	17/09/2019										
SVOC MS													
Other SVOCs													
1,2-Dichlorobenzene	<10	<10	<10								<10	ug/kg	TM16/PM8
1,2,4-Trichlorobenzene #M	<10	<10	<10								<10	ug/kg	TM16/PM8
1,3-Dichlorobenzene	<10	<10	<10								<10	ug/kg	TM16/PM8
1,4-Dichlorobenzene	<10	<10	<10								<10	ug/kg	TM16/PM8
2-Nitroaniline	<10	<10	<10								<10	ug/kg	TM16/PM8
2,4-Dinitrotoluene	<10	<10	<10								<10	ug/kg	TM16/PM8
2,6-Dinitrotoluene	<10	<10	<10								<10	ug/kg	TM16/PM8
3-Nitroaniline	<10	<10	<10								<10	ug/kg	TM16/PM8
4-Bromophenylphenylether #M	<10	<10	<10								<10	ug/kg	TM16/PM8
4-Chloroaniline	<10	<10	<10								<10	ug/kg	TM16/PM8
4-Chlorophenylphenylether	<10	<10	<10								<10	ug/kg	TM16/PM8
4-Nitroaniline	<10	<10	<10								<10	ug/kg	TM16/PM8
Azobenzene	<10	<10	<10								<10	ug/kg	TM16/PM8
Bis(2-chloroethoxy)methane	<10	<10	<10								<10	ug/kg	TM16/PM8
Bis(2-chloroethyl)ether	<10	<10	<10								<10	ug/kg	TM16/PM8
Carbazole	<10	<10	<10								<10	ug/kg	TM16/PM8
Dibenzofuran #M	<10	<10	<10								<10	ug/kg	TM16/PM8
Hexachlorobenzene	<10	<10	<10								<10	ug/kg	TM16/PM8
Hexachlorobutadiene #M	<10	<10	<10								<10	ug/kg	TM16/PM8
Hexachlorocyclopentadiene	<10	<10	<10								<10	ug/kg	TM16/PM8
Hexachloroethane	<10	<10	<10								<10	ug/kg	TM16/PM8
Isophorone #M	<10	<10	<10								<10	ug/kg	TM16/PM8
N-nitrosodi-n-propylamine #M	<10	<10	<10								<10	ug/kg	TM16/PM8
Nitrobenzene #M	<10	<10	<10								<10	ug/kg	TM16/PM8
Surrogate Recovery 2-Fluorobiphenyl	113	99	116								<0	%	TM16/PM8
Surrogate Recovery p-Terphenyl-d14	109	105	110								<0	%	TM16/PM8

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Element Materials Technology

Client Name: AECOM
Reference: M54
Location: Lower Pool
Contact: Tim Jones
EMT Job No: 19/15041

SVOC Report : **CEN 10:1 1 Batch**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-7	8-14	15-21	LOD/LOR	Units	Method No.
Sample ID	M1	M2	M3			
Depth	BULK	BULK	BULK			
COC No / misc						
Containers	V J T	V J T	V J T			
Sample Date	16/09/2019 11:00	16/09/2019 12:30	16/09/2019 12:30			
Sample Type	Clay	Clay	Clay			
Batch Number	1	1	1			
Date of Receipt	17/09/2019	17/09/2019	17/09/2019			
SVOC MS						
Phenols						
2-Chlorophenol	<1	<1	<1	<1	ug/l	TM16/PM30
2-Methylphenol	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1	<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1	<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1	ug/l	TM16/PM30
Phenol	<1	<1	<1	<1	ug/l	TM16/PM30
PAHs						
2-Chloronaphthalene	<1	<1	<1	<1	ug/l	TM16/PM30
2-Methylnaphthalene	<1	<1	<1	<1	ug/l	TM16/PM30
Naphthalene	<1	<1	2	<1	ug/l	TM16/PM30
Acenaphthylene	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Acenaphthene	<1	<1	<1	<1	ug/l	TM16/PM30
Fluorene	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Phenanthrene	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Anthracene	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Fluoranthene	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Pyrene	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Benzo(a)anthracene	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Chrysene	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene	<1	<1	<1	<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1	<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1	<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Phthalates						
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1	ug/l	TM16/PM30
Di-n-butyl phthalate	<1.5	<1.5	<1.5	<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1	ug/l	TM16/PM30
Diethyl phthalate	<1	<1	<1	<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1	ug/l	TM16/PM30

Element Materials Technology

Client Name: AECOM
Reference: M54
Location: Lower Pool
Contact: Tim Jones
EMT Job No: 19/15041

SVOC Report : **CEN 10:1 1 Batch**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-7	8-14	15-21			
Sample ID	M1	M2	M3			
Depth	BULK	BULK	BULK			
COC No / misc						
Containers	V J T	V J T	V J T			
Sample Date	16/09/2019 11:00	16/09/2019 12:30	16/09/2019 12:30			
Sample Type	Clay	Clay	Clay			
Batch Number	1	1	1			
Date of Receipt	17/09/2019	17/09/2019	17/09/2019	LOD/LOR	Units	Method No.
SVOC MS						
Other SVOCs						
1,2-Dichlorobenzene	<1	<1	<1	<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene	<1	<1	<1	<1	ug/l	TM16/PM30
1,3-Dichlorobenzene	<1	<1	<1	<1	ug/l	TM16/PM30
1,4-Dichlorobenzene	<1	<1	<1	<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1	<1	ug/l	TM16/PM30
2,4-Dinitrotoluene	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1	ug/l	TM16/PM30
4-Bromophenylphenylether	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1	<1	ug/l	TM16/PM30
4-Chlorophenylphenylether	<1	<1	<1	<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Azobenzene	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether	<1	<1	<1	<1	ug/l	TM16/PM30
Carbazole	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Dibenzofuran	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Hexachlorobenzene	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachlorobutadiene	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1	ug/l	TM16/PM30
Hexachloroethane	<1	<1	<1	<1	ug/l	TM16/PM30
Isophorone	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine	<0.5	<0.5	<0.5	<0.5	ug/l	TM16/PM30
Nitrobenzene	<1	<1	<1	<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	121	127	103	<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	118	115	100	<0	%	TM16/PM30

Client Name: AECOM **VOC Report :** **Solid**
Reference: M54
Location: Lower Pool
Contact: Tim Jones
EMT Job No: 19/15041

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-7	8-14	15-21	LOD/LOR	Units	Method No.
Sample ID	M1	M2	M3			
Depth	BULK	BULK	BULK			
COC No / misc						
Containers	V J T	V J T	V J T			
Sample Date	16/09/2019 11:00	16/09/2019 12:30	16/09/2019 12:30			
Sample Type	Clay	Clay	Clay			
Batch Number	1	1	1			
Date of Receipt	17/09/2019	17/09/2019	17/09/2019			
VOC MS						
Dichlorodifluoromethane	<2	<2	<2	<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #M	<6	<6	<6	<6	ug/kg	TM15/PM10
Chloromethane #	<3	<3	<3	<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1	<1	<1	ug/kg	TM15/PM10
Chloroethane #M	<6	<6	<6	<6	ug/kg	TM15/PM10
Trichlorofluoromethane #M	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #M	<6	<6	<6	<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<30	<30	<30	<30	ug/kg	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1-Dichloroethane #M	<6	<6	<6	<6	ug/kg	TM15/PM10
cis-1-2-Dichloroethene #M	<7	<7	<7	<7	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4	<4	ug/kg	TM15/PM10
Bromochloromethane #M	<4	<4	<4	<4	ug/kg	TM15/PM10
Chloroform #M	<5	<5	<5	<5	ug/kg	TM15/PM10
1,1,1-Trichloroethane #M	<5	<5	<5	<5	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	ug/kg	TM15/PM10
Carbon tetrachloride #M	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dichloroethane #M	<5	<5	<5	<5	ug/kg	TM15/PM10
Benzene #M	<5	<5	<5	<5	ug/kg	TM15/PM10
Trichloroethene (TCE) #M	<5	<5	<5	<5	ug/kg	TM15/PM10
1,2-Dichloropropane #M	<4	<4	<4	<4	ug/kg	TM15/PM10
Dibromomethane #M	<4	<4	<4	<4	ug/kg	TM15/PM10
Bromodichloromethane #M	<4	<4	<4	<4	ug/kg	TM15/PM10
cis-1-3-Dichloropropene	<4	<4	<4	<4	ug/kg	TM15/PM10
Toluene #M	<3	<3	<3	<3	ug/kg	TM15/PM10
trans-1-3-Dichloropropene	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #M	<4	<4	<4	<4	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	ug/kg	TM15/PM10
1,3-Dichloropropane #M	<4	<4	<4	<4	ug/kg	TM15/PM10
Dibromochloromethane #M	<5	<5	<5	<5	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3	<3	<3	ug/kg	TM15/PM10
Chlorobenzene #M	<4	<4	<4	<4	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #M	<5	<5	<5	<5	ug/kg	TM15/PM10
Ethylbenzene #M	<3	<3	<3	<3	ug/kg	TM15/PM10
m/p-Xylene #M	<4	<4	<4	<4	ug/kg	TM15/PM10
o-Xylene #M	<4	<4	<4	<4	ug/kg	TM15/PM10
Styrene	<3	<3	<3	<3	ug/kg	TM15_A/PM10
Bromoform	<4	<4	<4	<4	ug/kg	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #M	<3	<3	<3	<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2	<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #M	<4	<4	<4	<4	ug/kg	TM15/PM10
Propylbenzene #	<4	<4	<4	<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5	<5	<5	<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<6	<6	<6	<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4	<4	<4	<4	ug/kg	TM15/PM10
4-Isopropyltoluene #	<4	<4	<4	<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #M	<4	<4	<4	<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4	<4	<4	ug/kg	TM15/PM10
n-Butylbenzene #	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #M	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane #	<4	<4	<4	<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene #	<7	<7	<7	<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4	<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	<27	<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene #	<7	<7	<7	<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	94	92	101	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	96	81	100	<0	%	TM15/PM10

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: AECOM
Reference: M54
Location: Lower Pool
Contact: Tim Jones
EMT Job No: 19/15041

VOC Report : **CEN 10:1 1 Batch**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-7	8-14	15-21							LOD/LOR	Units	Method No.
Sample ID	M1	M2	M3									
Depth	BULK	BULK	BULK									
COC No / misc												
Containers	V J T	V J T	V J T									
Sample Date	16/09/2019 11:00	16/09/2019 12:30	16/09/2019 12:30									
Sample Type	Clay	Clay	Clay									
Batch Number	1	1	1									
Date of Receipt	17/09/2019	17/09/2019	17/09/2019									
VOC MS												
Dichlorodifluoromethane	<2	<2	<2							<2	ug/l	TM15/PM69
Methyl Tertiary Butyl Ether	<1	<1	<1							<1	ug/l	TM15/PM69
Chloromethane	<3	<3	<3							<3	ug/l	TM15/PM69
Vinyl Chloride	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM69
Bromomethane	<1	<1	<1							<1	ug/l	TM15/PM69
Chloroethane	<3	<3	<3							<3	ug/l	TM15/PM69
Trichlorofluoromethane	<3	<3	<3							<3	ug/l	TM15/PM69
1,1-Dichloroethene (1,1 DCE)	<3	<3	<3							<3	ug/l	TM15/PM69
Dichloromethane (DCM)	<5	<5	<5							<5	ug/l	TM15/PM69
trans-1-2-Dichloroethene	<3	<3	<3							<3	ug/l	TM15/PM69
1,1-Dichloroethane	<3	<3	<3							<3	ug/l	TM15/PM69
cis-1-2-Dichloroethene	<3	<3	<3							<3	ug/l	TM15/PM69
2,2-Dichloropropane	<1	<1	<1							<1	ug/l	TM15/PM69
Bromochloromethane	<2	<2	<2							<2	ug/l	TM15/PM69
Chloroform	<2	<2	<2							<2	ug/l	TM15/PM69
1,1,1-Trichloroethane	<2	<2	<2							<2	ug/l	TM15/PM69
1,1-Dichloropropene	<3	<3	<3							<3	ug/l	TM15/PM69
Carbon tetrachloride	<2	<2	<2							<2	ug/l	TM15/PM69
1,2-Dichloroethane	<2	<2	<2							<2	ug/l	TM15/PM69
Benzene	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM69
Trichloroethene (TCE)	<3	<3	<3							<3	ug/l	TM15/PM69
1,2-Dichloropropane	<2	<2	<2							<2	ug/l	TM15/PM69
Dibromomethane	<3	<3	<3							<3	ug/l	TM15/PM69
Bromodichloromethane	<2	<2	<2							<2	ug/l	TM15/PM69
cis-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM69
Toluene	<5	<5	<5							<5	ug/l	TM15/PM69
trans-1-3-Dichloropropene	<2	<2	<2							<2	ug/l	TM15/PM69
1,1,2-Trichloroethane	<2	<2	<2							<2	ug/l	TM15/PM69
Tetrachloroethene (PCE)	<3	<3	<3							<3	ug/l	TM15/PM69
1,3-Dichloropropane	<2	<2	<2							<2	ug/l	TM15/PM69
Dibromochloromethane	<2	<2	<2							<2	ug/l	TM15/PM69
1,2-Dibromoethane	<2	<2	<2							<2	ug/l	TM15/PM69
Chlorobenzene	<2	<2	<2							<2	ug/l	TM15/PM69
1,1,1,2-Tetrachloroethane	<2	<2	<2							<2	ug/l	TM15/PM69
Ethylbenzene	<1	<1	<1							<1	ug/l	TM15/PM69
m/p-Xylene	<2	<2	<2							<2	ug/l	TM15/PM69
o-Xylene	<1	<1	<1							<1	ug/l	TM15/PM69
Styrene	<2	<2	<2							<2	ug/l	TM15/PM69
Bromoform	<2	<2	<2							<2	ug/l	TM15/PM69
Isopropylbenzene	<3	<3	<3							<3	ug/l	TM15/PM69
1,1,2,2-Tetrachloroethane	<4	<4	<4							<4	ug/l	TM15/PM69
Bromobenzene	<2	<2	<2							<2	ug/l	TM15/PM69
1,2,3-Trichloropropane	<3	<3	<3							<3	ug/l	TM15/PM69
Propylbenzene	<3	<3	<3							<3	ug/l	TM15/PM69
2-Chlorotoluene	<3	<3	<3							<3	ug/l	TM15/PM69
1,3,5-Trimethylbenzene	<3	<3	<3							<3	ug/l	TM15/PM69
4-Chlorotoluene	<3	<3	<3							<3	ug/l	TM15/PM69
tert-Butylbenzene	<3	<3	<3							<3	ug/l	TM15/PM69
1,2,4-Trimethylbenzene	<3	<3	<3							<3	ug/l	TM15/PM69
sec-Butylbenzene	<3	<3	<3							<3	ug/l	TM15/PM69
4-Isopropyltoluene	<3	<3	<3							<3	ug/l	TM15/PM69
1,3-Dichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM69
1,4-Dichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM69
n-Butylbenzene	<3	<3	<3							<3	ug/l	TM15/PM69
1,2-Dichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM69
1,2-Dibromo-3-chloropropane	<2	<2	<2							<2	ug/l	TM15/PM69
1,2,4-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM69
Hexachlorobutadiene	<3	<3	<3							<3	ug/l	TM15/PM69
Naphthalene	<2	<2	<2							<2	ug/l	TM15/PM69
1,2,3-Trichlorobenzene	<3	<3	<3							<3	ug/l	TM15/PM69
Surrogate Recovery Toluene D8	109	114	112							<0	%	TM15/PM69
Surrogate Recovery 4-Bromofluorobenzene	112	113	111							<0	%	TM15/PM69

Please include all sections of this report if it is reproduced

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: AECOM
Reference: M54
Location: Lower Pool
Contact: Tim Jones

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Method No.	NDP Reason
19/15041	1	M2	BULK	8-14	Subcontracted	Sample unsuitable for this test

Client Name: AECOM
Reference: M54
Location: Lower Pool
Contact: Tim Jones

Matrix : CEN 10:1 1 Batch

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Method No.	NDP Reason
19/15041	1	M2	BULK	8-14	TM58/PM0	Sample unsuitable for this test

Client Name: AECOM
Reference: M54
Location: Lower Pool
Contact: Tim Jones

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 19/15041						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 19/15041

SOILS

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

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

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

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

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

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

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 19/15041

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM16/PM30/PM69	please refer to PM16/PM30 and PM69 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	No
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM69	Modified BS EN 12457 method.One part soil is mixed with 10 parts water in a vial leaving no headspace. The mixture is shaken and then left to leach for 24 hours before VOC analysis.			AR	Yes

EMT Job No: 19/15041

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM69	Modified BS EN 12457 method.One part soil is mixed with 10 parts water in a vial leaving no headspace. The mixture is shaken and then left to leach for 24 hours before VOC analysis.			AR	
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	Yes
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes

EMT Job No: 19/15041

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.			AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.	Yes	Yes	AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes		AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM69	Modified BS EN 12457 method.One part soil is mixed with 10 parts water in a vial leaving no headspace. The mixture is shaken and then left to leach for 24 hours before VOC analysis.			AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.			AR	Yes

EMT Job No: 19/15041

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes	Yes	AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM38/TM125	Total Nitogen/Organic Nitrogen by calculation	PM0	No preparation is required.			AR	Yes
TM38/TM125	Total Nitogen/Organic Nitrogen by calculation	PM20/PM0	PM20: Extraction of dried and ground samples with deionised water in a 2:1 water to solid ratio for Total Oxidised Nitrogen. Samples are extracted using an orbital shaker. PM0: No pre-preparation is required for Kjeldahl Nitrogen analysis.			AD	Yes
TM58	APHA Standard Methods for the extraction of water and waste water (SMEWW) 5210B. Comparible with ISO 5815:1989. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand. Determination of Dissolved Oxygen using the Hach HQ30D Oxygen Meter.	PM0	No preparation is required.				Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes

EMT Job No: 19/15041

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM76	Modified US EPA method 120.1. Determination of Specific Conductance by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes		AR	Yes
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.	Yes	Yes	AR	Yes
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM0	No preparation is required.			AR	Yes
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM119	As received solid samples are extracted with 1M NaOH by orbital shaker for Sulphide and Thiocyanate analysis.			AR	Yes
TM140	PSD	PM0	No preparation is required.			AD	Yes
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	NONE	No Method Code			AR	Yes

EMT Job No: 19/15041

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	
Subcontracted	See attached subcontractor report for accreditation status and provider.					AR	Yes
TM15_A	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes