A38 Derby Junctions

TR010022

Volume 6

6.3 Environmental Statement Appendices

Appendix 10.1: Ground Investigation Report

Regulation 5(2)(a)

Planning Act 2008

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

April 2019

Infrastructure Planning

Planning Act 2008

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

A38 Derby Junctions Development Consent Order 202[ ]

6.3 Environmental Statement Appendices
Appendix 10.1: Ground Investigation Report

Regulation Number	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010022
Application Document Reference	6.3
Author	A38 Derby Junctions Project Team, Highways England

Version	Date	Status of Version
1	April 2019	DCO Application

DESIGN CERTIFICATE - GEOTECHNICAL

Certificate No: HE514503-ACM-VGT-A38_SW_PR_ZZ-RP-GE-0001

Form of Certificate to be used by the Contractor and the Designer for certifying the design of geotechnical works:-

1. We certify that the Reports*, ~~Design Data*, Drawings* or Documents*~~ for the Geotechnical Works listed below have been prepared by us with reasonable professional skill and care, and that in our opinion:

i. constitute an adequate and economic design for the project

ii. solutions to all the reasonably foreseeable geotechnical problems have been incorporated

iii. the work intended is accurately represented and conforms to the Works Information

iv with the exception of any item listed below or appended overleaf, the documentation has been prepared in accordance with the relevant standards from the Design Manual for Roads and Bridges and the Manual of Contract Documents for Highway Works

(* - Delete as appropriate)

2. LIST OF REPORTS, DESIGN DATA, DRAWINGS OR DOCUMENTS

Scheme Title:	A38 Derby Junctions
Report Title:	Ground Investigation Report
HAGDMS Report Number:	30092
AECOM Repot Number:	HE514503-ACM-VGT-A38_SW_PR_ZZ-RP-GE-0001

3. DEPARTURES FROM STANDARDS

None

4. INCORPORATION OF GEOTECHNICAL DATA INTO CONSTRUCTION DETAILS

Not used

Signed:[redacted]
Designer (Designer's Geotechnical Advisor)

Name: PETER SHERWOOD

Date: 16/03/18

This Certificate is:

(a) received*
(b) received with comments as follows:*
(c) returned marked "comments" as follows:*

Signed: .....

Overseeing Organisation Geotechnical Advisor

Name: .....

Date: .....

(*- Delete as appropriate)

A38 Derby Junctions

Ground Investigation Report (Stage Approval)

HA GDMS No. 30092

Report Number: HE514503-ACM-VGT-A38_SW_PR_ZZ-RP-GE-0001 P05 S4
March 2018

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Appendix A **Parametric Study Charts**

Appendix B **Combined Tier 1 Screening Tables**

Appendix C **Combined Detailed Quantitative Risk Assessment**

1 EXECUTIVE SUMMARY

1.1.1 The A38 is the strategic route from Birmingham to Derby, through to the M1 at Junction 28. The A38 carries significant volumes of long-distance traffic, and where it passes through Derby large volumes of local traffic cross, join or leave the A38 resulting in congestion at three at-grade roundabout junctions.

1.1.2 The Scheme comprises the re-modelling of the roundabouts to provide grade separated junctions as follows:

- A38/A5111 Kingsway Junction.
- A38/A52 Markeaton Junction.
- A38/A61 Little Eaton Junction.

1.1.3 This Ground Investigation Report builds upon the Preliminary Sources Study, assimilating and interpreting historic information together with new information from ground investigation carried out at all three junctions in 2016. Geotechnical and geoenvironmental information is interpreted and presented with recommended considerations for detailed design.

1.1.4 Geotechnical plans and long section drawings are presented showing all exploratory hole locations – and summarising key geological features encountered.

1.1.5 Indicative soil and rock parameter ranges, derived from the ground investigation are presented in order to inform future design work.

1.1.6 Recommended considerations regarding contamination of the ground and of both surface water and groundwater are presented.

1.1.7 The geotechnical risk register, previously presented in the Preliminary Sources Study has been updated to account for the new information.

2 INTRODUCTION

2.1 Scope and Objective

2.1.1 This report relates to the scheme entitled A38 Derby Junctions, hereafter referred to as the Scheme. The location of the three junctions that are part of the Scheme are shown on drawing HE514503-ACM-VGT-A38_SW_PR_ZZ-DR-GE-0001.

2.1.2 The Ground Investigation Survey was carried out in summer 2016 with the scheme in PCF Stage 2. This was earlier than envisaged in the programme (as it was originally a Stage 3 activity); it was brought in an effort to mitigate some of the geotechnical risks early. This was agreed with the Highways England's Project Manager and Geotechnical Advisor and was a Compensation Event to AECOM under the design Contract (CE12 refers). This is recorded in the (draft) Client Scheme Requirements (CSR) for PCF Stage 3 under the 'Record of Requirements Changes' section, this also states that PCF Stage 3 was awarded without PRA being in place. The CSR is still draft pending Preferred Route Announcement.

2.1.3 This Ground Investigation Report has been produced, taking into account the ground investigation carried out during the summer of 2016 that was targeted towards the proposed scheme. Information gathered from previous ground investigations also informs this report.

2.1.4 This report has been prepared in accordance with the requirement of the Design Manual for Roads and Bridges, Vol. 4, Section 1, Part 2 HD22/08, Managing Geotechnical Risk. A summary of the report objectives based on the requirements of HD22/08 is provided below:

- Summarise and update existing geotechnical desk study information and to highlight the implications of this information to the project;
- Describe the results of existing geotechnical investigations relevant to the scheme;
- Present a summary interpretation on the geography, geology, hydrogeology, geomorphology, man-made features and historical development of the project;
- Present an interpretation of the ground conditions along the project route including descriptions of materials and justification for the parameters adopted for geotechnical design;
- Present details of geotechnical risks and mitigation measures in the form of a geotechnical risk register;
- Provide details of interpretation and justification for the geotechnical design criteria adopted.

2.2 Project Description

2.2.1 The A38 is the strategic route from Birmingham to Derby, through to the M1 at Junction 28. The A38 carries significant volumes of long-distance traffic, and where it passes through Derby large volumes of local traffic cross, join or leave the A38 resulting in congestion at three at-grade roundabout junctions.

2.2.2 Subject to confirmation at Preferred Route Announcement (PRA), the Scheme being considered at this stage comprises the re-modelling of the roundabouts to provide grade-separated junctions as follows:

- A38/A5111 Kingsway Junction, shown on drawing HE514503-ACM-VGT-Z1_ZW_PR_ZZ-DR-GE-0001:
  - A38 lowered to pass underneath the existing roundabout, in a new underpass
  - Construction of two new roundabouts and a new bridge at existing ground level to carry the traffic across the A38
  - Existing A38 carriageways generally converted into the junction's slip roads
  - A38 widened to 3 lanes in each direction between the Kingsway Junction and Kedleston Road (through Markeaton Junction)
  - Speed limit increasing from 40mph to 50mph
  - Closure of local accesses to the A38 at Brackensdale Avenue, Raleigh Street and Enfield Road and provision of a new local access
- A38/A52 Markeaton Junction, shown on drawing HE514503-ACM-VGT-Z2_ZW_PR_ZZ-DR-GE-0001:
  - A38 Lowered to pass underneath the existing roundabout, in a new underpass with associated slip roads
  - Construction of two new bridges to carry the A52 and roundabout traffic across the lowered A38
  - Increase speed limit from 40mph to 50mph
  - A38 widening to three lanes in each direction between Kingsway Junction and Kedleston Road (through Markeaton Junction)
  - Existing access to Esso and McDonalds to be modified
  - Existing access to Markeaton Park closed, improved access provided on A52
  - Replacement of the existing pedestrian footbridge over the A38 to Markeaton Park
- A38/A61 Little Eaton Junction, shown on drawing HE514503-ACM-VGT-Z3_ZW_PR_ZZ-DR-GE-0001:
  - Construction of the A38 on a new embankment to the south and east of the existing junction at Little Eaton, with construction of associated overbridges and slip roads for the local road network
  - The existing roundabout will be extended to the south and new slip roads constructed
  - Construction of two new bridges to carry the A38 over the roundabout
  - Two-lane dual carriageway will be provided for the A38 in each direction
  - The existing national speed limit on the A38 will be retained
  - Closure of the existing access from Ford Lane onto the A38

2.2.3 The project is considered to be Geotechnical Category II. This has not been changed following the 2016 GI.

2.2.4 Taking account of the above considerations, AECOM have completed a wide range of environmental and ecological surveys which fed into the Project Control Framework (PCF) Stage 2 environmental assessment. Further surveys are currently being undertaken. Environmental and ecological constraints associated with the scheme will continue to be taken into account during scheme design and specification of scheme construction solutions/ methods.

2.2.5 As part of the process described above, the following consultees were contacted during PCF Stage 2:

- A38 Managing Agent Contractor (Highways England);
- Amber Valley Borough Council;
- Breadsall Parish Council;
- Derby City Council;
- Derbyshire County Council;
- Derbyshire Wildlife Trust;
- Environment Agency;
- Erewash Borough Council;
- Historic England;
- Little Eaton Parish Council;
- Little Eaton and Stanley Ward;
- Natural England; and
- South Derbyshire District Council.

3 EXISTING INFORMATION

3.1 Introduction

Since 2001, AECOM (including legacy companies Scott Wilson until 2010 and later URS until 2014) has assisted Highways England (formerly the Highways Agency) in several stages of options assessment for improvement of the junctions.

A Preliminary Sources Study (PSS) was produced by URS in 2015 (Ref 01) that summarises information prior to that date for all three junctions. Additionally a localised Preliminary Sources Study Addendum focussed on the Proposed K2 Link Road (linking the east side of Kingsway Junction with Kingsway Park Close) was produced in 2016 (Ref 02). This summarised some additional information relevant to that area. Refer to Section 2 of these reports for sources of information.

The locations of holes from the historic ground investigations are shown for the three junctions on plans:

- A38/A5111 Kingsway Junction drawing HE514503-ACM-VGT-Z1_ZW_PR_ZZ-DR-GE-0001.
- A38/A52 Markeaton Junction drawing HE514503-ACM-VGT-Z2_ZW_PR_ZZ-DR-GE-0001.
- A38/A61 Little Eaton Junction drawing HE514503-ACM-VGT-Z3_ZW_PR_ZZ-DR-GE-0001.

For a more detailed breakdown showing the individual phases of historic ground investigation, refer to the PSS (Ref 01) and PSS Addendum (Ref 02).

Historic ground investigation information is also represented on cross sections:

- A38/A5111 Kingsway Junction drawing HE514503-ACM-VGT-Z1_ZW_PR_ZZ-DR-GE-0002.
- A38/A52 Markeaton Junction drawing HE514503-ACM-VGT-Z2_ZW_PR_ZZ-DR-GE-0002.
- A38/A61 Little Eaton Junction drawing HE514503-ACM-VGT-Z3_ZW_PR_ZZ-DR-GE-0002.

A Geotechnical Statement of Intent (SoI) was produced by URS in 2014 (Ref 03).

4 FIELD AND LABORATORY STUDIES

4.1 Walkover Survey

A site walkover has not been undertaken specifically for the preparation of this report. Site walkovers were previously undertaken in March and September 2003; December 2014; and January 2015. These are summarised in the Preliminary Sources Study (Ref 01)

4.2 Geomorphological / Geological Mapping

Not used.

4.2.1 Records of Principal Inspections (Kingsway Junction)

The locations of earthworks recorded in the Principal Inspections are shown on drawing HE514503-ACM-VGT-Z1_ZW_PR_ZZ-DR-GE-0001.

The inspections record / confirm that Kingsway Junction is primarily situated on densely vegetated embankments varying in height above the surrounding area, from 5 m in the north increasing to the centre reaching ~12.5 m and reducing to the south to 1.5 m. The south-eastern edge of the roundabout is at-grade and in cutting up to 6.1 m deep. The wide grassed verge between the carriageways, north of the junction, is at grade with the road. The verge between the carriageways, south of the junction, is deepened locally (to a max. 12.5 m below carriageway level, similarly to the centre of the roundabout) by the passage of Bramble Brook; the remaining verge is at grade with the carriageway. The southernmost extent of the site adjacent to the northbound A38 enters into a 3.5 m deep cutting.

The centre of the Junction is typically up to 15m below carriageway level with the slopes comprising steep (up to 32°) densely vegetated embankments. This low central area serves as storm water storage for the surrounding area and is crossed by the channels of Bramble Brook and local culverts. The natural topography rises from the centre of the junction, steeply towards the south-east and more gently to the north-east.

The Preliminary Sources Study (Ref 01) summarised defects identified in Principal Inspections carried out prior to 2015. An additional set of Principal Inspections were undertaken in early 2015 and the record of defects has been updated for this report. This record is shown in Table 4.1

Unless confirmed otherwise (see Table 4.1 comments) defects previously recorded are assumed to be still present.

Table 4.1 Kingsway Junction Defect Summary

HAGDMS Defect ID	Defect	Date	Comment
36755_252483 36755_548727	Soil slip at crest; minor terracing with some soil ravelling	06/03/2007, 24/01/2011 & 05/02/2015	Not observed in 2015 due to dense vegetation noted at location
36758_472291 36758_548732	Blocked drainage	28/02/2011 & 05/02/2015	Located on at-grade section south of 36759. Observation remains in system but no recent remarks.
36759_473263 36759_548745	Dislocated trees	06/03/2007, 28/02/2011 & 04/02/2015	Historic defect, appears to have been re-assessed following 2015 inspection.
36767_252617	Soil slip at crest	06/03/2007, 28/02/2011 & 04/02/2015	No remedial work identified on HAGDMS. Defect archived and appears to have been re-assessed (comment states 'Delete (not observed)').
36767_473331	Slip at crest	28/02/2011 & 04/02/2015	No remedial work identified on HAGDMS. Defect archived from HAGDMS and appears to have been re-assessed (comment states 'Delete (not observed)').
37058_254047	Erosion from leaking manhole under-cutting adjacent slope	12/03/2007	No remedial work identified on HAGDMS. No subsequent inspections since 2007
37058_254055	Animal burrows	12/03/2007	No remedial work identified on HAGDMS. No subsequent inspections since 2007.
37058_254064	Minor slip / tension crack at crest	12/03/2007	No remedial work identified on HAGDMS. No subsequent inspections since 2007.
37089_254187	Minor slip at crest	08/03/2007, 24/01/2011	2011 inspection indicates completely vegetated over, with no evidence of recent movement. Defect archived.
37089_254188	Minor soil slip in upper slope	08/03/2007, 24/01/2011 & 05/02/2015	No remedial work identified on HAGDMS. Reassessed in 2015 and defect archived.
37089_254189	Soil slip at crest	08/03/2007, 24/01/2011 & 05/02/2015	No remedial work identified on HAGDMS. Reassessed in 2015 and defect archived.

HAGDMS Defect ID	Defect	Date	Comment
37210_254687 37210_548806	Animal burrows	12/03/2007 , 24/02/2011 & 04/02/2015	No remedial work identified on HAGDMS. Reassessed in 2015 and defect archived.
37210_254683 37210_472294	Tension crack	12/03/2007 , 24/02/2011 & 04/02/2015	No remedial works identified on HAGDMS. Reassessed in 2015 and defect archived.
37211_254766	Minor soil slip and some dislocated trees	12/03/2007 , 24/02/2011 & 04/02/2015	No remedial works identified on HAGDMS Reassessed in 2015 and defect archived.
37211_256657 37211_472302 37211_548800	Tension crack / slip at crash barriers	08/03/2007, 24/02/2011 & 04/02/2015	Reassessed in 2015 and defect status changed to 'not observed'.
37211_254691 37211_472305 37211_548804	Dislocated trees	12/03/2007 , 24/02/2011 & 04/02/2015	Reassessed in 2015 and defect archived.
37211_256655 37211_472306 37211_548802	Slip at crest	08/03/2007 , 24/02/2011 & 04/02/2015	No remedial work identified on HAGDMS, Reassessed in 2015 and defect archived.
37211_256656 37211_472307 37211_548801	Dislocated trees at the toe	08/03/2007, 24/02/2011 & 04/02/2015	HAGDMS observation repeated in 2015
37613_255935	Retaining wall cracking in the mortar	12/03/2007 , 24/02/2011 & 05/02/2015	No remedial works identified on HAGDMS. Cracking appears to be minor
37766_256745 37766_472282 37766_548830	Slip at crest, mossy tension crack, and pond at toe	12/03/2007 , 24/02/2011 & 04/02/2015	'Possible' slip remains in 2015, although tension cracks and ponding not recorded
37770_256757	Dislocated trees	13/03/2007	No further inspections since 2007.
37778_256803 37778_472287	Tension crack 10cm wide	20/03/2007 & 24/02/2011	No remedial works identified on HAGDMS. Observed in 2011. No inspection since 2011.

4.2.2 Records of Principal Inspections (Markeaton Junction)

The locations of earthworks recorded in the Principal Inspections are shown on drawing HE514503-ACM-VGT-Z2_ZW_PR_ZZ-DR-GE-0001.

The inspections record that Markeaton Junction is primarily at grade, the carriageway follows the natural topography and is divided in to two halves at the point which it crosses the A52 at the lowest elevation. The northern section is called the Queensway and the southern section is called the Kingsway. The verges are all sparsely vegetated with grass and a few mature trees or comprise pedestrian footpaths and urban development.

A 200 m section of the Kingsway is in shallow cutting on both sides (no depth or slope angle details given, due to the small earthwork size), beginning approximately 200 m to the south of Markeaton Roundabout. The area is developed on all sides except to the north-west, where Markeaton Park lies.

The Principal Earthwork inspections, including those carried out in 2015, recorded the area to be at-grade and cutting with no defects identified.

In 2014 Markeaton Junction underwent development known as the Economy "Pinch Point" scheme to alleviate congestion of the junction. This scheme comprised verge widening to accommodate additional lanes and the reshaping of the roundabout as follows:

- The southbound Queensway diverge lane on the A52.
- The northbound Kingsway diverge lane on the A52.
- The A52 westbound toward Mackworth.

4.2.3 Records of Principal Inspections (Little Eaton Junction)

The locations of earthworks recorded in the Principal Inspections are shown on drawing HE514503-ACM-VGT-Z3_ZW_PR_ZZ-DR-GE-0001.

The inspections record that for the best part, the approaches to Little Eaton Junction are situated on embankments which have side-slopes up to 30°, although typically 1(v):2(h) with heights varying from grade to ~10 m. These slopes are densely vegetated with brambles, shrubs and medium-sized trees. Drainage typically comprised a gravel covered pipe at the embankment toe. The inspections identified a number of defects (Table 4.2).

Table 4.2: Little Eaton Junction – Defect Summary

HAGDMS Defect ID	Defect	Date	Comment
38298_259870	Dislocated trees	27/03/2007, 25/11/2010 & 12/02/2015	Reassessed in 2015 and defect archived
38298_259865	Subsidence, animal burrowing, close to crash barrier	27/03/2007, 25/11/2010, 12/02/2015	Earlier observations noted burrows. 2015 observation notes proximity to barrier
38385_260199 38385_464164 38385_550806	Subsidence on the verge and maybe superficial historical slip near the crest, 5m long. Bulging is not totally evident.	18/04/2007, 25/11/2010 & 13/02/2015	No remedial work identified on HAGDMS. Located north of Scheme extent.
40135_265021 40135_464110	Depression Settlement at Base of Sign	25/04/2007, 25/11/2010 & 12/02/2015	Reassessed in 2015 (changed on HAGDMS), indicated to no longer be evident

In 2014 Little Eaton Junction underwent development known as the Economy "Pinch Point" scheme to alleviate congestion of the junction. This scheme utilises gabion baskets, ranging from 6.5 m to 1 m high, at three sections to provide wider embankments within the existing arrangement to accommodate additional lanes.

- A38 Northbound Approach – widening the embankment from the railway bridge to the Little Eaton Roundabout – including 6.5 m gabion wall
- A61 Northbound Approach – widening the embankment from Derby to the Little Eaton Roundabout – including 3.5 m gabion wall.
- A38 to A61 Southbound Exit Slip – widening the embankment east of the Little Eaton Roundabout – including 1 m gabion wall.

4.3 Ground Investigations

4.3.1 Historic Ground Investigations

Ground Investigation Information relating to the three junctions undertaken prior to 2015 is summarised in the PSS (Ref 01) and K2 Link Road PSS Addendum (Ref 02)

4.3.2 2016 Ground Investigation

In 2016 Ground Investigation Works were carried out by Environmental Scientifics Group Limited (ESGL) under commission from Geoffrey Osborne Ltd (Osborne) on behalf of Highways England. The Factual Report on Ground Investigation (Ref 11) is presented in a separate volume. It has an ESGL Report No. A6067-16 and has been assigned HAGDMS No. 30195.

The 2016 Ground Investigation was performed in accordance with the general requirements of BS 5930:2015 (Ref 12), BS EN 1997-2:2007(Ref 13) and BS EN ISO 22475-1:2006 (Ref 14).

Kingsway Junction

The scope of investigation is summarised in Table 4.3.

Table 4.3: Kingsway Junction – 2016 Ground Investigation Summary

Type of Investigation	Quantity	Maximum Depth Achieved (m)
Dynamic sampling with rotary coring follow-on	9	35
Rotary coring	1	20
Dynamic sampling	9	20.5
Trial pit	4	2

The following in-situ tests were undertaken:

- 128 No. Standard Penetration Tests (SPT)

The location of all exploratory holes carried out at Kingsway as part of the 2016 Ground Investigation is shown on drawing HE514503-ACM-VGT-Z1_ZW_PR_ZZ-DR-GE-0001.

Markeaton Junction

The scope of investigation is summarised in Table 4.4.

Table 4.4: Markeaton Junction – 2016 Ground Investigation Summary

Type of Investigation	Quantity	Maximum Depth Achieved (m)
Dynamic sampling with rotary coring follow-on	16	30.2
Cable percussion with rotary coring follow-on	1	29.5
Rotary coring	1*	1.5*

* Borehole abandoned due to proximity to buried services and alternative location agreed.

The following in-situ tests were undertaken:

- 151 No. Standard Penetration Tests (SPT)
- 2 No. Pressuremeter (High pressure, direct strain measuring, borehole dilatometer – HPD)
- 3 No. Variable Head Permeability Tests
- 1 No. Pumping Test (Constant Rate Discharge, Step Test and Recovery Monitoring)

The locations of all exploratory holes carried out at Markeaton as part of the 2016 Ground Investigation are shown on drawing HE514503-ACM-VGT-Z2_ZW_PR_ZZ-DR-GE-0001.

Little Eaton Junction

The scope of investigation is summarised in Table 4.5.

Table 4.5: Little Eaton Junction – 2016 Ground Investigation Summary

Type of Investigation	Quantity	Maximum Depth Achieved (m)
Cable percussion with rotary coring follow-on	13	30.16
Cable percussion	3*	1.1*
Trial pit	8	3.7
Dynamic sampling	13	5.45

* Refused on hard material / Inspection pits only.

The following in-situ tests were undertaken:

- 177 No. Standard Penetration Tests (SPT)

The locations of all exploratory holes carried out at Little Eaton as part of the 2016 Ground Investigation are shown on drawing HE514503-ACM-VGT-Z3_ZW_PR_ZZ-DR-GE-0001.

4.4 Drainage Studies

4.4.1 Refer to PSS [(Ref 01)].

4.5 Geophysical Studies

4.5.1 Not used.

4.6 Pile Tests

4.6.1 Not used.

4.7 Other Fieldwork

4.7.1 Archaeology

Osborne commissioned Museum of London Archaeology (MOLA) to undertake a watching brief and deposit modelling in conjunction with the 2016 Ground Investigation site works.

This report concluded that the potential for archaeological and paleaeoenvironmental survival was low to moderate across the three junction locations. Recommendations were made in the report for further archaeological investigation in conjunction with further works but no significant features of concern were identified [(REF 10)].

During the 2016 Ground Investigation AECOM also commissioned an archaeological investigation at Little Eaton, which involved the following:

- Archaeological geophysical survey in six areas to the east and south of the existing road alignment;
- Geoarchaeological assessment of ten boreholes through river Derwent floodplain deposits; and
- Archaeological trial trenching (nine trenches in total excavated) to evaluate the archaeological anomalies detected by the geophysical survey.

The geophysical surveys found traces of archaeological activity consisting of ridge and furrow features and former demolished land boundaries, and areas of modern disturbance, including buried services and farming activity.

Boreholes drilled to a depth of between 3m to 4m recorded sediments consistent with their location (alluvial clay and sand deposits overlain by modern topsoil). However, no waterlogged or preserved organic deposits were encountered during the investigations. Small unidentifiable fragments of ceramic material were found in two of the holes, but these are likely to be pieces of brick and were not considered to be archaeological significant.

Subsequent trial trenching found that most of the geophysical anomalies were of non-archaeological interest, or the result of modern disturbance (farming activity and various buried services).

4.7.2 Unexploded Ordnance (UXO)

Osborne commissioned 1st Line Defence to carry out a Detailed UXO Risk Assessment for the Markeaton Junction area in conjunction with the 2016 Ground Investigation. A low risk of dropped 2nd Wold War era German UXO was identified, with a medium risk of Allied UXO (e.g. unused ammunition) in some parts of Markeaton Park and the nearby Territorial Army Centre premises.

Where medium risk was identified, 1st Line Defence provided specialist personnel to supervise shallow intrusive works.

4.7.3 Post Ground Investigation Monitoring

Post Ground Investigation monitoring is being undertaken by AECOM and will be completed by April 2018. The results of monitoring undertaken to date are summarised in Section 5.4; a full summary and review of monitoring results will be captured in a Monitoring Factual Report, which will be produced following the final round of monitoring.

4.8 Laboratory Investigation

4.8.1 Geotechnical laboratory testing was carried out as part of the 2016 Ground Investigation for material recovered from exploratory holes from all three junctions. Testing was carried out in accordance with BS 1377:1990 (Ref 04) and ISRM:2007 (Ref 05). Testing included:

Kingsway Junction

- 27 No. Water Content Determination
- 25 No. Atterberg Limit Determination
- 21 No. Particle Size Distribution Analysis
- 103 No. Point Load Index testing
- 7 No. Uniaxial Compressive Strength Testing
- 3 No. Uniaxial Compressive Strength with deformability
- 23 No. pH, Water Soluble Sulfate, Acid Soluble Sulfate, and Total Sulfur Tests in accordance with BRE Special Digest 1 guidance (Ref 06).

Markeaton Junction

- 48 No. Water Content Determination
- 41 No. Atterberg Limit Determination
- 16 No. Particle Size Distribution Analysis
- 9 No. Unconsolidated Undrained Triaxial Compression Testing
- 5 No. Moisture Condition Value (MCV) / Moisture Content Relationship Testing
- 107 No. Point Load Index testing
- 1 No. Uniaxial Compressive Strength Testing
- 2 No. Uniaxial Compressive Strength with deformability

- 20 No. pH, Water Soluble Sulfate, Acid Soluble Sulfate, and Total Sulfur Tests in accordance with BRE Special Digest 1 guidance (Ref 06).

Little Eaton Junction

- 72 No. Water Content Determination
- 65 No. Atterberg Limit Determination
- 53 No. Particle Size Distribution Analysis
- 2 No. Hand Shear Vane Testing
- 4 No. One Dimensional Oedometer Consolidation Testing
- 70 No. Point Load Index testing
- 23 No. pH, Water Soluble Sulfate, Acid Soluble Sulfate, and Total Sulfur Tests in accordance with BRE Special Digest 1 guidance (Ref 06).

4.9 Supplementary Ground Investigation

4.9.1 Technical Note TN-GE-029 identified locations where practical or safety considerations (e.g. access difficulties, proximity to buried services) resulted in exploratory ground investigation not being undertaken at the targeted locations in 2016. .

The requirement for confirmatory Ground Investigation during the construction works will be considered during detailed design.

5 GROUND SUMMARY

5.1 Ground Summary Introduction

5.1.1 This section provides a summary interpretation of the following aspects of the scheme:

- Geography;
- Topography;
- Geology;
- Geomorphology
- Hydrology;
- Hydrogeology;
- Man-made features and historical development.

5.2 Geography & Topography

The locations of the three junctions are shown on Drawing HA514503-ACM-VGT_A38_SW_PR_ZZ-DR-GE-0001:

- The A38 / A5111 Kingsway Junction is located approximately 2.5 km due west of Derby city centre (NGR SK 327 360).
- The A38 / A52 Markeaton Junction is located approximately 2 km west-north-west of Derby city centre (NGR SK 334 369)
- The A38 / A61 Little Eaton Junction is located approximately 4 km north of Derby city centre (NGR SK 363 339).

5.2.1 Kingsway Junction

The existing roundabout is situated primarily on embankment (Drawing HE514503-ACM-VGT-Z1_ZW_PR_ZZ-DR-GE-0001), with at-grade sections and a cut slope located on the south and east sides at the junction with the A5111. The centre of the roundabout comprises a very deep and steep densely vegetated depression, which is crossed by the channels of Bramble Brook and local culverts and forms a sunken area relative to carriageway level.

The ground in the centre of the roundabout is at a level of 68 mAOD, and rises steeply towards the south-east to a level of 86 mAOD, approximately 150 m to the south-east of the Junction. The land rises more gently to the north-west to a level of 75 mAOD over the same distance.

The A38 approaches the roundabout from the south-west at-grade and in cutting, at a level of 75 mAOD. The carriageways then divide, the northbound predominantly on embankment with a section at-grade and the southbound at-grade with a section of embankment approximately 150 m from the roundabout. The wide central reservation is deepened locally by Bramble Brook leaving the verge at-grade and is densely vegetated. The roundabout carriageway level is 75-76 mAOD. The A38 continues in a north-easterly direction, with both carriageways on embankment rising to a level of 81 mAOD approximately 0.5 km north of the roundabout. The A5111 approaches the roundabout reducing in elevation from 84 mAOD in the south-east to 76 mAOD where it joins the roundabout, formed in cutting on the south side and on to embankment on the north-east side.

To the north-east and east lie industrial and retail parks and to the south a college with sports grounds. To the south-west and west is an area of open grassland, and to the north-west, residential development.

Bramble Brook runs through the central reservation from south-west to north-east.

5.2.2 Markeaton Junction

The existing roundabout is at-grade, situated in a built-up urban area and parkland. The layout of the junction is given in Drawing HE514503-ACM-VGT-Z2_ZW_PR_ZZ-DR-GE-0001.

The A38 crosses from south-west to north-east, while the A52 crosses from south-east to north-west. The A52 approaches to the roundabout are at-grade. The A38 northbound carriageway is in cutting approximately 200 m south of the roundabout and the A38 is also formed in cutting approximately 600 m to the north at the junction with Kedleston Road.

The A38 falls from a level of 81 mAOD approximately 0.5 km south-west to a level of 65 mAOD at the roundabout. The carriageway then falls to a level of 57 mAOD in the vicinity of Markeaton Lake, approximately 0.5 km to the north-east. The general topography falls from the west and south-west to east and north-east.

The Junction is surrounded by residential developments to the east and south, whilst to the north lies an area of parkland (Markeaton Park), comprising both open and wooded areas. Immediately west of the roundabout is a petrol station and a restaurant, beyond which lie residential developments.

The recent economy “Pinch Point” scheme comprised verge widening to accommodate additional lanes and reshaping of the roundabout to an ellipse.

5.2.3 Little Eaton Junction

The existing roundabout is at-grade to the north and north-west, whilst being raised above the land to the east, south and west on low embankment. The layout of the Junction is shown on Drawing HE514503-ACM-VGT-Z3_ZW_PR_ZZ-DR-GE-0001.

The A38 approaches the roundabout from the west on embankment crossing over the River Derwent and the London St Pancras to Sheffield railway line located approximately 500 m and 200 m west of the roundabout respectively. The embankment level falls from 57 mAOD adjacent to the river bridge to 53 mAOD at the roundabout. The A38 continues north on embankment, rising to a level of 69 mAOD 0.6 km north of the Junction. The A61 approaches the roundabout from the south at-grade and on low embankment.

The land surrounding the Junction to the east, south and west consists of flat farmland. The natural ground level rises from 49 mAOD adjacent to the River Derwent, along the alignment of the A38 to 51 mAOD at the roundabout. To the immediate north and north-west lies a mobile home park and roadside restaurant, beyond which lies hummocky, grassy open land. The ground level rises to the east from the edge of the floodplain.

The recent Economy "Pinch Point" scheme consisted of embankment widening on the existing arrangement with gabion baskets up to 6.5 m high to accommodate additional lanes.

5.3 Geology & Geomorphology

Published information on geology and information from historic ground investigations are summarised in detail in the PSS [(Ref 01)], which is referred to in Section 3.1 of the present report.

The following information should be read in conjunction with the PSS and is intended to summarise the geology and geomorphology, and the extent to which the information presented there has been verified or refined by the 2016 GI.

5.3.1 Kingsway Junction

Key geological features at Kingsway Junction are shown on plan Drawing HE514503-ACM-VGT-Z1_ZW_PR_ZZ-DR-GE-0001 and long section drawing HE514503-ACM-VGT-Z1_ZW_PR_ZZ-DR-GE-0002. The ground conditions in the vicinity of the Junction comprise:

- Topsoil, overlying;
- Artificial ground including Made Ground;
- Superficial deposits including Alluvium;
- Underlain by rocks of the Mercia Mudstone Group.

The artificial ground and superficial deposits in the vicinity of Kingsway Junction are summarised in Table 5.1.

In terms of structural geology, the bedding within the Mercia Mudstone Group is generally shallow to subhorizonally dipping. A normal fault is shown on mapping, trending NW-SE, roughly in perpendicular alignment with the A38 approximately 100m south of the Lyttleton Street bridge. The down-thrown side of the fault is shown to be on the northeastern side. Rocks of the Sidmouth Mudstone Formation (of the Mercia Mudstone Group) are found on the down-thrown side and the Tarporley Siltstone Formation (of the Mercia Mudstone Group) is recorded on the up-thrown side.

Table 5.2 summarises bedrock geology in the vicinity of Kingsway Junction.

Table 5.1 – Kingsway Summary descriptions of artificial ground and superficial deposits

Deposit	Summary Description	Approximate Distribution	Approximate Thickness	Significant Features
Made Ground	Embankment fill and road construction material	Vicinity of A38 corridor and earthworks	Varies. Parts of Kingsway roundabout are on an embankment constructed up to 10m high. Elsewhere the road is close to at-grade. Base of embankment varies from approximately 67-79m AOD due to variation in topography	
Landfill	Historic landfills (varied waste)	Historic Landfill to east of Kingsway Junction (K2 Link Road Cutting area) and in former railway cutting, crossing the junction on an east-west alignment.	Varies. Maximum 18.7m depth of landfill material encountered without proving base of landfill. Majority of exploratory holes in 2016 GI indicated the base of the landfill to shallower depth. The 2016 GI did not specifically sample the railway cutting landfill – an exploratory hole in the vicinity was cancelled due to the proximity of unrecorded services. Base of landfill varies. Deepest part lower than 51.76m AOD, as encountered in BK13.	
Alluvium	Historic GI described as soft mottled marly clay with peat.	Ch1300-1750 (small sections of carriageway, mainly central reservation to south of Kingsway Junction. Also easternmost section of K2 link road, near Junction with Kingsway Park Close.	Up to 3.66m in historic exploratory holes, thins towards edges. Only a few of the 2016 GI exploratory holes encountered this material. Base of alluvium varies, with the deepest encountered at approximately 72m AOD	Alluvium is mostly confined to the nearby vicinity of the Bramble Brook.

Table 5.2 – Kingsway Summary descriptions of solid strata

Stratum		Summary Description	Approximate Distribution	Approximate Thickness	Significant Features
Upper Triassic	Mercia Mudstone Group (Sidmouth Mudstone Formation)	Dominantly mudstone and siltstone, red-brown with common grey-green reduction patches and spots. Includes beds of grey-green dolomitic siltstone	From fault location at approximately Ch1850-1900 to northeast of Kingsway site extents	Not proven in 2016 Ground Investigation. BGS records up to 130m in the East Midlands.	Inferred normal fault location shown at approximately Ch1850-1900, trending NW-SE. Sidmouth Mudstone Formation is on northeast side of fault.
Lower to Upper Triassic	Mercia Mudstone Group (Tarporley Siltstone Formation)	Interbedded siltstones, mudstones (both reddish brown) and fine sandstones (typically pale grey brown).	From southwest of Kingsway site extents to fault location at approximately Ch1850-1900	Not proven in 2016 Ground Investigation. BGS records between 20-60m in the East Midlands.	Inferred normal fault location shown at approximately Ch1850-1900, trending NW-SE. Tarporley Siltstone Formation is on southwest side of fault. BGS lexicon notes that bedding is generally planar, tabular, and laterally extensive but also notes some channel sandstones with incised, erosional bases.

5.3.2 Markeaton Junction

Key geological features at Kingsway Junction are shown on plan Drawing HE514503-ACM-VGT-Z2_ZW_PR_ZZ-DR-GE-0001 and long section drawing HE514503-ACM-VGT-Z2_ZW_PR_ZZ-DR-GE-0002. The ground conditions in the vicinity of the Junction comprise:

- Topsoil, overlying;
- Artificial ground including Made Ground;
- Superficial deposits including Alluvium and River Terrace deposits;
- Underlain by rocks of the Mercia Mudstone Group.

The artificial ground and superficial deposits in the vicinity of Markeaton Junction are summarised in Table 5.3.

Similarly to Kingsway Junction (see Section 5.3.1), Markeaton Junction is underlain by rocks of the Mercia Mudstone Group: the Sidmouth Mudstone Formation, Gunthorpe Member, and the Tarporley Siltstone Formation. Bedding is generally recorded as subhorizontal and locally showing a shallow dip to the east and southeast.

On the current 2014 BGS map, an inferred normal fault is shown, closely following the approximate east-west aligned route of the A52 to the west of Markeaton Junction. To the east of the junction it is shown to continue on a similar alignment, but placing it a little way to the north of the A52. In earlier mapping the alignment of was shown to trend in a northwest-southeast direction, diagonally crossing the route of the A52 approximately 100m to the northeast of Markeaton Junction. During the 2016 GI, several boreholes between these two locations showed frequently non-intact material with relatively low recovery during rotary drilling, even after attempts to improve recovery. Conclusively identifying which formation the Mercia Mudstone Group materials belonged to in this area proved difficult. This may point to a wider fault-disturbed zone in the area, rather than a more closely defined fault plane as might be assumed to be indicated from the published maps.

The bedrock geology in the vicinity of Markeaton Junction is summarised in Table 5.4.

Table 5.3 – Markeaton Summary descriptions of artificial ground and superficial deposits

Deposit	Summary Description	Approximate Distribution	Approximate Thickness	Significant Features
Made Ground	Embankment fill and previous road construction material	Along A38 corridor.	Up to 3.2 m. Base varies with topography from approx.. 53-80m AOD	
Alluvium	Predominantly silty clay or sandy silty clay, also clay, clayey silt, and marly clay with sand and gravel. Occasionally the inclusion of pebbles and organic material are described. The colour is variously brown-grey, red-brown and grey, grey-black, and light brown-orange mottled yellow.	Mapping shows presence north of approximately Ch3200.	Thin, where present, in vicinity of Markeaton Junction. Thickens to 4.1m to the north of the junction. Not consistently encountered in exploratory holes within junction area.	Overlies, or cut into, the River Terrace Deposits. Mostly outside the area of proposed works.
River Terrace Deposits	Poorly to well graded, fine to coarse sand and/or gravel, sometimes silty or clayey. Occasionally it is described as containing cobbles. The colour is brown, yellow-brown and red-brown. Organic material is sometimes present.	From approximately Ch2900 towards north of site	Up to 4.1m. Thins towards edges. Base varies from approx. 51-53m AOD.	

Table 5.4 – Markeaton Summary descriptions of solid strata

Stratum		Summary Description	Approximate Distribution	Approximate Thickness	Significant Features
Upper Triassic	Mercia Mudstone Group (Sidmouth Mudstone Formation)	Dominantly mudstone and siltstone, red-brown with common grey-green reduction patches and spots. Includes beds of grey-green dolomitic siltstone	From southwest of Markeaton site extends to fault location near junction with A52.	Not proven in 2016 Ground Investigations. BGS records up to 130m in the East Midlands.	Inferred normal fault location shown at approximately Ch2800, approximately aligned with the NW-SE trending route of the A52. Sidmouth Mudstone Formation is on southwest side of fault. Mapping prior to 2014 shows fault location further to the north at approximately Ch2900-2950.
Lower to Upper Triassic	Mercia Mudstone Group (Tarporley Siltstone Formation)	Interbedded siltstones, mudstones (both reddish-brown) and fine sandstones (typically pale grey brown).	From fault location near junction with A52 to northeast of Markeaton site extents	Not proven in Ground Investigations. BGS records between 20-60m in the East Midlands	Inferred normal fault location shown at approximately Ch2800, trending NW-SE. Tarporley Siltstone Formation is on northeast side of fault. Mapping prior to 2014 shows fault location situated further to the north at approximately Ch2900-2950. BGS lexicon notes that bedding is generally planar, tabular, and laterally extensive but also notes presence of some channel sandstones with incised, erosional bases.

5.3.3 Little Eaton Junction:

Key geological features at Kingsway Junction are shown on plan Drawing HE514503-ACM-VGT-Z3_ZW_PR_ZZ-DR-GE-0001 and long section drawing HE514503-ACM-VGT-Z3_ZW_PR_ZZ-DR-GE-0002. The ground conditions in the vicinity of the Junction comprise:

- Topsoil, overlying;
- Artificial ground including Made Ground;
- Superficial deposits including Alluvium;
- Underlain by rocks of the Millstone Grit Group.

The artificial ground and superficial deposits in the vicinity of Little Eaton Junction are summarised in Table 5.5.

Little Eaton Junction is underlain by rocks of the Millstone Grit Group: Morridge Formation.

The bedrock geology in the vicinity of Little Eaton Junction is summarised in Table 5.6.

Table 5.5 – Little Eaton Summary descriptions of artificial ground and superficial deposits

Deposit	Summary Description	Approximate Distribution	Approximate Thickness	Significant Features
Made Ground	Embankment fill and previous road construction materials	Along A38 corridor and other road corridors approaching junction.	Up to 5.75m within A38 corridor to south of Junction. Base varies with topography. Deepest encountered approx. 58m AOD.	
Alluvium (Predominantly Silt & Clay)	Typically firm to stiff beneath embankment fill, sometimes soft to firm, typically described as clay with secondary constituents in varying proportions of sand, gravel and silt. Colour is typically brown with orange grey mottling. Some horizons are high in organic content.	From approximately 50m west of Little Eaton site extends to approximately Ch7650-7800, diagonally crossing the road alignment on a NW-SE orientation. Usually overlies granular alluvium.	Up to 2.7m recorded on Historic Ground Investigations. Deepest encountered approx. 47m AOD.	
Alluvium (Predominantly Sand & Gravel):	Gravel, with less frequent horizons of sand, and sand & gravel. Gravel horizons are: variously very sandy and slightly to very clayey. The gravel is typically subangular to subrounded, fine to coarse of sandstone, Mudstone, siltstone, limestone and mixed lithologies. Sand horizons are fine to coarse. Typically brown and grey brown.	From approximately 50m west of Little Eaton site extends to approximately Ch7650-7800, diagonally crossing the road alignment an a NW-SE orientation	Up to 7.2m recorded by 2016 GI. Base relatively uniform. Deepest encountered approx. 41,m AOD.	

Note: Glaciofluvial deposits are shown mapped to the north of Little Eaton Junction but not within the area of proposed earthworks.

Table 5.6 – Little Eaton Summary descriptions of solid strata

Stratum		Summary Description	Approximate Distribution	Approximate Thickness	Significant Features
Middle-Carboniferous	Millstone Grit Group (Morridge Formation)	Dark grey mudstone with beds of pale grey protoquarzitic siltstone and sandstone, and marine bands	Beneath entire works area for Little Eaton Junction.	Not proven in ground investigations. BGS records up to 600m.	Some previous maps identify bedrock in this area as the Bowland Shale Formation. Indicated as Morridge formation on 2014 BGS mapping.

5.4 Hydrogeology and Hydrology

5.4.1 Kingsway Junction

Hydrology

Bramble Brook is present within and immediately to the south of the current Kingsway Junction and within the curtilage of the new junction. Bramble Brook is partly culverted in the area of the junction. Bramble Brook flows in a northerly direction towards the junction, then turning towards an easterly direction. The Environment Agency does not monitor the quality of the water within Bramble Brook.

The Environment Agency Flood Map for Planning has not assigned a risk of flooding associated with the Bramble Brook within the area of the junction. A Flood Zone classification is given for the brook as it flows parallel with Cheviot Street, east of the site which his classed as both a flood zone 2 and 3. A Flood Zone 2 refers to land having medium probability of flooding (land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding). A Flood Zone 3 refers to land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%),

Hydrogeology

The superficial deposit underlying the Kingsway Junction is classified by the Environment Agency as a Secondary 'A' aquifer. The bedrock deposits underlying the site are classified by the Environment Agency as Secondary 'B' aquifer (Mercia Mudstone Group – Mudstone) and as a Secondary Undifferentiated aquifer (Mercia Mudstone Group – Siltstone, Dolomitic).

The past borehole records did not clearly indicate a standing water level, but the logs do comment on the soft and moist nature of the top 6 ft (approx. 2m) of soil.

Groundwater monitoring has been undertaken once-monthly between November 2016 and October 2017 (note: no readings were taken in May or June 2017). Table 5.7 shows the monitored groundwater levels within the Made Ground and natural strata.

Table 5.7– Kingsway Junction Monitored groundwater Levels (2016/2017)

Exploratory Hole Location	Average Monitored Groundwater Depth (m BGL)	Average Monitored Groundwater Level (m AOD)	Strata Screened
BK03S	4.84	69.93	Made Ground - Historic landfills (varied waste)
BK10	3.88	68.45	Made Ground - Historic landfills (varied waste)
BK12	7.43	65.22	Made Ground - Historic landfills (varied waste)
BK13	7.08	65.18	Made Ground - Historic landfills (varied waste)
BK14	6.66	65.91	Made Ground - Historic landfills (varied waste)
BK16(S)	5.08	70.00	Made Ground - Historic landfills (varied waste)
BK05	2.46	67.51	Made Ground / Alluvium
BK01	12.31	66.47	Alluvium / Mercia Mudstone

Exploratory Hole Location	Average Monitored Groundwater Depth (m BGL)	Average Monitored Groundwater Level (m AOD)	Strata Screened
BK04	3.23	67.56	Alluvium / Mercia Mudstone
BK02	8.18	66.03	Mercia Mudstone
BK03D	8.70	66.07	Mercia Mudstone
BK09S	6.30	73.63	Mercia Mudstone
BK09D	8.32	64.61	Mercia Mudstone
BK11	2.64	70.54	Mercia Mudstone
BK15	8.54	65.35	Mercia Mudstone
BK16(D)	7.43	67.64	Mercia Mudstone

Note: for dual installations, (S) = Shallow, (D) = Deep.

The groundwater monitoring data from exploratory hole locations screened within the Made Ground (landfill material), adjacent to the location of Sainsbury's Supermarket, indicates a range of average groundwater levels of 3.88 – 7.43 mBGL (70.00 - 65.18 mAOD) within the Made Ground. The average groundwater levels within the Mercia Mudstone in the area of the Kingsway Junction range between 2.64 and 13.31 mBGL (70.54 and 65.35m AOD). Variation in groundwater level within the monitoring installations has been approximately 1 m on average across the Kingsway Junction area.

5.4.2 Markeaton Junction

Hydrology

Markeaton Lake is located (circa 125 m) to the north of the Junction, on the western side of the A38. A water body, which may be a part of Markeaton Lake, is also present on the eastern side of the A38.

The Environment Agency Flood Map for Planning has not assigned a risk of flooding to the junction. However, the land to the north of the junction is designated as a Flood Zone 2. The area of Markeaton Lake and the water body on the eastern side of the A38 are classed by the Environment Agency as Flood Zone 3. A flood zone 2 refers to land having a medium probability of flooding (land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding). A Flood Zone 3 refers to land assessed as having a high probability of flooding (1 in 100 or greater annual probability of river flooding (>1%)). Other unnamed surface water courses are present further to the north of the junction.

Hydrogeology

The superficial Alluvial deposit at the Markeaton Junction is classified by the Environment Agency as a Secondary A aquifer. The Mercia Mudstone underlying the site is classified by the Environment Agency as a Secondary B aquifer (Mercia Mudstone Group – Mudstone) and as a Secondary Undifferentiated aquifer (Mercia Mudstone Group – Siltstone, Dolomitic).

The Groundwater Vulnerability Zones Map indicates that the Markeaton Junction is located at the junction between an area of a high-vulnerability (to the east) and an area of intermediate-vulnerability (to the north). The area of high vulnerability refers to the Alluvium, while the area of intermediate vulnerability is associated with the River Terrace Deposits.

Past borehole records indicated the groundwater level to be present between approximately 2.5m and 6.0m below existing ground level in the vicinity of the junction at the time of the investigations.

Groundwater monitoring has been undertaken once-monthly between November 2016 and February 2018 (note: readings are ongoing on a monthly basis until April 2018, but no readings were taken in May or June 2017). Table 5.8 shows the monitored groundwater levels within the Alluvium and Mercia Mudstone.

Table 5.8– Markeaton Junction monitored groundwater levels (2016/2018)

Exploratory Hole Location	Average Monitored Groundwater Level m (BGL)	Average Monitored Groundwater Level m (AOD)	Strata Screened
BM07	6.31	60.53	Alluvium
BM12	2.15	57.58	Alluvium
BM14	1.66	57.29	Alluvium
BM15	1.09	57.29	Alluvium
BM16	1.17	56.51	Alluvium / Mercia Mudstone
BM02	10.44	66.50	Alluvium / Mercia Mudstone
BM04	7.73	59.18	Alluvium / Mercia Mudstone
BM05	3.89	66.83	Alluvium / Mercia Mudstone
BM06A	7.67	58.47	Alluvium / Mercia Mudstone
BM08	4.53	58.92	Mercia Mudstone
BM09	4.33	60.03	Mercia Mudstone
BM10	4.24	58.42	Made Ground / Alluvium / Mercia Mudstone
BM11	2.66	59.62	Made Ground / Alluvium / Mercia Mudstone
BM13	2.82	59.03	Alluvium / Mercia Mudstone

The average groundwater level from exploratory hole locations screened within the Alluvium ranged between 1.09 mBGL and 6.31 mBGL (60.53 and 57.29 mAOD). The average groundwater levels within the Mercia Mudstone in the main area of the Markeaton Junction ranged from between 1.17 mBGL and 10.44 mBGL (66.83 – 56.51 mAOD), according to monitoring data. The large variation in groundwater level could be due to changes in land elevation. BM16, which has the shallowest monitored groundwater level within the Mercia Mudstone, has a ground level of approximately 58 mAOD. BM02, which has the deepest monitored groundwater level, has a ground level of approximately 77 mAOD.

Pump Test

Following completion of the main intrusive investigation works a pump test was undertaken within the Mercia Mudstone strata at location BM08 with the purpose of determining hydrogeological parameters such as transmissivity and the degree of connection between skerry bands in the Mercia Mudstone strata. The information is required to inform the design and works for the proposed cutting at Markeaton junction. Data loggers were installed in borehole locations round the vicinity of BM08 for the purpose of monitoring the response of the mudstone to pumping. The boreholes used for monitoring were BM09, BM10, BM11 and BM13. The response zone at the pumped borehole BM08 was between 16m and 20m BGL within the Mercia Mudstone. The pump test consisted of three tests. These tests included an initial step test, followed by a constant rate discharge test and a subsequent recovery test. Groundwater depth data was recorded before, during and after testing by diver type data loggers installed in the wells, together with manual dipping. The data loggers were left in the boreholes until 23 November 2016 to allow groundwater level recovery information to be recorded.

The step test involved increasing the flow rate of water in increments being pumped out of BM08. The flow rate was increased incrementally after periods of thirty minutes. In total the flow rate was increased five times over a time period of 150 minutes. This is a relatively short duration for a test of this type and was due to the discharge flow rate from BM08 falling significantly at each increment and the groundwater in BM08 not recharging sufficiently to allow further increments of increasing discharge rate. The flow rate was initially set at 0.26 litres per minute. The initial groundwater level was recorded at 4.9m BGL and as the step test progressed the drawdown of groundwater increased as flow rate increased. The final water depth was recorded at 9.4m BGL, the groundwater having been drawn down by 4.52m and only a volume of 80 litres having been pumped.

For the constant rate discharge test a constant flow was maintained through recording the time taken to pump one litre of water, and adjusting the pump power accordingly. This flow rate varied between approximately 30 seconds to 75 seconds. The power was adjusted as necessary to try to keep flow rate constant and the pump was therefore set at an average constant rate discharge test of 1.18 litres per second. At the beginning, the flow rate was highly sensitive to changes on the controller, but as the water level dropped, larger increments were needed. After some time, at full capacity it was clear that the flow rate would continue to decline and it would not be possible to maintain even an approximation of constant discharge and the test was stopped at this point. The initial groundwater level was recorded at 4.9m BGL and as the constant rate discharge test progressed the groundwater level was drawn down by 3.95m, the water level at 8.85m BGL on completion. The constant rate discharge test indicated that even a very low rate of discharge was enough to cause a steep drawdown in groundwater level. This means that there is very limited transmissivity of groundwater within the Mudstone.

The recovery test involved leaving the data loggers in place within the surrounding boreholes (BM09, BM10, BM11 and BM13) so that the water-level (residual drawdown) measurements prior to, during and after the termination of pumping could be recorded. Analysis of the recovery test data enables a comparison of groundwater levels to be made between the location of the pump test and the surrounding boreholes, from which the hydraulic properties and the spatial effects of pumping on the groundwater in the mudstone can be observed.

Figure 5.1 charts the response in groundwater level within BM08 and surrounding boreholes to the pump test undertaken on the 21st November 2016. When the pump test is undertaken the drawdown in groundwater level from 4.9m BGL to 8.27m BGL within BM08 is observed. However, a response / reciprocal drawdown is not recorded within the surrounding boreholes. The lack of a response in the surrounding monitored boreholes indicates that whilst the groundwater within the Mercia Mudstone in BM08 is hydraulically connected with the groundwater in the locations of the other monitoring boreholes, the low permeability and transmissivity of the mudstone restricts the capability of the mudstone to transmit groundwater under a hydraulic gradient. Low permeability and low transmissivity is a function of the low porosity of the mudstone, the lack of open fissures, joints and bedding planes and the restricted connections between fissures joints and bedding planes.

The recovery test data from after the pump test shows that groundwater levels within BM08 recharge to the initial recorded groundwater level after approximately a day. This lag time for such a small volume of water to recharge further indicated the limited transmissivity of the Mercia Mudstone aquifer.

The results of the pump test indicate that there is a limited degree of transmissivity within the Mercia Mudstone, and that BM08 and that lateral hydraulic connection, as represented by the results from the surrounding boreholes, appears to be very limited.

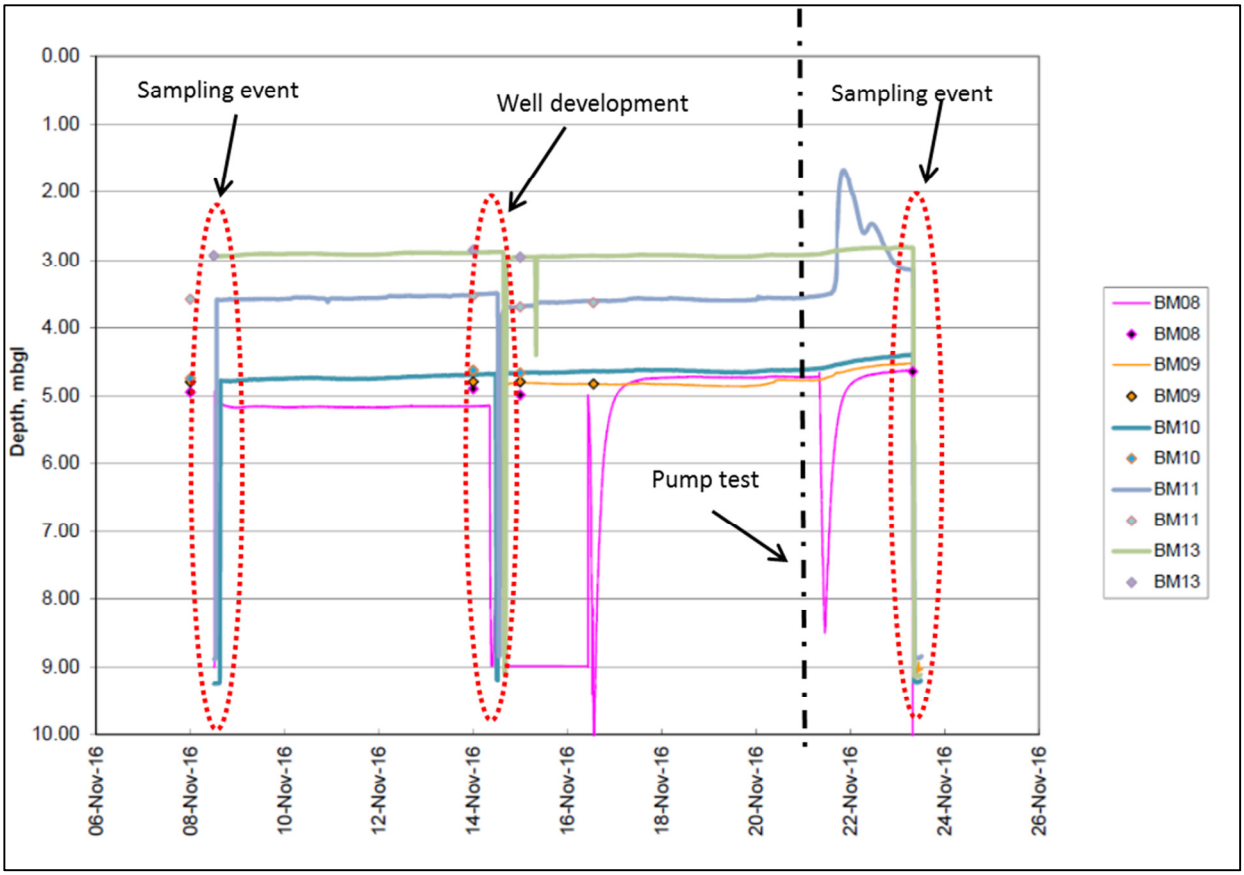
Variable Head Permeability Test

Variable Head Permeability Tests were undertaken on at Markeaton Junction in BM10, a summary of the results are presented in Table 5.9:

Table 5.9– Variable Head Permeability Tests undertaken in BM10 at Markeaton Junction (06 September 2016)

Borehole	Test Number	Type of Test	Differential head at start of test, H_0	Differential head at end of test, H_1	Time elapsed at end of test (mins)	Permeability k (m/s)
BM10	Water Strike	Rising Head	11.60m	2.2m	20	4.8E-05
BM10	1	Rising Head	0.84m	0.06m	10	3.8E-07
BM10	2	Falling Head	4.22m	0.05m	10	1.2E-06

Figure 5.1 Data logger monitored groundwater levels. The red line represents the date of the pump test.



5.4.3 Little Eaton Junction

Hydrology

Dam Brook / Boosemoor Brook flows towards the junction and along the eastern boundary to the current junction, heading in a southerly direction. The river Derwent is located to the east of the junction. However, the eastern section of the A38 crosses the River Derwent. At this location the river is aligned in a north – south orientation. The Envirocheck Report indicates that the Dam Brook is culverted.

The Environment Agency classified the land within the Little Eaton Junction as a Flood Zone 2. Land to the east of the junction encompassing Dam Brook and Boosemoor Brook is also a Flood Zone 2. The areas to the north and the west of the junction associated with the River Derwent are classified as Flood Zone 3. Flood defences are present to the north and the south of the junction along the course of the Derwent.

The water within the River Derwent flows in a southerly direction. The current ecological quality and the 2015 predicted ecological quality of this section of the River Derwent are both classed by the Environment Agency as 'moderate'.

The current chemical quality and the 2015 predicted chemical quality of this section of the River Derwent is classed by the Environment Agency as 'fail'.

Land to the south and east of the junction are indicated on mapping by the Environment Agency to be at low to high risk of flooding.

A flood risk modelling exercise (and a Flood Risk Assessment) has been undertaken by AECOM which identified the need for mitigation flood storage – this has been reviewed by the Environment Agency. At the time of the present report AECOM is continuing with a new round of flood risk modelling to take account of EA comments, scheme design evolutions and increased climate change provisions. Options to reduce the scheme footprint are subject to ongoing consideration.

Hydrogeology

The Environment Agency classifies the bedrock (Morridge Formation - Mudstone, Siltstone and Sandstone) and the superficial Alluvium deposits at the site as Secondary 'A' aquifers. The Environment Agency Groundwater Vulnerability Map (Sheet 23) indicates that the Little Eaton junction is situated on land that classifies the soil as high vulnerability (Class H2 soil), suggesting that the soil has a low attenuation potential for pollutants, and that it drains rapidly. To the west of the junction, the classification alters to that of medium vulnerability (Class I1 soil), indicating that it could possibly transmit a wide range of pollutants.

Past borehole records indicate standing groundwater level ranged between 0.5m and 2.5m below existing ground level at the time of the investigations. However, these boreholes are located some distance from the junction itself.

The current chemical quality of groundwater at this location is classified by the Environment Agency as 'poor (deteriorating)' and the 2015 predicted chemical quality of groundwater at this location is classified as 'poor'.

The majority of the area of Little Eaton Junction overlies Zone III of a Source Protection Zone for a groundwater abstraction well(s). This groundwater abstraction is located within the Millstone Grit Formation to the west of the site. The western end of the Junction overlies the Zone I and II of the same Source Protection Zone.

- Zone I (Inner Zone) – 50 day travel time from any point below the water table to the source;
- Zone II (Outer Zone) – 400 day travel time from a point below the water table;
- Zone III (Total Catchment) – The area around a source within which all groundwater recharge is presumed to be discharged at the source.

Groundwater monitoring was undertaken monthly between November 2016 and October 2017 (note: no readings were taken in May or June 2017). Table 5.10 shows the monitored groundwater levels within the Alluvium and mudstone [Morridge Formation].

Table 5.10– Little Eaton Junction monitored groundwater levels (2016/2017)

Exploratory Hole Location	Average Monitored Groundwater Level m (BGL)	Average Monitored Groundwater Level m (AOD)	Strata Screened
BL02	0.94	48.83	Alluvium
BL03	0.42	48.83	Alluvium
BL05	0.70	48.88	Alluvium
BL08	3.70	49.29	Alluvium
BL10	0.88	49.41	Alluvium
BL11	1.17	50.80	Alluvium
BL07	1.45	49.35	Alluvium
BL05	0.76	48.82	Mudstone (Morridge Formation)

The average groundwater level from exploratory hole locations screened within the Alluvium ranges between 0.42 mBGL and 3.70 mBGL (48.83 and 50.80 mAOD).

5.5 Man-made Features & Historical Development

Man-made features and historical development are summarised in the PSS (Ref 01).

6 GROUND CONDITIONS AND MATERIAL PROPERTIES

6.1 General

6.1.1 The analysis presented in the following chapter is derived from a database of electronic (AGS-format) ground investigation data. The majority of this data, including in-situ laboratory testing results, are sourced from the 2016 Ground Investigation. In addition historic ground investigation data included within the PSS [(Ref 01)], including some in-situ and laboratory testing results, has been utilised to inform the results presented.

6.1.2 It should be noted that not all of the test result data available from the historical investigations listed in the PSS [(Ref 01)] have been uploaded onto the database. The majority of available test result data from historical investigations has been uploaded and has been utilised, particularly when a limited quantity of testing was carried out during the 2016 Ground Investigation

6.2 Made Ground

6.2.1 Kingsway Junction

Made Ground materials recovered during the 2006 GI at Kingsway included material recovered from landfill and embankment fill from the earthworks in the vicinity of Kingsway roundabout.

The made ground encountered was often heterogeneous and we consider that it would be misleading to attempt to classify the materials as discreet units. Appropriate strength and density parameters will be assessed on a location specific basis using available ground investigation data.

6.2.2 Markeaton Junction

Relatively few exploratory holes encountered made ground in the vicinity of Markeaton Junction. Where they are required, appropriate strength and density parameters will be assessed on a location specific basis using available ground investigation data.

6.2.3 Little Eaton Junction

Made Ground materials recovered during the 2006 GI at Little Eaton included material recovered from embankment fill from the embankments on the approach to Little Eaton Roundabout.

The made ground encountered was often heterogeneous and we consider that it would be misleading to attempt to classify it as a single material type. Appropriate strength and density parameters will be assessed on a location specific basis using available ground investigation data.

6.3 Alluvium

6.3.1 Kingsway Junction

Alluvium in the vicinity of Kingsway Junction is mainly confined to the immediate vicinity of Bramble Brook. Exploratory holes directly investigating the alluvium are limited in number and parameters will be assessed on a location specific basis.

6.3.2 Markeaton Junction

Alluvium is mainly found to the north of Markeaton Junction, outside the area of proposed works. If required, parameters will be assessed on a location specific basis.

6.3.3 Little Eaton Junction

Two distinct types of Alluvium are consistently encountered over the floodplain at Little Eaton:

- Alluvium (Predominantly silt and clay), overlying
- Alluvium (Predominantly sand and gravel).

Parameter ranges for the Alluvium are given in Tables 6.1 and 6.2. Given the variability encountered during the ground investigation, the parameters to be used for design will be assessed on a location-specific basis.

Table 6.1 – Unfactored Material Parameter Range: Alluvium (Predominantly Silt and Clay)

Parameter	Range encountered	Remarks
Bulk Density (kN/m^3)	17 - 19	Based on test data and typical published values for material described. See Appendix A chart L-ALC2.
SPT'N' (No.)	6-38	Material is relatively heterogeneous. No clear relationship with depth. Design to be based on inspection of local data. See Appendix A charts L-AL-C6 and L-AL-C7.
Undrained cohesion c_u (kN/m^2)	20 - 80	Material is relatively heterogeneous. No clear relationship with depth. Design to be based on inspection of local data.
Effective cohesion c' (kN/m2)	0	Conservative base value.
Effective angle of friction phi' (degrees)	20 - 30	Wide range of PI values encountered in material indicates no general parameters should be assigned and localised assessment will be necessary. See Appendix A Charts L-AL-C1 and L-AL-C3.
Coefficient of Compressibility, m_v (m^2/MN)	0.1 – 0.6	Based on test data (range across all load increments, loading only).
BRE-SD1 / ACEC Class	DS-5 / AC-5* (1) DS-1 / AC-1 (2) DS-4 / AC-4 (23)	Kingsway Markeaton Little Eaton * The DS and AC classes are based on a single Water Soluble Sulfate test result value (WSS). As a single test this is considered not to be representative, additionally the result is considered to be implausibly high (believed likely erroneous). Furthermore the WSS test result is not in any kind of agreement with the accompanying Acid Soluble Sulfate and Total Potential Sulfate test results (which would yield classes of DS-1 and AC-1). A more realistic but conservative upper range classes for this type of material would be DS-3 and AC-3. (No. of samples in brackets)

Table 6.2 – Unfactored Material Parameter Range: Alluvium (Predominantly Sand and Gravel)

Parameter	Range encountered	Remarks
Bulk Density (kN/m^3)	16 - 18	Based on insitu test data and typical published values for material described.
SPT'N' (No.)	8-45 (0-3m BGL) 11->50 (3-12.5m BGL)	Derived from test results. See Appendix A charts L-AL-S&G2 and L-AL-S&G3.
Effective angle of friction phi' (degrees)	34 - 40	Derived from insitu testing results and soil descriptions. Location specific interpretation likely to be important due to variable composition. See Appendix A charts L-AL-S&G1, L-AL-S&G2 and L-AL-S&G3.
Drained Modulus E' (MPa)	=1*N	See Ref. 15
Undrained Modulus E_u	=1.2*E'	See Ref. 15
BRE-SD1 / ACEC Class	DS-2 / AC-2 (8)	(No. of samples in brackets)

6.4 River Terrace Deposits

6.4.1 Markeaton Junction

River terrace deposits are present in the vicinity of Markeaton Junction, from approximately 100m northeast of the existing roundabout to the beyond the northern extents of the junction area.

Table 6.3 – Unfactored Material Parameter Range : River Terrace Deposits

Parameter	Range encountered	Remarks
Bulk Density (kN/m^3)	16 - 18	Derived from insitu test results. Design to be based on inspection of local data.
SPT'N' (No.)	8 - >50	As encountered by insitu test results. Design to be based on inspection of local data. Refer to Appendix A charts M-RT2 and M-RT3.
Effective angle of friction phi' (degrees)	34 - 40	Derived from insitu testing results and particle size distribution (Refer to Appendix A chart M-RT1, M-RT-2 and M-RT-3) and soil descriptions. Location specific interpretation likely to be important due to variable composition.
Drained Modulus E' (MPa)	=1*N	See Ref. 15
Undrained Modulus E_u	=1.2*E'	See Ref. 15
BRE-SD1 / ACEC Class	DS-1 / AC-1* (4)	* Classes of DS-2 and AC-2 are recommended on the basis of potential weathering of sulfur species across the general site extents as a result of the proposed construction works and transfer of weathering products through permeable strata. (No. of samples in brackets)

6.5 Mercia Mudstone Group

6.5.1 Kingsway Junction

Of the Mercia Mudstone Group the Sidmouth Mudstone Formation and Tarporley Siltstone Formation are both present in the vicinity of Kingsway Junction, as described in Section 5.1. Both are encountered either as a weathered, predominantly clay material and as a relatively unweathered predominantly mudstone material. In either case bands of siltstone or sandstone are present. The weathering profile is somewhat inconsistent with depth and at some locations clay type material can be found beneath mudstone.

Table 6.4 presents parameter ranges for Mercia Mudstone Group mudstone but parameters for design will need to be selected carefully on a location specific basis. Siltstone and sandstone horizons encountered were generally stronger than the mudstone but represent a relatively minor proportion of the material and will be assessed for design on a location-specific basis.

6.5.2 Markeaton Junction

Of the Mercia Mudstone Group the Sidmouth Mudstone Formation and Tarporley Siltstone Formation are both present in the vicinity of Markeaton Junction, as described in Section 5.1. Both are encountered either as a weathered, predominantly clay material and as a relatively unweathered predominantly mudstone material. In either case bands of siltstone or sandstone are present. The weathering profile is somewhat inconsistent with depth and at some locations clay type material can be found beneath mudstone.

Of particular significance to the Mercia Mudstone Group materials at Markeaton is the presence of the fault disturbed zone referred to in section 5.3.2. In this zone, softened and weakened material, or low recovery rates that were observed during drilling, have been encountered to a greater depth than elsewhere in the vicinity of the Markeaton Junction.

Table 6.4 presents parameter ranges for the Mercia Mudstone Group materials but parameters for design will need to be selected carefully on a location specific basis. Siltstone and sandstone horizons encountered were generally stronger than the mudstone but represent a relatively minor proportion of the material and will be assessed for design on a location-specific basis.

Table 6.4 – Unfactored Material Parameter Range: Mercia Mudstone Group (Sidmouth Mudstone and Tarporley Siltstone Formations)

Parameter	Range encountered		Remarks
	Weathered	Unweathered *	
Bulk Density (kN/m^3)	18-21	21 – 25*	Derived from laboratory testing. Refer to Appendix A charts K-MMG2 and M-MMG2
SPT'N' (No.)	3 - >50		No clear relationship with depth. Strength extremely variable, especially in locality of faults. Location specific interpretation likely to be important due to variable strength. Refer to Appendix A charts K-MMG10, K-MMG11, M-MMG9 and M-MMG10
Undrained Cohesion c_u (kN/m^2)	20 - 70 (low strength bands) 120 – 250 (in general)	120-250+*	Damaged membrane during triaxial testing means lowest values may not be reliable. Lowest strength material may not have been recovered for testing. Location specific interpretation likely to be important due to variable strength. Unweathered parameters taken from literature. Low strength material particularly likely in fault / crush zones.
Effective Cohesion c' (kN/m^2)	0-80	≥35*	Values based on literature (Refs. 7 & 16). Location specific interpretation likely to be important due to variability of material.
Critical angle of friction phi' (degrees)	21-30	≥28*	Values from literature (Refs. 7 & 16) and correlation with PI. Location specific interpretation likely to be important due to variability of material. Refer to Appendix A charts K-MMG1, K-MMG3, K-MMG12, M-MMG1, M-MMG3 and M-MMG11.
UCS (MPa)	0.4-31 (0.5-37)	0.5-45*	Derived from laboratory testing. Figures without brackets taken from direct UCS tests. Figures in brackets derived from correlation factor of 32 for Point Load Index tests with UCS (limited sample number does not allow statistically significant correlation of PLI with UCS – values in literature suggest lower correlation factor. Upper unweathered values from published values (Ref 07)). Refer to Appendix A charts K-MMG6, K-MMG7, K-MMG8 and K-MMG9.
Drained Modulus E' (MPa)	=1*N		See Ref. 15
Undrained Modulus E_u	=1.2*E'		See Ref. 15
Shear Modulus, G (MPa)	-	220 - 250	Based on 2 No. insitu pressuremeter tests at 10 – 20 m depth. Shear modulus (G) at yield quoted.
BRE-SD1 / ACEC Class	DS-4 / AC-4 (19) DS-4 / AC-4 (57)		Kingsway Markeaton (No. of samples in brackets)

*Significant thickness of unweathered material not generally encountered. Discreet horizons within the Mercia Mudstone group may approach unweathered values represented.

6.6 Millstone Grit Group

6.6.1 Little Eaton Junction

The bedrock beneath Little Eaton Junction is the Morridge Formation, part of the Millstone Grit Group. This was generally recovered as extremely weak to weak grey mudstone material but was rarely recovered as gravelly clay. The mudstone material was frequently recovered as non-intact and, being on the borderline in behaviour between rock and soil, this limited the number of rock-type laboratory tests that could be undertaken. Notably, although UCS testing was scheduled, no samples were found to be suitable for this test in the laboratory (with point load tests being substituted). As a result no reliable correlation between UCS and point load testing could be established and the values presented below are reliant on published data. Occasional horizons of siltstone and sandstone are present that are of higher strength than the mudstone material.

Table 6.5 presents parameter ranges for the Morridge Formation material.

Table 6.5 – Unfactored Material Parameter Range: Millstone Grit Group (Morridge Formation)

Parameter	Range Encountered		Remarks
	Weathered	Unweathered	
Bulk Density (kN/m^3)	20-24		Derived from laboratory testing and published values.
SPT'N' (No.)	25-50 (5-10mBGL) 40-50 (10-15mBGL) 50+ (15mBGL+)		Typical observed values. Heterogeneity indicates that no general parameters should be assigned and localised assessment will be necessary. Refer to Appendix A chart L-MSGG7
Effective cohesion c' (kN/m^2)	0-2	Up to 22	Values based on literature (Ref. 16). Heterogeneity indicates that no general parameters should be assigned and localised assessment will be necessary.
Critical angle of friction phi' (degrees)	28-30	Up to 30	Value based on literature (Ref.16) and correlation with PI. Heterogeneity indicates that no general parameters should be assigned and localised assessment will be necessary. Refer to Appendix A chart L-MSGG1 and L-MSGG2.
UCS (MPa)	0-3	1-13	UCS testing could not be successfully undertaken due to lack of suitable samples at Little Eaton. UCS estimated from Point Load Index tests using IS_{50} correlation factor of 16 (Ref 07). Heterogeneity indicates that no general parameters should be assigned and localised assessment will be necessary. Refer to Appendix A chart L-MSGG4, L-MSGG5 and L-MSGG6.
Drained Modulus E' (MPa)	=1*N		See Ref. 15
Undrained Modulus E_u	=1.2*E'		See Ref. 15
BRE-SD1 / ACEC Class	DS-5 / AC-5 (17)		(No. of samples in brackets)

6.7 Groundwater/chemistry

6.7.1 Human Health Risk Assessment

The following sections present an evaluation of the risks to human health (e.g. future site users following redevelopment of the site) associated with any potential contamination present within the Made Ground and natural deposits present at the site. This evaluation has been based on the chemical analysis results obtained during the recent ground investigation undertaken at the site, with regard to the commercial/industrial end use. A commercial/industrial end use is considered most appropriate to a highway development.

An initial Tier 1 Risk Assessment was undertaken on the soil sample dataset to

identify whether any of the samples had recorded concentrations of the determinands tested that were elevated in comparison with the corresponding GAC for Commercial/Industrial end-use.

Generic Assessment Criteria (GAC) are defined in CLR11 as:

'criteria derived using largely generic assumptions about the characteristics and behaviour of Sources (S), Pathways (P) and Receptors (R)'.

These generic assumptions are generally conservative based upon a defined range of conditions, the appropriateness of such values to site conditions therefore needs to be fully understood and evaluated.

The hierarchy of soil generic assessment criteria sources for a Commercial/Industrial land use (Sandy Loam, TOC 1.45 – 3.48%) utilised in the analysis is as follows:

- LQM/CIEH Suitable 4 Use Levels (2014). Commercial. Inorganic;
- LQM/CIEH Suitable 4 Use Levels (2014). Commercial. 1.45 – 3.48% SOM;
- EIC/AGS/CL:AIRE GAC. Commercial/Industrial, Sandy Loam, 1.45 – 3.48% SOM;
- AECOM GAC, modified EIC. Commercial/Industrial, Sandy Loam, 1.45 – 3.48% SOM;
- Defra (2014) SP1010: Development of Category 4 Screening Levels for Assessment of Land Contamination - Policy Companion Document, December 2014. Commercial. 1.45 – 3.48% SOM; and
- US Environmental Protection Agency, Risk Screening Levels, June 2015. Industrial (no vapours).

These GAC constitute Tier 1 quantitative risk assessment criteria and are based upon the series of standard default assumptions as to ground conditions, the duration and frequency of exposure of the end-use receptor group as defined in the EA/DEFRA science reports and are based on a sandy loam soil type, with a Soil Organic Matter content of 1.45 – 3.48% and is considered to be a conservative approach for a highway environment.

Possible impacts to construction workers by potential contamination during the works must be covered by the site health and safety plan and procedures that are based on the findings of this human health risk assessment.

Whether material can be re-used during the works will be dependent on the findings of both the human health risk assessment and of the controlled water risk assessment. It will also be dependent on the proposed location that the materials would be re-used.

6.7.1.1 Tier 1 Screening (Soil)

The results of the Tier 1 screening assessment for the soil samples obtained during the ground investigation are presented in Appendix B and the certificates of chemical analysis are presented in the Contractor's Factual Report (Separate Volume – refer to ESGL's Factual Report on Ground Investigation, Report No. A6067-16[Ref.11] / HAGDMS No. 30195).

Kingsway Junction

The results of the Tier 1 Screening of soil samples at the Kingsway Junction did not identify any exceedances of metal, inorganic or organic determinands when compared against the corresponding GAC value. Therefore, it is considered that for the development of the highway, the risk to human health from metal, inorganic and organic determinands is negligible.

Four Trial Pits (TK01, TK02, TK03 and TK04), located at the former landfill, were terminated at depths between 1m and 2m BGL due to suspected asbestos during the investigation. Forty (40) soil samples taken from ground level to a depth of 7.5m BGL were tested for asbestos identification. The samples were taken from the Made Ground across the Kingsway junction. Asbestos was identified in seven (7) exploratory hole locations all within the historical landfill as summarised in Table 6.6, locations of which are presented on Drawing HE514503-ACM-VGT-Z1_ZW_PR_ZZ-DR-GE-0001. No asbestos was identified outside the footprint of the historical landfill.

Table 6.6 – Summary of Asbestos Identified at the Kingsway Junction (Landfill)

Location	Depth (m BGL)	Asbestos Fibre Types Identified
TK01	0.6	Chrysotile (Free Fibres)
TK02	0.5	Amosite (Free Fibres)
TK02	2.0	Crocidolite (Free Fibres)
TK04	0.2	Chrysotile (Free Fibres)
TK04	1.0	Chrysotile (Free Fibres)
TK04	1.9	Amosite, Chrysotile (Free Fibres)
BK10	3.5	Amosite, Chrysotile (Free Fibres / Lagging)
BK12	1.0	Chrysotile (Free Fibres)
BK12	2.5	Amosite, Chrysotile (Lagging)
BK13	6.2	Amosite (Free Fibres)
BK13	7.5	Amosite (Free Fibres)
BK16	0.5	Chrysotile

The exploratory hole logs record materials that appeared to be asbestos containing materials. Where asbestos was either visually recorded on logs or identified in the laboratory, it is likely that the content of asbestos will result in the material being considered as hazardous waste in regards to waste disposal activities.

It is currently estimated that there could be up to approximately 6,000 m^3 of asbestos containing materials requiring excavation, treatment and disposal from the Kingsway Park Close Link Road cutting. Given the presence of asbestos within BH13 at depths greater than the cutting a further allowance of 1,000m^3 may be necessary for any material requiring disposal from the 2m over-excavation. It is considered that these

estimates should be re-assessed at the detailed design stage.

Markeaton Junction

The results of the Tier 1 Screening of soil samples at the Markeaton Junction did not identify any exceedances of metal, inorganic or organic determinands when compared against the corresponding GAC value. Therefore, it is considered that for the development of the highway, the risk to human health from metal, inorganic and organic determinands is negligible.

Nineteen soil samples taken from Made Ground and Natural Strata between ground level to a depth of 3.0m BGL were tested for asbestos identification. Chrysotile (free fibres) was identified in two of the nineteen samples, one from the Made Ground at BM03 (0.5m BGL) located on the land to the south of the Markeaton roundabout and one within the Natural Strata of BM13 (0.5m BGL) located near the miniature railway.

Little Eaton Junction

The results of the Tier 1 Screening of soil samples at the Little Eaton Junction did not identify any exceedances of metal, inorganic or organic determinands when compared against the corresponding GAC value. Therefore, it is considered that for the development of the highway, the risk to human health from metal, inorganic and organic determinands is negligible.

Three soil samples taken from ground level to a depth of 3.0m BGL were tested for asbestos identification. The samples were taken from Topsoil, Made Ground and Natural material across the site. No asbestos was identified in any of the samples analysed at the Little Eaton Junction.

Summary

The risks to human health (i.e. site users) from metals, organics and inorganics are considered to be negligible. Risks in relation to construction and maintenance workers are difficult to fully determine, since such risks will be dependent on the duration that such workers works on a potentially contaminated site and how often. Therefore, risks to construction workers and maintenance workers are dealt with by site health and safety plans and procedures. Asbestos was identified within the landfill, necessary outline mitigation measures are described in section 6.7.5.

6.7.1.2 Controlled Water Risk Assessment

Soil leachate and groundwater monitoring datasets have been evaluated against the following hierarchy of criteria for the drinking water abstraction or groundwater receptors in order to assess potential risks with respect to the Drinking Water Standards (DWS):

- Water, England & Wales - Water Supply (Water Quality) Regulations, 2016 No. 614;
- Guidelines for Drinking-water Quality (4th Edition). World Health Organisation. 2011;
- WHO, Petroleum Products in Drinking-water. Background document for development of WHO Guidelines for Drinking-water Quality WHO/SDE/WSH/05.08/123, 2008;
- Drinking Water Guidelines Calculated using WHO Methodology;
- US Environmental Protection Agency, Regional Screening Levels, May 2016.

Tapwater; and

- Draft health protective concentration from California Environmental Protection Agency (1999) Ethanol in Gasoline.

Soil leachate and groundwater monitoring datasets have been evaluated against the following hierarchy of criteria for the surface watercourse receptor in order to assess potential risks with respect to Environmental Quality Standards (EQS):

- The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 - AA-EQS Inland; MAC-EQS Inland and Freshwater Standards;
- The Water Environment (River Basin Management Planning etc.) (Miscellaneous Amendments) (Scotland) Regulations 2015. Scottish SI 2015 No. 211. AA-EQS Inland and MAC-EQS Inland;
- SEPA - Supporting Guidance (WAT-SG-53) Environmental Quality Standards for Discharges to Surface Waters. v6. Dec 2015. Fresh EQS – AA and Fresh EQS – MAC;
- The Water Framework Directive (Classification, Priority Substances and Shellfish Waters) Regulations (Northern Ireland) 2015. AA-EQS Inland; MAC-EQS Inland and Freshwater Standards;
- European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2015. S.I. No. 386 of 2015. Ireland - AA-EQS Inland and MAC-EQS Inland; and
- PNEC derived for EU REACH registration dossiers - Freshwater

An Initial Tier 1 Risk Assessment was undertaken to compare the soil leachate, groundwater and surface water monitoring datasets from the junctions to the criteria detailed above depending on the identified receptor. The aim of the Tier 1 screening is to identify whether any of the samples had recorded elevated concentrations of metals, inorganic or organic determinands compared to the screening criteria and is considered a conservative approach.

It should be noted that for a risk to be present, a viable pollutant linkage should be identified between the source and receptor.

6.7.1.3 Critical Receptors

Introduction

The critical receptor for Kingsway Junction, Markeaton Junction and Little Eaton Junction is considered to be the surface water ecology of Bramble Brook, Markeaton Brook and the River Derwent. Groundwater is also considered a critical receptor at Little Eaton Junction due to the Scheme being located within a Groundwater Source Protection Zone (SPZ). The critical receptors are described in greater detail in the following sections.

Kingsway Junction

The underlying soil geology of the Mercia Mudstone Group – Mudstone and Tarporley Siltstone Formation – Siltstone, Mudstone and Sandstone is classified by the Environment Agency (EA) as a Secondary 'B' Aquifer. There is no groundwater source protection zone or potable water abstraction within 1km of the Kingsway junction. Therefore, surface water ecology is considered the critical receptor at the junction.

The groundwater monitoring data at the Kingsway Junction indicates that groundwater flows in the northeast direction towards the River Derwent (ca. 2.5 km to the northeast of the junction). However, as a conservative option, the Bramble Brook (located ca. 200m to the east of the Kingsway landfill) has been considered as the main controlled water receptor due to its proximity.

Therefore, soil leachate, groundwater and surface water test results at the Kingsway junction have been compared against the corresponding Environmental Quality Standards (EQS).

Markeaton Junction

The underlying geology at the Markeaton junction is classed by the EA as Secondary 'B' Aquifer. There is no groundwater source protection zone or potable water abstraction within 1km of the junction. Therefore, surface water ecology is considered the critical receptor at the junction.

The main receptor present at the site considered within the controlled waters risk assessment is the Markeaton Lake a surface water body located approximately 400m north-east which is fed by the Markeaton Brook, running approximately northwest to southeast.

Therefore, soil leachate, groundwater and surface water test results at the Markeaton junction have been compared against the corresponding Environmental Quality Standards (EQS).

Little Eaton Junction

The underlying soil geology of Alluvium (Superficial) and the Morridge Formation (Bedrock) are both classified by the Environment Agency as Secondary 'A' Aquifers. The Little Eaton Junction is located within a Total Catchment (Zone 3) groundwater source protection zone (SPZ). The Outer Zone (Zone 2) and Inner Zone (Zone 3) are located to the west of the junction, with the source protection borehole location circa 500m to the north of the junction.

The key hydrological feature in the vicinity of the junction is the River Derwent

located ca. 400m to the west of the junction. The river is abstracted for potable water supply by Severn Trent Water.

Both the groundwater body and the surface water feature are considered as critical receptors, due to the SPZ associated with the groundwater and the potable abstractions from the surface water. Therefore, soil leachate, groundwater and surface water test results at the Kingsway junction have been compared against the corresponding Drinking Water Standards (DWS).

6.7.1.4 Leachate Test Results (Tier 1 Screening)

Kingsway Junction

Soil leachate from forty-two (42) samples from the area of the Kingsway Junction were analysed for metals, inorganic and organic determinands. The following determinands exhibited concentrations above the Tier 1 assessment criteria (EQS): Arsenic, Boron, Cadmium, Chromium (hexavalent), Copper, Iron, Lead, Nickel, Zinc, Cyanide (Total), Naphthalene, Fluoranthene, Benzo(a)pyrene, Benzo(b)fluoranthene and Phenol. Statistical analyses have been undertaken for contaminants detected at elevated concentrations to determine the 95th percentile upper confidence limit (UCL95) of the dataset and the summary is presented Table 6.7.

Table 6.7 – Summary of Exceedances Recorded in Soil Leachates at Kingsway Junction

Determinand	Units	EQS	No. of Exceedances EQS	Recorded Concentrations Range	UCL95	UCL95 > EQS
Arsenic	µg/l	50	1/42	<1 - 73	13.8	No
Boron	µg/l	2000	1/42	<10 -2310	734	No
Cadmium	µg/l	0.08	30/42	<0.1 – 1.4	0.53	Yes
Copper	µg/l	1	42/42	2 - 285	70.9	Yes
Iron	µg/l	1,000	1/42	40 – 2780	663	No
Lead	µg/l	1.2	35/42	<1 - 113	35.3	Yes
Nickel	µg/l	4	17/42	<1 – 105	27.5	Yes
Zinc	µg/l	10.9	40/40	19 – 174	99.7	Yes
Chromium (Hexavalent)	µg/l	3.4	5/42	<10 – 570	85.1	Yes
Cyanide (Total)	µg/l	0.001	5/42	<0.02 – 1.52	0.20	Yes
Naphthalene	µg/l	2	3/33	<0.005-11	2.86	Yes
Fluoranthene	µg/l	0.0063	20/31	<0.022 – 0.342	0.31	Yes
Benzo (a) Pyrene	µg/l	0.00017	6/30	<0.01 – 0.021	0.27	Yes
Benzo(b) fluoranthene	µg/l	0.017	4/30	<0.01 – 0.03	0.28	Yes
Phenol	µg/l	7.7	8/42	<0.5 – 26	17.1	Yes

The statistical assessment indicates the UCL95 for Arsenic, Boron and Iron are lower than the corresponding EQS values. As such it is considered that the risk from these contaminants in soil leachates is negligible. Further assessment will be required to determine the risks from the remaining contaminants in the table.

Markeaton Junction

Soil leachate from twenty-two (22) samples from the area of the Markeaton Junction were analysed for metals, inorganic and organic determinands. The following determinands exhibited concentrations above the Tier 1 assessment criteria (EQS); Cadmium, Copper, Iron, Lead, Nickel, Zinc, Chromium, Cyanide Benzene, Naphthalene, Fluoranthene, Benzo(a)pyrene, Benzo(g,h,i)perylene, Benzo(b)fluoranthene, Benzo(k)fluoranthene and Phenol. Statistical analyses have been undertaken for contaminants detected at elevated concentrations and the summary is presented Table 6.8.

Table 6.8 – Summary of Exceedances Recorded in Soil Leachates at Markeaton Junction

Determinand	Units	EQS	No. of Exceedances EQS	Recorded Concentrations Range	UCL95	UCL95 > EQS
Cadmium	µg/l	0.08	11/22	<1 – 2.3	0.74	Yes
Copper	µg/l	1	21/22	<1 – 62	29.1	Yes
Iron	µg/l	1000	5/22	110 - 2940	1223	Yes
Lead	µg/l	1.2	12/22	<1 - 46	19.0	Yes
Mercury	µg/l	0.07	1/22	<0.1 – 0.1	0.06	No
Nickel	µg/l	4	2/22	<1 - 9	4.00	No
Zinc	µg/l	10.9	15/17	8 – 254	137	Yes
Chromium (Hexavalent)	µg/l	3.4	3/22	<10 – 40	14.9	Yes
Cyanide (Total)	µg/l	0.001	4/22	<0.02 - 4	0.02	Yes
Benzene	µg/l	10	1/15	<1 – 21	8.38	No
Naphthalene	µg/l	2	1/18	<0.02 – 9.81	2.99	Yes
Fluoranthene	µg/l	0.0063	16/18	<0.01 – 0.228	0.11	Yes
Benzo (a) pyrene	µg/l	0.00017	4/18	<0.01 – 0.054	0.024	Yes
Indeno(1,2,3-c,d)pyrene	µg/l	0.00017	4/18	<0.01 – 0.044	0.02	Yes
Benzo (g,h,i) perylene	µg/l	0.0082	5/18	<0.01 – 0.25	0.036	Yes
Benzo (b) fluoranthene	µg/l	0.017	4/18	<0.01 – 0.074	0.035	Yes
Benzo (k) fluoranthene	µg/l	0.017	2/18	<0.01 – 0.027	0.015	No
Phenol	µg/l	7.7	5/22	<0.5 – 31.9	11.4	Yes

The statistical assessment indicates the UCL95 for Mercury, Nickel, Benzene and Benzo(k)fluoranthene are lower than the corresponding EQS values. As such it is considered that the risk from these contaminants in soil leachates is negligible. Further assessment will be required to determine the risks from the remaining contaminants in the table.

Little Eaton Junction

Soil leachate from twenty-five (25) samples, from the area of the Little Eaton

Junction, were analysed for metals, inorganic and organic determinands. The following determinands exhibited concentrations above the Tier 1 assessment criteria (DWS); Cadmium, Iron, Lead, Mercury, Nickel, Selenium, Benzo(a)pyrene and Benzo(b)fluoranthene. Statistical analyses have been undertaken for contaminants detected at elevated concentrations and the summary is presented Table 6.9.

Table 6.9 – Summary of Exceedances Recorded in Soil Leachates at Little Eaton Junction

Determinand	Units	EQS	No. of Exceedances DWS	Recorded Concentrations Range	UCL95	UCL95 > DWS
Cadmium	µg/l	5	1/25	<1 – 151	32.7	Yes
Iron	µg/l	200	19/25	50 – 2290	941	Yes
Lead	µg/l	10	8/25	<1 - 46	19.0	Yes
Mercury	µg/l	0	1/25	<0.1 – 0.2	0.08	No
Nickel	µg/l	20	2/25	<1 – 2,610	562	Yes
Selenium	µg/l	10	2/25	<1 – 122	27.3	Yes
Benzo(a) pyrene	µg/l	0.01	3/16	<0.01 – 0.086	0.5	Yes
Benzo(b) fluoranthene	µg/l	0.1	0/16	<0.01 – 0.102	0.51	Yes

The statistical assessment indicates the UCL95 for Mercury is lower than the corresponding DWS value. As such it is considered that the risk from Mercury in soil leachates is negligible. Further assessment will be required to determine the risks from the remaining contaminants in the table.

6.7.1.5 Groundwater Test Results (Tier 1 Screening)

Kingsway Junction

Groundwater samples were obtained from one Trial Pit (TK17) during the ground investigation period and from seven (7) monitoring wells following the completion of the ground investigation. A total of three (3) groundwater sampling rounds were undertaken between December 2016 and July 2017.

Table 6.10 details the statistical summary of the determinands in groundwater that exhibited exceedances of the Tier 1 Assessment Criteria.

Table 6.10 – Summary of Exceedances Recorded in Groundwater at Kingsway Junction

Determinand	Units	EQS	No. of Exceedances EQS	Recorded Concentrations Range	UCL95	UCL95 > EQS
Boron	µg/l	2000	2/23	24.4 – 3,030	1325	No
Cadmium	µg/l	0.08	2/23	<0.08 – 0.4	0.16	Yes
Copper	µg/l	1	3/23	<0.85 – 6	1.86	Yes
Iron (Total Unfiltered)	µg/l	1000	19/23	<19 – 429,000	161,161	Yes
Lead[1]	µg/l	1.2	1/23	<0.1 – 11	2.67	Yes
Nickel	µg/l	4	11/23	1.08 – 50.3	21.38	Yes
Zinc[1]	µg/l	10.9	2/23	<1.3 - 53	15.14	Yes
Ammoniacal Nitrogen as N	mg/l	0.3	7/16	<0.01 – 56.3	24.77	Yes
>EC5-EC7 Aromatics	µg/l	10	2/22	<10 – 17	9.51	No
Benzene	µg/l	10	3/23	<1 – 24.2	9.27	No
Ethylbenzene	µg/l	20	2/23	<1 – 34	11.38	No
Naphthalene	µg/l	2	5/23	<0.1 – 15.3	6.36	Yes
Anthracene	µg/l	0.1	6/23	<0.015 – 21.8	7.97	Yes
Fluoranthene	µg/l	0.0063	15/23	<0.017 – 65.2	28.84	Yes
Benzo(a)pyrene	µg/l	0.00017	14/23	<0.009 – 78.9	21.87	Yes
Indeno(1,2,3-c,d) pyrene	µg/l	0.00017	13/23	<0.014 – 43.5	12.00	Yes
Benzo(g,h,i) perylene	µg/l	0.0082	13/23	<0.016 – 45.8	12.56	Yes
Benzo(b) fluoranthene	µg/l	0.017	13/23	<0.023 – 89.3	24.44	Yes
Benzo(k)fluoranthene	µg/l	0.017	11/23	0.027 – 35.4	9.62	Yes
2,4 - dichlorophenol	µg/l	4.2	1/23	<0.5 – 4.76	1.31	No
Bis(2-ethylhexyl)phthalate	µg/l	1.3	6/23	<2 – 37.4	15.94	Yes

The review of the test results indicates that the exceedances recorded in

groundwater are primarily within the historic landfill area to the east of the Kingsway Junction. The statistical assessment indicates the UCL95 for Ethylbenzene, 2,4 – dichlorophenol, EC5-EC7 (Aromatics), Benzene and Boron are lower than the corresponding EQS values. As such it is considered that the risk, from these three contaminants in groundwater, is negligible. Further assessment will be required to determine the risks from the remaining contaminants in the table.

Markeaton Junction

Groundwater samples were obtained from two of the monitoring wells (BM05 and BM06A) during the two monitoring rounds undertaken at the Markeaton Junction. The summary of exceedances recorded is presented in Table 6.11. No statistical assessment was undertaken as the dataset for this junction includes less than 5 samples.

Table 6.11 – Summary of Exceedances Recorded in Groundwater at Markeaton Junction

Determinand	Units	EQS	No. of Exceedances EQS	Recorded Concentrations Range
Copper	µg/L	1	1/5	<0.85 – 17
Iron	µg/L	1000	1/5	<19 - 27800
Mercury	µg/l	0.07	1/5	<0.01 – 0.4
Benzene	µg/L	1	1/5	<1 - 11
Chloroform	µg/l	2.5	1/5	<1 – 15
Fluoranthene	µg/L	0.0063	4/5	0.0302 – 0.77
Benzo (a) pyrene	µg/l	0.00017	2/5	<0.009 – 1.05
Benzo (g,h,i) perylene	µg/l	0.0082	2/5	<0.016 – 0.73
Benzo (b) fluoranthene	µg/l	0.017	2/5	<0.023 – 1.26
Benzo (k) fluoranthene	µg/l	0.017	2/5	<0.027 – 0.532

The groundwater analysis results indicate that with the exception of chloroform, all the exceedances recorded in groundwater were also present in the leachate samples, suggesting possible leaching of soil contaminants into the underlying groundwater body. Chloroform was only recorded in BM05 during the first monitoring round, subsequent test results show that the contaminant concentration is below the detection limit of the analysis.

Little Eaton Junction

Groundwater samples were obtained from four Trial Pits (TL02, TL03, TL04 and

TL06) during the ground investigation period and from three (3) monitoring wells (BL02, BL08 and BL10) following the completion of the ground investigation at the Little Eaton junction. A total of three (3) groundwater sampling rounds were undertaken between December 2016 and July 2017.

Table 6.12 details the statistical summary of the determinands in groundwater that exhibited exceedances of the Tier 1 Assessment Criteria (DWS).

Table 6.12 – Summary of Exceedances Recorded in Groundwater at Little Eaton Junction

Determinand	Units	DWS	No. of Exceedances DWS	Recorded Concentrations Range	UCL95	UCL95 > DWS
Cadmium	µg/l	5	1/12	<0.08 – 5.24	2.56	No
Chromium (total)	µg/l	3	2/12	<1 – 136	74.39	Yes
Iron	µg/l	200	12/12	<19 – 440,000	248,733	Yes
Nickel[1]	µg/l	20	2/12	<1 – 37.9	24.6	Yes
Benzo(a) pyrene	µg/l	0.01	5/9	<0.009 – 1.55	0.97	Yes
Indeno(1,2,3-c,d) pyrene	µg/l	0.1	4/7	<0.01 – 0.951	0.60	Yes
Dibenz(a,h)anthracene	µg/l	0.07	1/9	<0.016 – 0.189	0.12	Yes
Benzo(g,h,i)perylene	µg/l	0.1	4/9	<0.01 – 1.06	3.12	Yes
Benzo(b)fluoranthene	µg/l	0.1	4/9	<0.01 – 2.46	1.54	Yes
Benzo(k)fluoranthene	µg/l	0.1	2/9	<0.01 – 1.2	0.75	Yes

The statistical assessment for the groundwater samples from Little Eaton indicates the UCL95 for Cadmium is lower than the corresponding DWS value. As such it is considered that the risk from Cadmium in groundwater is negligible. Further assessment will be required to determine the risks from the remaining contaminants in the table.

6.7.1.6 Surface Water Test Results (Tier 1 Screening)

Kingsway Junction

Surface water samples were obtained at three locations (HK1, HK2, and HK3) from the Bramble Brook at the Kingsway junction, which is shown on Drawing HE514503-ACM-VGT-Z1_ZW_PR_ZZ-DR-GE-0001. A total of three (3) surface water sampling rounds were undertaken between December 2016 and July 2017. Table 6.13 presents the statistical summary of the determinands in surface water that exhibited exceedances of the Tier 1 Assessment Criteria.

Table 6.13 – Summary of Exceedances Recorded in Surface Water at Kingsway Junction

Determinand	Units	EQS	No. of Exceedances EQS	Recorded Concentrations Range
Copper	µg/l	1	4/6	4/6
Iron	µg/l	1000	4/8	4/8
Zinc[1]	µg/l	3000	1/6	1/6
Fluoranthene	µg/l	0.0063	6/8	6/8
Benzo(a)pyrene	µg/l	0.00017	6/8	6/8
Indeno(1,2,3-c,d)pyrene	µg/l	0.00017	5/8	5/8
Benzo(g,h,i)perylene	µg/l	0.0082	5/8	5/8
Benzo(b)fluoranthene	µg/l	0.017	6/8	6/8
Benzo(k)fluoranthene	µg/l	0.017	58	58

Markeaton Junction

Surface water samples were obtained at five locations (HM1 to HM5) from the Markeaton Lake, which is shown on Drawing HE514503-ACM-VGT-Z2_ZW_PR_ZZ-DR-GE-0001. A total of three (3) surface water sampling rounds were undertaken between December 2016 and July 2017. Table 6.14 presents the statistical summary of the determinands in surface water that exhibited exceedances of the Tier 1 Assessment Criteria EQS.

Table 6.14 – Summary of Exceedances Recorded in Surface Water at Markeaton Junction

Determinand	Units	EQS	No. of Exceedances EQS	Recorded Concentrations Range
Copper	µg/l	1	10/14	<0.3 – 4.02
Cadmium	µg/l	0.08	3/14	<0.08 – 0.15
Lead	µg/l	1.2	1/14	<0.1 – 1.63
Zinc	µg/l	10.9	3/14	5.9 – 18.3
Fluoranthene	µg/l	0.0063	12/15	0.017 – 0.0892
Benzo(a)pyrene	µg/l	0.00017	9/15	<0.009 – 0.0618
Benzo(g,h,i)perylene	µg/l	0.0082	8/15	<0.016 – 0.0498
Benzo(b)fluoranthene	µg/l	0.017	2/15	<0.023 – 0.0797
Benzo(k)fluoranthene	µg/l	0.017	1/15	<0.027 – 0.0284

Little Eaton Junction

Surface water samples were obtained at two locations (HL1 and HL2) from the River Derwent, and three locations (HL3 to HL5) from the Boosemoor Brook, which are shown on Drawing HE514503-ACM-VGT-Z1_ZW_PR_ZZ-DR-GE-0001. A total of three (3) surface water sampling rounds were undertaken between December 2016 and July 2017.. Table 6.15 presents the statistical summary of the determinands in surface water that exhibited exceedances of the Tier 1 Assessment Criteria EQS.

Table 6.15 – Summary of Exceedances Recorded in Surface Water at Little Eaton Junction

Determinand	Units	Recorded Concentrations Range	DWS	No. of Exceedances DWS
Iron (total unfiltered)	µg/l	49 - 972	200	10/15
Benzo(a) pyrene	µg/l	<0.009 – 0.0343	0.01	2/15

6.7.1.7 Detailed Quantitative Risk Assessment

Following the Tier 1 risk assessment for controlled waters, elevated concentrations of some metals, PAHs, TPHs and SVOCs which were detected in soil leachates and groundwater samples at the junctions warrant further detailed assessment. The detailed quantitative risk assessment (DQRA) has been undertaken based on the guidance contained within the Environment Agency (2006) Remedial Target Methodology - Hydrogeological Risk Assessment for Land Contamination' (RTM) and

the associated Remedial Targets Worksheet (Release 3.2). The RTM document provides guidance on the method to derive remedial targets from soil, leachate and groundwater data.

For exceedances recorded in soil leachates, 'Level 2 Soil' and 'Level 3 Soil' assessments were undertaken. For exceedances recorded in groundwater 'Level 3 groundwater' assessment was undertaken.

The Level 2 assessment considers whether dilution of contaminants leached from the soil by groundwater flow below the site and attenuation of pollutants within the unsaturated zone are sufficient to reduce contaminant concentrations to acceptable levels.

The Level 3 assessment simulates the migration of contaminants that have already reached the underlying groundwater, taking into account the potential attenuation as the contaminated groundwater moves to the receptor. The assessment does not take into consideration dilution at the receptor.

Kingsway Junction

Exceedances of leachates and groundwater contaminants were recorded at the Kingsway junction when compared with the EQS. As a conservative approach, contaminants detected in soil leachates were assumed to be present in groundwater. Therefore, a level 3 groundwater assessment was undertaken on all elevated contaminants in leachates and groundwater.

Table 6.16 presents a summary of the DQRA results for Kingsway junction. The results summarise the predicted concentrations of the contaminant after the contaminant reaches the receptor. A Remedial Target Value (RTV) is given in Red or Green. Red corresponds to an RTV value less than the maximum concentration recorded in groundwater which indicates that mitigation measures may be required and Green corresponds to an RTV value more than the maximum concentration recorded in groundwater which indicates that mitigation measures are not required.

Table 6.16 – Results of the Detailed Quantitative Risk Assessment (DQRA) Kingsway Junction

Determinand	Target Concentration (EQS) (µg/l)	Maximum concentration recorded in Groundwater (µg/l)[1]	Predicted concentration at receptor (µg/l)[2]	Remedial Target Value (µg/l)[3,4]
Arsenic	50	73	19.3	189
Boron	2000	3030	813	7450
Cadmium	0.08	0.4	0.105	0.303
Chromium VI	3.4	570	148	13.1
Copper	1	6	1.61	3.73
Cyanide	0.001	1.52	0.408	0.0038
Lead	1.2	11	2.32	5.69

Determinand	Target Concentration (EQS) (µg/l)	Maximum concentration recorded in Groundwater (µg/l)[1]	Predicted concentration at receptor (µg/l)[2]	Remedial Target Value (µg/l)[3,4]
Nickel	20	50.3	13.3	75.6
Zinc	10.9	53	14.2	40.6
Ammoniacal Nitrogen	300	56,300	7,320	1,120
Bis(2-ethylhexyl)phthalate	1.3	37.4	<0.000001	>10,000
Ethylbenzene	20	34	<0.000001	>10,000
Naphthalene	2	15.3	<0.000001	>10,000
Anthracene	0.1	21.8	<0.000001	>10,000
Fluoranthene	0.0063	65.2	<0.000001	>10,000
Benzo(a) pyrene	0.00017	78.9	<0.000001	>10,000
Indeno(1,2,3-c,d) pyrene	0.00017	43.5	<0.000001	>10,000
Benzo (g,h,i) perylene	0.0082	45.8	<0.000001	>10,000
Benzo(b) fluoranthene	0.017	89.3	<0.000001	>10,000
Benzo(k) fluoranthene	0.017	35.4	<0.000001	>10,000
Phenol	7.7	26	<0.000001	>10,000

[1] Maximum leachate concentration assumed where there are no groundwater exceedances
[2] Predicated concentration at receptor after contaminant reaches the receptor
[3] xx RTV less than maximum concentration recorded in groundwater
[4] xx RTV greater than maximum concentration recorded in groundwater

The results of the DQRA at Kingsway junction suggest that there will be negligible risks from organic contaminants present in leachate and groundwater to the identified critical receptor (Bramble Brook). However, there remain potential risks to the Brook from the presence of dissolved concentrations of the metals and inorganic determinands identified.

Markeaton Junction

The soil leachates at the Markeaton junction were identified as the main source of contamination to identified controlled water critical receptor (Markeaton Lake). Therefore, a DQRA has been undertaken to determine the potential risks from the contaminants that exceeded the Tier 1 leachate screening criteria.

Table 6.17 presents a summary of the DQRA results for Markeaton junction. A Remedial Target Value (RTV) is given in Red or Green. Red corresponds to an RTV value less than the maximum concentration recorded in groundwater which indicates that mitigation measures may be required and Green corresponds to an RTV value more than the maximum concentration recorded in groundwater which indicates that mitigation measures are not required.

Table 6.17 – Results of the Detailed Quantitative Risk Assessment (DQRA) Markeaton Junction

Determinand	Units	EQS	UCL95	Level 2 RTV	Level 3 RTV
Cadmium	µg/l	0.08	0.74	0.092	0.093
Copper	µg/l	1	29.1	1.14	1.14
Lead	µg/l	1.2	19.0	1.37	1.63
Zinc	µg/l	10.9	137	12.5	12.5
Chromium (Hexavalent)	µg/l	3.4	14.9	3.89	3.98
Cyanide (Total)	µg/l	0.001	0.02	0.0011	0.0011
Naphthalene	µg/l	2	2.99	2.29	1,140
Fluoranthene	µg/l	0.0063	0.11	0.0072	69,300
Benzo (a) pyrene	µg/l	0.00017	0.024	0.0002	84,000
Indeno(1,2,3-c,d)pyrene	µg/l	0.00017	0.02	0.0002	1,210
Benzo (g,h,i) perylene	µg/l	0.0082	0.036	0.0094	>100,000
Benzo (b) fluoranthene	µg/l	0.017	0.035	0.019	>100,000
Benzo (k) fluoranthene	µg/l	0.017	0.015	0.019	>100,000
Phenol	µg/l	7.7	11.4	8.8	221

xx RTV less than UCL 95 soil leachate concentrations recorded in groundwater

xx RTV greater than UCL 95 soil leachate concentrations recorded in groundwater

The results of the DQRA shows that the derived Level 3 Remedial Target Values (RTV) for organic determinands are greater than the UCL95 of their concentrations in soil leachate, indicating negligible risks from these contaminant to the receptor. However, there remains potential risk to the receptor from dissolved concentrations of Copper, Lead, Zinc, Chromium (VI) and Cyanide.

Little Eaton Junction

Exceedances of contaminants in leachate and groundwater were recorded in samples from the Little Eaton junction when compared with the DWS. As a conservative approach, contaminants exceeding the corresponding DWS value in soil leachates were assumed to be present in groundwater. Therefore, a level 3 groundwater assessment was undertaken on all elevated contaminants in leachates and groundwater.

Table 6.18 presents a summary of the DQRA results for Little Eaton junction. The

results summarise the predicted concentrations of the contaminant after the contaminant reaches the receptor. A Remedial Target Value (RTV) is given in Red or Green. Red corresponds to an RTV value less than the maximum concentration recorded in groundwater which indicates that mitigation measures may be required and Green corresponds to an RTV value more than the maximum concentration recorded in groundwater which indicates that mitigation measures are not required.

Table 6.18 – Results of the Detailed Quantitative Risk Assessment (DQRA) Little Eaton Junction

Determinand	Target Concentration (DWS) (µg/l)	Maximum concentration recorded in Groundwater (µg/l)[1]	Predicted concentration at receptor (µg/l)[2]	Remedial Target Value (µg/l)[3,4]
Cadmium	5	151	8.70	86.8
Chromium	3	136	1.26	325
Lead	10	46	<0.000001	>10,000
Nickel	20	37.9	3.70	205
Selenium	10	122	80.7	15.1
Benzo(a) pyrene	0.01	1.55	No impact	No impact
Benzo(b) fluoranthene	0.1	2.46	<0.000001	>10,000
Benzo(g,h,i) perylene	0.1	1.06	No impact	No impact
Benzo(k)fluoranthene	0.1	1.2	No impact	No impact
Dibenz(a,h) anthracene	0.07	0.189	No impact	No impact
Indeno(1,2,3-c,d) pyrene	0.1	0.951	<0.000001	>10,000

[1] Maximum leachate concentration assumed where there are no groundwater exceedances
[2] Predicated concentration at receptor after contaminant reaches the receptor
[3] xx RTV less than maximum concentration recorded in groundwater
[4] xx RTV greater than maximum concentration recorded in groundwater

6.7.1.8 Summary of Controlled Water Risk Assessment

No organic contaminants were identified as potential risk to controlled waters at any of the three junctions.

Soil leachates and groundwater samples from all three A38 Derby junctions were assessed to determine the potential risks to the identified controlled water receptors at each junction. The leachates and groundwater tests results were initially compared with the relevant screening criteria (EQS or DWS). Further risk assessment (DQRA) was undertaken for contaminants recorded at concentrations exceeding the screening criteria.

The results of the DQRA indicate that there are potential risks to controlled waters from Chromium hexavalent, Copper, Cyanide, Lead, Nickel, Zinc and Ammoniacal Nitrogen at the Kingsway junction. At the Markeaton junction, potential risks to controlled waters were identified from Cadmium, Copper, Lead, Zinc, Chromium hexavalent and Cyanide. The DQRA undertaken at the Little Eaton junction indicates there are potential risks to controlled waters from Cadmium and Selenium. The determinands identified at elevated concentrations in leachate and groundwater will be from both made ground and natural materials, with the exception of those determinands identified at the former landfill at Kingsway.

6.7.2 Ground Gas Risk Assessment

The generation or migration of ground gases from natural sources can pose a major hazard to structures, if the gases are able to accumulate within them. In terms of the proposed scheme, the main risks are that ground gases may accumulate within excavations, any enclosed structures or beneath any pavements.

For this study, the borehole gas concentration and flow rate results for carbon dioxide (CO_2) and methane (CH_4) have been compared to guidance values given in the following documents:

- BSI Standards Publication BS 8485:2015 “Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings” (Ref 08); and
- CIRIA Report C665 (2007) “Assessing Risks Posed by Hazardous Ground Gases to Buildings” (Ref 09)

These guidelines have been developed to address ground gas risks to buildings. However, the procedures and methodology used in these standards can be used to assess the risk of gas accumulation within confined spaces during construction work and operation of a highway, where such spaces exist.

6.7.2.1 Ground Gas Monitoring Results

Kingsway Junction

A total of six boreholes within the historical landfill were monitored for ground gas on six (6) occasions between the 17th November 2016 and the 6th July 2017 and two rounds of gas monitoring was undertaken on four (4) boreholes outside of the historic landfill in December 2016 and July 2017. Gas measurements were made for carbon dioxide (CO_2), methane (CH_4), oxygen (O_2), carbon monoxide (CO), hydrogen sulphide (H_2S) and flow rate. Both boreholes were screened in the Made Ground and Natural material within the historical landfill and within the Natural material in other locations.

Table 6.19 presents a summary of the results from within the historic landfill and outside the historic landfill at the Kingsway junction.

Table 6.19 – Summary of Recorded Maximum Gas Concentrations and Flow Rates at Kingsway Junction

Borehole	Peak Gas Readings					
	Max CH_4 (% v/v)	**Max CO_2 (% v/v)**	**Min O_2 (% v/v)**	**Max CO (ppm)**	**Max H_2S (ppm)**	**Flow Rate (l/hr)**
Within the historic landfill area						
BK10	26.4	13.2	0.3	1	42	0.8
BK12	1.6	11.7	0.2	2	<1	0.5
BK13	14.8	4.1	0.9	9	<1	3.7
BK14	51.4	5.4	<0.1	18	272	0.8
BK15	4.0	6	17.5	53	<1	1.4
BK16	10.5	19.9	<0.1	1	<1	0.2
Outside the historic landfill area						
BK03	0.1	2.9	2.1	2.0	<1	<0.1
BK04	<0.1	0.7	20.5	<1	<1	0.1
BK09	<0.1	0.5	20.4	<1	<1	<0.1
BK11	0.1	3.7	8.6	<1	<1	<0.1

The monitoring wells within the landfill exhibited peak concentrations of methane ranging between 1.6% v/v and 51.4% v/v and carbon dioxide, between 3.4% v/v and 19.9% v/v. Oxygen concentrations are also depleted, recording values of between <0.1% to 17.8% v/v. Hydrogen sulphide was recorded above the equipment detection limit in two boreholes (BK10 and BK14) with a maximum concentration of 272 ppm recorded at BK14 during the third monitoring round. The maximum carbon

monoxide concentration of 53ppm was recorded at BK15 during the fourth monitoring round. Gas flow rates ranged between 0.2 l/hr and 3.7 l/hr.

The boreholes located outside of the historical landfill did not exhibit elevated levels of methane; with a peak concentration of 0.1% v/v. Carbon dioxide was detected in all four boreholes with concentrations between 0.5% to 2.9%v/v. BK03 and BK11 exhibited depleted oxygen concentrations of 2.1% v/v and 14.0% v/v respectively. Gas flow rates ranged between <0.1 l/hr and 0.1 l/hr.

Markeaton Junction

A total of three boreholes at the Markeaton junction were monitored for ground gas on three (3) occasions between the December 2016 and July 2017. Table 6.20 presents a summary of the gas monitoring results at the junction.

Table 6.20 – Summary of Recorded Maximum Gas Concentrations and Flow Rates at Markeaton Junction

Borehole	Peak Gas Readings					
	Max CH_4 (% v/v)	Max CO_2 (% v/v)	Min O_2 (% v/v)	Max CO (ppm)	Max H_2S (ppm)	Flow Rate (l/hr)
BM05	0.2	3.2	18.1	<1	<1	0.3
BM06A	0.2	0.8	20.6	<1	<1	0.1
BM07	0.2	0.7	20.3	<1	<1	0.5

None of the monitoring wells exhibited elevated concentrations of methane; with a peak concentration of 0.2% v/v. Carbon dioxide was detected in all four boreholes with concentrations between 0.1% to 3.2% v/v. Oxygen concentrations were near atmospheric values apart from BM05 where slightly depressed values were recorded. Gas flow rates ranged between 0.1 l/hr and 0.5 l/hr.

Little Eaton Junction

A total of three boreholes at the Little Eaton junction were monitored for ground gas on three (3) occasions between the December 2016 and July 2017. Table 6.21 presents a summary of the gas monitoring results at the junction.

Table 6.21 – Summary of Recorded Maximum Gas Concentrations and Flow Rates at Little Eaton Junction

Borehole	Peak Gas Readings					
	Max CH_4 (% v/v)	Max CO_2 (% v/v)	Min O_2 (% v/v)	Max CO (ppm)	Max H_2S (ppm)	Flow Rate (l/hr)
BL02	0.2	2.0	20.2	<1	<1	0.4
BL08	0.2	5.2	4.8	<1	<1	0.2
BL10	0.4	0.4	13.8	3.0	<1	8.2

The boreholes did not exhibit elevated concentrations of methane; with a peak concentration of 0.4% v/v. Carbon dioxide was detected in all four boreholes with concentrations ranging between 0.1% v/v to 5.2% v/v. BL08 and BL10 exhibited depleted oxygen concentrations of 4.8% v/v and 13.8% v/v, respectively. Gas flow rates ranged between 0.2 l/hr and 8.2 l/hr.

6.7.2.2 Classification of Gas Regime

In accordance with guidelines within CIRIA C665 (2007), Gas Screening Values (GSVs) have been calculated to assess the significance of gas generation at the site. This is achieved by multiplying the percentage gas concentration (as a decimal) by the flow rates. A Gas Screening Value has been calculated for each monitoring well location at Kingsway Junction, Markeaton Junction and Little Eaton Junction based on the maximum gas concentration and maximum flow rate recorded in each monitoring well.

Gas screening values (GSV) can be calculated from the gas concentration and the flow rate:

$$GSV\ (l/hr) = \frac{Gas\ concentrataion\ (\%\ v/v)}{100}\ \ x\ \ flow\ rate\ (l/hr)$$

The corresponding Characteristic Situation (CS) for the site is based on comparison of the generated GSVs to the values given in Table 6.22 taken from CIRIA report C665.

Table 6.22 – Classification Scheme for Site Gas Risk Assessment (Modified Wilson and Card Classification)

Characteristic Situation	Risk Classification	Gas Screening Value (CH_4/CO_2) l/hr	Additional Factors	Typical Source of Generation
1	Very Low	<0.07	Typically CH4 <1% and CO2 <5%. Otherwise consider increase to CS2.	Natural Soil with low organic content. "Typical" Made Ground.
2	Low	<0.7	Borehole air flow rate not to exceed 70l/hr. Otherwise consider increase to CS3.	Natural Soil with high peat/organic content. "Typical" Made Ground.
3	Moderate	<3.5	-	Old landfill Inert waste Mineworking (flooded)
4	Moderate to High	<15	Quantitative Risk Assessment required to evaluate scope of protective measures.	Mineworking susceptible to flooding Completed Landfill (WMP 26b criteria)
5	High	<70	-	Mineworking unflooded inactive with shallow workings near the surface.
6	Very High	>70	-	Recent Landfill site

Source: Table reproduced from CIRIA Report C665

The initial approach in the assessment is to use the worst case scenario by determining the Gas Screening Value (GSV) based on the maximum methane / carbon dioxide concentration and maximum flow rate recorded across the site over the monitoring period. Table 6.23 presents the most conservative GSV and characteristic situation at each of the junctions.

Table 6.23 – Summary of Gas Regime based on Overall Peak Readings

Location	Peak Gas Readings			Gas Screening Values		Characteristic Situation
	Max CH_4 (% v/v)	Max CO_2 (% v/v)	Flow Rate (l/hr)	Max CH_4 (l/hr)	Max CO_2 (l/hr)	
Kingsway (within the landfill)	51.4	19.9	3.7	1.9018	0.7363	3
Kingsway (outside the landfill)	0.1	2.9	0.1	0.0001	0.0029	1
Markeaton	0.2	3.2	0.5	0.001	0.016	1
Little Eaton	0.4	5.2	8.2	0.0328	0.426	2

6.7.3 Oxygen

Table 6.24 summarises the physiological effects of an oxygen deficient atmosphere.

Table 6.24 – Effect of Reduced Oxygen Concentrations (CIRIA Report 149)

Oxygen Concentration (%v/v)	Physiological Effects
19 – 21	Normal range of concentration in the atmosphere
17	Faster, deeper breathing, slight impairment of judgement.
10-16	Initial signs of anoxia leading to emotional upsets; abnormal fatigue upon exertion.
6-10	Nausea, vomiting, unconsciousness; collapse may occur.
<6	Convulsions, gasping respiration, death.

Based on the oxygen data recorded at the junctions, it is concluded that there is potential risk to construction workers entering excavations or other enclosed spaces at the Kingsway (landfill area) and the Little Eaton junctions.

6.7.3.1 Methane

The greatest hazards posed by methane are those of fire and explosion. The limits of flammability, i.e. the Lower Explosion Limit (LEL) and Upper Explosion Limit (UEL) are 5% v/v and 15% v/v, respectively. Where methane concentrations are encountered between these two ranges there is the possibility of ignition/explosion. However, concentrations above this should not necessarily be considered safe, because on dilution with air the composition may fall within this flammable range.

The level of toxicity from asphyxiation is currently set at 30% (v/v) (8 hour long term Occupational Exposure Limit OEL). Ventilation in confined spaces is required at concentrations greater than 0.25% (v/v).

Kingsway Junction

Methane concentrations were recorded across the Kingsway junction in the range of <0.1% v/v to 51.4% v/v within the historical landfill and <0.1% v/v outside of the historical landfill. Therefore, within the historical landfill area, there is risk of explosion or asphyxiation due to methane for construction workers working in confined spaces and excavations.

Markeaton Junction

Concentrations of methane were not detected at elevated concentration at Markeaton junction with a maximum of 0.2% v/v recorded. Therefore, the risk from methane is considered to be low. However, ventilation should be provided in confined spaces as the recorded concentration was close to 0.25% v/v.

Little Eaton Junction

The maximum methane concentration (0.4% v/v) recorded at the Little Eaton junction was significantly less than the both the lower explosion limit and the occupational exposure limit. Therefore it is considered that there is low risk from methane to construction workers working in confined spaces and excavations at the junction. However, ventilation should be provided in confined spaces as the recorded concentration was above 0.25% v/v.

6.7.3.2 Carbon Dioxide

For carbon dioxide there is no risk of flammability. However, there is a risk of asphyxiation and as such there are toxicity limits of 0.5% (v/v) for an 8 hour long term Occupational Exposure Limit (OEL) and 1.5% (v/v) for a 10 minute Occupational Exposure Limit (OEL).

Kingsway Junction

Concentrations of carbon dioxide were reported in the range of <<0.01% to 19.9% v/v in the wells in the area of the historical landfill. Concentrations outside of the historical landfill ranged from 0.3% to 2.9% v/v. The concentrations of carbon dioxide recorded both outside and inside of the historic landfill area were sufficient to exceed the 8 hour long term OEL and 10 minute OEL. Therefore, it is concluded that there may be a risk to construction workers entering confined spaces across the area of the Kingsway Junction from carbon dioxide.

Markeaton Junction

Concentrations of carbon dioxide were reported in the range of <0.1 % to 2.2 % v/v during monitoring round. The concentrations of carbon dioxide recorded were sufficient to exceed the 8 hour long term OEL and 15 minute OEL. Therefore, it is concluded that there may be a risk to construction workers entering confined spaces across the area of the Markeaton Junction from carbon dioxide.

Little Eaton Junction

Concentrations of carbon dioxide were reported in the range of 0.1% to 5.2% v/v during monitoring in the wells across the site. The concentration of carbon dioxide recorded at the site is sufficient to exceed the 8 hour long term OEL and 10 minute OEL. Therefore, it is concluded that there may be a risk to construction workers entering confined spaces across the area of the Little Eaton Junction from carbon

dioxide.

6.7.3.3 Carbon Monoxide

A long term (8 hour) workplace exposure limit of 30ppm and a short term (15 minute) workplace exposure limit of 200ppm are given for carbon monoxide.

Kingsway Junction

The boreholes within the historic landfill area recorded concentrations of between 1.0ppm to 53.0ppm, the highest recorded concentrations were identified in BK14 and BK15. Therefore, the concentrations of carbon dioxide recorded within the historic landfill area were sufficient to exceed the 8 hour long term OEL.

The boreholes located outside of the historic landfill area did not record concentrations of carbon monoxide above the instrument detection limit of 1ppm. Therefore, risk due to short term or prolonged exposure to carbon monoxide is considered not to be present outside of the historic landfill area.

Markeaton Junction

None of the boreholes recorded concentrations of carbon monoxide above the detection limit of 1ppm. Therefore, it is considered there is a negligible risk from carbon monoxide.

Little Eaton Junction

Carbon monoxide was recorded above the equipment detection limit up to a maximum of 3ppm at one location during the monitoring. This concentration is significantly lower than both the short term and long term exposure limits. Therefore, it is considered there is a low risk from carbon monoxide.

Hydrogen Sulphide

A long term (8 hour) workplace exposure limit of 5ppm and a short term (15 minute) workplace exposure limit of 10ppm are given for hydrogen sulphide.

Kingsway Junction

Hydrogen sulphide was present at concentrations between <1ppm in all boreholes within the historic landfill, apart from BK14 which recorded a maximum concentration of 272ppm. Therefore, the concentrations of hydrogen sulphide recorded within the historical landfill were sufficient to exceed both the 8 hour long term and 15 minute short term OEL.

The boreholes located outside of the historic landfill area did not record concentrations of hydrogen sulphide above the instrument detection limit of 1ppm. Therefore, risk due to short term or prolonged exposure to hydrogen sulphide is considered not to be present outside of the historic landfill.

Markeaton Junction

Concentrations of hydrogen sulphide were not recorded above the limit of detection of 1ppm. Therefore, risk due to short term or prolonged exposure to hydrogen sulphide is considered not to be present.

Little Eaton Junction

Concentrations of hydrogen sulphide were not recorded above the limit of detection

of 1ppm. Therefore, risk due to short term or prolonged exposure to hydrogen sulphide is considered not to be present.

6.7.3.4 Ground Gas Risk Mitigation Measures

The risks from accumulations of ground gas are considered to be during the construction and maintenance phases. There is considered not to be a significant risk from ground gas during the operation phase as ground gas accumulation is only considered a risk in confined/enclosed spaces.

However, a cutting will be taken through the former landfill at Kingsway which will require the removal of part of the source of the ground gas. Mitigation measures will be required to address migration of ground gases into the cutting and diversion of ground gases towards other receptors.

During the construction phase, restricted access to confined spaces and excavations should be implemented. Where work in confined spaces is unavoidable, a site-specific and task-specific risk assessment should be undertaken prior to the commencement of the works. Monitoring of confined spaces for potential ground gas accumulations should be undertaken and the works should be undertaken by suitably trained personnel with the use of specialist PPE where necessary.

Maintenance workers that are required to undertake excavations during the operational life of the scheme will be provided with sufficient information on the nature of each sub area at the site, upon which to base site and task specific risk assessments. Such work will also include measures as detailed in the construction phase to minimise the effects of the work to human health.

6.7.4 Geo-environmental Conclusions

Following the completion of the ground investigation at the A38 Kingsway, Markeaton and Little Eaton junctions, the test results and monitoring data have been assessed. The following conclusions have been made based on the assessment undertaken with respect to geo-environmental issues:

- Asbestos contamination was identified within the landfill area at Kingsway junction. A few fibres of asbestos were also identified at the Markeaton junction and none was detected at Little Eaton. If disturbed, asbestos could pose significant risk to human receptors especially construction workers and visitors at the site. Therefore, works within the landfill area at Kingsway will be subjected to Control of Asbestos Regulations (CAR 2012) and are likely to be licensed work.
- Removal of material will be required from the landfill area. At this stage is it considered that there is 6,000 m^3 of asbestos containing materials requiring excavation, treatment and disposal from the Kingsway Park Close Link Road cutting. Given the presence of asbestos within BH13 at depths greater than the cutting a further allowance of 1,000m^3 should be allowed for any material requiring disposal from the 2m over-excavation. It is considered that these estimates should be re-assessed at a more detailed design stage.
- In the context of the proposed scheme, no other risk to human health was identified from the metal, inorganic and organic contaminants identified in the soil samples at the site.

- Base on the assessment results, there are potential risks to controlled water receptors from metals and inorganic contaminants at the junctions. No organic contaminant is considered to present significant risk to controlled waters. Further Detailed Quantitative Risk Assessment will be required to assess the potential risks identified due to metal and inorganic determinands in leachate and groundwater and to determine whether remedial works will be required to mitigate the potential risks.
- The ground gas risk assessment undertaken has identified potential risks construction workers in confined spaces and / or excavations from at least one ground gas or from oxygen depletion at each of the junctions. Therefore, it is recommended that site-specific and task-specific risk assessment should be undertaken prior to the commencement of any works in excavations and confined spaces.
- Mitigation measures will be required for the cutting through the former landfill at Kingsway to contain remaining materials within the former landfill including asbestos containing materials. Mitigation measures are also needed to prevent migration of polluted landfill leachate and ground gas into the area of the cutting.
- Generally, earthworks materials arising from the excavations may be re-used within the within the works. However, this will be subject to re-use acceptability criteria to be derived for the development. Elevated leachate concentrations recorded within materials obtained from all three junctions may pose risks to controlled waters and therefore assessment will be required to determine where such materials may be re-used within the works.
- Waste materials from the former landfill at Kingsway are not suitable for re-use within the works. Clay capping type materials may be re-used subject to passing re-use acceptability criteria.

6.7.5 Outline Mitigation Measures

- If any asbestos contaminated material is encountered during the earthworks, then the requirements of an earthworks/reclamation strategy and health and safety plan will be complied with. Typically such requirements will include segregation and quarantine of the excavated materials until assessment of testing results provide evidence that the material can be re-used within the works or whether the material requires disposal off-site to a permitted landfill site. Material movement records would be checked to determine whether material from the same location has been used within the works before asbestos was identified in the excavated materials and an assessment would be undertaken to determine whether such material would need to be removed and replaced.
- A CEMP would be prepared and implemented by the selected construction contractor. This CEMP will include a range of measures associated with mitigating potential impacts as associated with land contamination as detailed below. Such measures accord with legal compliance and best practice guidance when working with or around contaminated materials.
- Potential impacts specific to construction workers during construction would be mitigated by adherence to the working practices in accordance with CIRIA (2015) C741 Environmental Good Practice on Site. 4th Edition, including:
- measures to minimise dust generation;
- provision of personal protective equipment (PPE), such as gloves, barrier cream, overalls etc. to minimise direct contact with soils;
- provision of adequate hygiene facilities and clean welfare facilities for all construction site workers;
- monitoring of confined spaces for potential ground gas accumulations, restricting access to confined spaces i.e. by suitably trained personnel, and use of specialist PPE, where necessary; and
- preparation and adoption of a site and task specific health and safety plan.
- The mitigation measures would aim to ensure that the surface water run-off from the construction site (site preparation, earthworks and construction activities) do not have a detrimental effect on any receiving watercourses (e.g. Bramble Brook). Mitigation measures would also aim to ensure that surface water run-off does not have a detrimental effect on the underlying Secondary ‘A’ and ‘B’ Aquifers. Surface water run-off would be controlled using appropriate drainage measures and infiltration into the ground would be minimised. This would minimise the potential for contaminants to migrate to controlled waters.
- Materials used to construct the proposed scheme would be designed and specified taking due account of the potential for aggressive ground conditions. The assessment methodology set out in Building Research Establishment Special Digest 1 (2005) would be adopted to determine the appropriate concrete classification in relation to the protection of buried concrete against sulphate attack.
- The potential impacts on off-site receptors would be addressed through the adoption of the following measures:
  - damping of ground with water to minimise dust;

- sheeting of lorries transporting spoil off site and the use of dust suppression equipment on plant;
- groundwater level controls (as required);
- adequate fuel / chemical storage facilities e.g. bunded tanks, hard standing and associated emergency response/ spillage control procedures;
- well maintained plant and associated emergency response/ spillage control procedures; and
- any temporary onsite storage of contaminated material would be stored on sheeting and covered to minimise the potential for leachate and run off from the stockpile being generated.

7 GEOTECHNICAL RISK REGISTER

7.1 General

The geotechnical risk register is provided in Table 7.1. The risk register lists geotechnical risks to the project which have been identified during preliminary assessment. Possible consequences of the risks are outlined in the register, together with proposed risk mitigation measures to be taken as the project develops.

Table 7.1 – Geotechnical Risk Register

	Hazard / Risk (Principal location given in brackets)	**Consequence**	**Control**
1	**Ground Conditions:**		
1.1	Soft / compressible ground. Embankment on alluvial material and historic route of Derby Canal (Kingsway and Abbey Hill).	Short-term instability of earthwork. Potentially large total settlement / differential settlement of embankment and adjacent construction / structures. Possible distortion of services beneath embankment.	Geotechnical design to consider local conditions recorded during GI. Ground treatment, construction monitoring, surcharging and pause periods potentially required.
1.2	Soft ground. Cutting (Kingsway).	Local or global slope failure, excavated material potentially unsuitable for re-use as fill material.	Geotechnical design to consider local conditions. Slope stability remedial solutions potentially required.
1.3	Soft / compressible ground. Structures (Kingsway and Markeaton).	Founding stratum does not meet strength requirements. Increased foundation size / depth required.	Geotechnical design to consider local conditions recorded during GI.
1.4	Depth to suitable bearing stratum for structure foundations greater than anticipated.	Deeper foundations required, possibly with mobilisation of alternative plant.	Geotechnical design to consider local conditions recorded during GI.
1.5	Rockhead / hard strata encountered at shallower depth than anticipated.	Interception of hard strata during excavation / structure piled foundation construction. Excavation / construction progress reduced. Inappropriate plant on site to carry out excavation.	Geotechnical design to consider local conditions recorded during GI. Communicate residual hazard of hard strata horizons on construction drawings.
1.6	Fault disturbed ground. (Kingsway and Markeaton)	Broken ground, softened and disturbed material leading to preferential instability.	Geotechnical design to consider local conditions recorded during GI. Communicate residual hazard of fault-disturbed ground on construction drawings Observation during construction and treatment of material.
1.7	Soft / unsuitable material at pavement formation level.	Short-term trafficability problems. Increased construction thickness required.	Allowance for excavate and replace / treatment. Design to accommodate observed thicknesses.
1.8	Potential risk of long-term ground heaving due to the deep cutting into Mercia Mudstone (overconsolidated) on the new road formation.	Potential serviceability problem affecting base slab and road construction.	Risk considered negligible in general due to low swelling potential of Mercia Mudstone. Detailed design to consider and account for whether localised features (e.g. minerals prone to volume change) may present higher risk.

2	**Groundwater Conditions:**		
2.1	Shallow groundwater levels. Cutting and structure (Markeaton).	Groundwater ingress into cutting and deformation / uplift of structure / road pavement due to groundwater pressure.	Geotechnical design to account for groundwater observed during GI and pre-construction monitoring. Drainage measures and construction monitoring. Very shallow or artesian groundwater to be communicated as residual hazard on construction drawings.
2.2	Shallow groundwater levels (embankment and structures within River Derwent floodplain).	Short-term instability during construction due to excess pore water pressure.	
2.3	Artesian groundwater (Kingsway and Little Eaton)	Difficulty in controlling water during construction. Deformation / uplift of structures or road pavement.	

3	**Contamination:**		
3.1	Contaminated material. Former Landfill site (Little Eaton).	Extent of site greater than anticipated or liner breached and waste / leachate extends to within Scheme corridor.	Geotechnical design to account for conditions encountered. Remediation of contaminated material potentially required (e.g. in-situ treatment or removal). Volume of material
3.2	Contaminated material. Filling station (Markeaton).	Contamination of adjacent soil and groundwater from previous leakages.	
3.3	Contaminated material. Historic route of Derby Canal (Little Eaton).	Contaminated ground from previous spillage / dumping of material within Scheme corridor.	
3.4	Contaminated material. Former Landfill (Kingsway)	Former landfill is within the curtilage of the road scheme. Landfilled materials are contaminated, including the presence of asbestos.	
3.5	Potential contaminants present in groundwater	Works may cause migration of potential contaminants towards sensitive water receptors.	Geotechnical design to account for conditions encountered. Remediation of groundwater potentially required (e.g. in-situ treatment or removal). Where dewatering of excavations is required, the incidental water may require treatment before disposal/discharge/
3.6	Contaminated material. Markeaton.	Contaminated ground in two exploratory holes within Markeaton Park.	Assess whether ground needs to be disturbed. Plan for appropriate site controls and disposal

4	**Ground Chemistry:**		
4.1	Ground chemistry / solution features.	Ground conditions aggressive to concrete and steel products. Pavement heave. Voids / softened material leading to collapse / increased settlement of earthworks and structures.	Geotechnical design to account for conditions encountered.

5	**Re-Use of Material:**		
5.1	Proportions of acceptable / unacceptable material from cuttings different to predicted.	Shortfall in acceptable material and consequent increase in off-site disposal / import.	Material re-use to be assessed on a location and use specific basis. Additional testing may be necessary to confirm suitability of materials for re-use.
5.2	Presence of Made Ground, including old road surface and foundry sand (Kingsway).	Old road surface material may not be acceptable for re-use.	Material re-use to be assessed on a location and use specific basis. Additional testing may be necessary to confirm suitability of materials for re-use.
5.3	Made Ground material at former landfill (Kingsway)	Landfill material excavated in area of cutting unsuitable for re-use.	Material re-use to be assessed on a location and use specific basis. Additional testing may be necessary to confirm suitability of materials for re-use.

6	**Site Conditions:**		
6.1	Flooding adjacent to earthwork. River Derwent floodplain.	Short-term trafficability problems and construction works flooding. Embankment instability following flood event. Erosion, swelling and collapse settlement of embankment fill.	Provide appropriate design features. Surface / scour protection, selection of appropriate fill and reduced slope gradients.
6.2	Existing earthwork defects.	Earthwork instability during construction and more robust design required for new earthworks.	Review earthwork defect information during design. Pre-condition survey / asset inspection (with enabling works such as vegetation clearance). Geotechnical design to account for conditions encountered.
6.3	Existing structure foundations.	Interception of existing foundation during foundation excavation / installation and cutting excavation.	Review applicable as-built information during design and undertake investigations if necessary.
6.4	Existing services, in particular those installed after previous studies.	Services require diversion and/or protection.	Review applicable information during design and undertake supplementary ground investigation if requirement is identified (e.g. for trenchless crossings). In locations where unidentified services were suspected or encountered during 2016 GI, consider additional surveys (e.g. GPR with targeted inspection pits) to better identify service locations
6.5	Potential ground instability during construction works	Potential effect of excavation works during construction on ground stability, affecting highway or adjacent infrastructure.	Temporary works design to account for geotechnical conditions encountered. Assess need for monitoring and / or traffic management during works. Communicate residual ground hazards on construction drawings.
6.6	Potential for Unexploded Ordnance to be disturbed during construction works (Markeaton)	Potential to affect construction works. Potential threat to construction plant and safety risk to construction workers and public.	Utilise existing information on UXO and ground conditions to assess risk. Communicate ‘at risk’ areas as residual hazard. UXO specialist to observe works where risk is identified.

8 REFERENCES

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DRAWINGS

HE514503-ACM-VGT-A38_SW_PR_ZZ-DR-GE-0001

Site Location Plan and Geotechnical Constraints Plan Scheme Key

HE514503-ACM-VGT-Z1_ZW_PR_ZZ-DR-GE-0001

Geotechnical Constraints Plan Kingsway Junction

HE514503-ACM-VGT-Z2_ZW_PR_ZZ-DR-GE-0001

Geotechnical Constraints Plan Markeaton Junction

HE514503-ACM-VGT-Z3_ZW_PR_ZZ-DR-GE-0001

Geotechnical Constraints Plan Little Eaton Junction

HE514503-ACM-VGT-Z1_ZW_PR_ZZ-DR-GE-0002

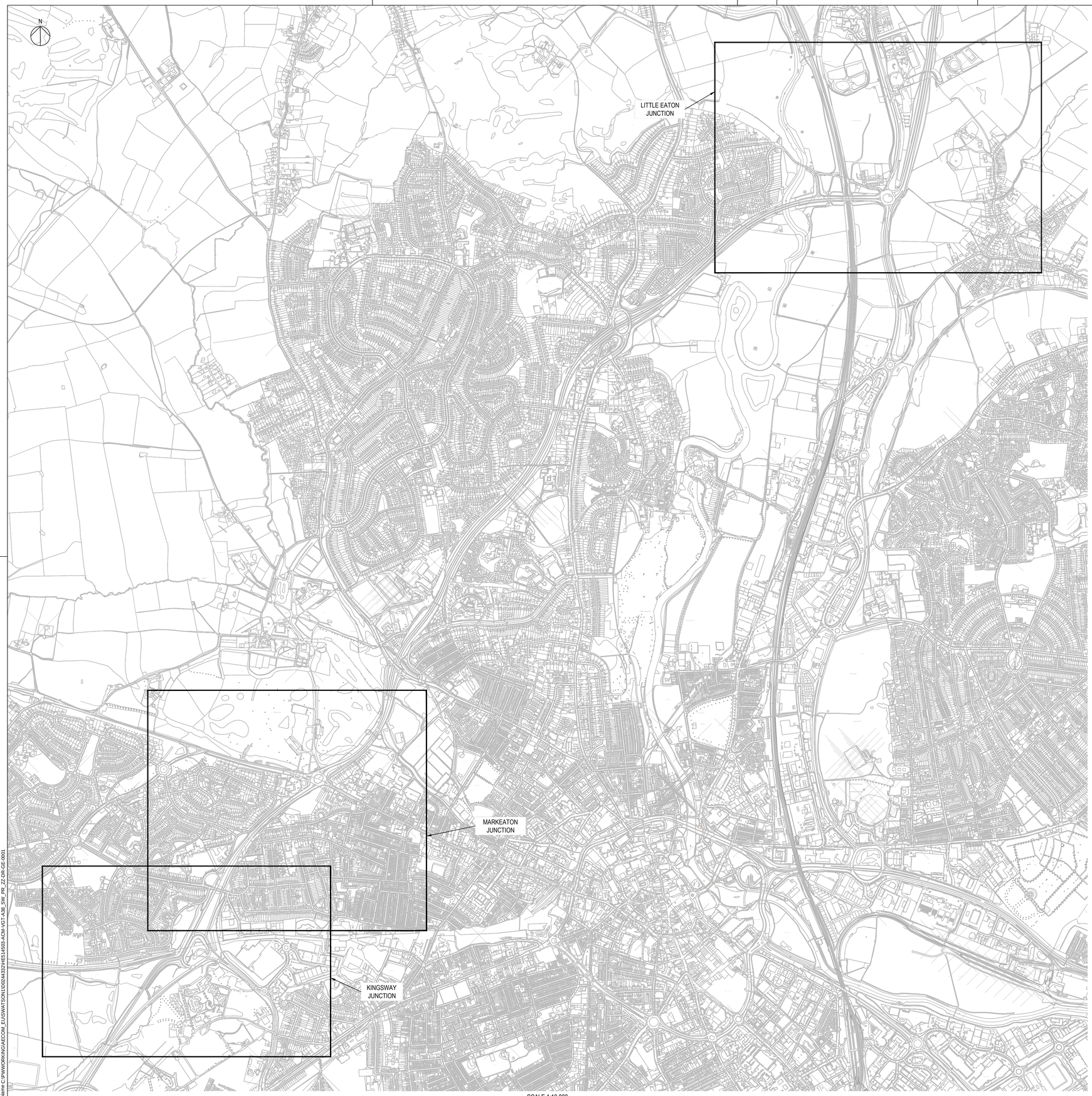
Long Sections Kingsway Junction

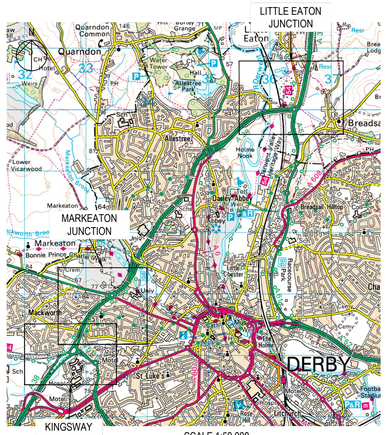
HE514503-ACM-VGT-Z2_ZW_PR_ZZ-DR-GE-0002

Long Section Markeaton Junction

HE514503-ACM-VGT-Z3_ZW_PR_ZZ-DR-GE-0002

Long Section Little Eaton Junction





KEY (SEE NOTE 9)

GEOLOGY AND HISTORICAL FEATURES (SEE NOTE 9)

- AIR SHAFT
- POTENTIALLY INFILLED LAND (NON-WATER)
- POTENTIALLY INFILLED LAND (WATER)
- LICENSED WASTE MANAGEMENT FACILITY
- REGISTERED LANDFILL SITE
- HISTORIC LANDFILL LOCATION
- INFILLED LAND (NON-WATER) LOCATION
- ALLUVIUM
- RIVER TERRACE DEPOSITS
- GLACIAL-FLUVIAL DEPOSITS
- EXTENT OF POTENTIAL REFUSE OR SLAG HEAP IDENTIFIED ON 2000 MAP
- HOUSE FOUNDATIONS
- PETROL STATION
- EXISTING EARTHWORKS EXTENT
- EMB: 7_A38_37229 HAGDMS EARTHWORK ID EMBANKMENT
- CUT: 7_A38_36755 HAGDMS EARTHWORK ID CUTTING

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CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

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5. ROAD ALIGNMENT AND CHAINAGE BASED ON...
6. INDICATIVE SOLID GEOLOGY FAULTS AND SUPERFICIAL DEPOSITS FROM BGS MAP 125 (2014) AND SK33NW (1969).
7. 2016 GROUND INVESTIGATION CARRIED OUT BY ESG LTD. FOR GEOFFREY OSBORNE LTD. ON BEHALF OF HIGHWAYS ENGLAND.
8. HISTORIC GROUND INVESTIGATION INFORMATION TAKEN FROM DRAWING HA514503-URS-08-DR-GE-25.004 IN PRELIMINARY SOURCES STUDY (HAGDMS No. 28093).
9. KEY RELATES TO FEATURES SHOWN ON DRAWINGS: HA514503-ACM-VGT-Z1-ZW-PR-ZZ-DR-GE-0001, HA514503-ACM-VGT-Z2-ZW-PR-ZZ-DR-GE-0001 & HA514503-ACM-VGT-Z3-ZW-PR-ZZ-DR-GE-0001.

Revision Details	By / Check	Date	Suffix
Second Issue Addressed Comments	DMG /	03/08/17	P01
First Issue	/	07/04/17	P01.1

Purpose of issue

INITIAL STATUS OR WIP

Client
Highways England
Major Projects
Piccadilly Gate
Store Street
Manchester
M1 2WD

Working on behalf of highways england

Project Title

A38 DERBY JUNCTIONS

Drawing Title

SITE LOCATION PLAN AND GEOTECHNICAL CONSTRAINTS PLAN SCHEME KEY

Designed	Drawn	Checked	Approved	Date
DG	---	---	---	---

Internal Project No.	Suitability
60533462	S0
Scale @ A1	Zone
AS SHOWN	Whole Scheme

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Drawing Number				Rev
Highways England PIN	Originator	Volume		
HE514503	-ACM	-VGT -		P01.1
A38_SW_PR_ZZ		-DR-GE-0001		
Location		Type	Role	Number

Plot Date: 12 September 2017 11:05:13
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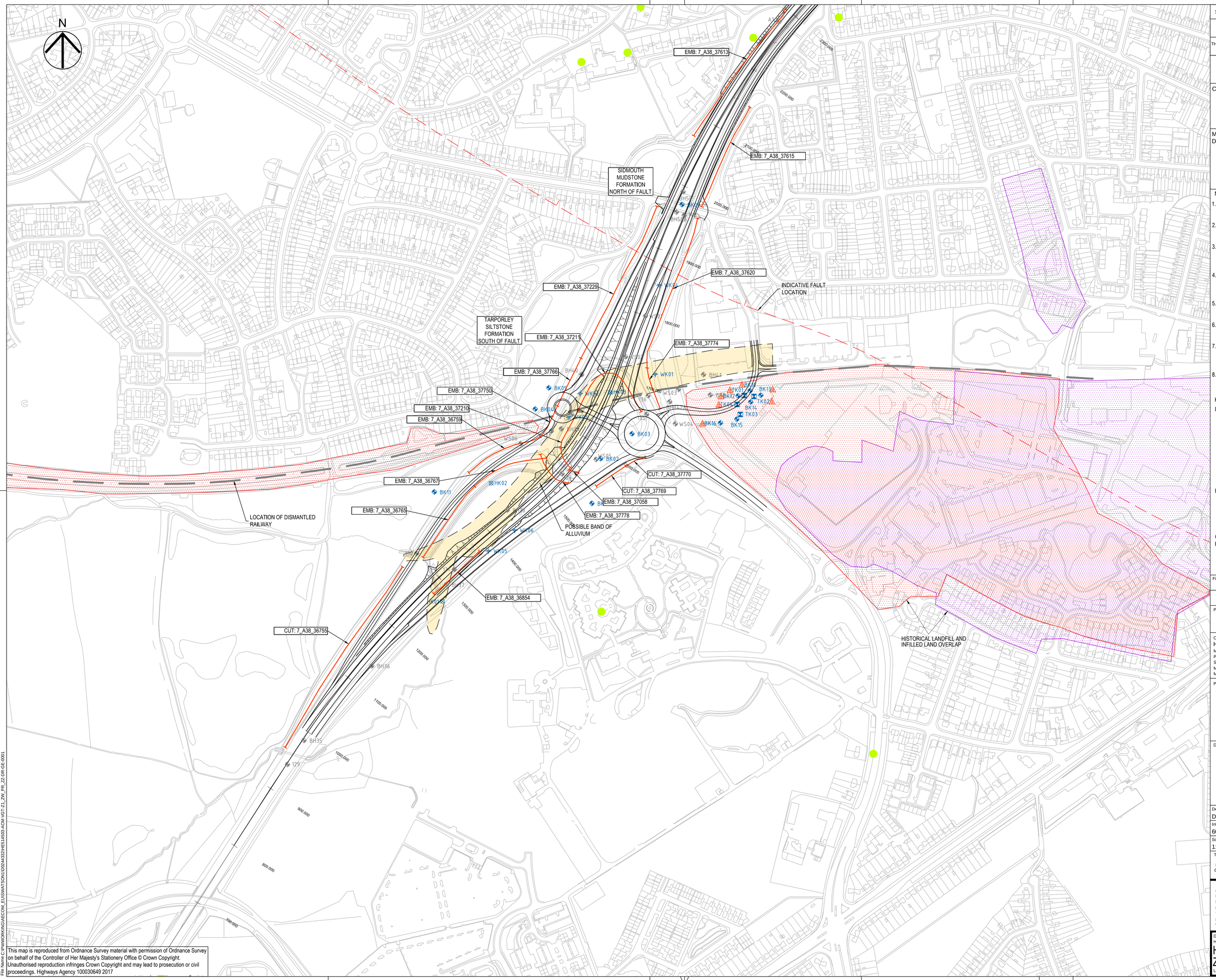

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Plot Date: 12 September 2017 13:06:02
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MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

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8. HISTORIC GROUND INVESTIGATION INFORMATION TAKEN FROM DRAWING HA514503-URS-08-DR-GE-25.004 IN PRELIMINARY SOURCES STUDY (HAGDMS No. 28093).

KEY

LOCATIONS:

BK01	BOREHOLE
TK02	TRIAL PIT
WK01	PERCUSSIVE WINDOWLESS SAMPLER
(P)	PIEZOMETER / STANDPIPE / GAS INSTALLATION
HK01	SURFACE WATER MONITORING LOCATION
	ASBESTOS FIBRES IDENTIFIED (2016 GI)

HISTORIC GI LOCATIONS

BH40	BOREHOLE
T2	TRIAL PIT
WS01	WINDOW SAMPLE

GEOLOGY AND HISTORIC FEATURES REFER TO DRAWING HE514503-ACM-VGT-A38-SW-PR-ZZ-DR-GE-0001

First Issue		07/04/17	P01.1
Revision Details	By / Check	Date	Suffix

Purpose of issue: INITIAL STATUS OR WIP

Client: Highways England
Major Projects
Piccadilly Gate
Store Street
Manchester
M1 2WD

Working on behalf of highways england

Project Title: A38 DERBY JUNCTIONS

Drawing Title: GEOTECHNICAL CONSTRAINTS PLAN KINGSWAY JUNCTION

Designed	Drawn	Checked	Approved	Date
DG	---	---	---	---

Internal Project No. 60533462	Suitability S0
Scale @ A1 1:2500	Zone A38/A5111 Kingsway

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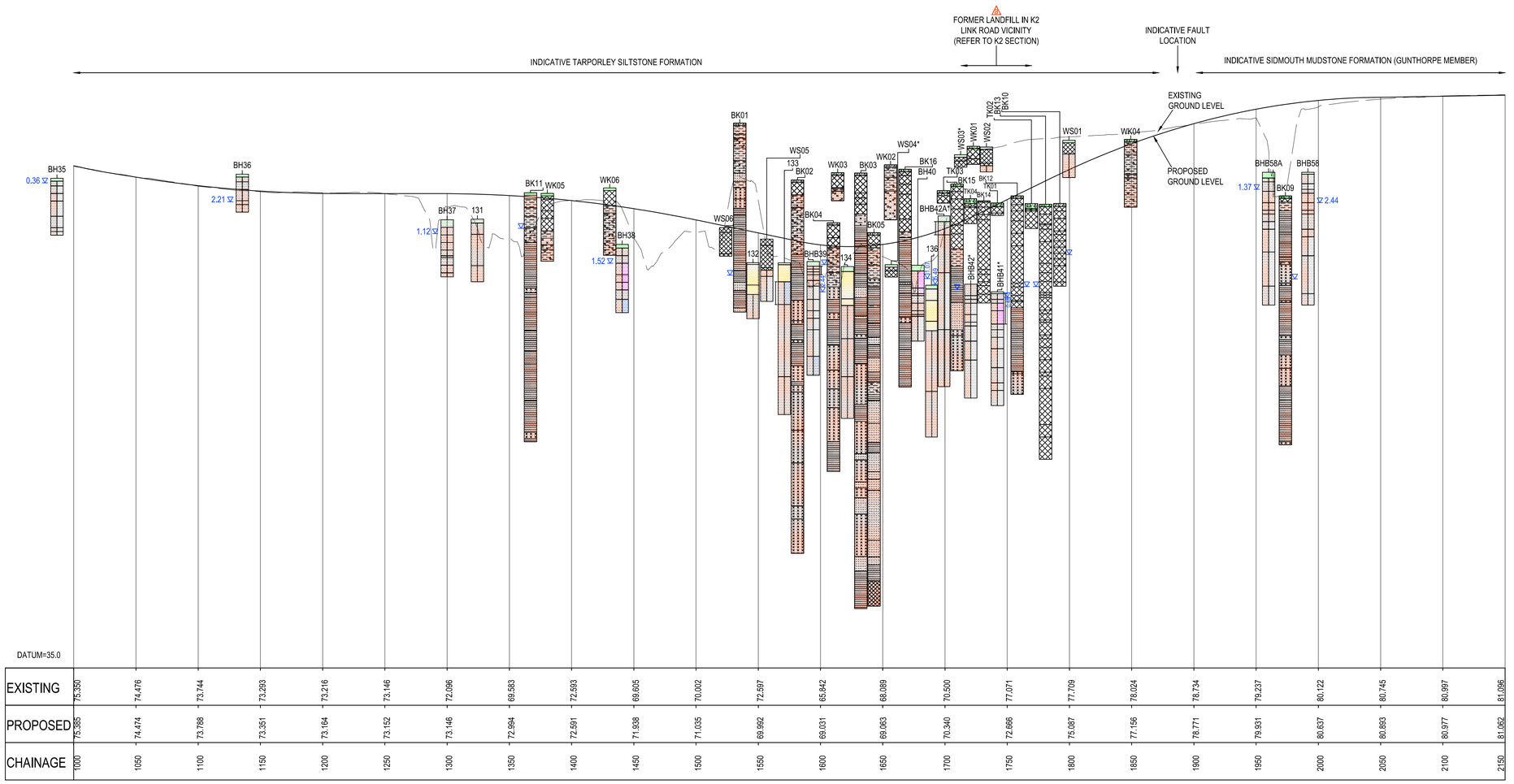
Drawing Number				Rev
Highways England PIN	Originator	Volume		
HE514503	-ACM	-VGT -		P01.1
Z1_ZW_PR_ZZ		-DR-GE-0001		
Location		Type	Role / Number	


FORMER LANDFILL IN K2 LINK ROAD VICINITY (REFER TO K2 SECTION)
INDICATIVE FAULT LOCATION
INDICATIVE TARPORLEY SILTSTONE FORMATION
INDICATIVE SIDMOUTH MUDSTONE FORMATION (GUNTHORPE MEMBER)
EXISTING GROUND LEVEL
PROPOSED GROUND LEVEL
BH35
0.36
BH36
2.21
BH37
1.12
131
BK11
WK05
WK06
BH38
1.52
WS06
BK01
WS05
133
BK02
WK03
BK03
WK02
WS04*
BK16
BH40
TK03
BK15
BK12
TK04
BK14
BHB42A*
132
BHB39
BK04
BK05
134
136
BHB42*
BHB41*
WS03*
WK01
WS02
TK02
BK13
BK10
WS01
WK04
BHB58A
1.37
BK09
BHB58
2.44
DATUM=35.0

| | | |

N

POSSIBLE EXTENT OF ALLUVIUM

TARPORLEY SILTSTONE FORMATION NORTH OF FAULT

POSSIBLE EXTENT OF RIVER TERRACE DEPOSITS

INDICATIVE FAULT LOCATION SHOWN ON RECENT MAPPING

ALTERNATIVE FAULT LOCATION SHOWN ON OLDER MAPPING

SIDMOUTH MUDSTONE FORMATION SOUTH OF FAULT

CUT: 7_A38_37614

EMB: 7_A38_37613

EMB: 7_A38_37615

SIDMOUTH MUDSTONE FORMATION NORTH OF FAULT

EMB: 7_A38_37620

EMB: 7_A38_37229

INDICATIVE FAULT LOCATION

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Plot Date: 12 September 2017 12:08:13
File Name: C:\PWWORK\KGU\EC\DM_EU\SWAT5\DN1\D0024332\HE514503-ACM-VGT-Z2_ZW_PR_ZZ-DR-GE-0001

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

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CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

NOTES

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7. 2016 GROUND INVESTIGATION CARRIED OUT BY ESG LTD. FOR GEOFFREY OSBORNE LTD. ON BEHALF OF HIGHWAYS ENGLAND.
8. HISTORIC GROUND INVESTIGATION INFORMATION TAKEN FROM DRAWING HA514503-URS-08-DR-GE-25.004 IN PRELIMINARY SOURCES STUDY (HAGDMS No. 28093).

KEY

LOCATIONS:

BM01	BOREHOLE
TM02	TRIAL PIT
WM01	PERCUSSIVE WINDOWLESS SAMPLER
(P)	PIEZOMETER / STANDPIPE / GAS INSTALLATION
HM01	SURFACE WATER MONITORING LOCATION
	ASBESTOS FIBRES IDENTIFIED (2016 GI)

HISTORIC GI LOCATIONS

BH40	BOREHOLE
T2	TRIAL PIT
WS01	WINDOW SAMPLE

GEOLOGY AND HISTORIC FEATURES REFER TO DRAWING HE514503-ACM-VGT-A38-SW-PR-ZZ-DR-GE-0001

Revision Details	By / Check	Date	Suffix
First Issue		07/04/17	P01.1

Purpose of issue

INITIAL STATUS OR WIP

Client
Highways England
Major Projects
Piccadilly Gate
Store Street
Manchester
M1 2WD

Working on behalf of highways england

Project Title

A38
DERBY JUNCTIONS

Drawing Title

GEOTECHNICAL CONSTRAINTS PLAN MARKEATON JUNCTION

Designed	Drawn	Checked	Approved	Date
DG	---	---	---	---

Internal Project No.	Suitability
60533462	S0
Scale @ A1	Zone
1:2500	A38/A52 Markeaton

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Drawing Number	Originator	Volume	Rev
Highways England PIN			
HE514503 Z2_ZW_PR_ZZ	-ACM	-VGT - -DR-GE-0001	P01.1
Location		Type / Role / Number	

KEY

TOPSOIL
- TOPSOIL

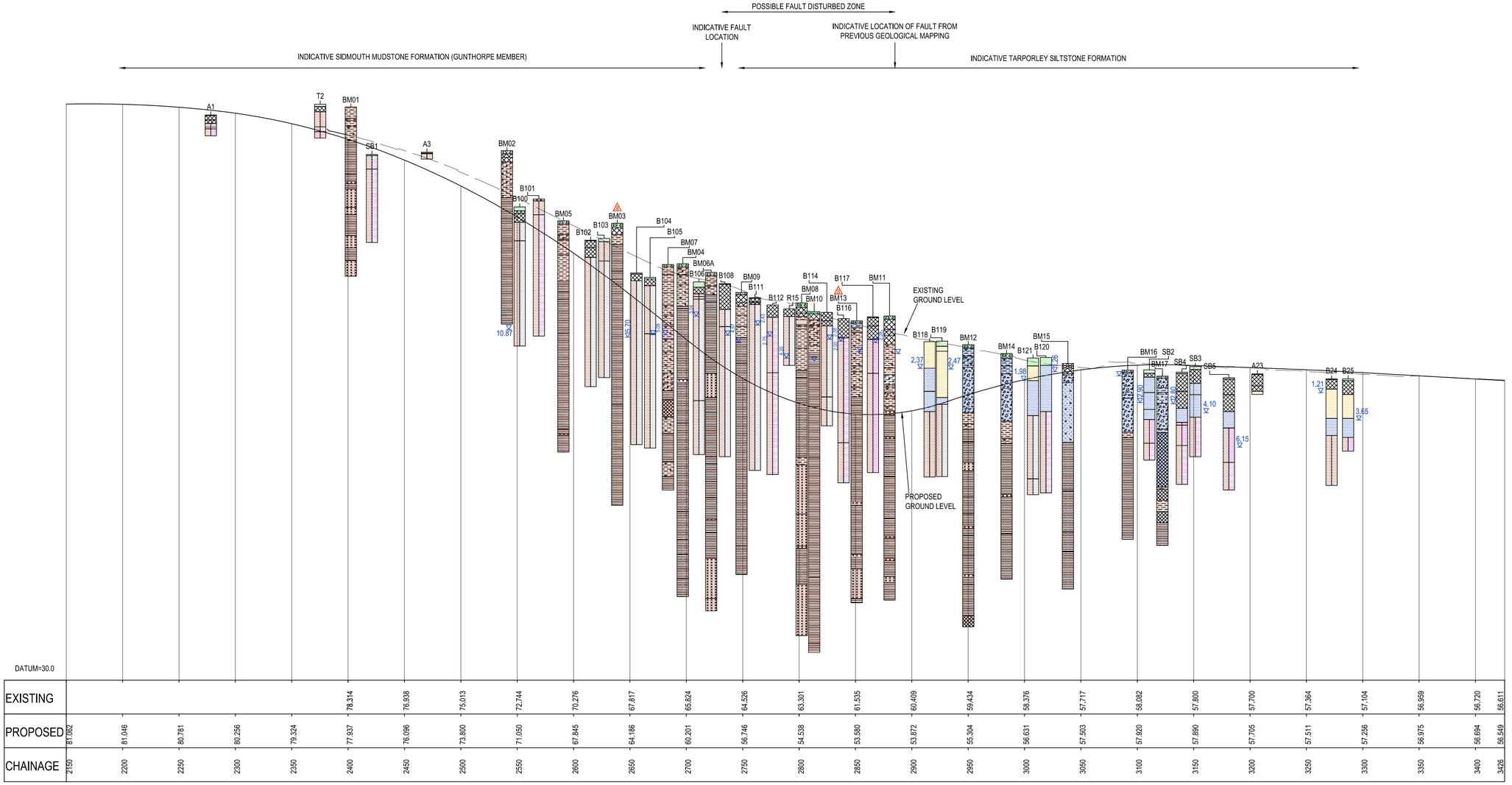
ARTIFICIAL GROUND
- MADE GROUND

SUPERFICIAL GROUND
- ALLUVIUM
- RIVER TERRACE

BEDROCK GEOLOGY (2016 GI)
- MERCIA MUDSTONE GROUP

BEDROCK GEOLOGY (HISTORIC GI SEE NOTE 8)
- MERCIA MUDSTONE GROUP
- SKERRY BAND
- SILT, SILTY CLAY AND / OR MARL
- CLAY AND / OR MARL
- CLAY AND / OR MARL WITH SANDSTONE
- CLAY AND / OR MARL WITH GRAVEL
- ASBESTOS FIBRES IDENTIFIED (2016 GI)
- 2.50 GROUNDWATER STRIKE LEVEL
- 2.50 GROUNDWATER RISE LEVEL
- 2.50(M) GROUNDWATER MONITORED LEVEL

- TOPSOIL
- MADE GROUND
- CLAY
- SILT
- SAND
- GRAVEL
- GRAVEL
- MUDSTONE
- SILTSTONE



SCALE 1:2000(H) 1:200(V)

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5. ROAD ALIGNMENT BASED ON HA514503-URS-00-ZZ-M2-CE-001-3R_PROPOSED ALIGNMENT. ROAD CHAINAGES BASED ON HA514503-URS-00-ZZ-M2-CE-001-3R_CHAINAGE.
6. FOR EXPLORATORY HOLE LOCATIONS SEE GEOTECHNICAL CONSTRAINTS PLAN 47041319-URS-08-DR-GE-25.002-0D.
7. INDICATIVE FAULT & FORMATIONS FROM BGS MAP 125 (2014).
8. HISTORIC EXPLORATORY HOLE STEMS SEPARATED INTO LEFT AND RIGHT SECTIONS. LEFT SECTION INDICATES CURRENT TERMINOLOGY. RIGHT SECTION SHOWS LEGACY DESCRIPTIONS.
9. BOREHOLE STEM HATCHINGS ARE PRODUCED DIRECTLY FROM IMPORTED AGS DATA. NO ALTERATIONS HAVE BEEN MADE AND AECOM ACCEPT NO RESPONSIBILITY FOR THE ACCURACY OR CONSISTENCY OF HATCHING.

Revision Details	By / Check	Date	Suffix
First Issue		30/03/17	P01.1

Purpose of issue

INITIAL STATUS OR WIP

Client
Highways England
Major Projects
Piccadilly Gate
Store Street
Manchester
M1 2WD

Working on behalf of highways england

Project Title

A38
DERBY JUNCTIONS

Drawing Title

LONG SECTION
MARKEATON JUNCTION

Designed	Drawn	Checked	Approved	Date
DG	---	---	---	---

Internal Project No.	Suitability
60533462	S0
Scale @ A1	Zone
AS SHOWN	A38/A52 Markeaton

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Drawing Number				Rev
Highways England PIN	Originator	Volume		
HE514503	-ACM	-VGT -		P01.1
Z2_ZW_PR_ZZ		-DR-GE-0002		
Location		Type	Role Number	

Plot Date: 15 March 2018 15:14:22
File Name: C:\Work\60533462\ACCOM_EIUSWATSON1\D0044332\HE514503-ACM-VGT-Z2_ZW_PR_ZZ-DR-GE-0002

N

POSSIBLE EXTENT OF GLACIO-FLUVIAL DEPOSITS

MORRIDGE FORMATION BENEATH FULL EXTENTS OF JUNCTION

POSSIBLE EXTENT OF ALLUVIUM

EXTENT OF POTENTIAL REFUSE OR SLAG HEAP IDENTIFIED ON 2000 MAP

PROBABLE COURSE OF FORMER DERBY CANAL

POSSIBLE EXTENT OF ALLUVIUM

Breadsall

Little Eaton Junction

8000.000 7900.000 7800.000 7700.000 7600.000 7500.000 7400.000 7300.000 7200.000 7100.000 7000.000 6900.000

TL08 BL12 BL11 TL06 TL05 BL10 WL05 WL04 WL03 BL08C WL02 WL01 BL09 HL05 TL04 BL07 WL11 TL03 BL02 BL01 TL01 HL01 HL02 WL17 WL16 WL15 WL12 WL13 WL14 WL06 WL08 WL09 WL10 BL04 TL02 BL05 HL03 CP 1 CP 2 CP 3 CP 4 8R 7R 6R 5R 4R 3R 2R 57B 66B

BH16 BH15 BH1 BH2 BH3 BH4 BH5 WS1 WS2 WS3 WS4 WS5 WS6 WS7 WS8 WS9 WS10 WS11 WS12

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

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8. HISTORIC GROUND INVESTIGATION INFORMATION TAKEN FROM DRAWING HA514503-URS-08-DR-GE-25.004 IN PRELIMINARY SOURCES STUDY (HAGDMS No. 28093).

KEY

LOCATIONS:

BL01	BOREHOLE
TL02	TRIAL PIT
WL01	PERCUSSIVE WINDOWLESS SAMPLER
(P)	PIEZOMETER / STANDPIPE / GAS INSTALLATION
HL01	SURFACE WATER MONITORING LOCATION
	ASBESTOS FIBRES IDENTIFIED (2016 GI)

HISTORIC GI LOCATIONS

BH40	BOREHOLE
T2	TRIAL PIT
WS01	WINDOW SAMPLE

GEOLOGY AND HISTORIC FEATURES REFER TO DRAWING HE514503-ACM-VGT-A38-SW-PR-ZZ-DR-GE-0001

First Issue			07/04/17	P01.1
Revision Details	By / Check		Date	Suffix

Purpose of issue

INITIAL STATUS OR WIP

Client
Highways England
Major Projects
Piccadilly Gate
Store Street
Manchester
M1 2WD

Working on behalf of highways england

Project Title

A38
DERBY JUNCTIONS

Drawing Title

GEOTECHNICAL CONSTRAINTS PLAN
LITTLE EATON JUNCTION

Designed	Drawn	Checked	Approved	Date
DG	---	---	---	---

Internal Project No. 60533462	Suitability S0
Scale @ A1 1:2500	Zone A38/A61 Little Eaton

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Drawing Number	Originator	Volume	Rev
Highways England PIN HE514503 Z3_ZW_PR_ZZ	-ACM	-VGT -	P01.1
Location		Type Role Number: -DR-GE-0001	

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Plot Date: 19 September 2017 13:09:59
File Name: C:\PROJ\60553462\ACDM_EU\SWATSON1\D0004332\HE514503-ACM-VGT-Z3_ZW_PR_ZZ-DR-GE-0001

KEY

TOPSOIL
- TOPSOIL

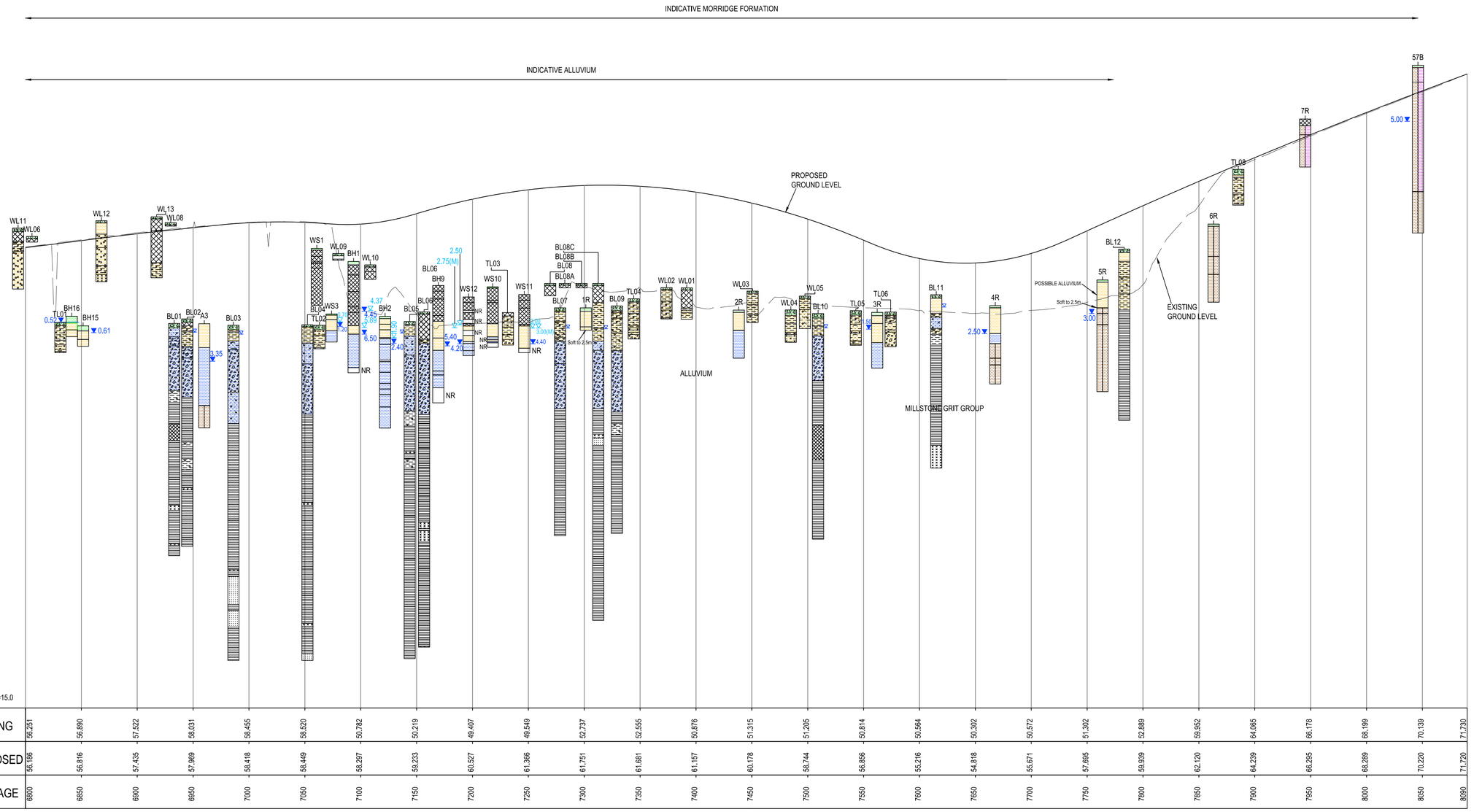
ARTIFICIAL GROUND
- MADE GROUND

SUPERFICIAL GROUND
- ALLUVIUM (SILT / CLAY)
- ALLUVIUM (SAND / GRAVEL)

BEDROCK GEOLOGY (2016 GI)
- MILLSTONE GRIT GROUP

BEDROCK GEOLOGY (HISTORIC GI, SEE NOTE 8)
- MILLSTONE GRIT GROUP
- SILTSTONE
- MUDSTONE
- NR NO RECOVERY
- 2.50 ▼ GROUNDWATER STRIKE LEVEL
- 2.50 ▽ GROUNDWATER RISE LEVEL
- 2.50(M) ▽ GROUNDWATER MONITORED LEVEL

- TOPSOIL
- MADE GROUND
- CLAY
- SILT
- SAND
- GRAVEL
- GRAVEL
- MUDSTONE
- SILTSTONE



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Appendix A Parametric Study Charts

Markeaton River Terrace Deposits

- M-RT1 - Particle Size Distribution
- M-RT2 - SPT N Value versus depth
- M-RT3 - SPT N Value versus depth (Historic)

Little Eaton Alluvium (Predominantly Silt and Clay)

- L-AL-C1 - NMC, LL, PL (%) versus depth
- L-AL-C2 - Bulk Density versus depth
- L-AL-C3 - Plasticity Index versus depth
- L-AL-C4 - Plasticity Chart
- L-AL-C5 - Particle Size Distribution
- L-AL-C6 - SPT N Value versus depth
- L-AL-C7 - SPT N Value versus depth (Historic)
- L-AL-C8 – pH Value versus depth
- L-AL-C9 – Acid Soluble Sulfate versus depth
- L-AL-C10 – Water Soluble Sulfate versus depth
- L-AL-C11 – Total Sulfur versus depth

Little Eaton Alluvium (Predominantly Sand and Gravel)

- L-AL-S&G1 - Particle Size Distribution
- L-AL-S&G2- SPT N Value versus depth
- L-AL-S&G3 - SPT N Value versus depth (Historic)

Kingsway Mercia Mudstone Group

- K-MMG1 - NMC, LL, PL (%) versus depth
- K-MMG2 - Bulk Density versus depth
- K-MMG3 – Plasticity Index versus depth
- K-MMG4 – Plasticity Chart
- K-MMG5 – Particle Size Distribution
- K-MMG6 – UCS Versus Depth
- K-MMG7 – Point Load Index (IS(50)) Vs depth (Mudstone)
- K-MMG8 – Point Load Index (IS(50)) Vs depth (Sandstone)

- K-MMG9 – Point Load Index (IS(50)) Vs depth (Siltstone)
- K-MMG10 – SPT N Value versus depth
- K-MMG11 – SPT N Value versus depth (Historic)
- K-MMG12 – NMC, LL, PL (%) versus depth (New and Historic)
- K-MMG13 – pH Value versus depth
- K-MMG14 – Acid Soluble Sulfate versus depth
- K-MMG15 – Water Soluble Sulfate versus depth
- K-MMG16 – Total Sulfur versus depth

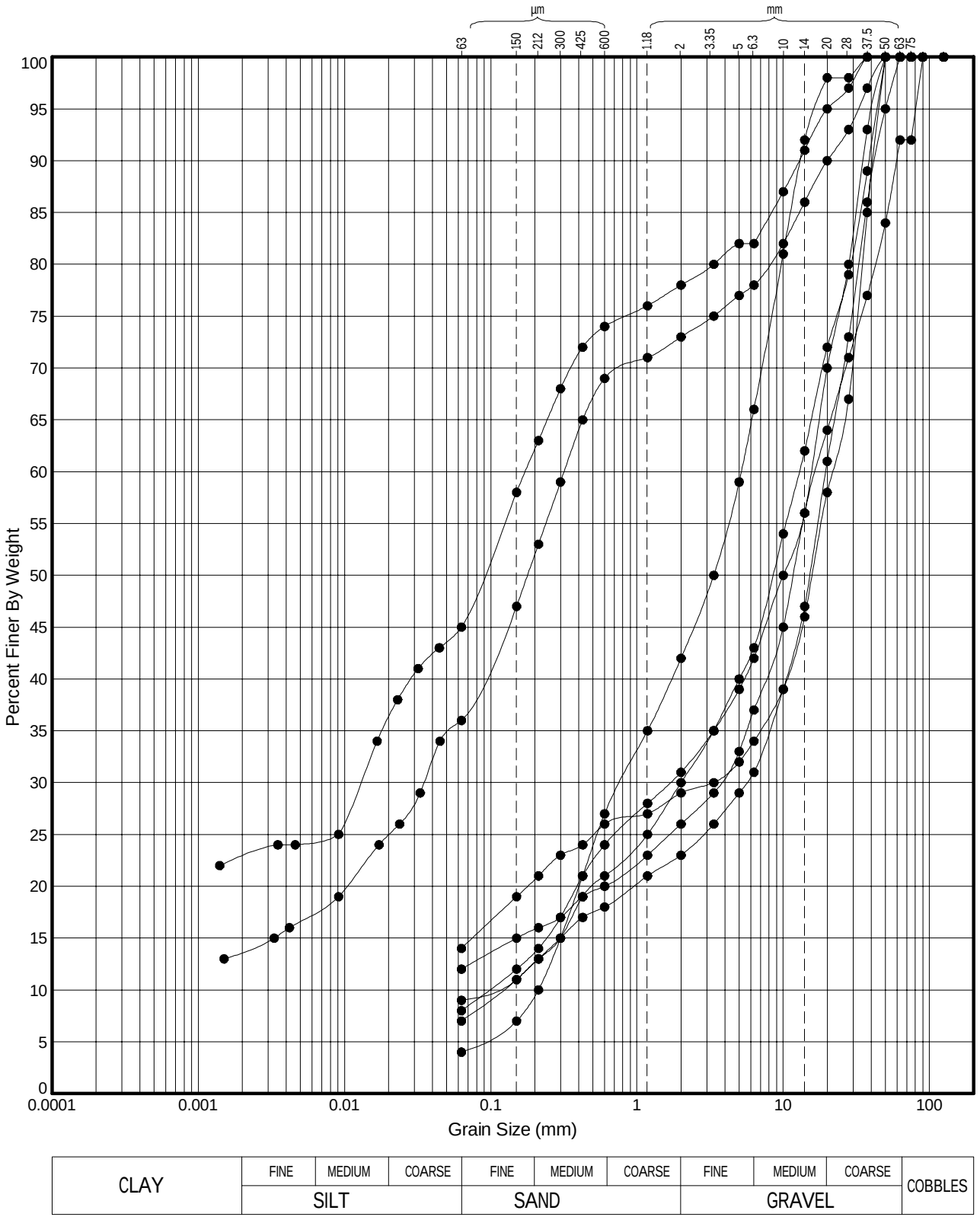
Markeaton Mercia Mudstone Group

- M-MMG1 - NMC, LL, PL (%) versus depth
- M-MMG2 - Bulk Density versus depth
- M-MMG3 – Plasticity Index versus depth
- M-MMG4 – Plasticity Chart
- M-MMG5 – Particle Size Distribution
- M-MMG6 – UCS Versus Depth
- M-MMG7 – Point Load Index (IS(50)) Vs depth (Mudstone)
- M-MMG8 – Point Load Index (IS(50)) Vs depth (Siltstone)
- M-MMG9 – SPT N Value versus depth
- M-MMG10 – SPT N Value versus depth (Historic)
- M-MMG11 – NMC, LL, PL (%) versus depth (New and Historic)
- M-MMG12 – pH Value versus depth
- M-MMG13 – Acid Soluble Sulfate versus depth
- M-MMG14 – Water Soluble Sulfate versus depth
- M-MMG15 – Total Sulfur versus depth

Little Eaton Millstone Grit Group

- L-MSGG1 - NMC, LL, PL (%) versus depth
- L-MSGG2 - Plasticity Index versus depth
- L-MSGG3 – Plasticity Chart
- L-MSGG4 - Point Load Index (IS(50)) Vs depth (Mudstone)
- L-MSGG5 - Point Load Index (IS(50)) Vs depth (Sandstone)
- L-MSGG6 - Point Load Index (IS(50)) Vs depth (Siltstone)
- L-MSGG7 - SPT N Value versus depth
- L-MSGG8 - NMC, LL, PL (%) versus depth (New and Historic)
- L-MSGG9 – pH Value versus depth

- L-MSGG10 – Acid Soluble Sulfate versus depth
- L-MSGG11 – Water Soluble Sulfate versus depth
- L-MSGG12 – Total Sulfur versus depth



Markeaton River Terrace Deposits

Client	Figure Title	Figure Number	Date
Highways England	**PARTICLE SIZE DISTRIBUTION**	**M-RT1**	**15/08/17**
	Project Title / **A38 DERBY JUNCTIONS**	**Project Number** / **HE514503**	AECOM

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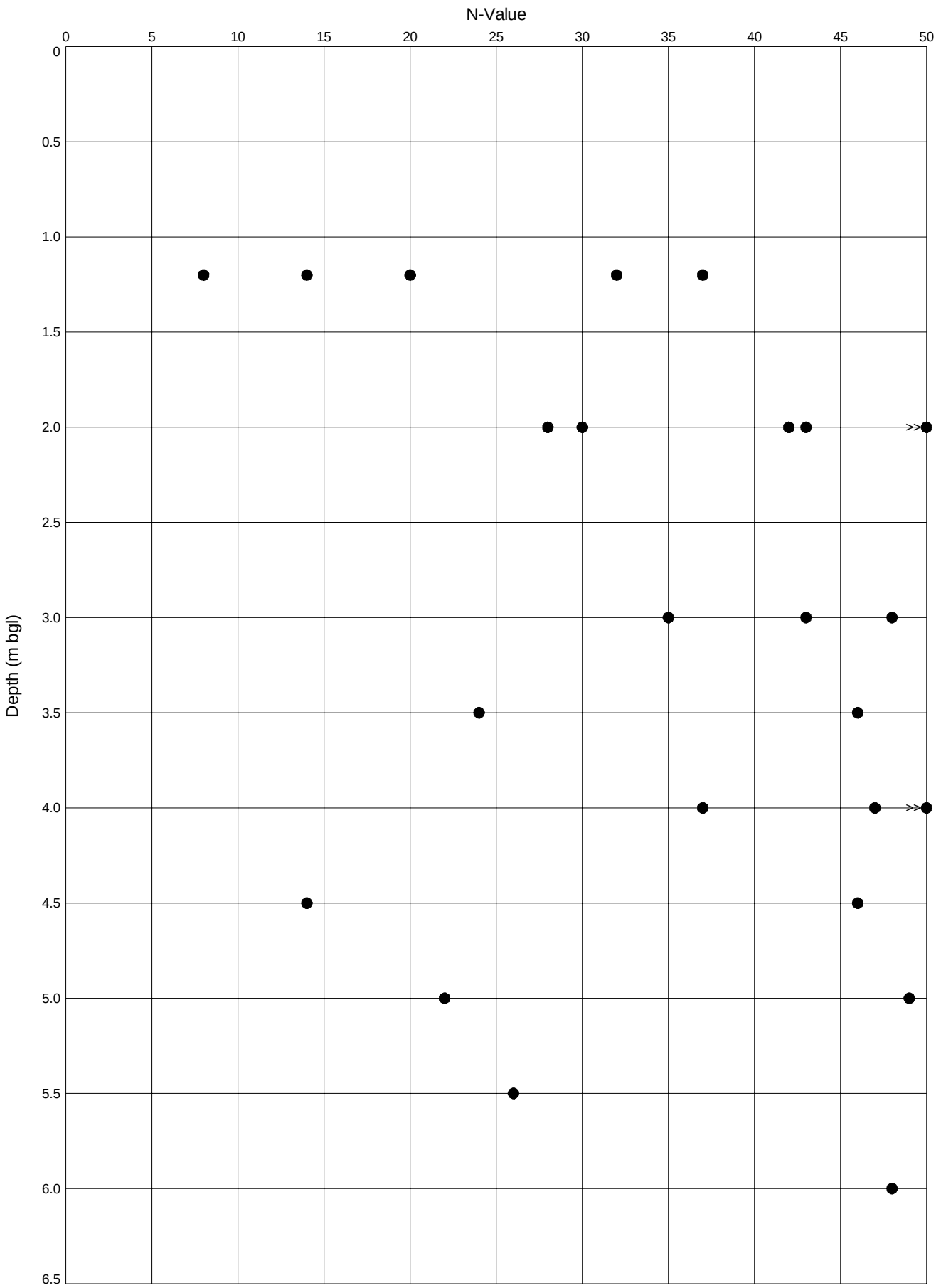

Markeaton River Terrace Deposits

Client	Figure Title		Figure Number	Date
Highways England	**SPT N VALUE VERSUS DEPTH**		**M-RT2**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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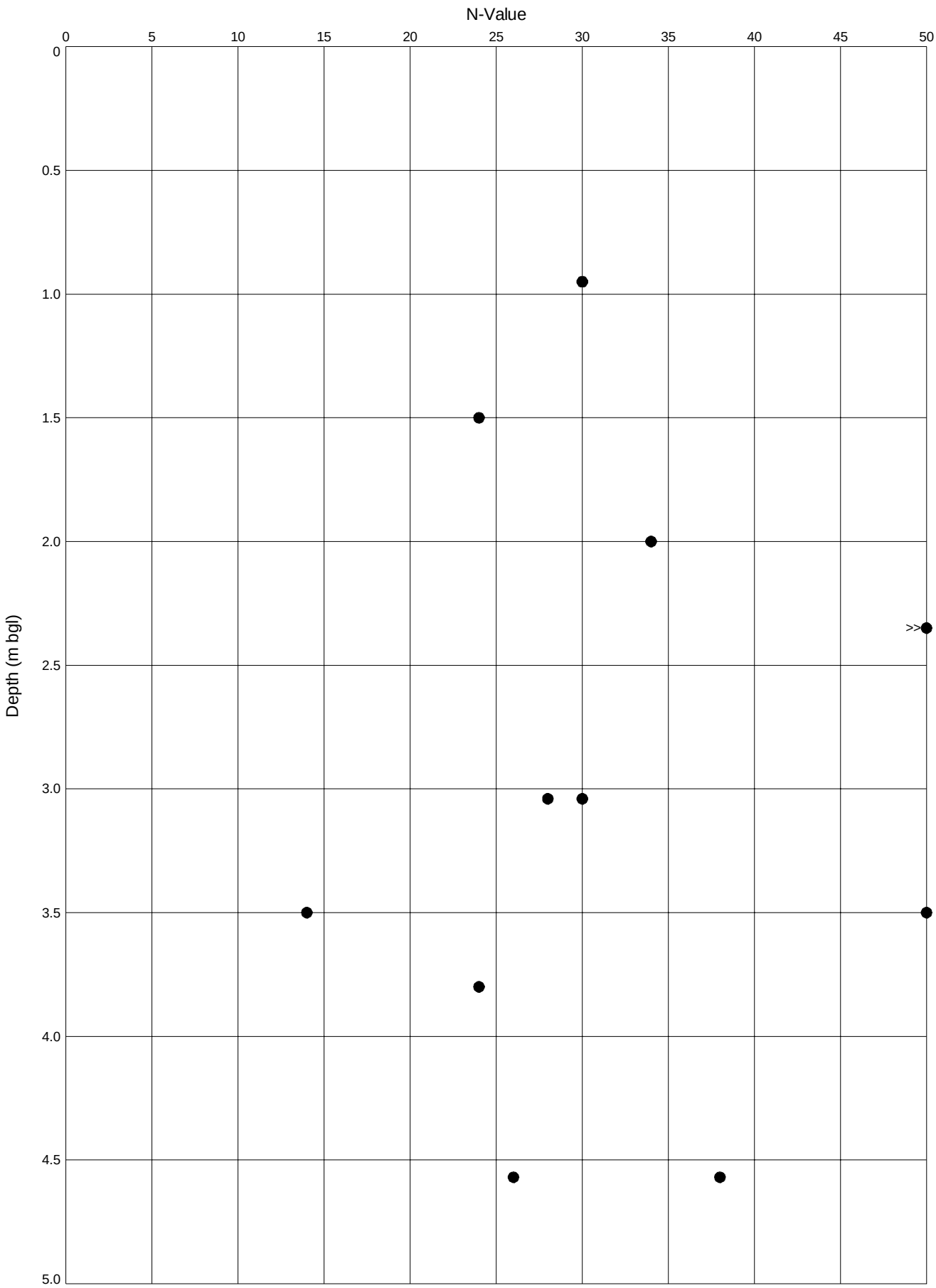

Markeaton River Terrace Deposits (Historic)

Client	Figure Title		Figure Number	Date
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	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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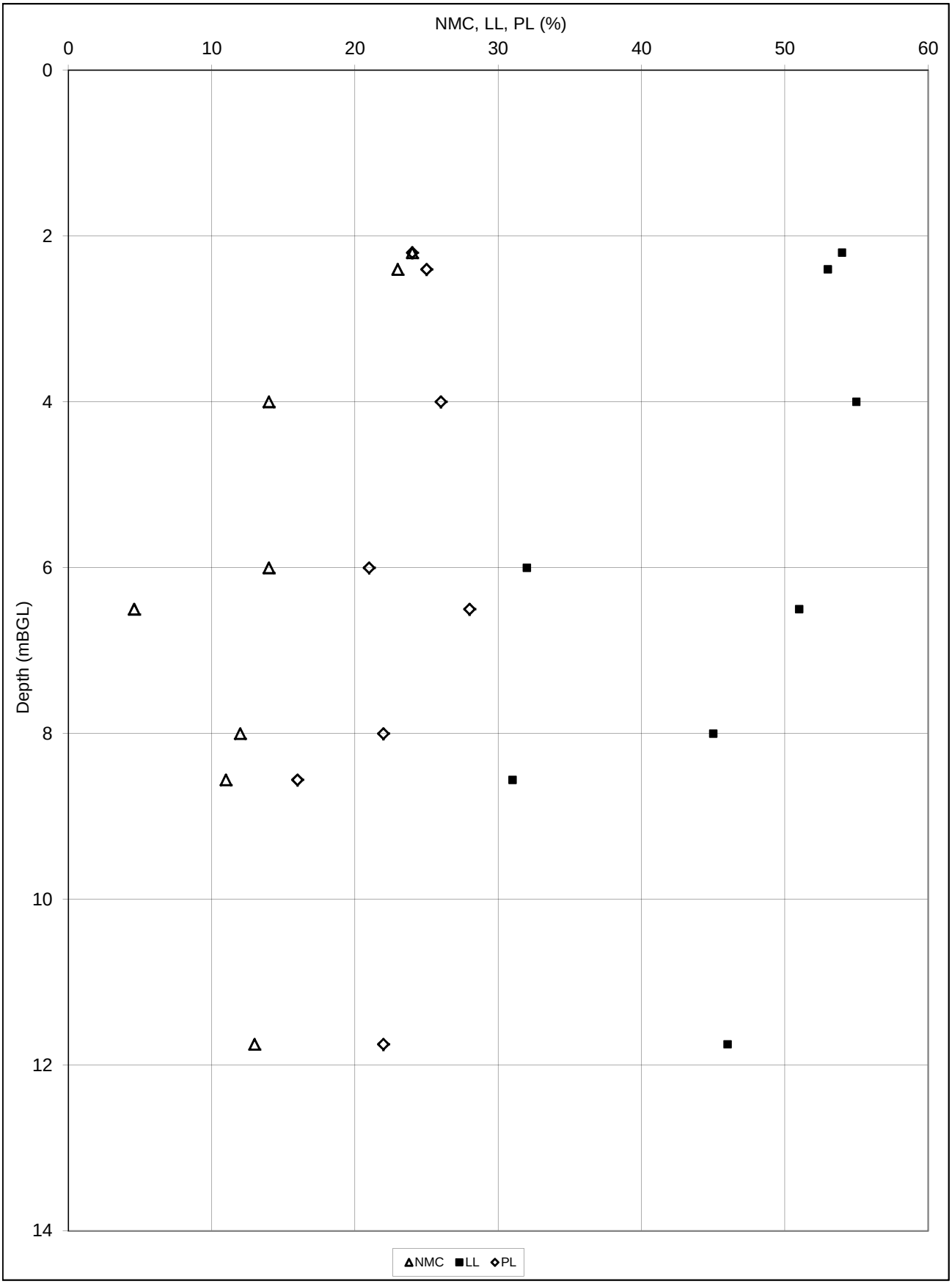
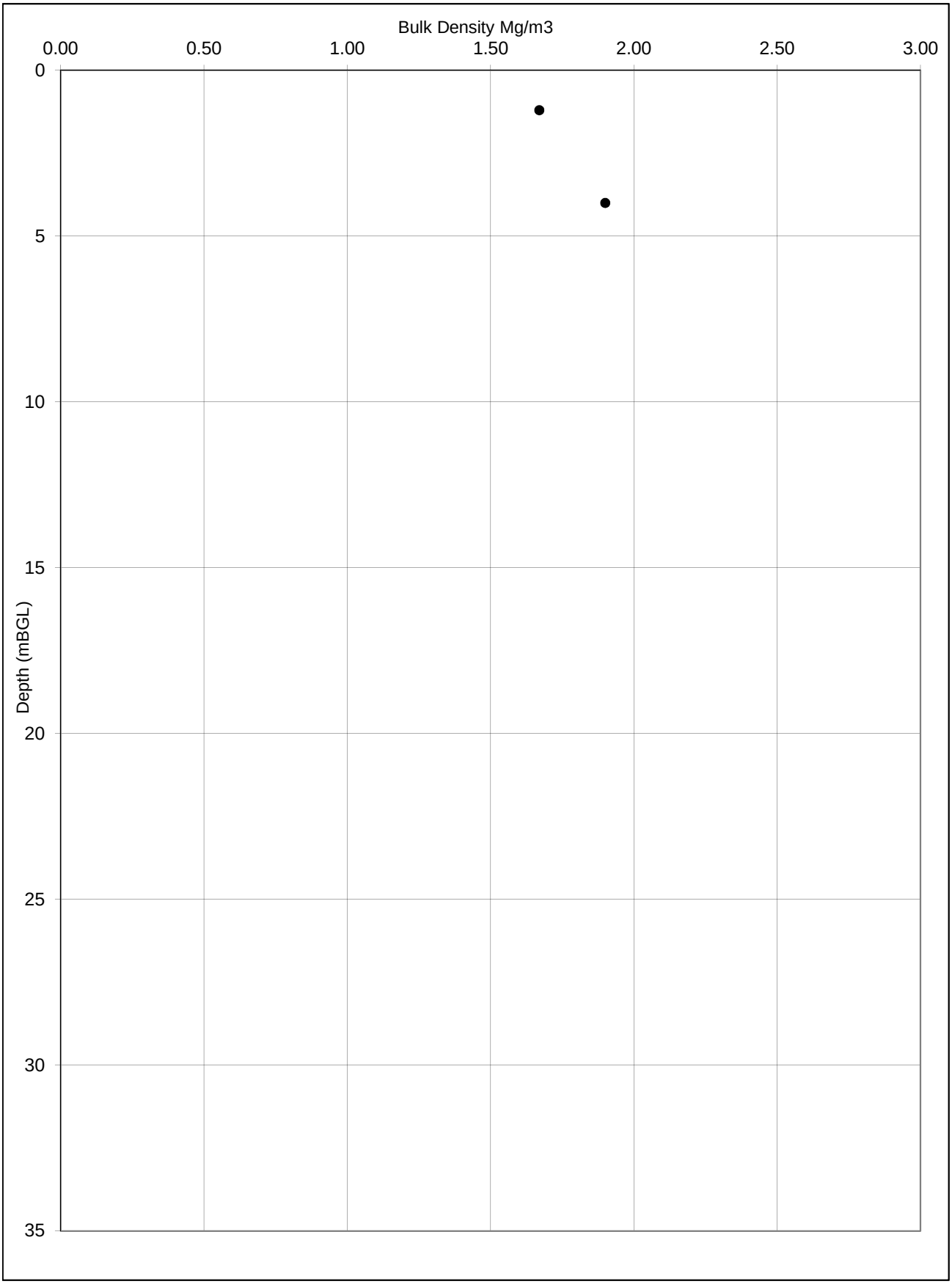


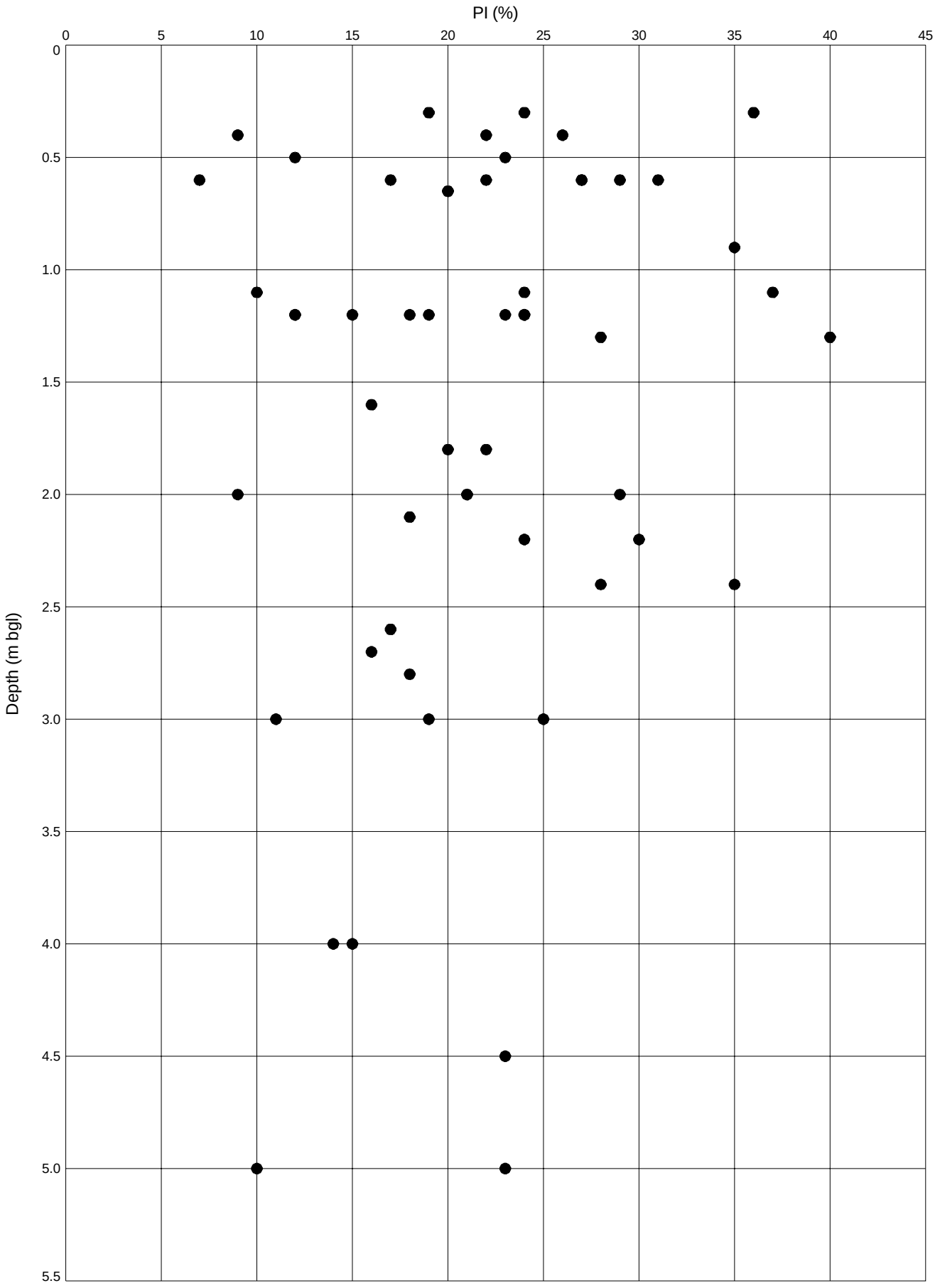
Little Eaton Alluvium (Predominantly Silt & Clay)

Client	Figure Title	Figure Number	Date
Highways England	NMC, LL, PL (%) VERSUS DEPTH	L-AL-C1	30/03/2017
	Project Title: A38 DERBY JUNCTIONS	Project Number: HE514503	AECOM



Little Eaton Alluvium (Predominantly Silt & Clay)

Client	Figure Title		Figure Number	Date
Highways England	BULK DENSITY VERSUS DEPTH		L-AL-C2	30/03/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



Little Eaton Alluvium (Predominantly Silt and Clay)

Client	Figure Title		Figure Number	Date
Highways England	**PLASTICITY INDEX VERSUS DEPTH**		**L-AL-C3**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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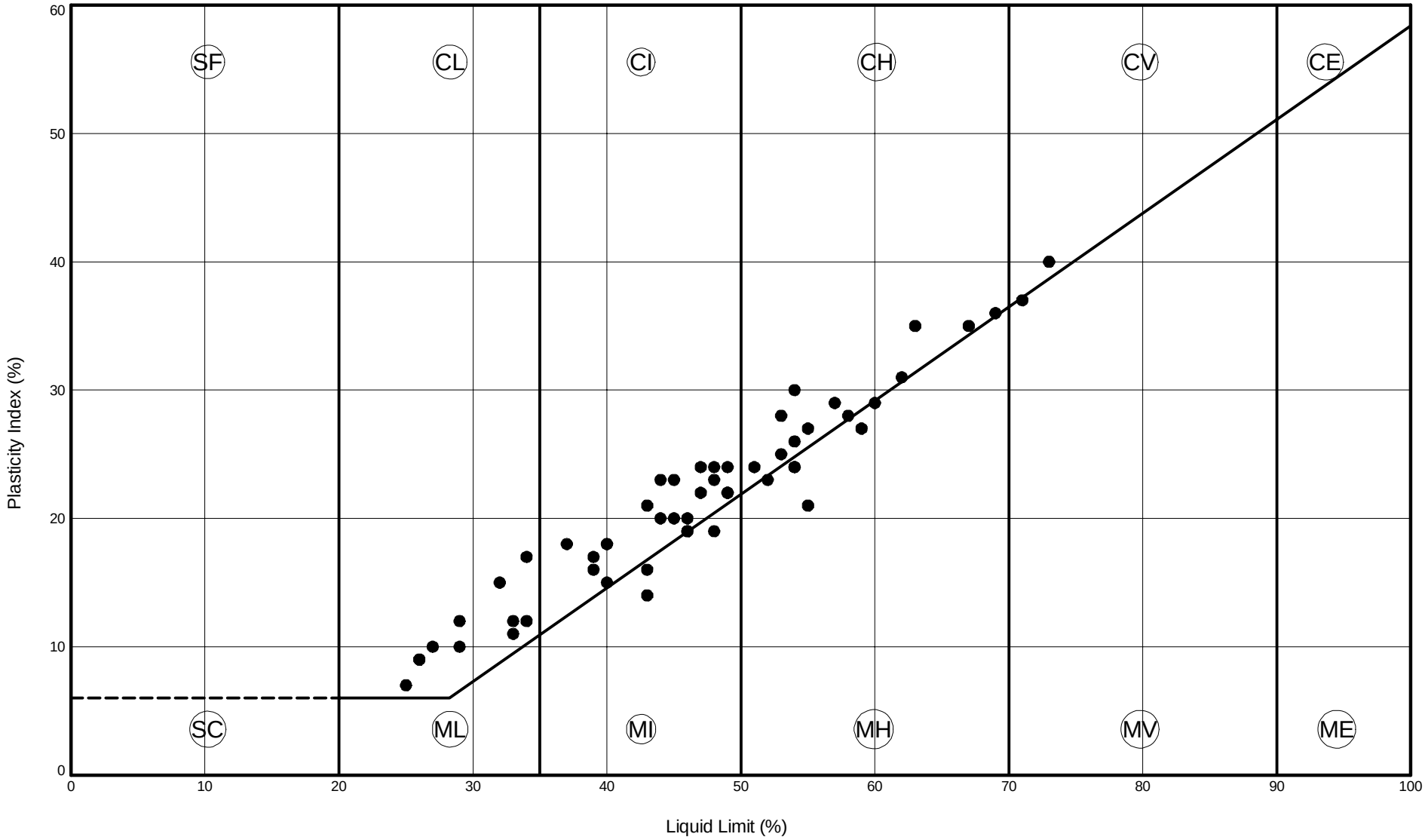
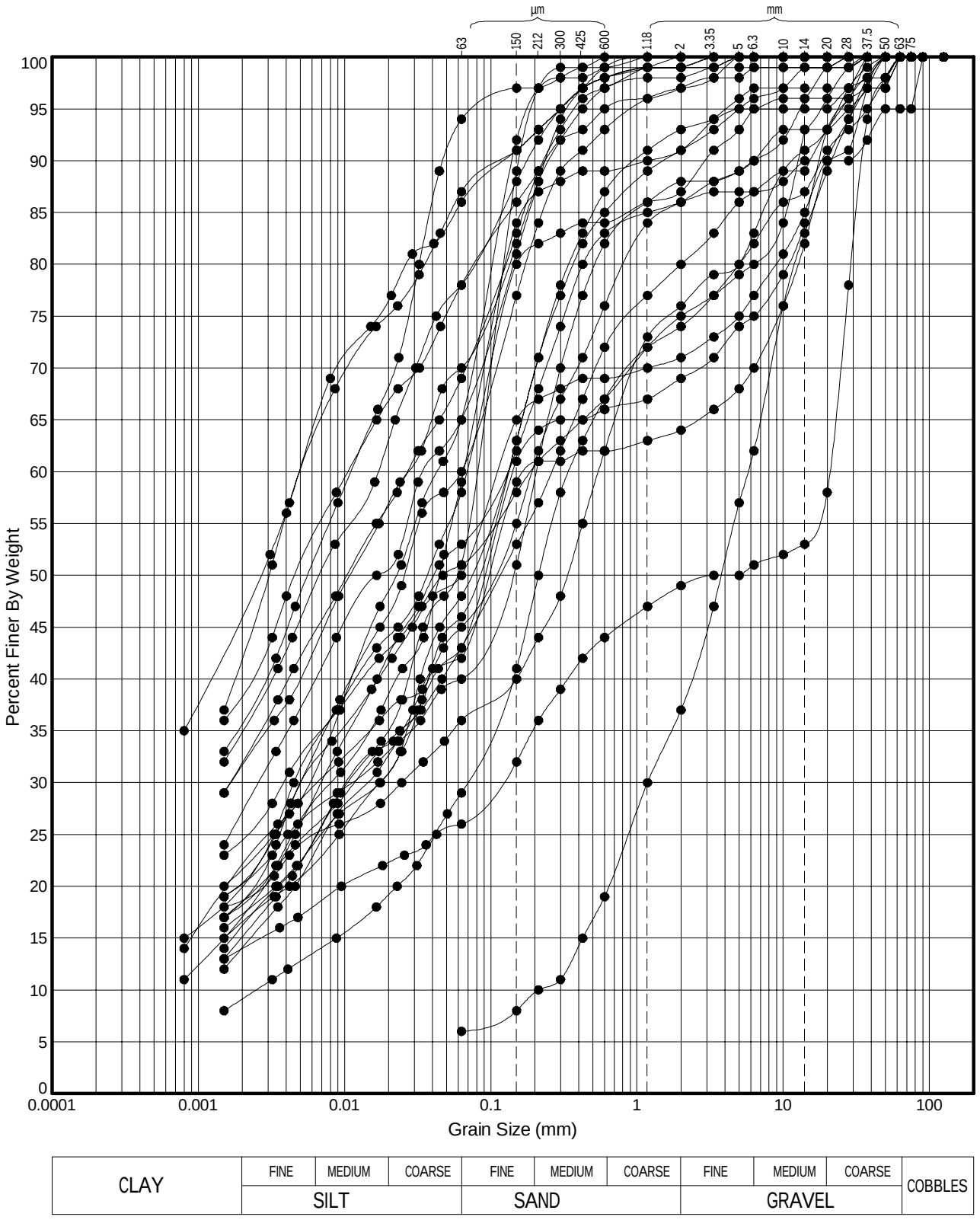


Little Eaton Alluvium (Predominantly Silt & Clay)

Client	**Figure Title**		**Figure Number**	**Date**
Highways England	**PLASTICITY CHART**		**L-AL-C4**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

PLASTICITY CHART 2017-06-27.GPJ AECOM AGS4.GDT 15/8/17



CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COBBLES
	SILT			SAND			GRAVEL			

Little Eaton Alluvium (Predominantly Silt & Clay)

Client	Figure Title	Figure Number	Date
Highways England	**PARTICLE SIZE DISTRIBUTION**	**L-AL-C5**	**15/08/17**
	Project Title	**Project Number**	
	A38 DERBY JUNCTIONS	**HE514503**	AECOM

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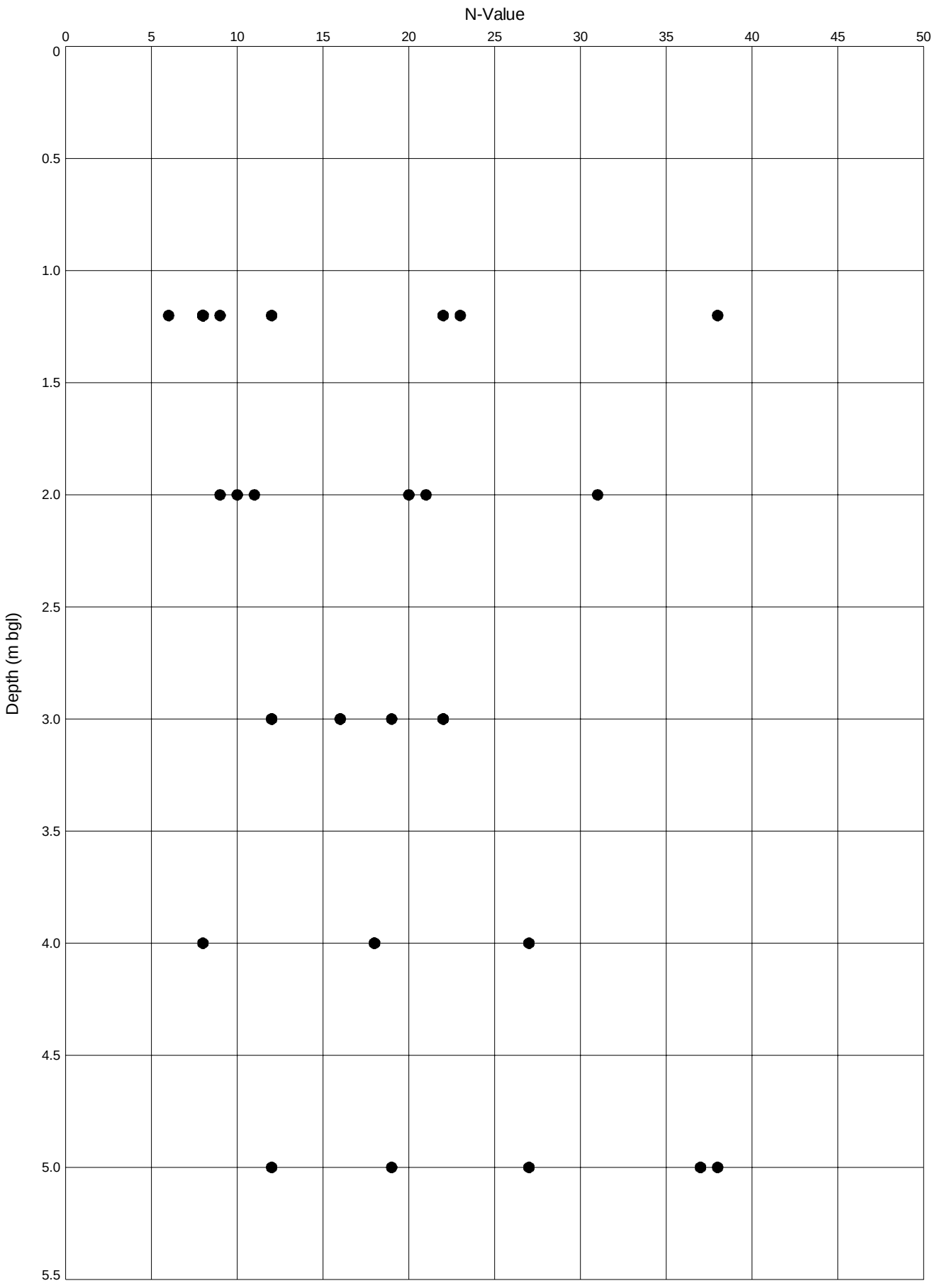

Little Eaton Alluvium (Predominantly Silt & Clay)

Client	Figure Title		Figure Number	Date
Highways England	**SPT N VALUE VERSUS DEPTH**		**L-AL-C6**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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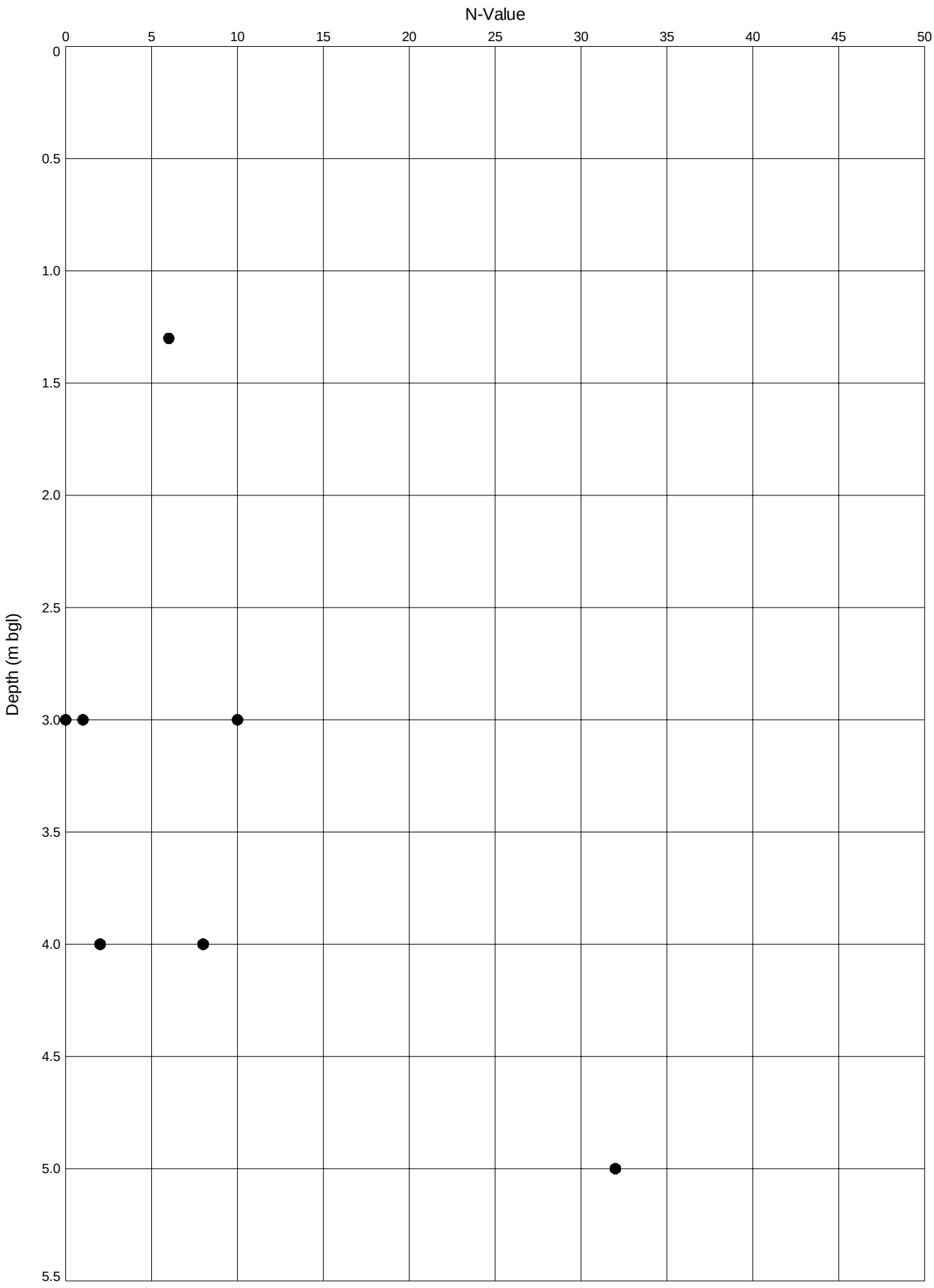

Little Eaton Alluvium (Predominantly Silt & Clay) (Historic)

Client	Figure Title		Figure Number	Date
Highways England	**SPT N VALUE VERSUS DEPTH**		**L-AL-C7**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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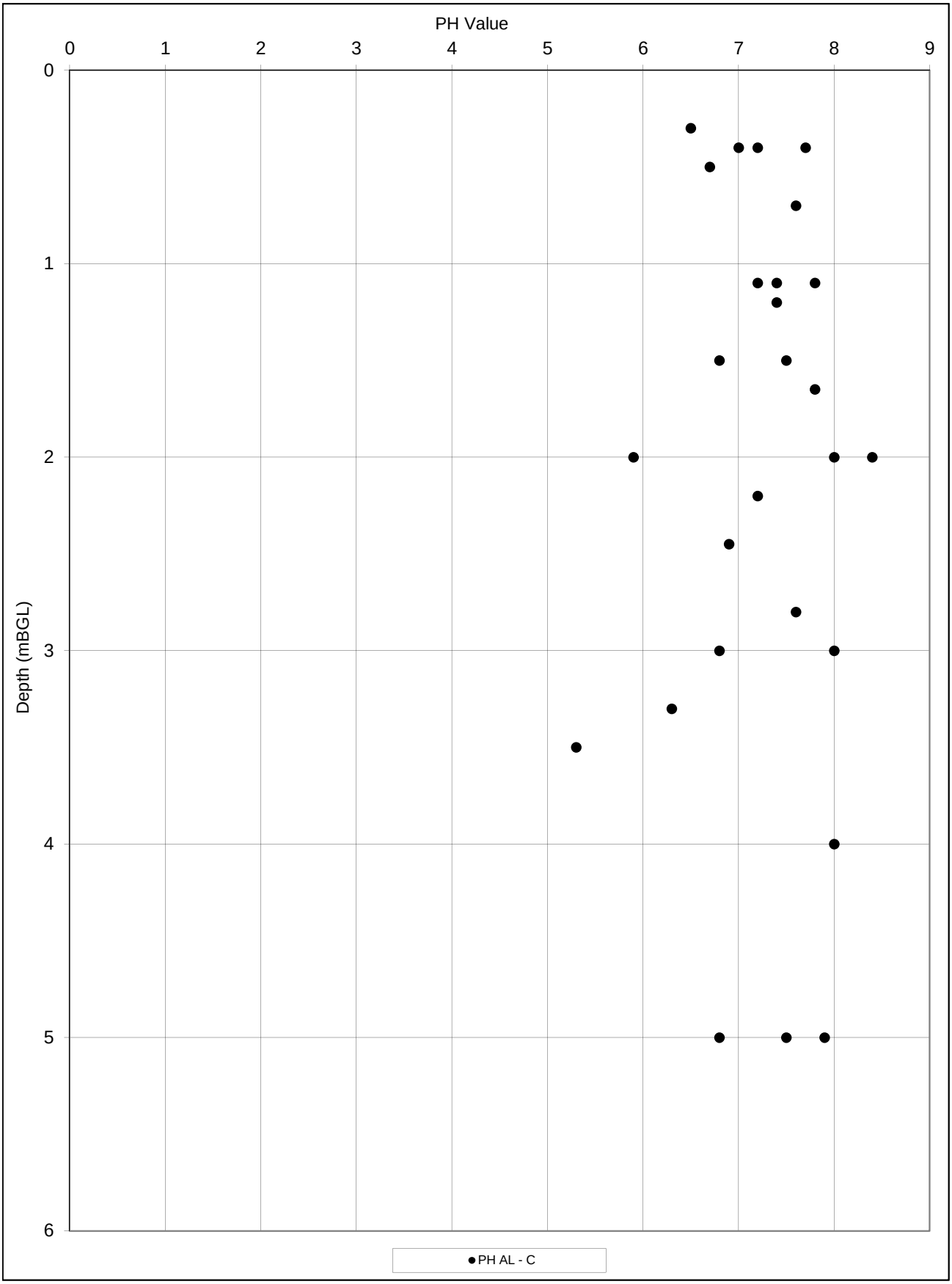
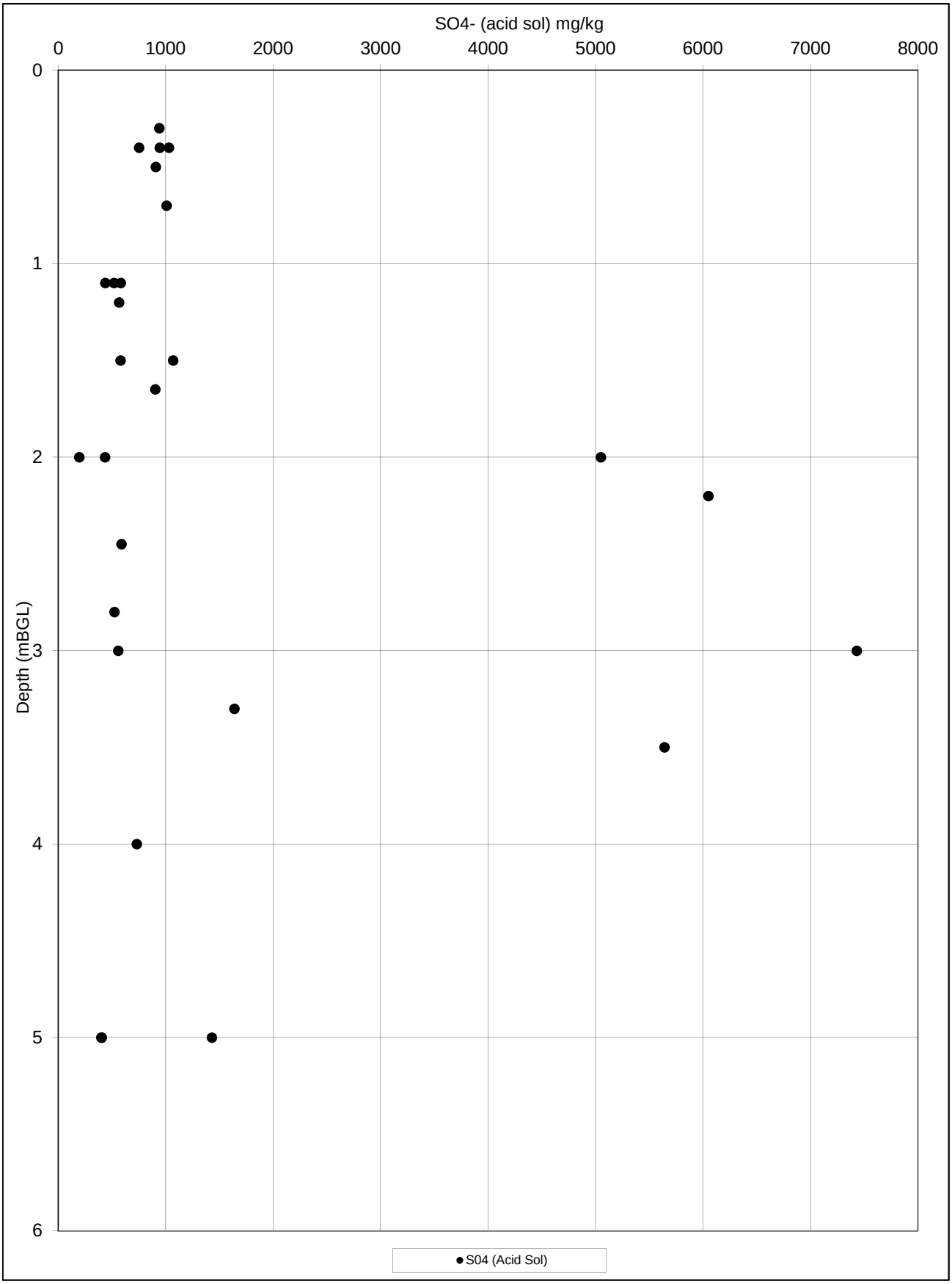


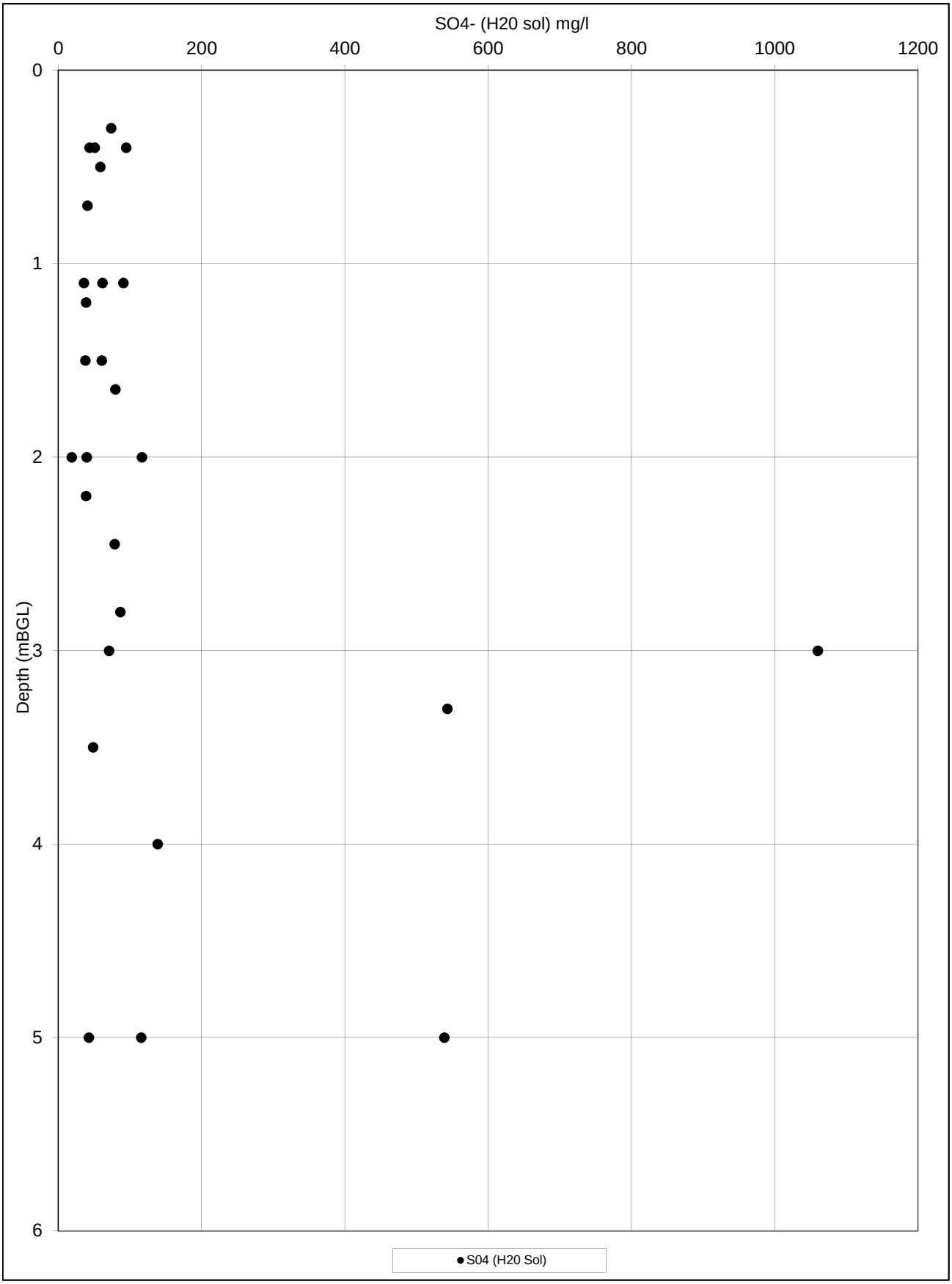
Little Eaton Alluvium (Predominantly Silt & Clay)

Client	Figure Title		Figure Number	Date
Highways England	PH VALUE VS DEPTH		L-AL-C8	11/08/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



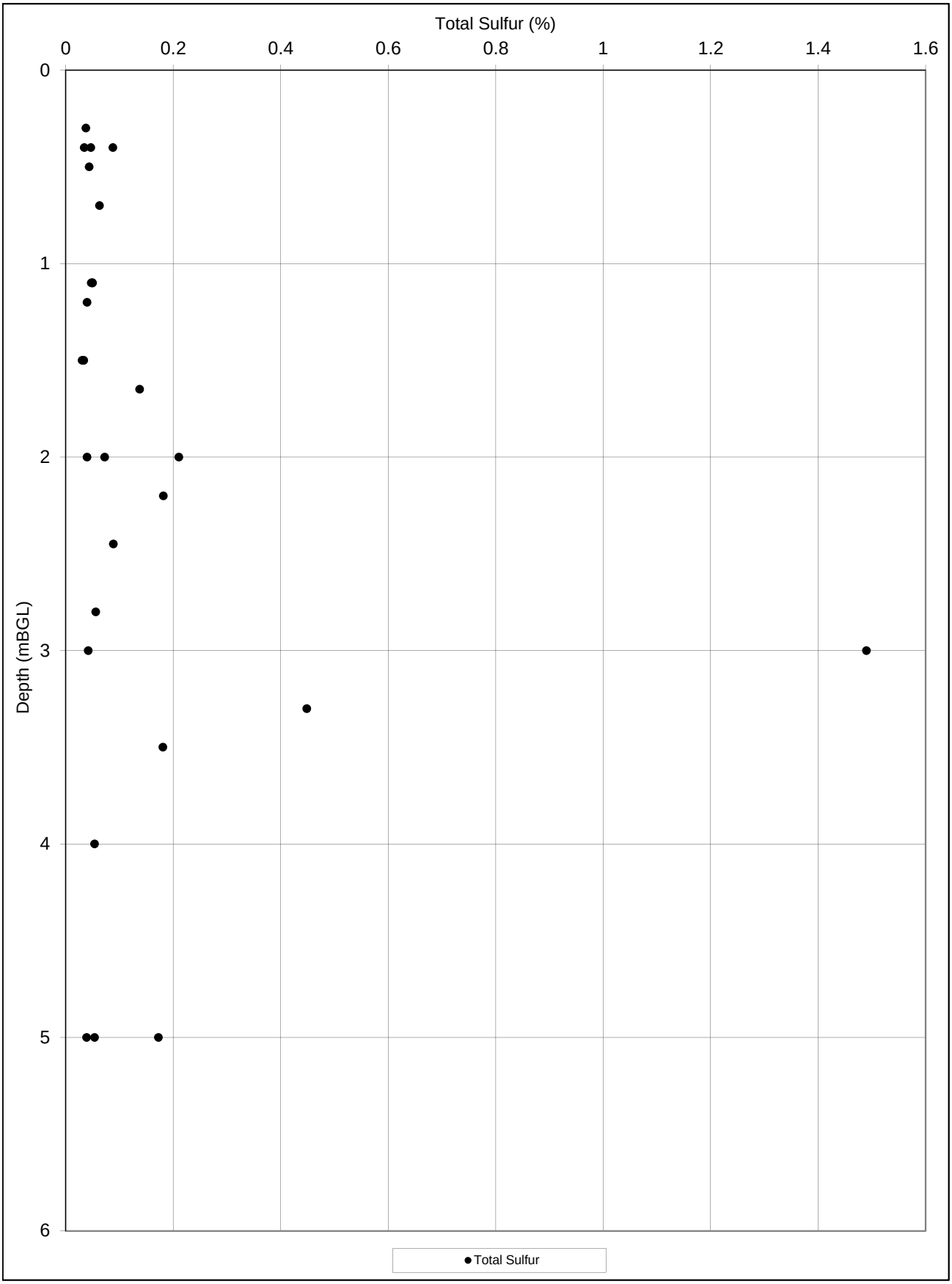
Little Eaton Alluvium (Predominantly Silt & Clay)

Client	Figure Title		Figure Number	Date
Highways England	S04 (Acid Sol) mg/kg VS DEPTH		L-AL-C9	15/08/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



Little Eaton Alluvium (Predominantly Silt & Clay)

Client	Figure Title	Figure Number	Date
Highways England	S04 (H20 Sol) mg/l VS DEPTH	L-AL-C10	15/08/2017
	Project Title: A38 DERBY JUNCTIONS	Project Number: HE514503	AECOM



Little Eaton Alluvium (Predominantly Silt & Clay)

Client	Figure Title		Figure Number	Date
Highways England	TOTAL SULFUR(%) VS DEPTH		L-AL-C11	15/08/2017
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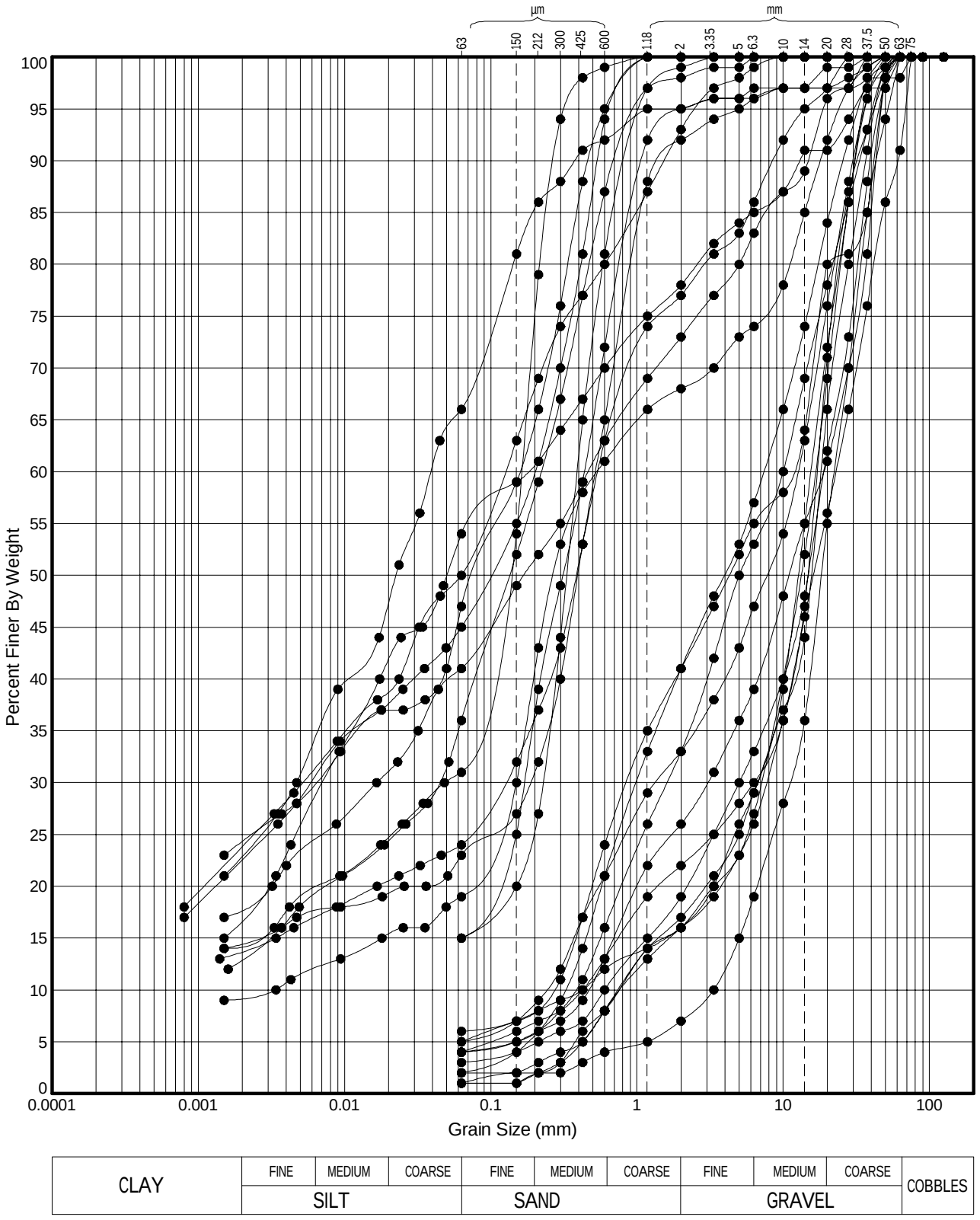

Little Eaton Alluvium (Predominantly Sand & Gravel)

Client	Figure Title		Figure Number	Date
Highways England	**PARTICLE SIZE DISTRIBUTION**		**L-AL-S&G1**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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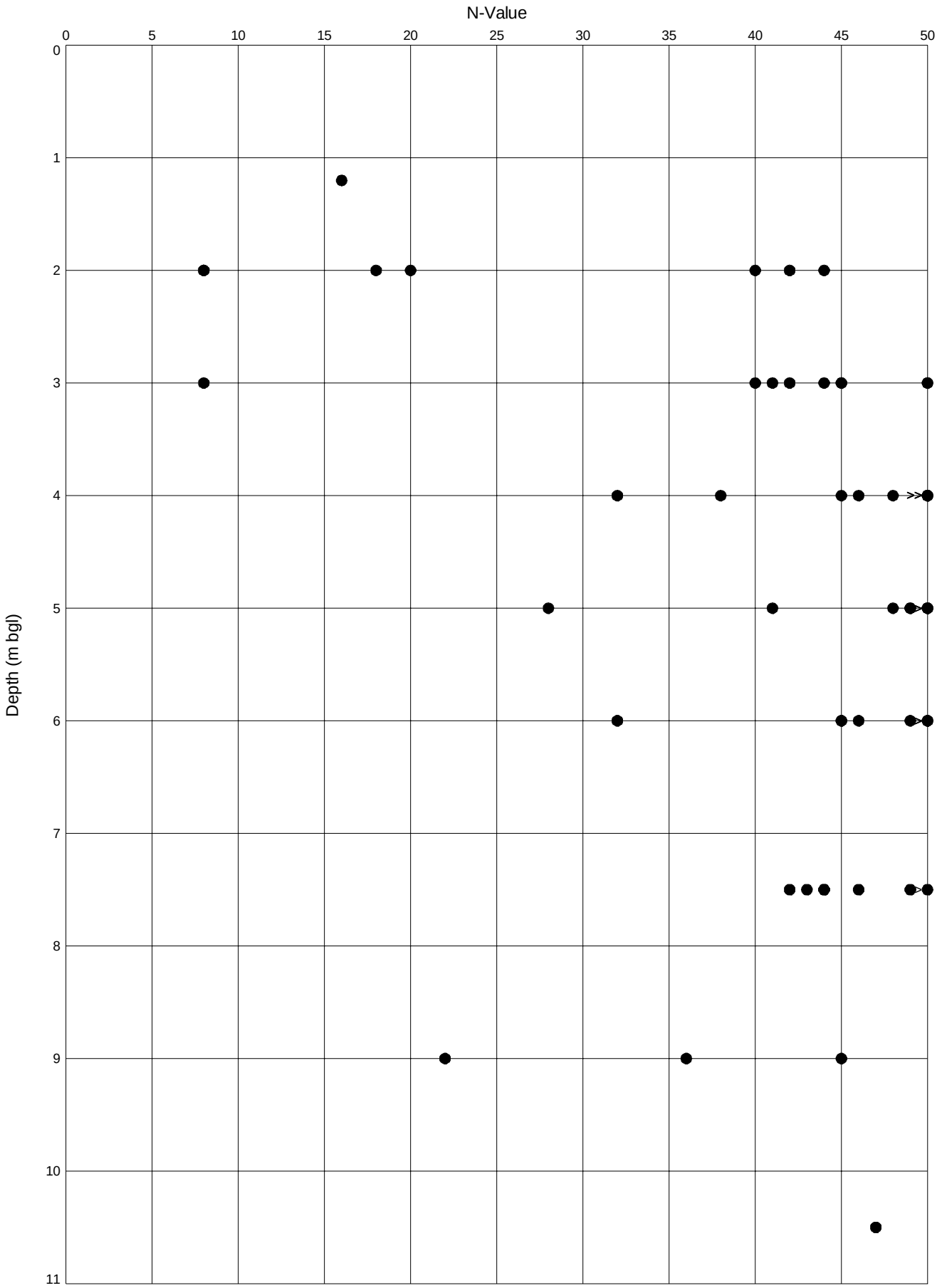

Little Eaton Alluvium (Predominantly Sand & Gravel)

Client	Figure Title		Figure Number	Date
Highways England	**SPT N VALUE VERSUS DEPTH**		**L-AL-S&G2**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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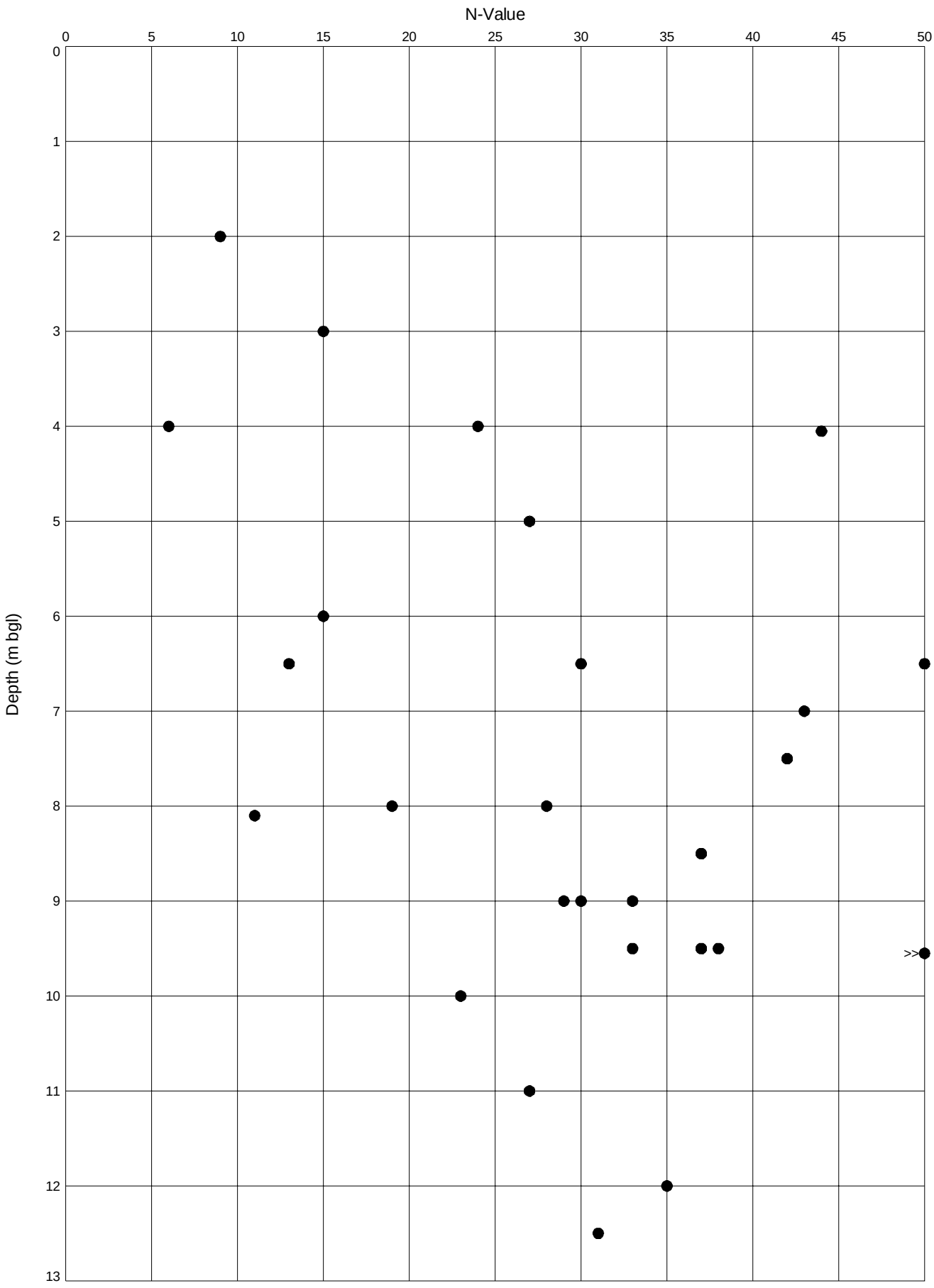

Little Eaton Alluvium (Predominantly Sand & Gravel) (Historic)

Client	Figure Title		Figure Number	Date
Highways England	**SPT N VALUE VERSUS DEPTH**		**L-AL-S&G3**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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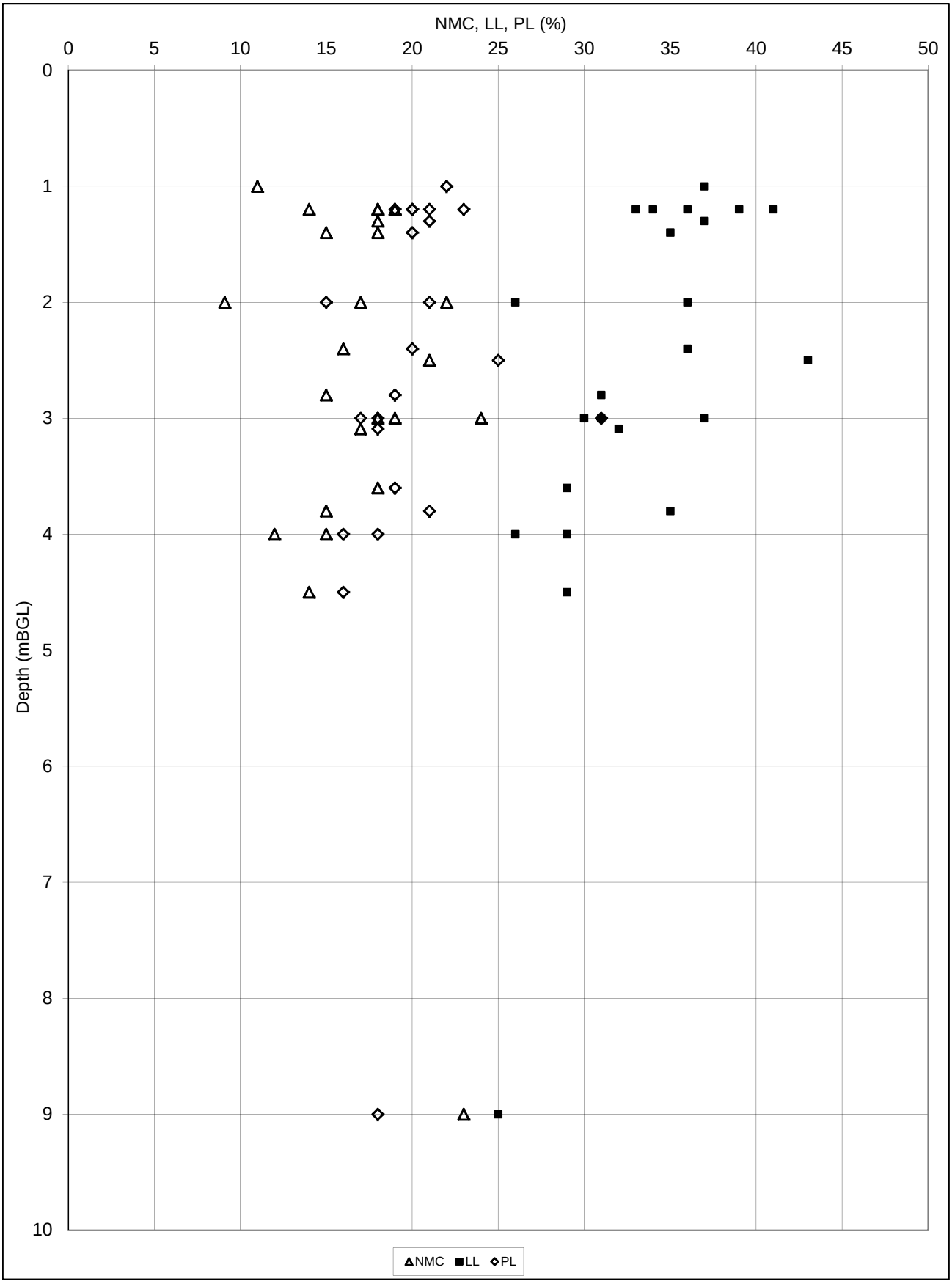
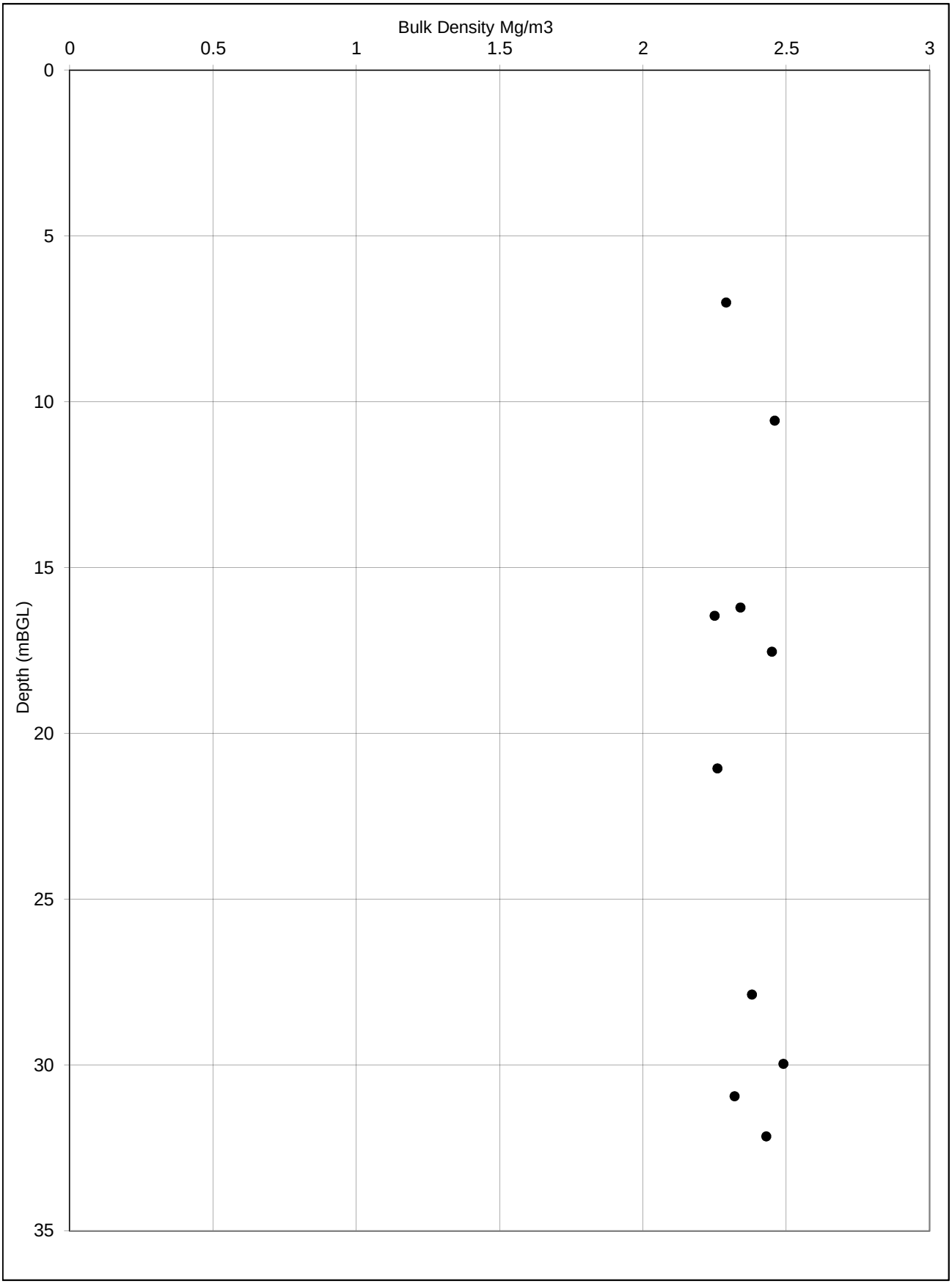


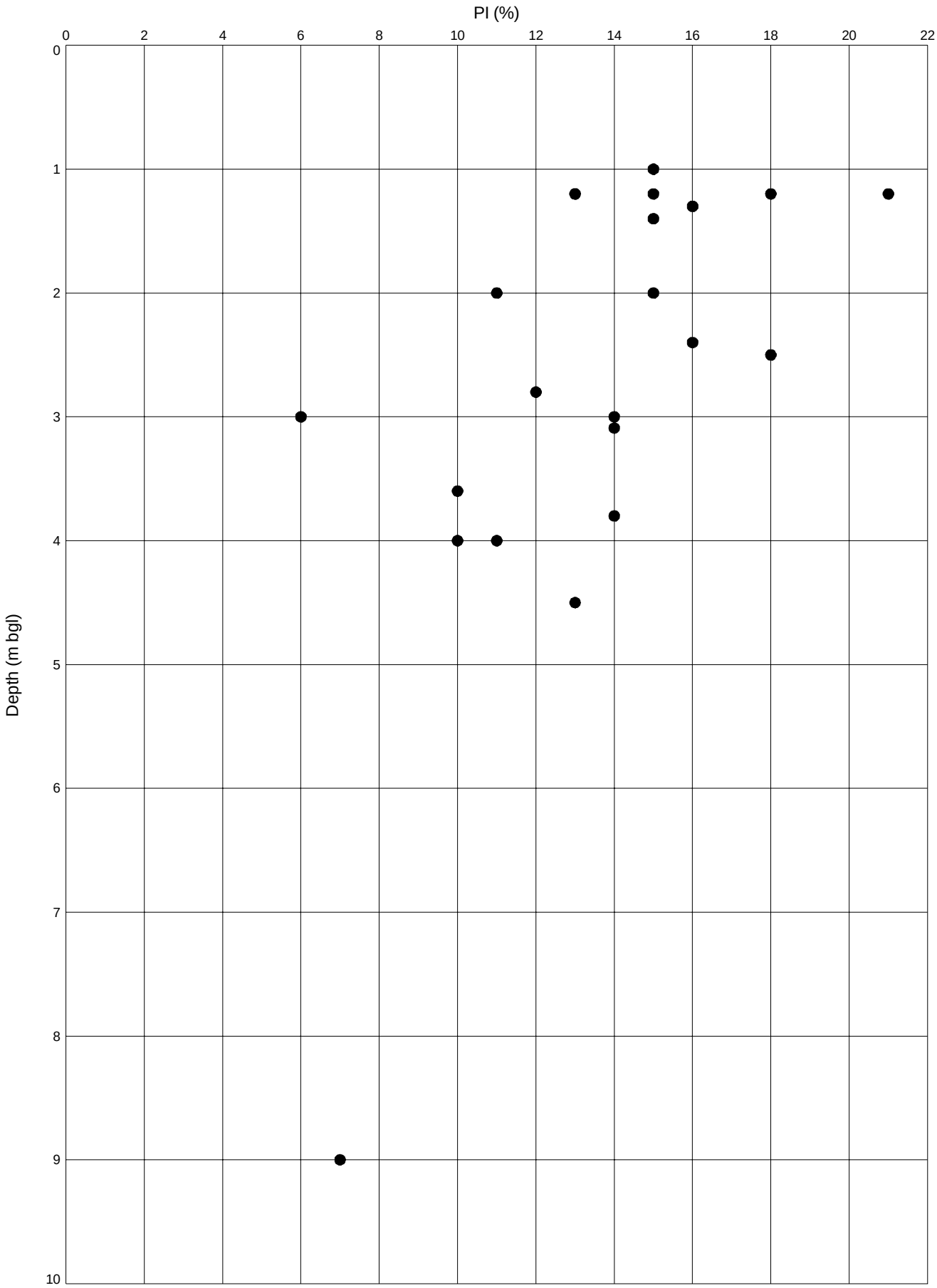
Kingsway Mercia Mudstone Group

Client	Figure Title		Figure Number	Date
Highways England	NMC, LL, PL (%) VERSUS DEPTH		K-MMG1	30/03/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



Kingsway Mercia Mudstone Group

Client	Figure Title	Figure Number	Date
Highways England	BULK DENSITY VERSUS DEPTH	K-MMG2	30/03/2017
	Project Title: A38 DERBY JUNCTIONS	Project Number: HE514503	AECOM



Kingsway Mercia Mudstone Group

Client	Figure Title		Figure Number	Date
Highways England	**PLASTICITY INDEX VERSUS DEPTH**		**K-MMG3**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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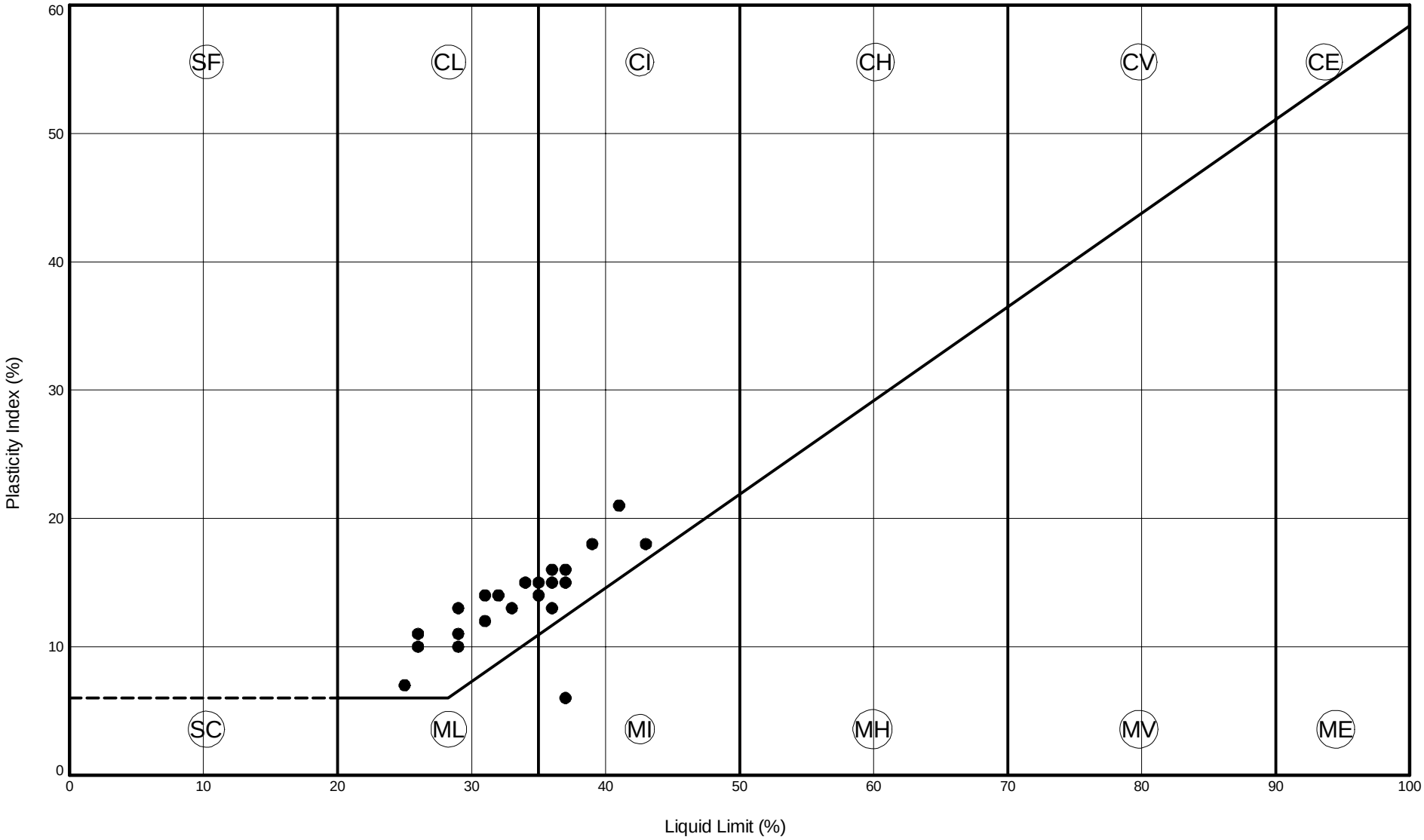
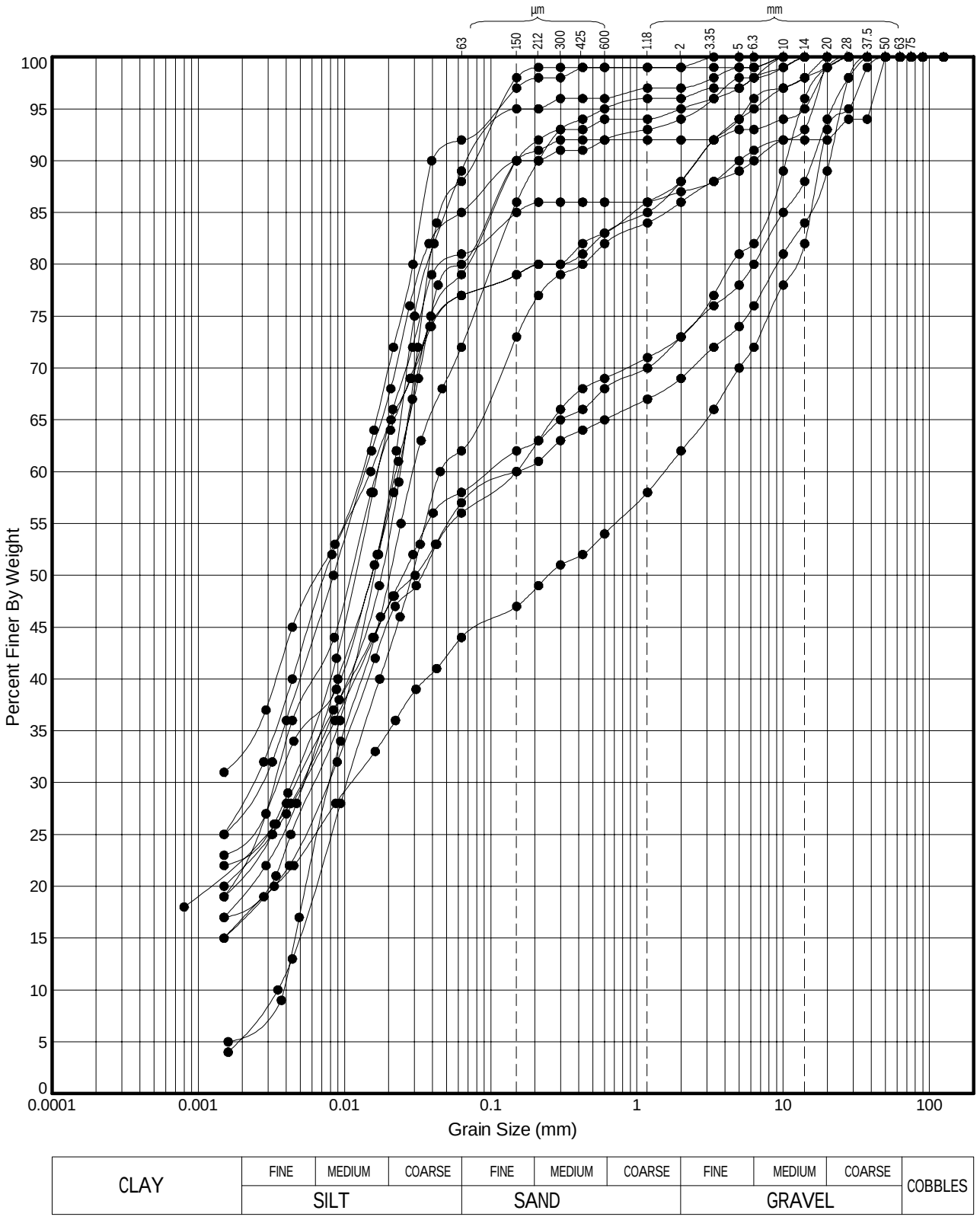


Kingsway Mercia Mudstone Group

Client	**Figure Title**		**Figure Number**	**Date**
Highways England	**PLASTICITY CHART**		**K-MMG4**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

PLASTICITY CHART 2017-06-27.GPJ AECOM AGS4.GDT 15/8/17



Kingsway Mercia Mudstone Group

Client	Figure Title	Figure Number	Date
Highways England	**PARTICLE SIZE DISTRIBUTION**	**K-MMG5**	**15/08/17**
	Project Title	**Project Number**	
	A38 DERBY JUNCTIONS	**HE514503**	AECOM

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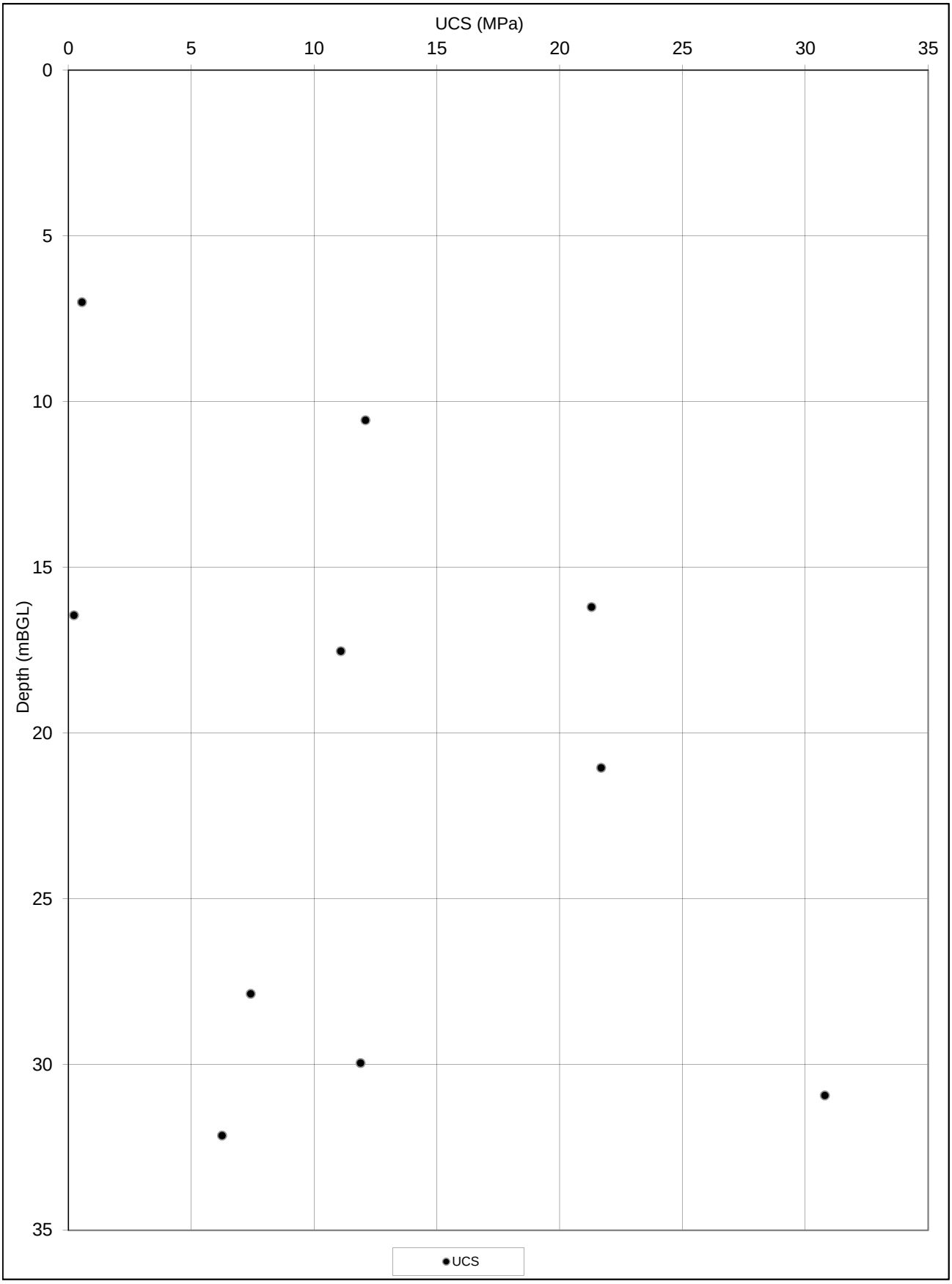
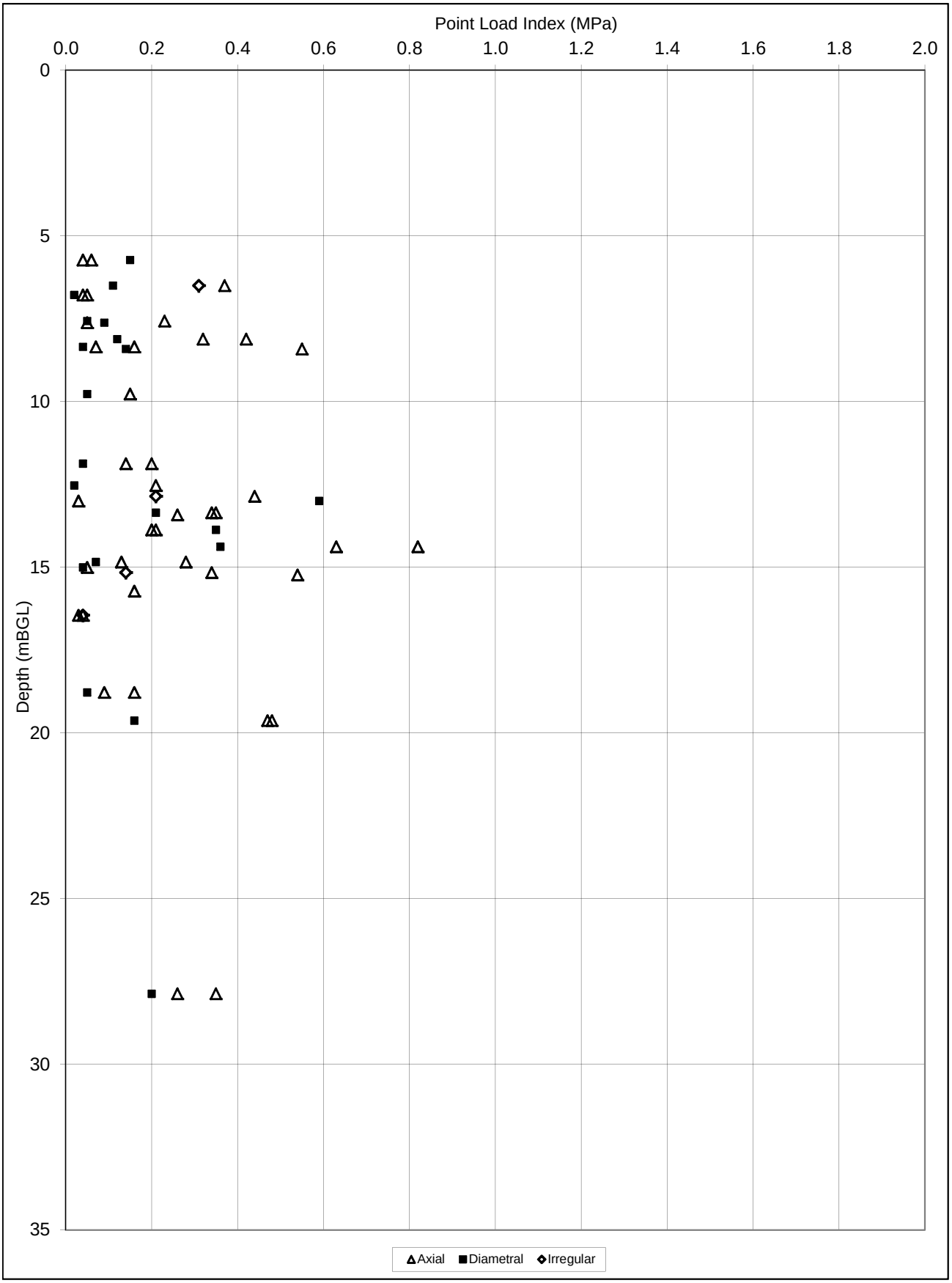


Kingsway Mercia Mudstone Group

Client	Figure Title		Figure Number	Date
Highways England	UCS VERSUS DEPTH		K-MMG6	30/03/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



Kingsway Mercia Mudstone Group (Mudstone)

Client	Figure Title	Figure Number	Date
Highways England	POINT LOAD INDEX (IS(50)) VS DEPTH	K-MMG7	30/03/2017
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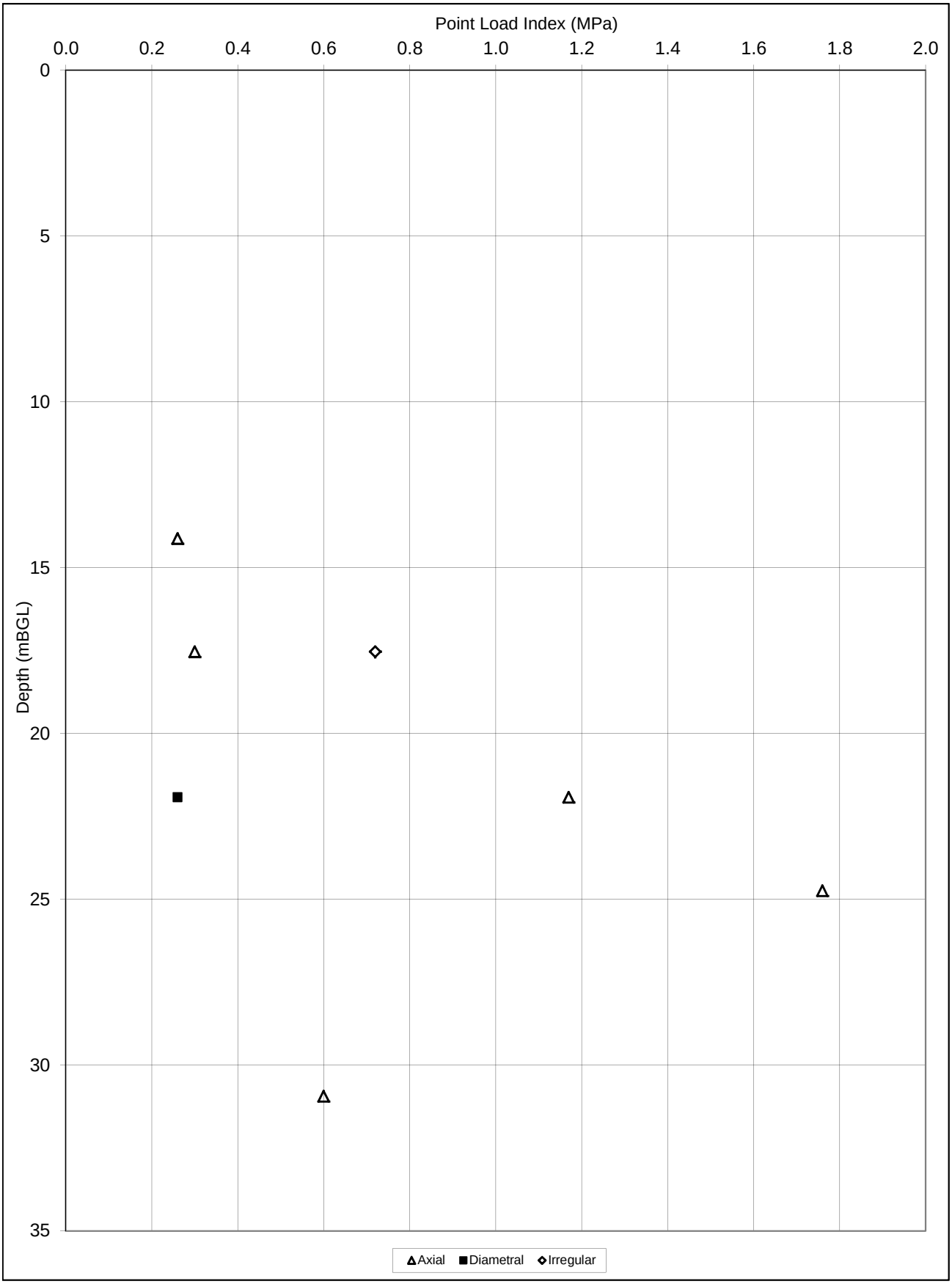
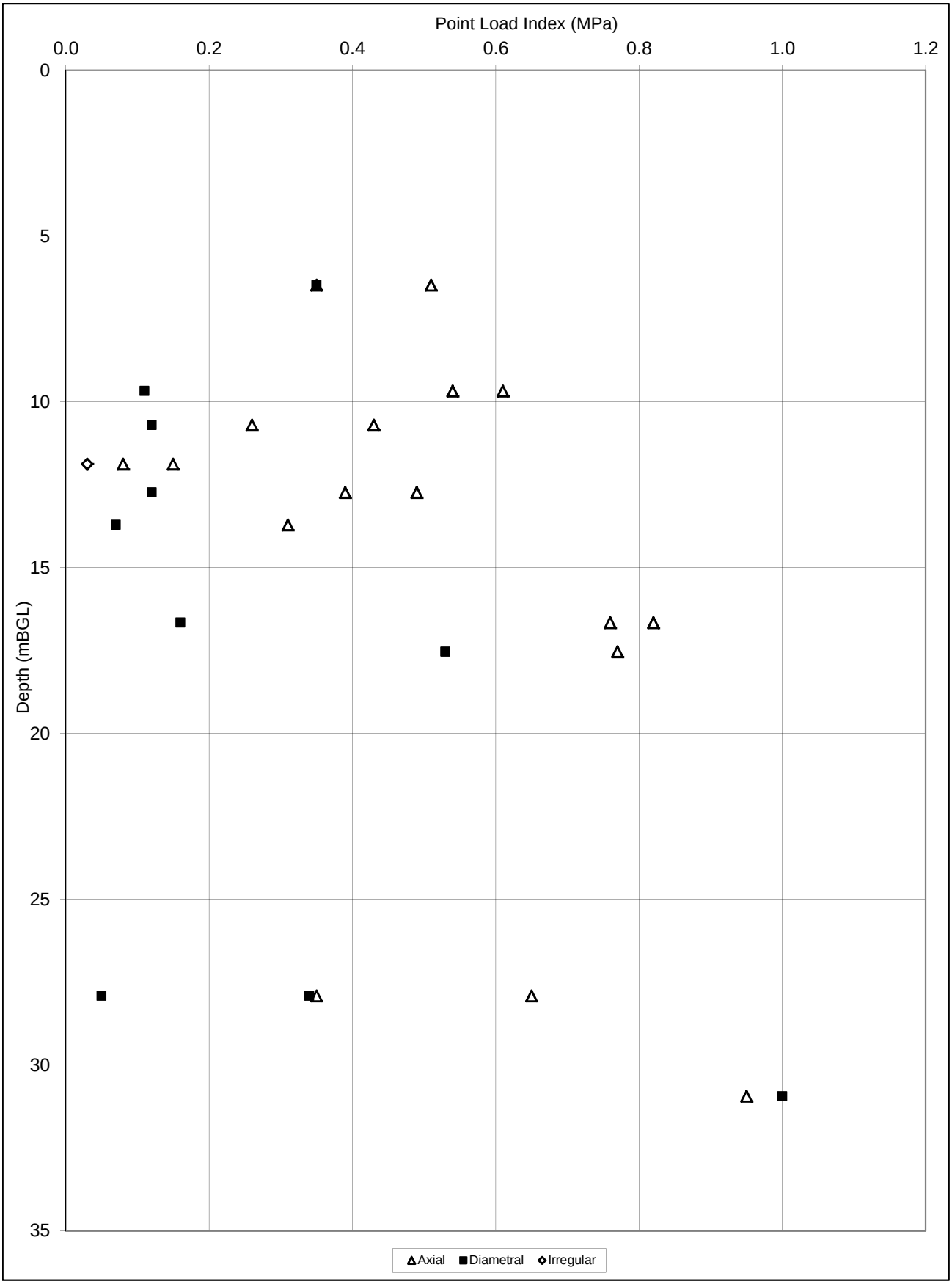


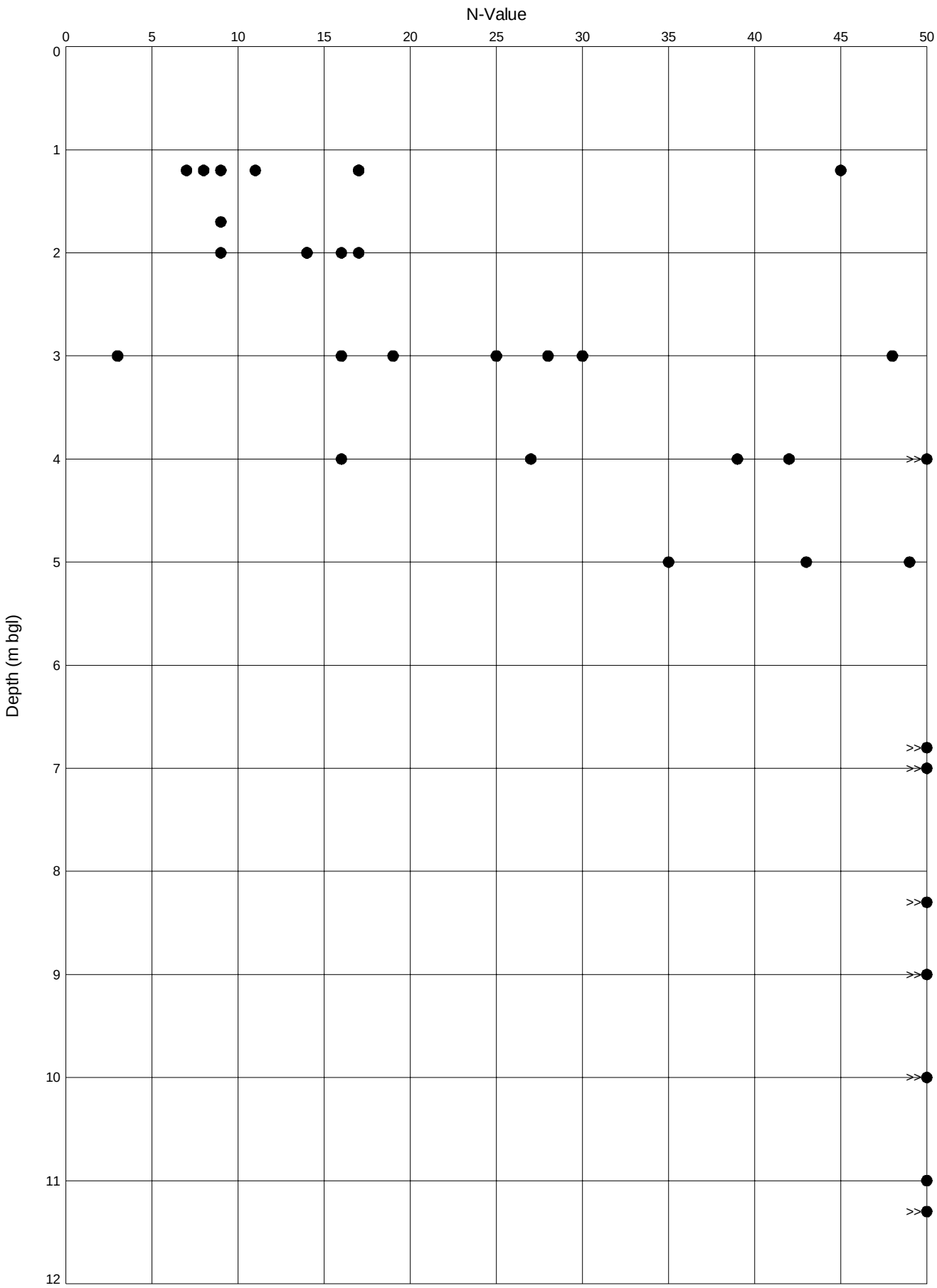
Kingsway Mercia Mudstone Group (Sandstone)

Client	Figure Title	Figure Number	Date
Highways England	POINT LOAD INDEX (IS(50)) VS DEPTH	K-MMG8	30/03/2017
	Project Title: A38 DERBY JUNCTIONS	Project Number: HE514503	AECOM



Kingsway Mercia Mudstone Group (Siltstone)

Client	Figure Title		Figure Number	Date
Highways England	POINT LOAD INDEX (IS(50)) VS DEPTH		K-MMG9	30/03/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



Kingsway Mercia Mudstone Group

Client	Figure Title		Figure Number	Date
Highways England	**SPT N VALUE VERSUS DEPTH**		**K-MMG10**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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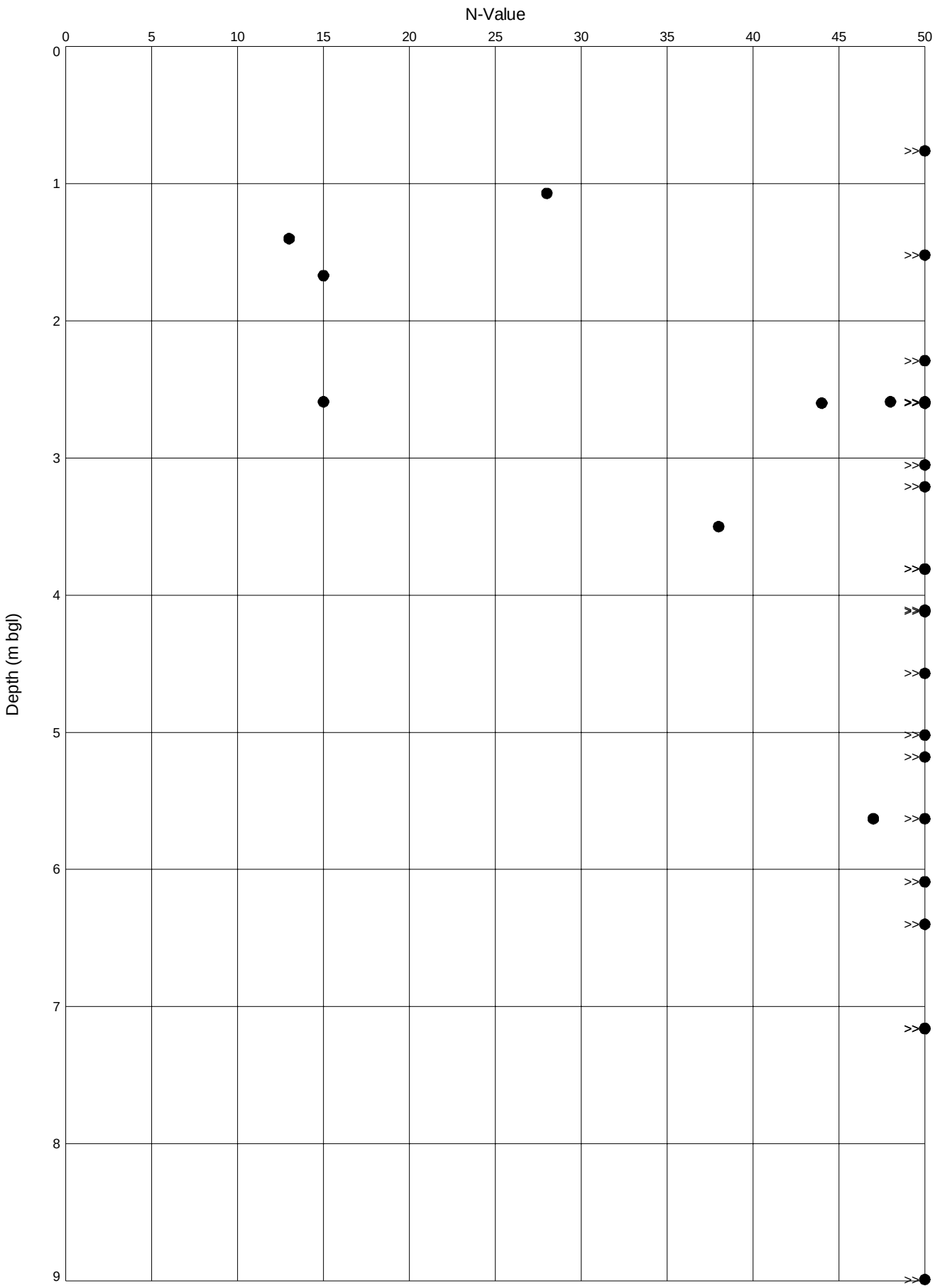

Kingsway Mercia Mudstone Group (Historic)

Client	Figure Title		Figure Number	Date
Highways England	**SPT N VALUE VERSUS DEPTH**		**K-MMG11**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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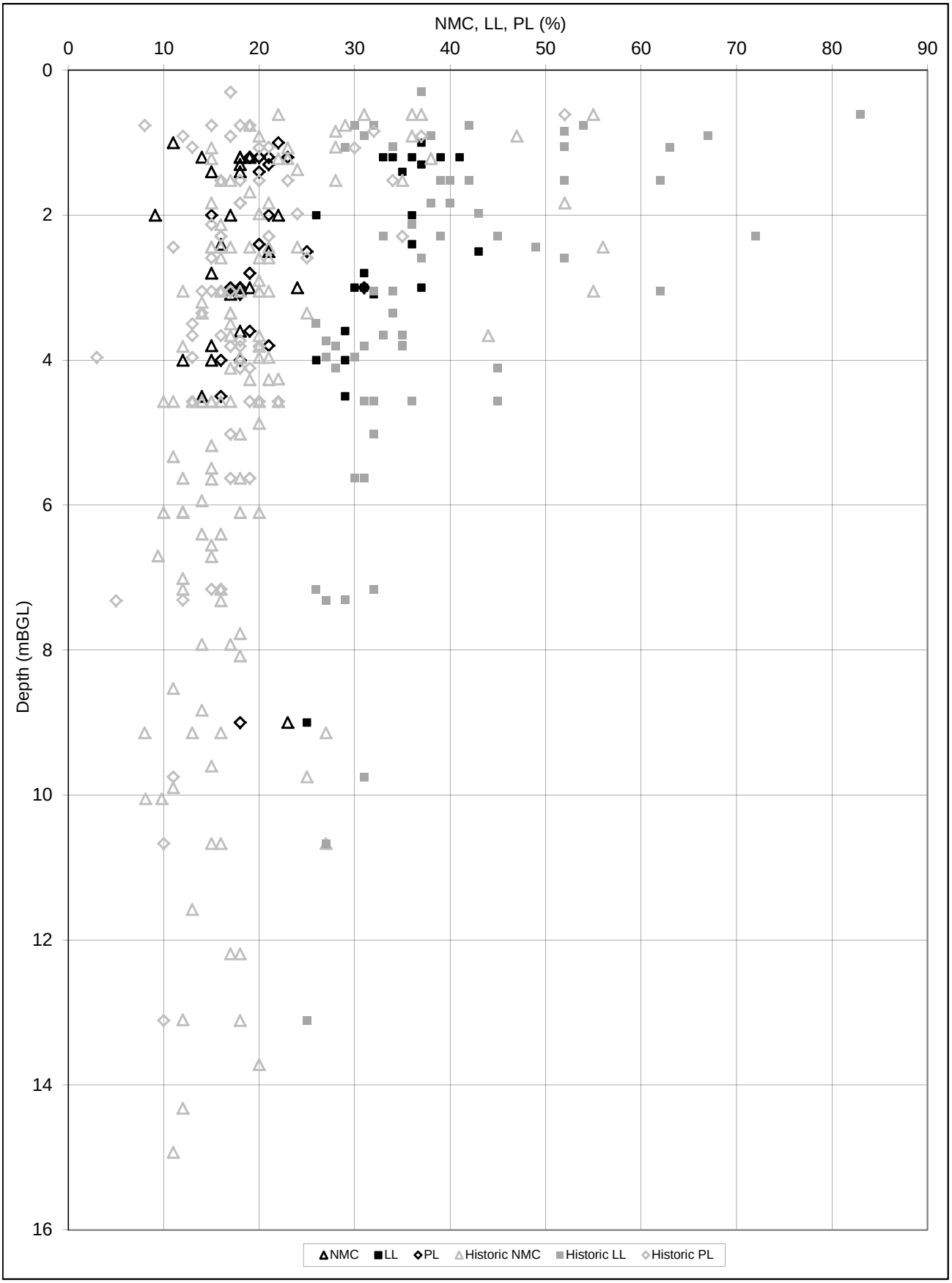
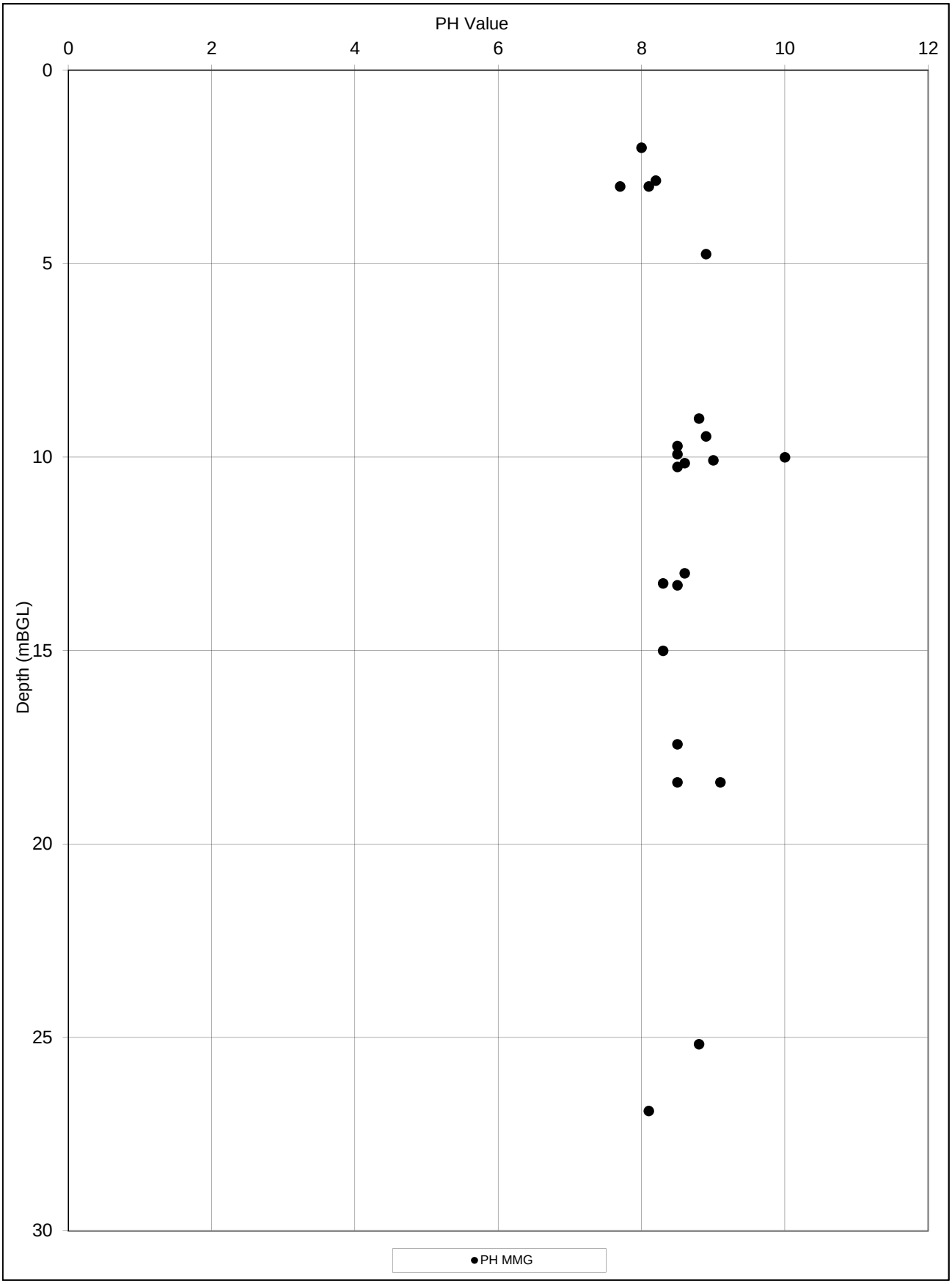


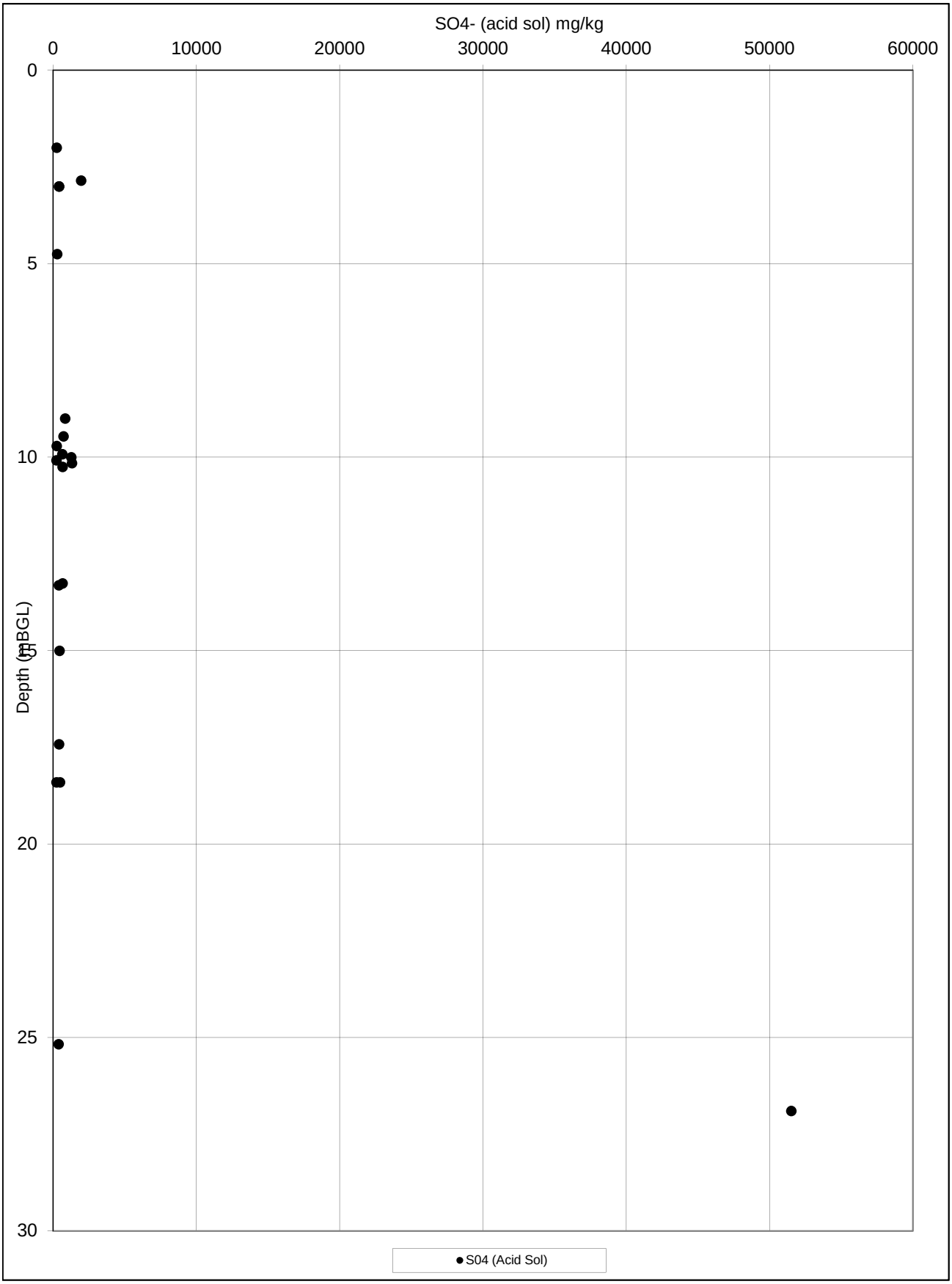
Kingsway Mercia Mudstone Group (New and Historic)

Client	Figure Title	Figure Number	Date
Highways England	NMC, LL, PL (%) VERSUS DEPTH	K-MMG12	15/08/2017
	Project Title: A38 DERBY JUNCTIONS	Project Number: HE514503	AECOM



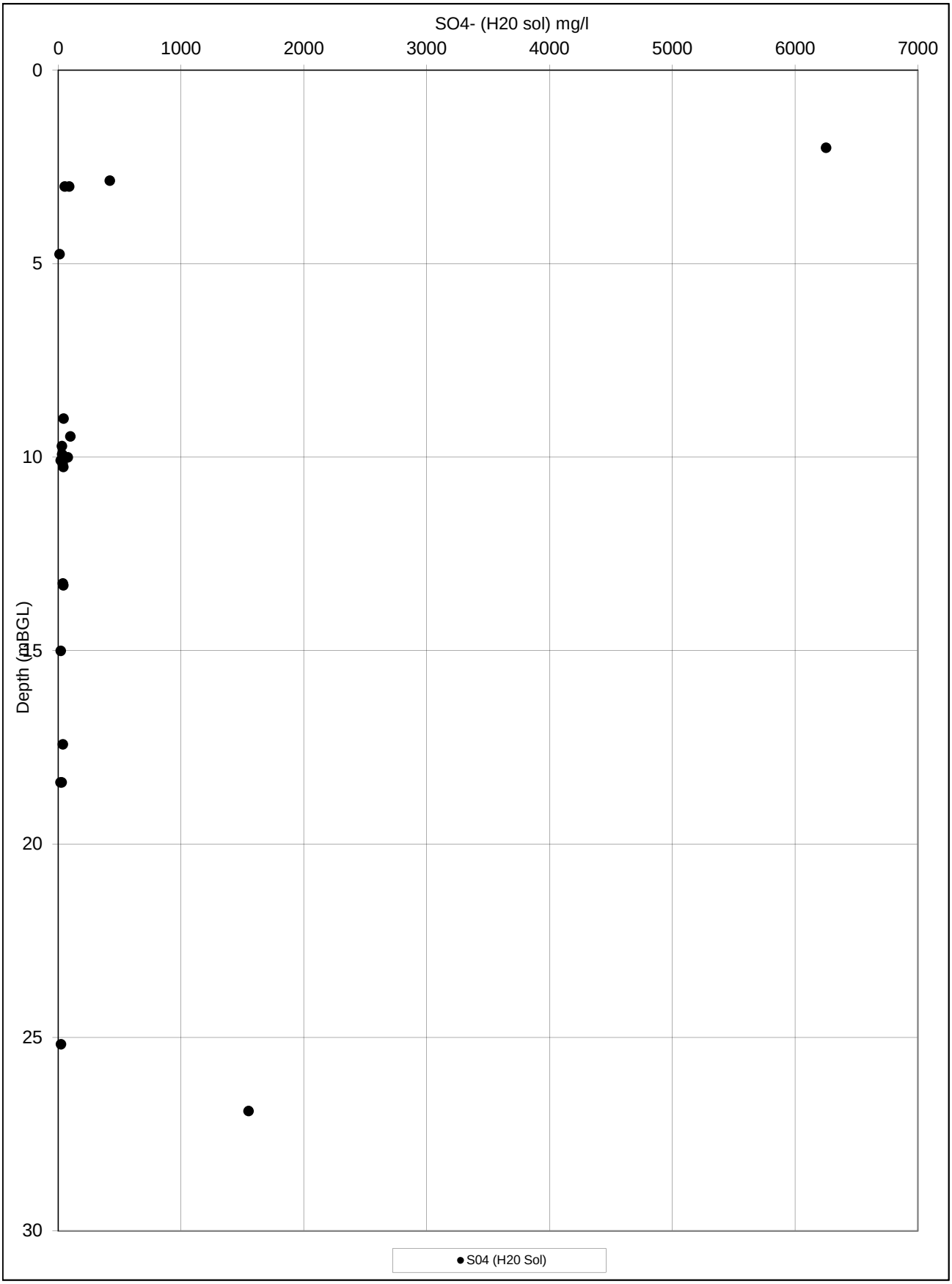
Kingsway Mercia Mudstone Group

Client	Figure Title		Figure Number	Date
Highways England	PH VALUE VS DEPTH		K-MMG13	15/08/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



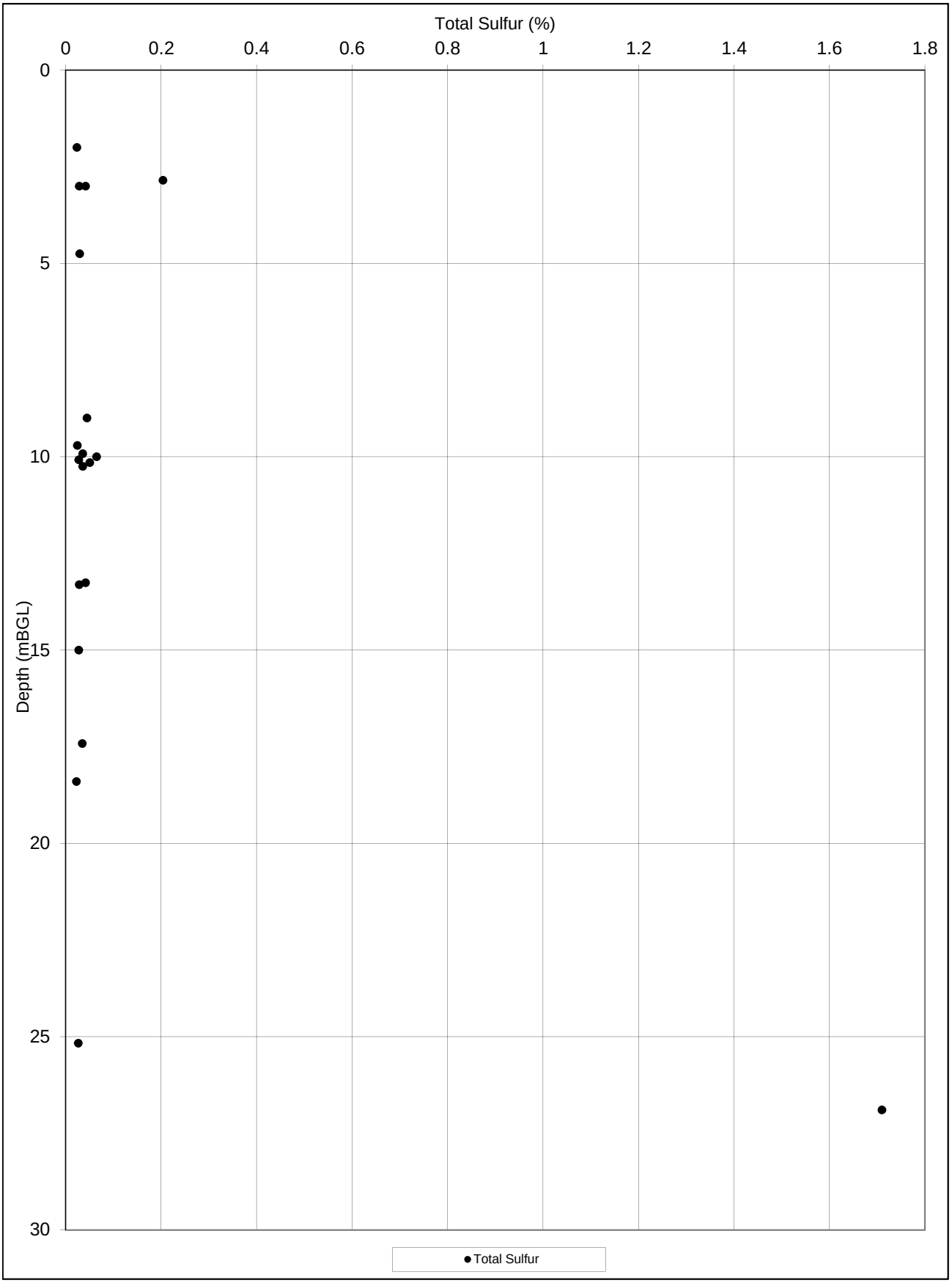
Kingsway Mercia Mudstone Group

Client	Figure Title		Figure Number	Date
Highways England	S04 (Acid Sol) mg/kg VS DEPTH		K-MMG14	15/08/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



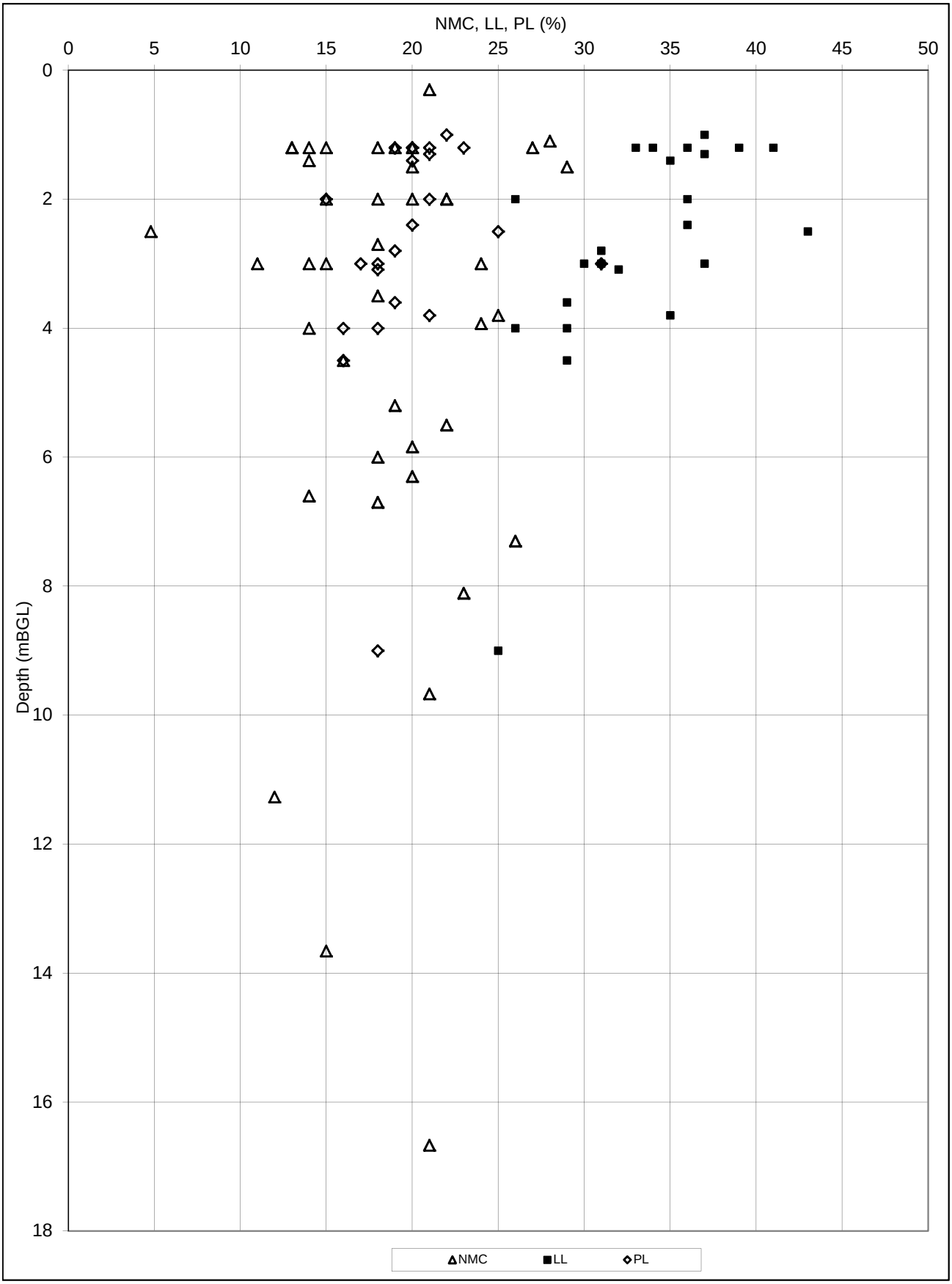
Kingsway Mercia Mudstone Group

Client	Figure Title		Figure Number	Date
Highways England	S04 (H20 Sol) mg/l VS DEPTH		K-MMG15	15/08/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



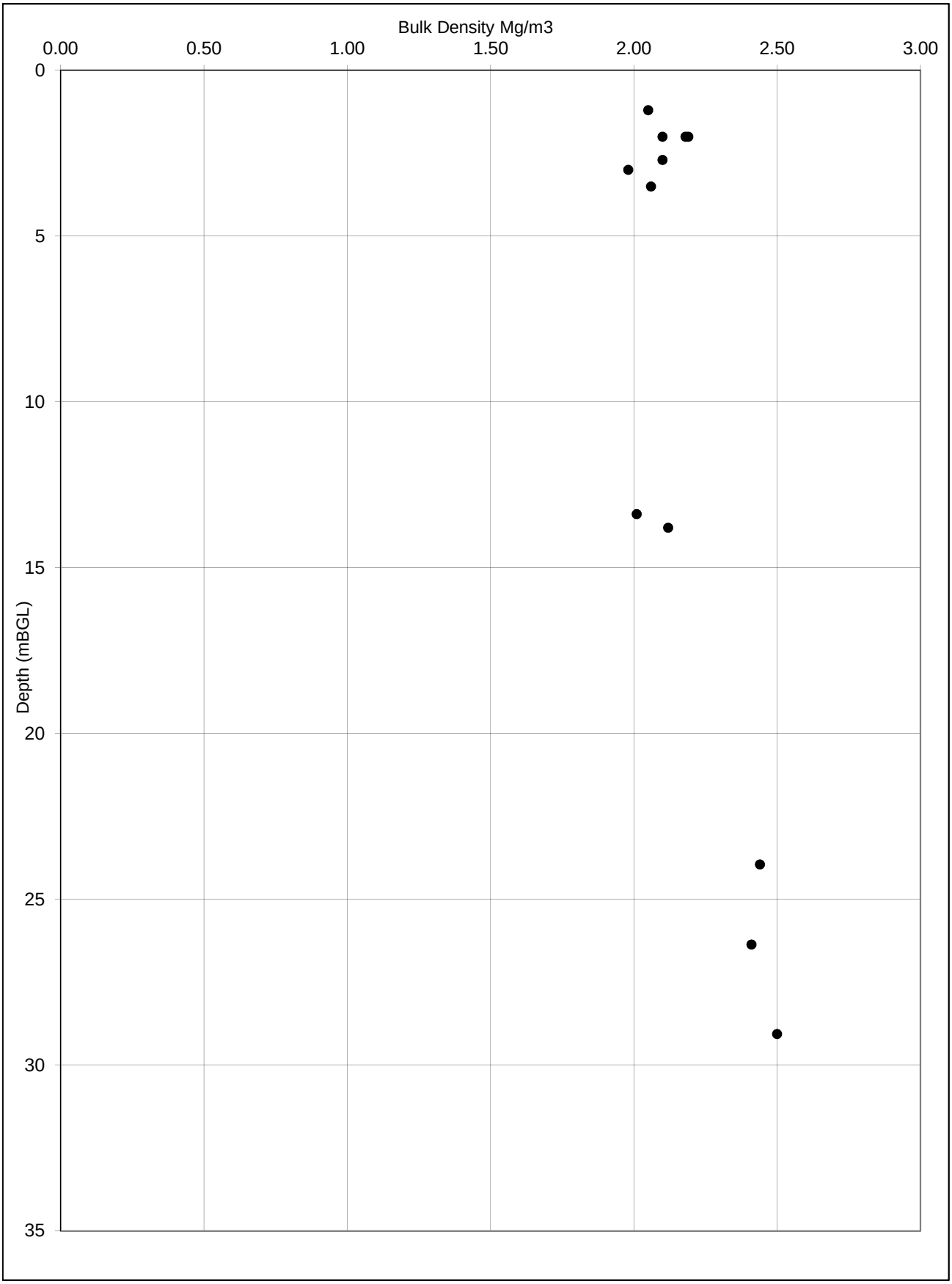
Kingsway Mercia Mudstone Group

Client	Figure Title		Figure Number	Date
Highways England	TOTAL SULFUR(%) VS DEPTH		K-MMG16	15/08/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



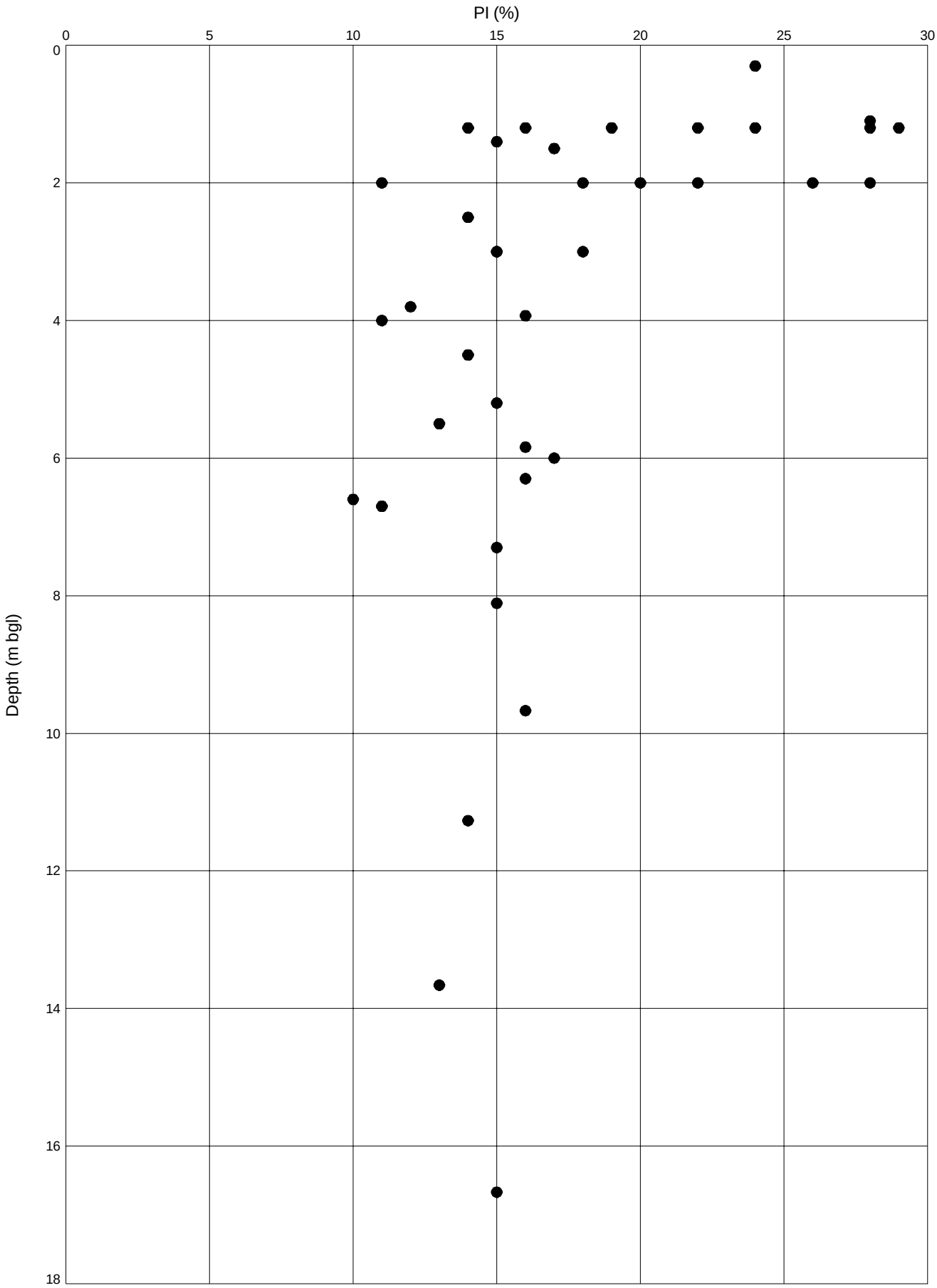
Markeaton Mercia Mudstone Group

Client	Figure Title	Figure Number	Date
Highways England	NMC, LL, PL (%) VERSUS DEPTH	M-MMG1	30/03/2017
	Project Title: A38 DERBY JUNCTIONS	Project Number: HE514503	AECOM



Markeaton Mercia Mudstone Group

Client	Figure Title		Figure Number	Date
Highways England	BULK DENSITY VERSUS DEPTH		M-MMG2	30/03/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



Markeaton Mercia Mudstone Group

Client	Figure Title		Figure Number	Date
Highways England	**PLASTICITY INDEX VERSUS DEPTH**		**M-MMG3**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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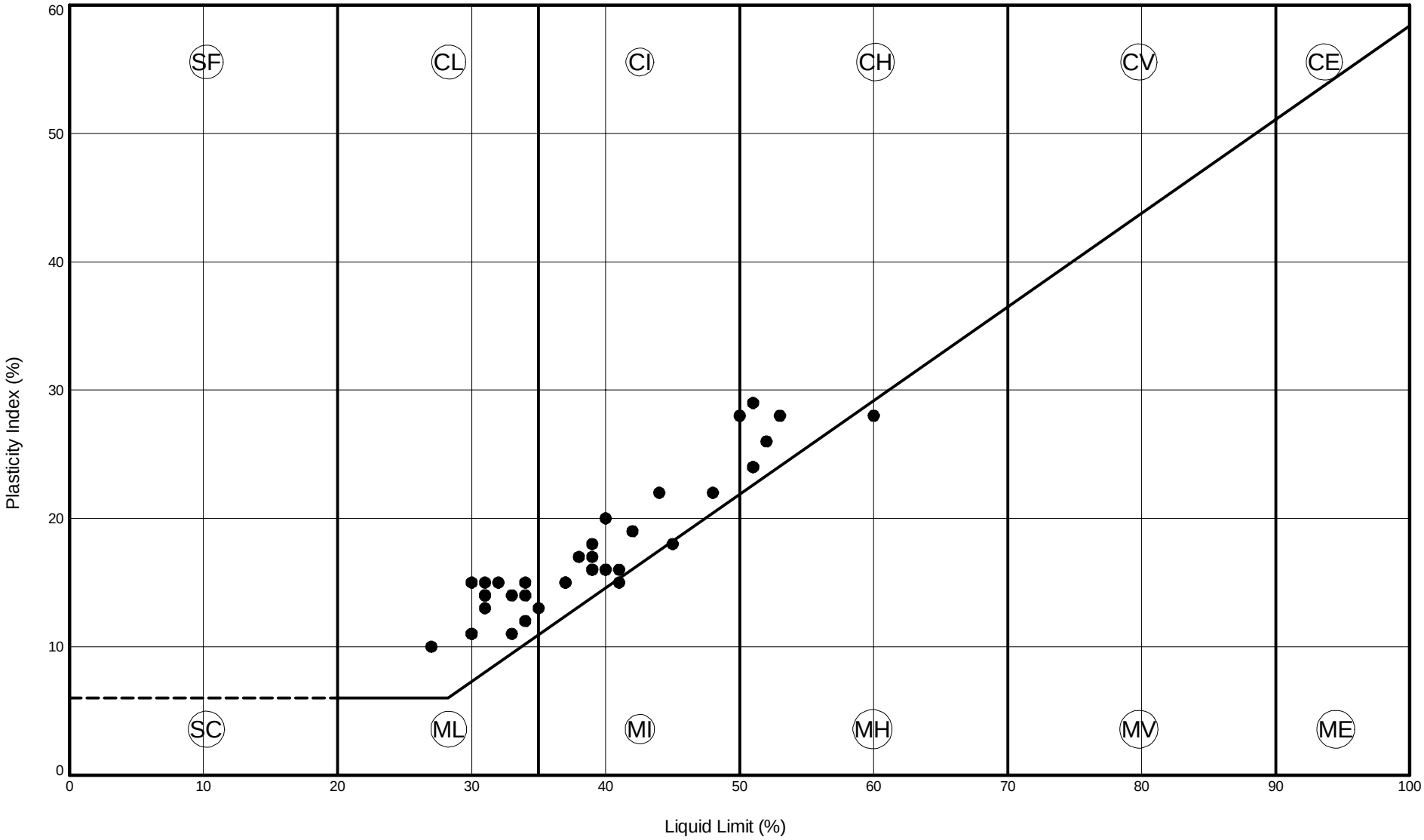
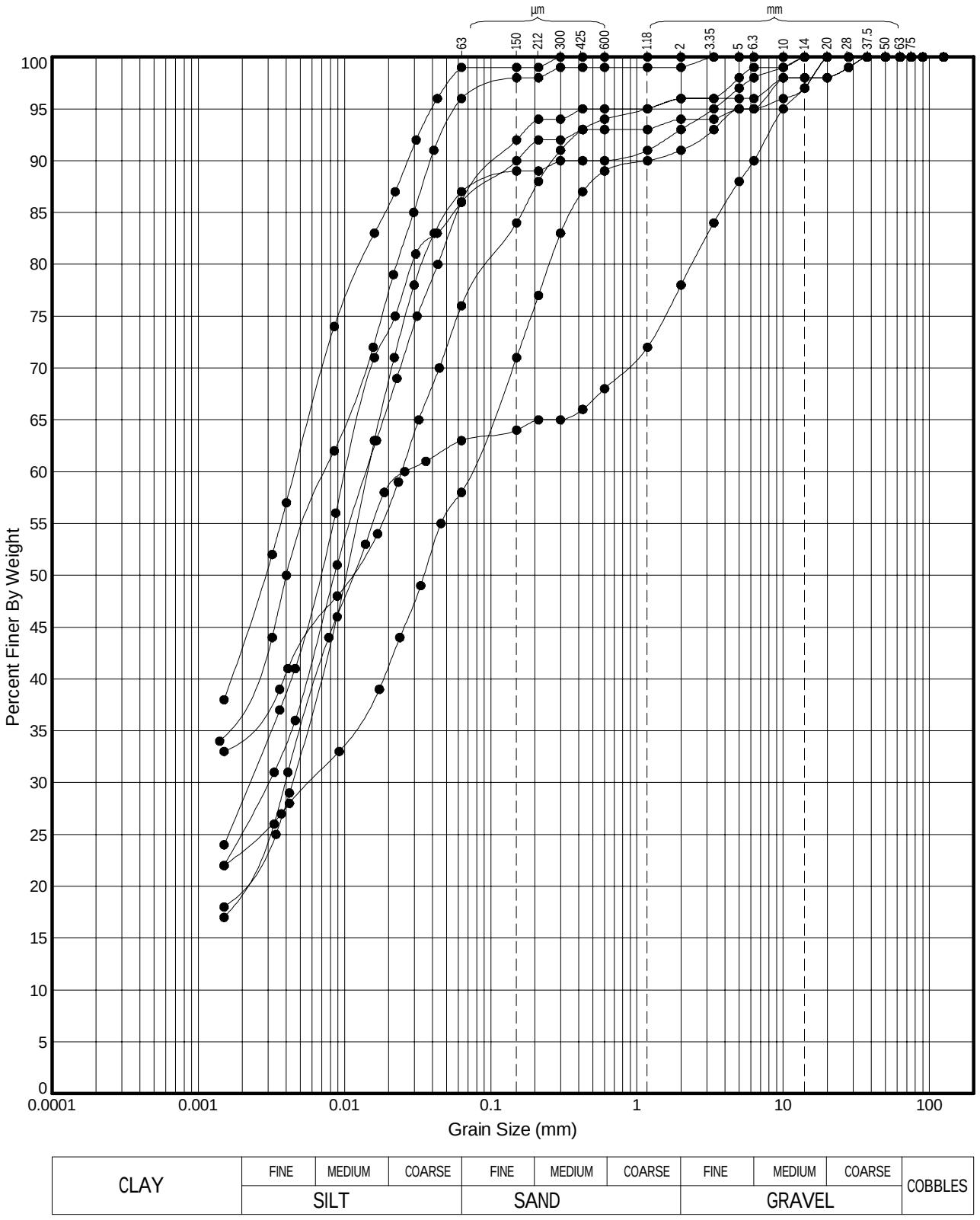


Markeaton Mercia Mudstone Group

Client	**Figure Title**		**Figure Number**	**Date**
Highways England	**PLASTICITY CHART**		**M-MMG4**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

PLASTICITY CHART 2017-06-27.GPJ AECOM AGS4.GDT 15/8/17



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	SILT			SAND			GRAVEL			

Markeaton Mercia Mudstone Group

Client	Figure Title		Figure Number	Date
Highways England	**PARTICLE SIZE DISTRIBUTION**		**M-MMG5**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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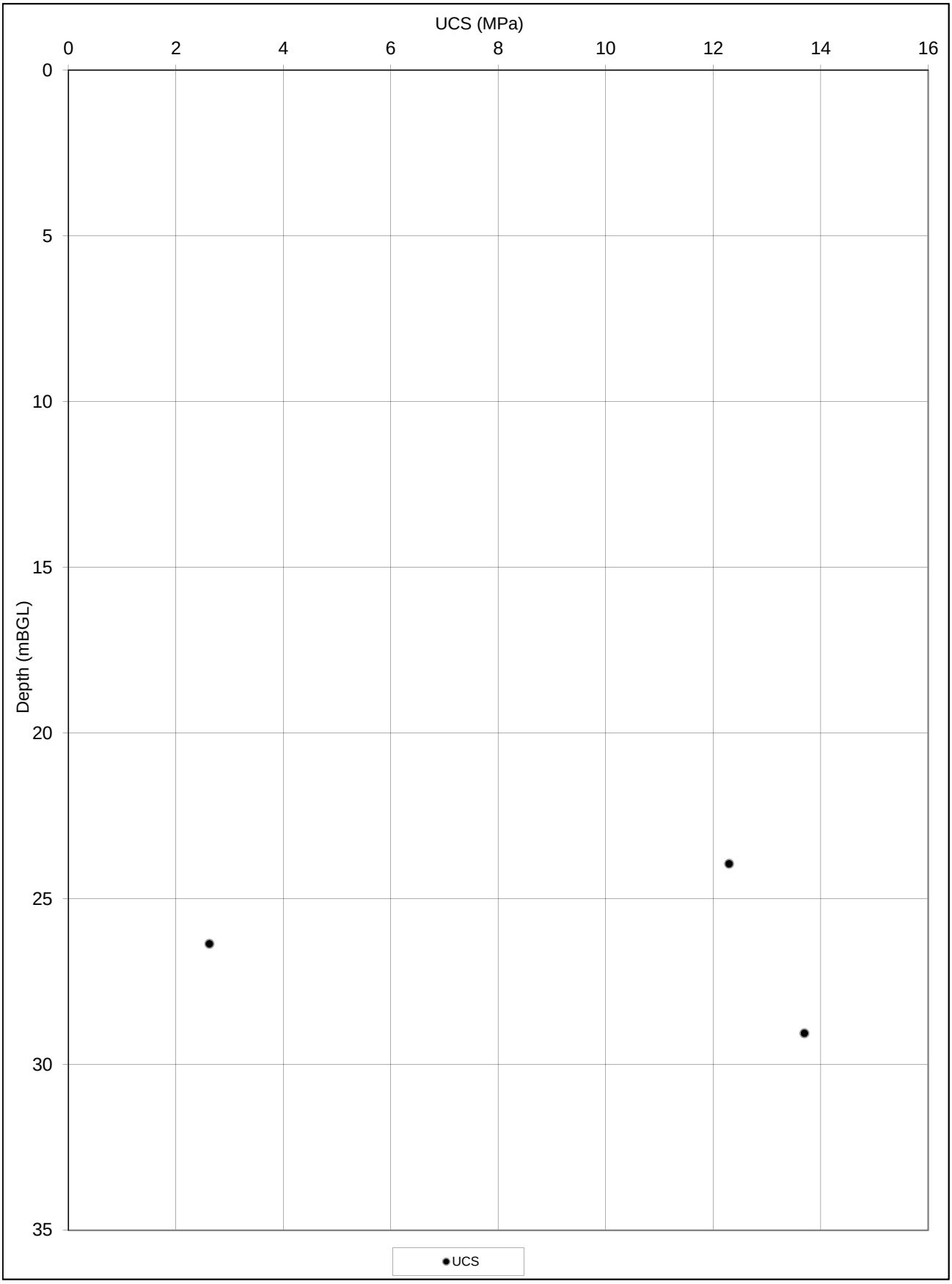
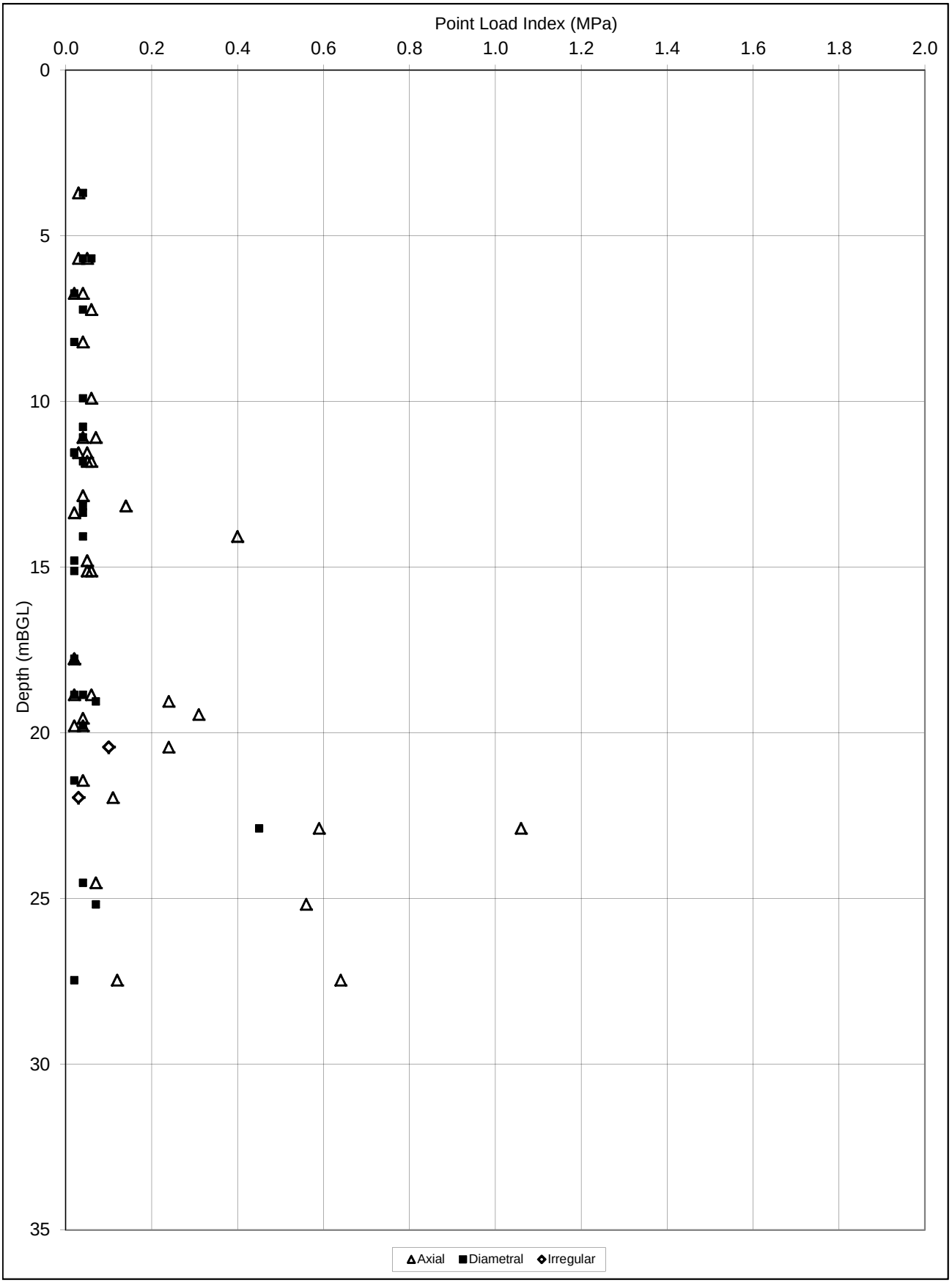


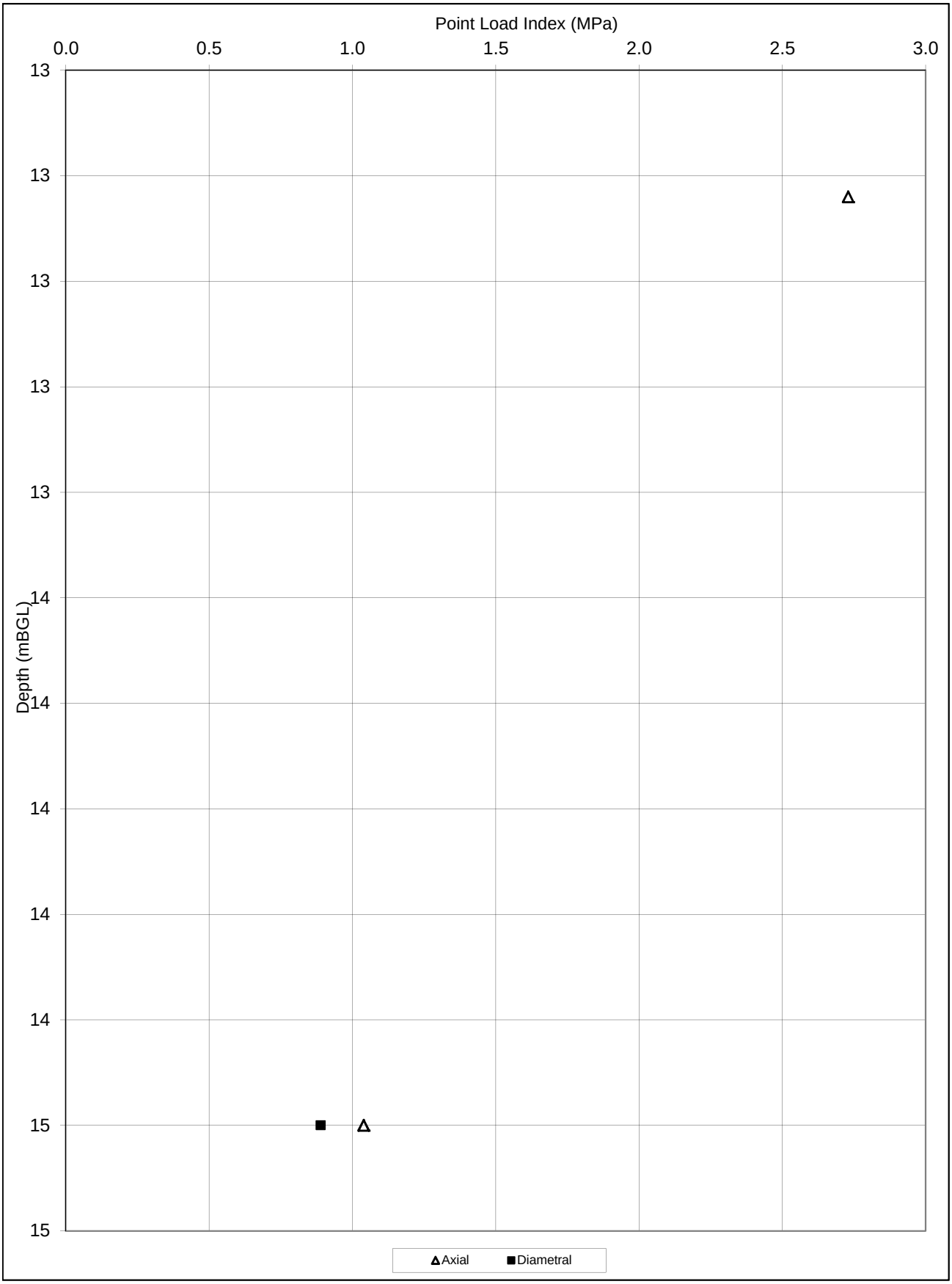
Markeaton Mercia Mudstone Group

Client	Figure Title		Figure Number	Date
Highways England	UCS VERSUS DEPTH		M-MMG6	30/03/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



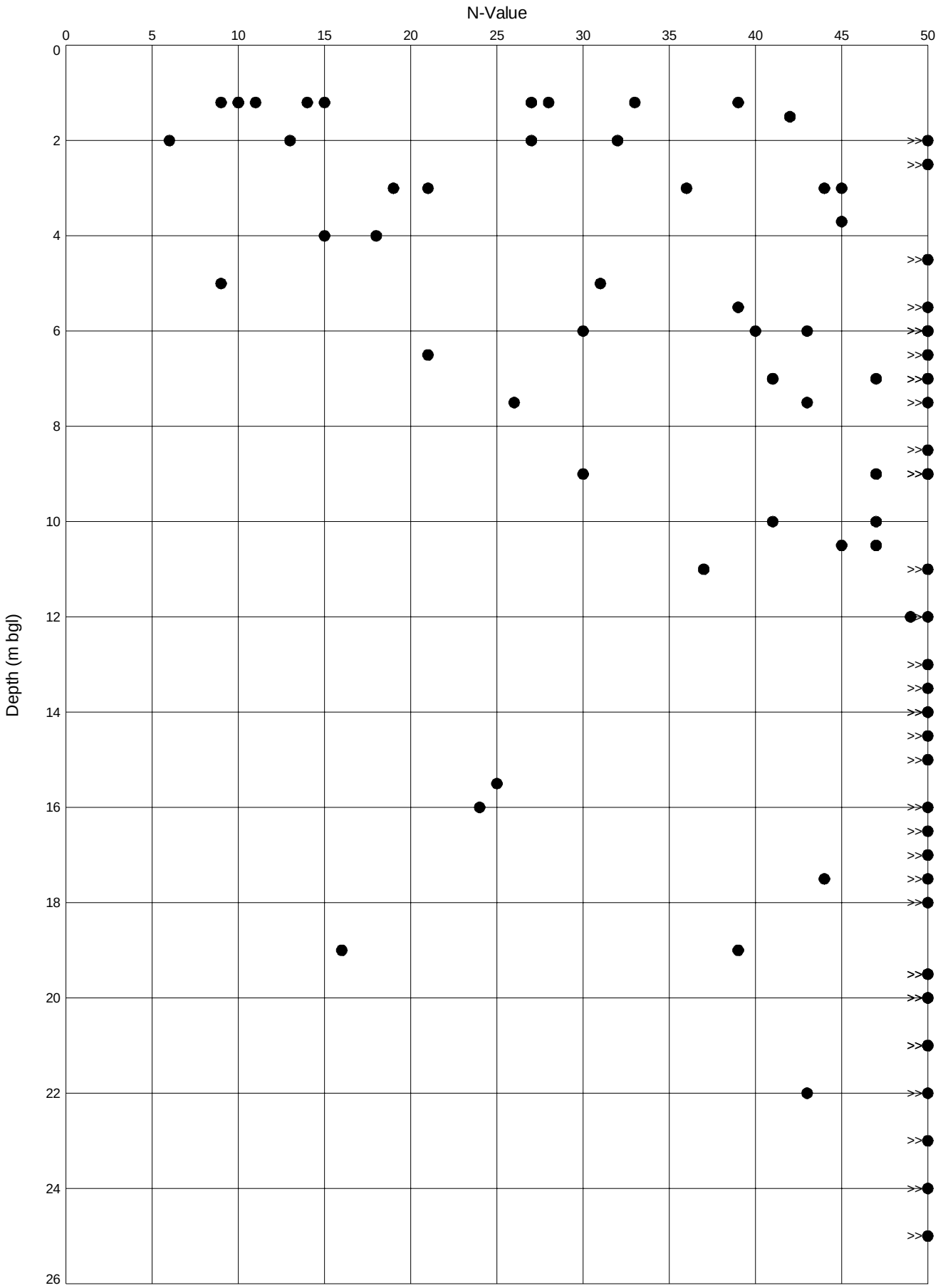
Markeaton Mercia Mudstone Group (Mudstone)

Client	Figure Title	Figure Number	Date
Highways England	POINT LOAD INDEX (IS(50)) VS DEPTH	M-MMG7	30/03/2017
	Project Title: A38 DERBY JUNCTIONS	Project Number: HE514503	AECOM



Markeaton Mercia Mudstone Group (Siltstone)

Client	Figure Title	Figure Number	Date
Highways England	POINT LOAD INDEX (IS(50)) VS DEPTH	M- MMG8	29/03/2017
	Project Title: A38 DERBY JUNCTIONS	Project Number: HE514503	AECOM



Markeaton Mercia Mudstone Group

Client	Figure Title		Figure Number	Date
Highways England	**SPT N VALUE VERSUS DEPTH**		**M-MMG9**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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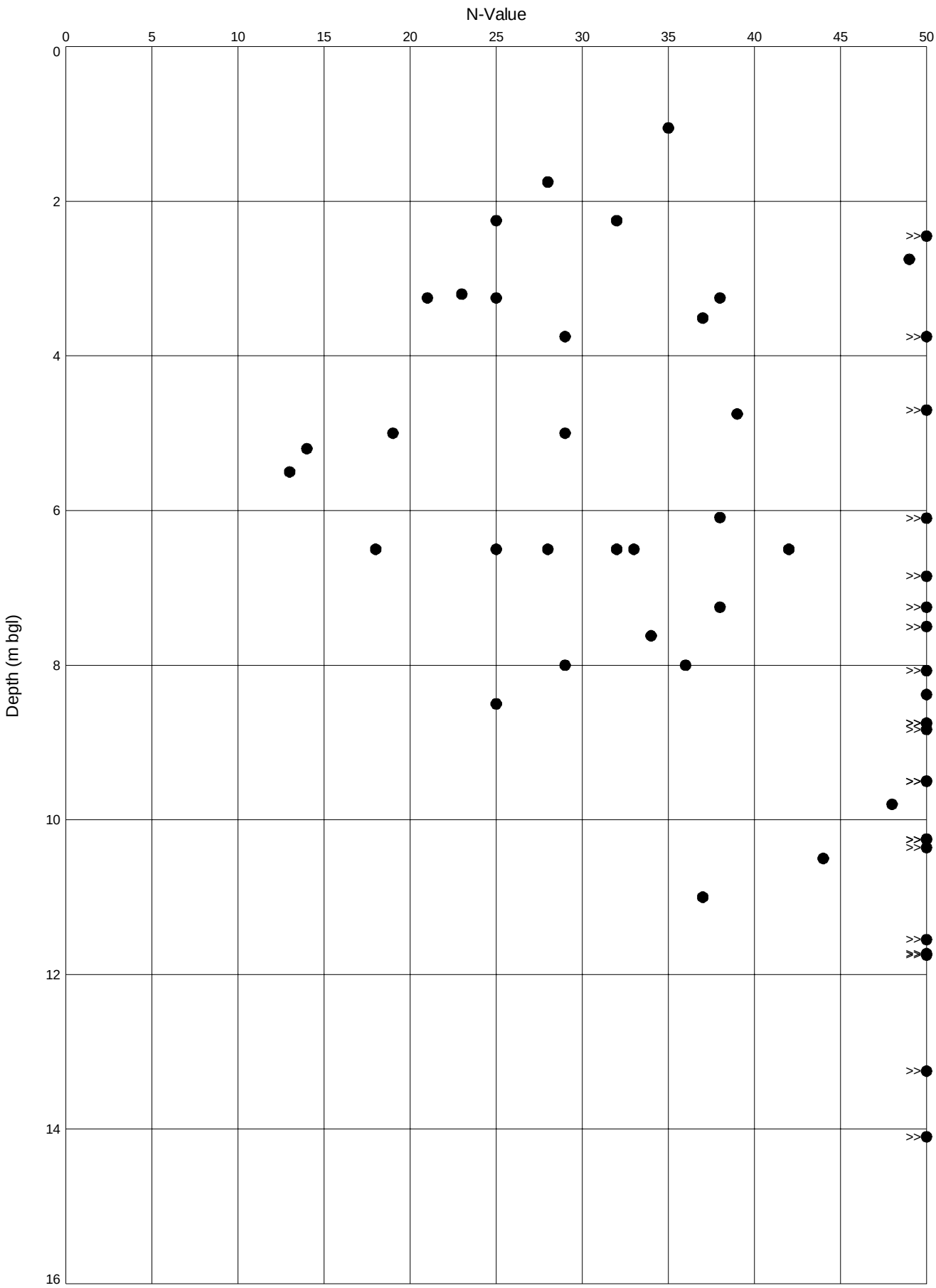

Markeaton Mercia Mudstone Group (Historic)

Client	Figure Title		Figure Number	Date
Highways England	**SPT N VALUE VERSUS DEPTH**		**M-MMG10**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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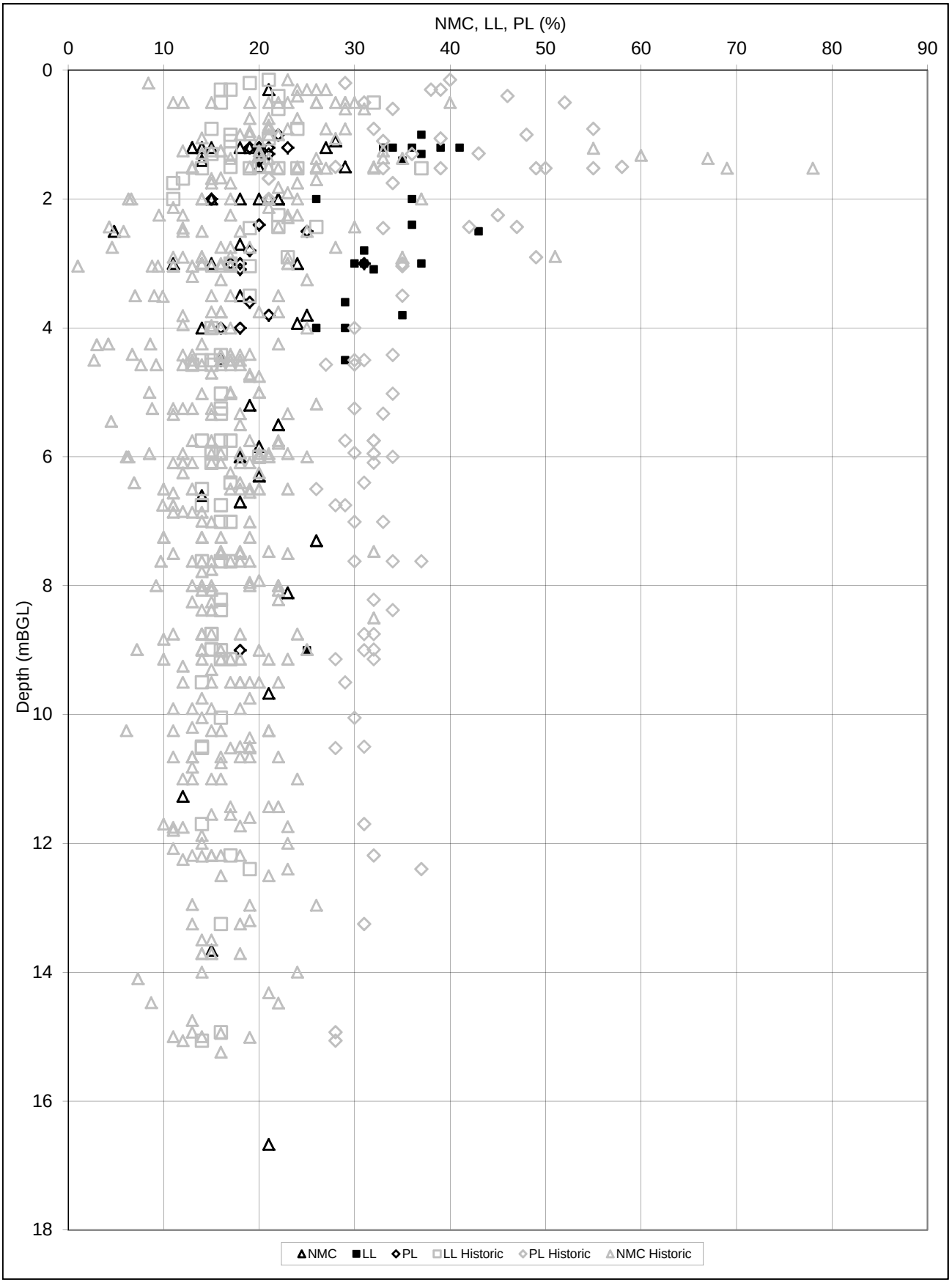
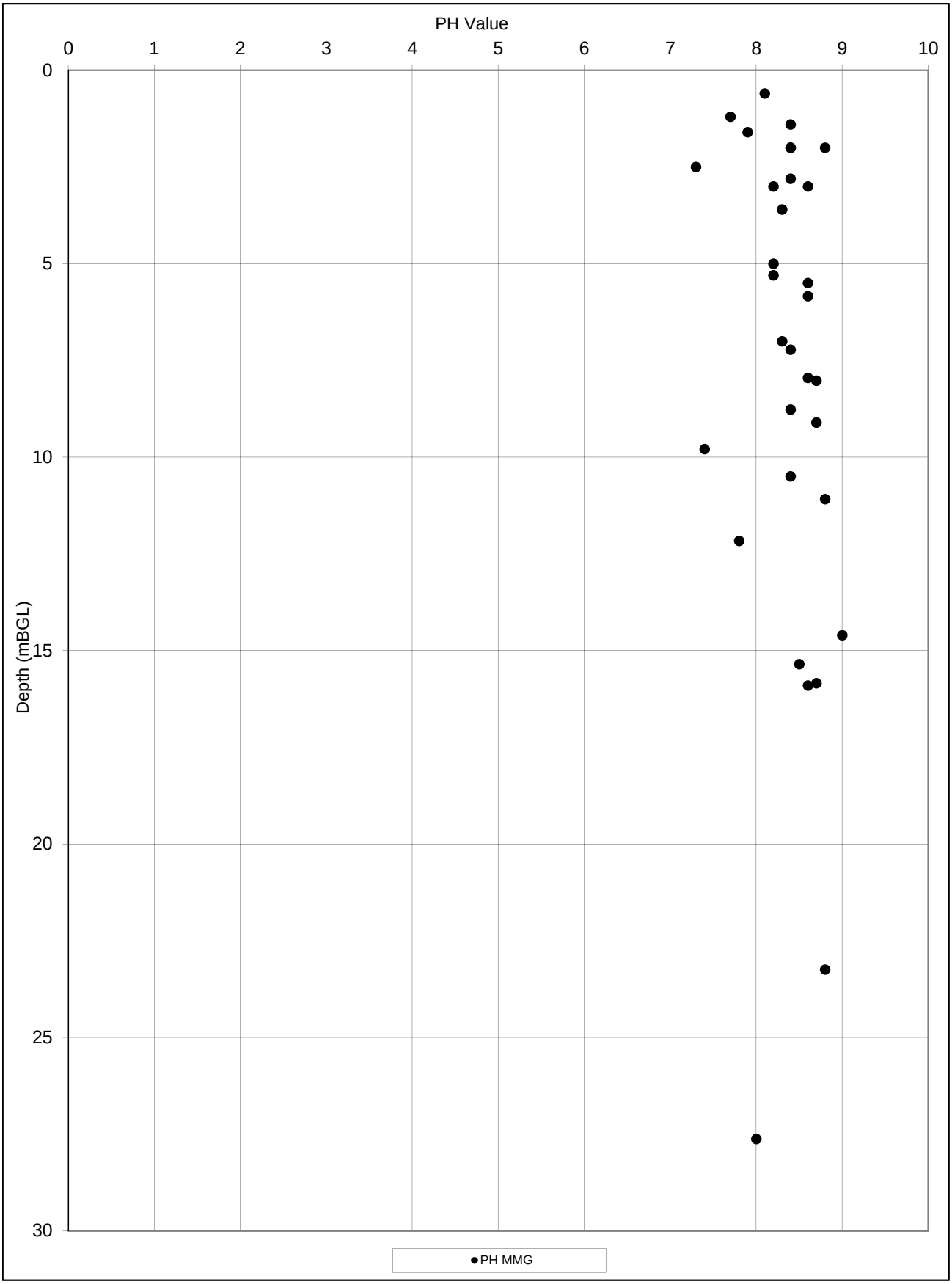


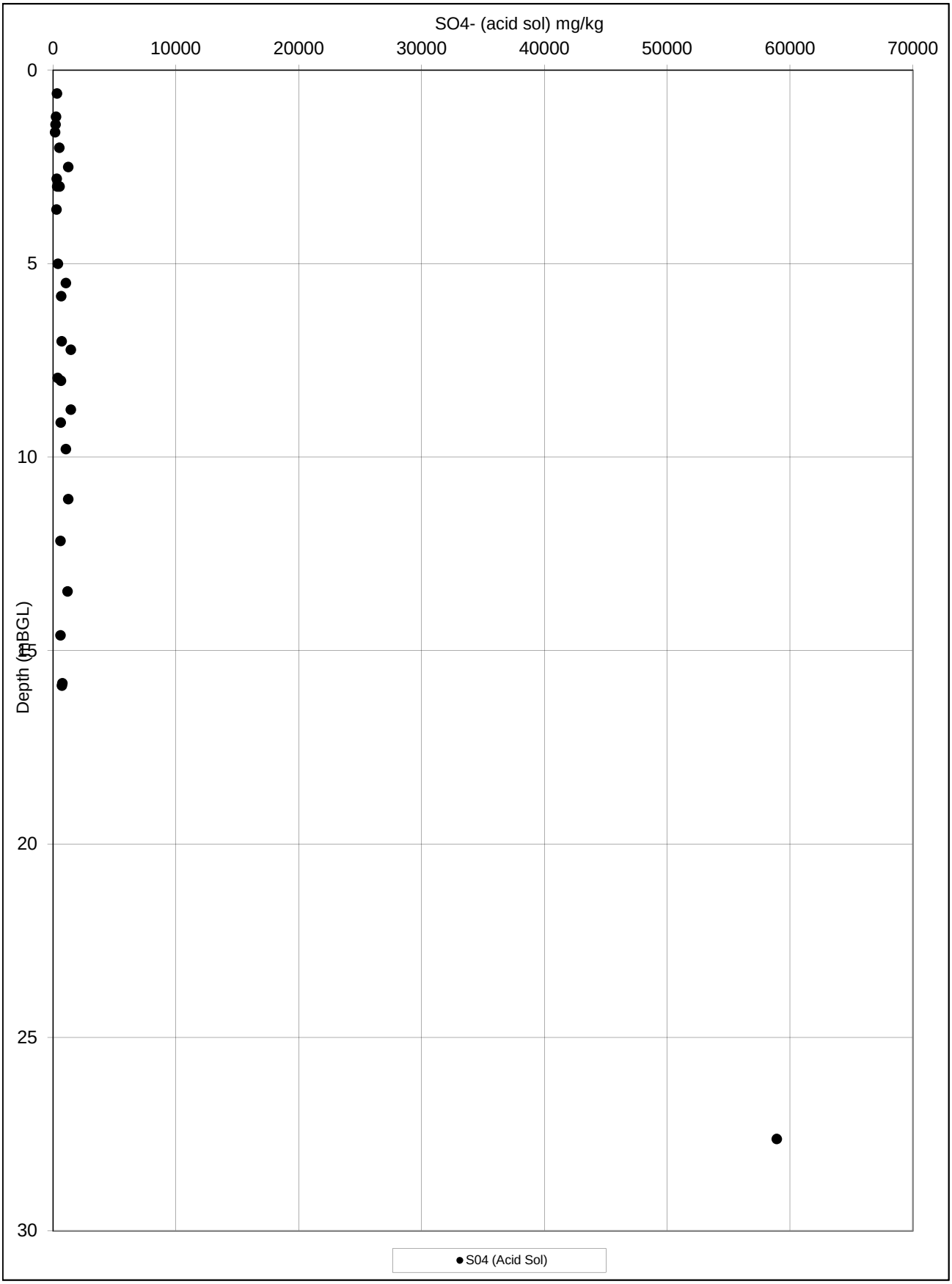
Markeaton Mercia Mudstone Group (New + Historic)

Client	Figure Title	Figure Number	Date
Highways England	NMC, LL, PL (%) VERSUS DEPTH	M-MMG11	06/04/2017
	Project Title: A38 DERBY JUNCTIONS	Project Number: HE514503	AECOM



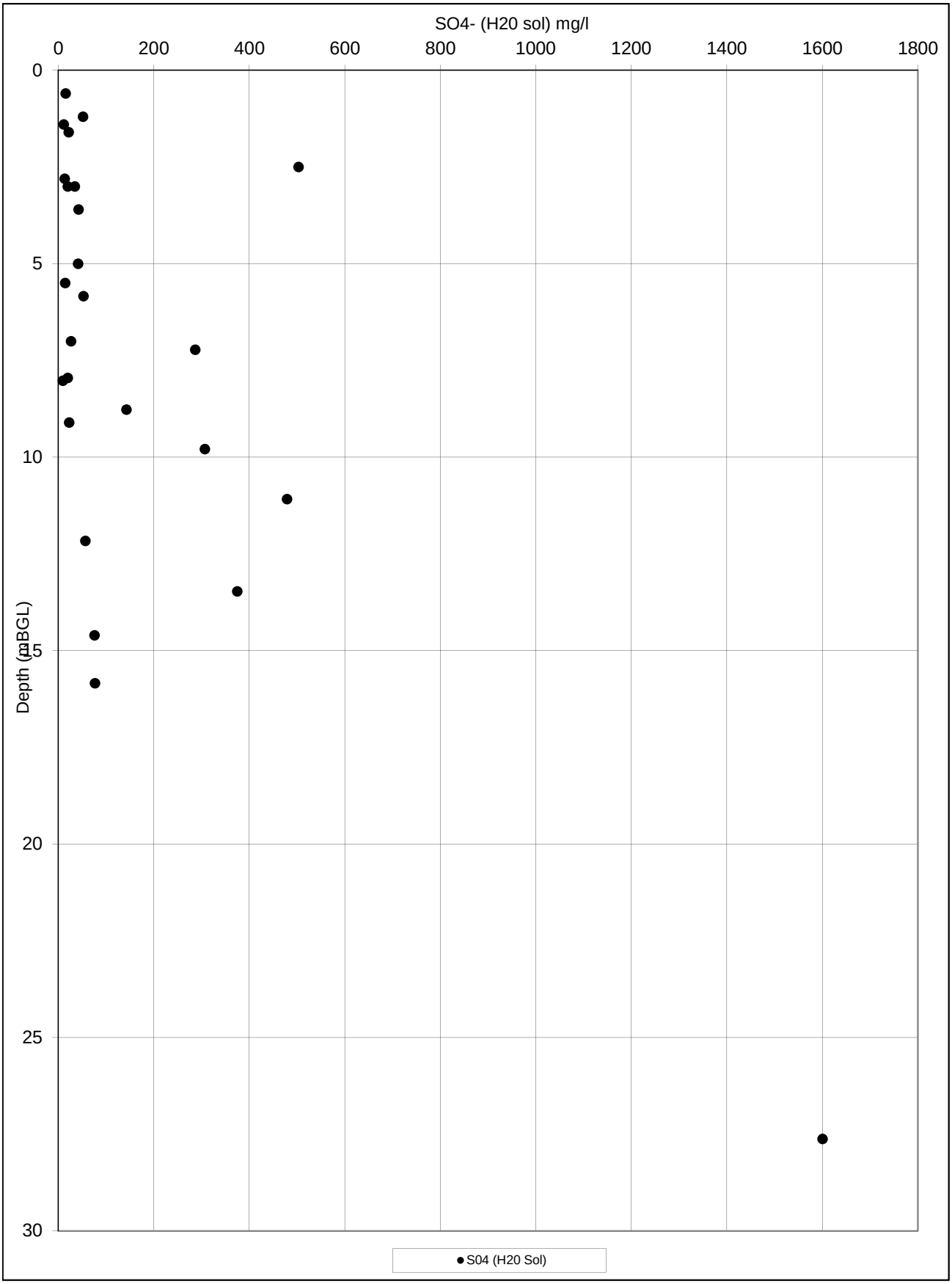
Markeaton Mercia Mudstone Group

Client	Figure Title	Figure Number	Date
Highways England	PH VALUE VS DEPTH	M-MMG12	15/08/2017
	Project Title: A38 DERBY JUNCTIONS	Project Number: HE514503	AECOM



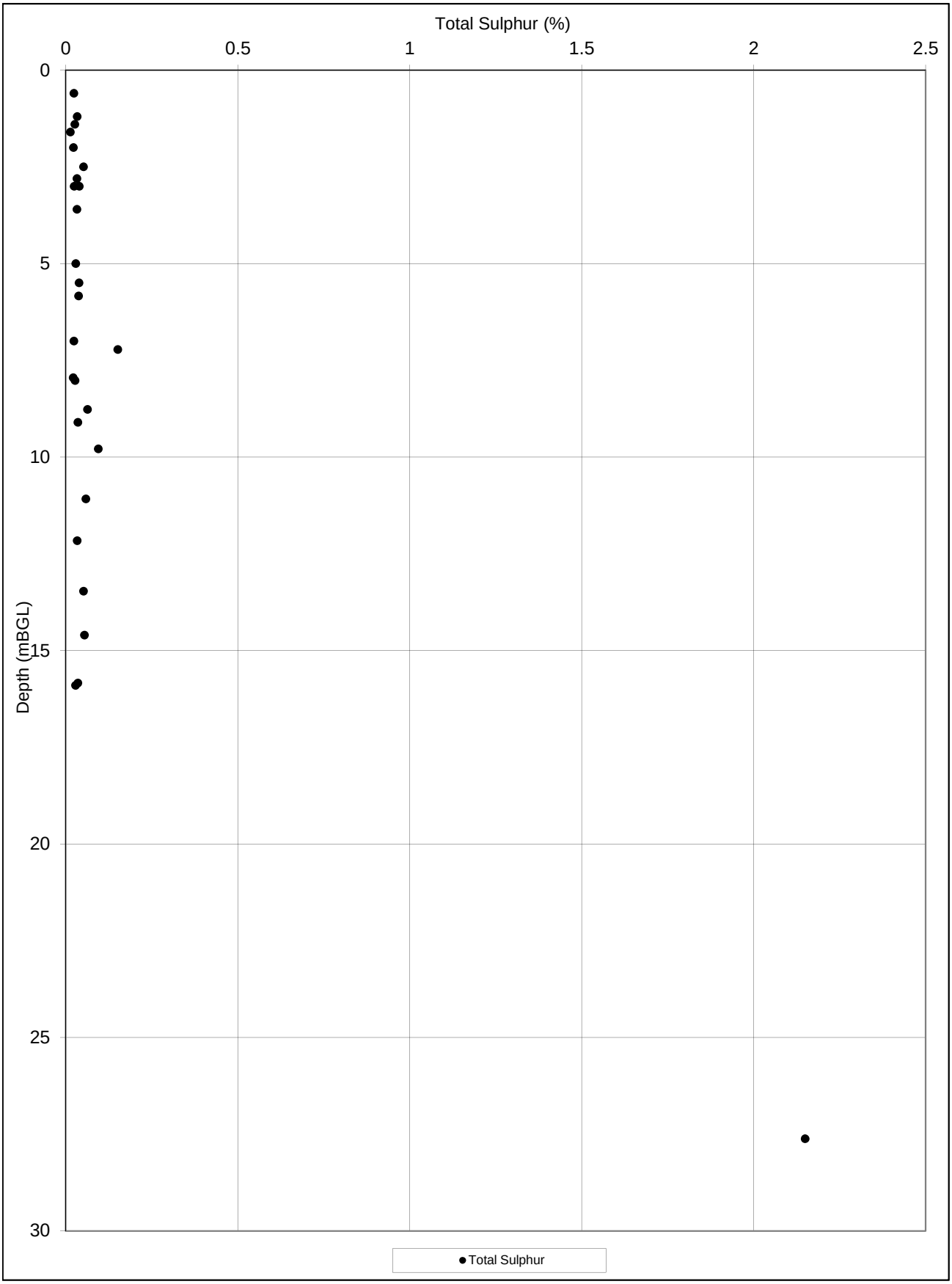
Markeaton Mercia Mudstone Group

Client	Figure Title		Figure Number	Date
Highways England	S04 (Acid Sol) mg/kg VS DEPTH		M-MMG13	15/08/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



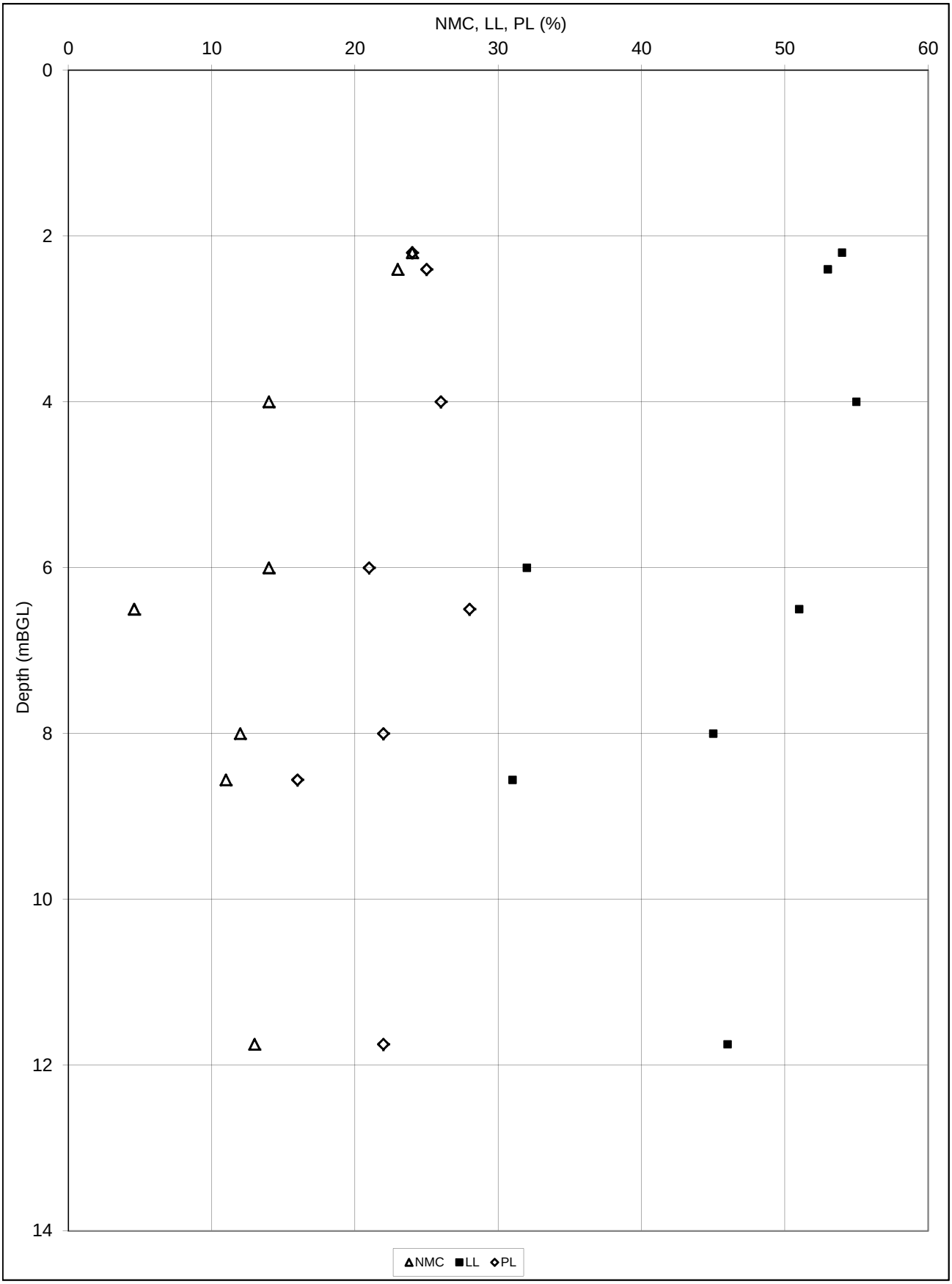
Markeaton Mercia Mudstone Group

Client	Figure Title		Figure Number	Date
Highways England	S04 (H20 Sol) mg/l VS DEPTH		M-MMG14	15/08/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



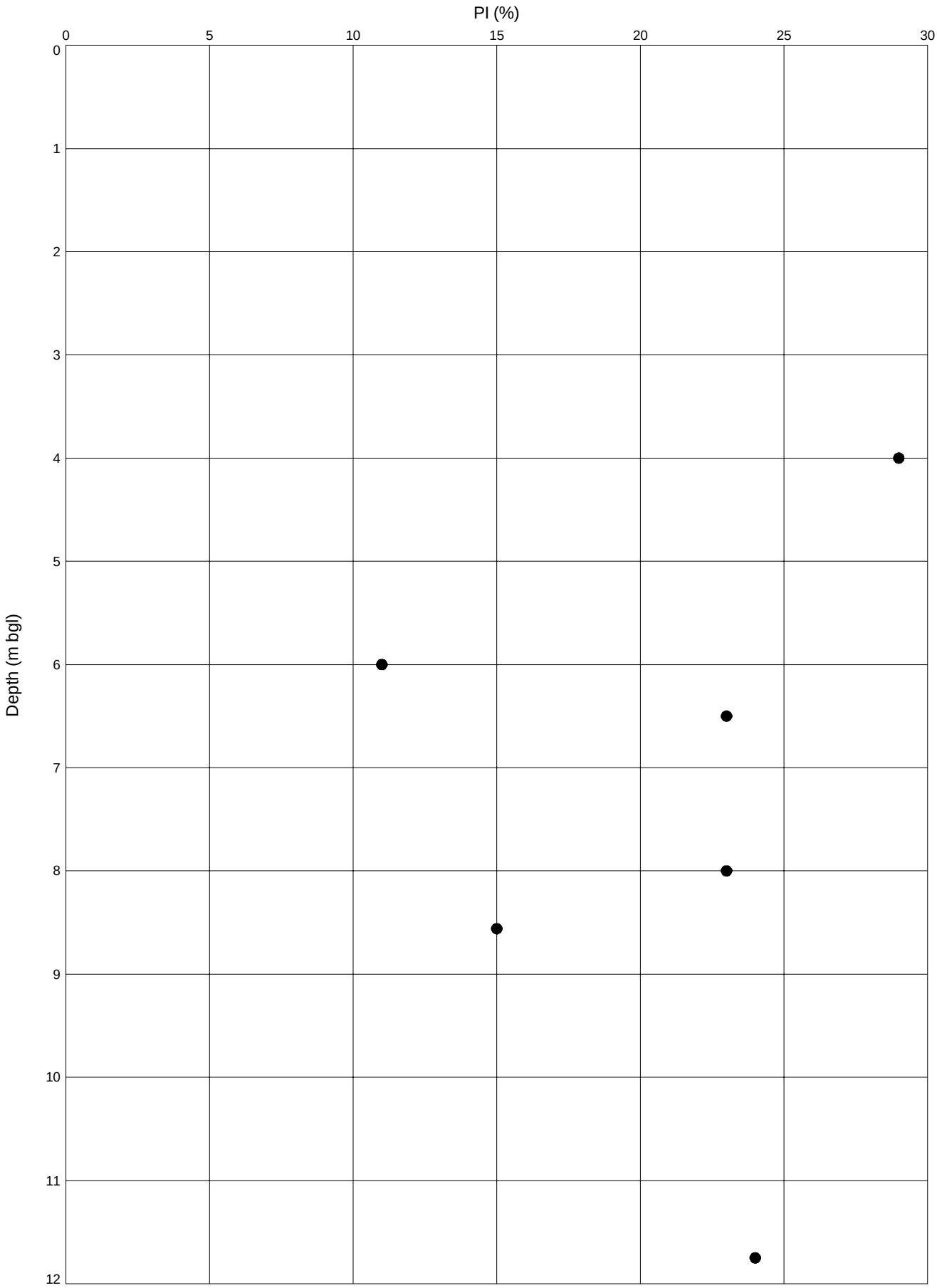
Markeaton Mercia Mudstone Group

Client	Figure Title	Figure Number	Date
Highways England	TOTAL SULPHUR(%) VS DEPTH	M-MMG15	15/08/2017
	Project Title: A38 DERBY JUNCTIONS	Project Number: HE514503	AECOM



Little Eaton Milstone Grit Group

Client	Figure Title		Figure Number	Date
Highways England	NMC, LL, PL (%) VERSUS DEPTH		L-MSGG1	30/03/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



Little Eaton Milstone Grit Group

Client	Figure Title		Figure Number	Date
Highways England	**PLASTICITY INDEX VERSUS DEPTH**		**L-MSGG2**	**15/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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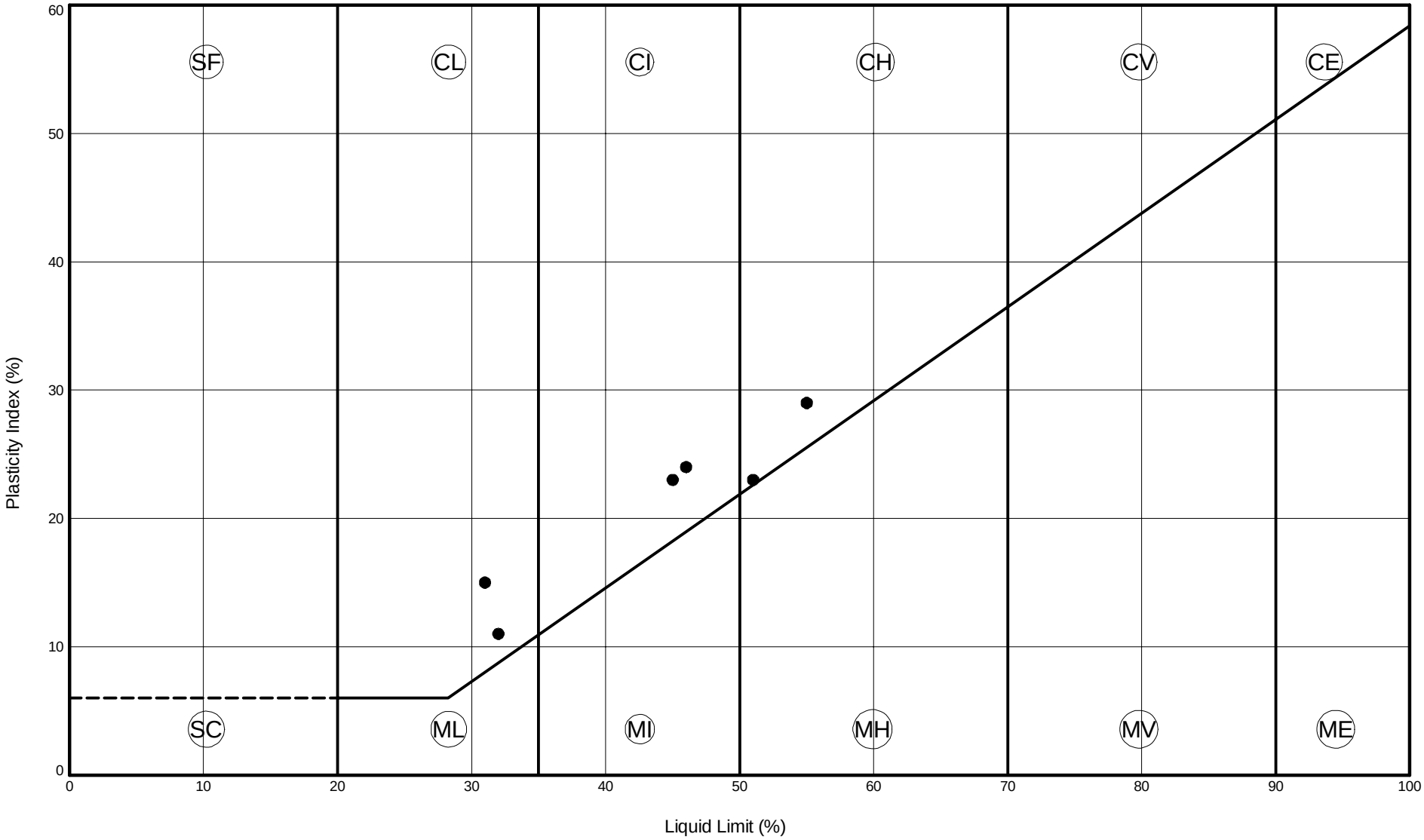
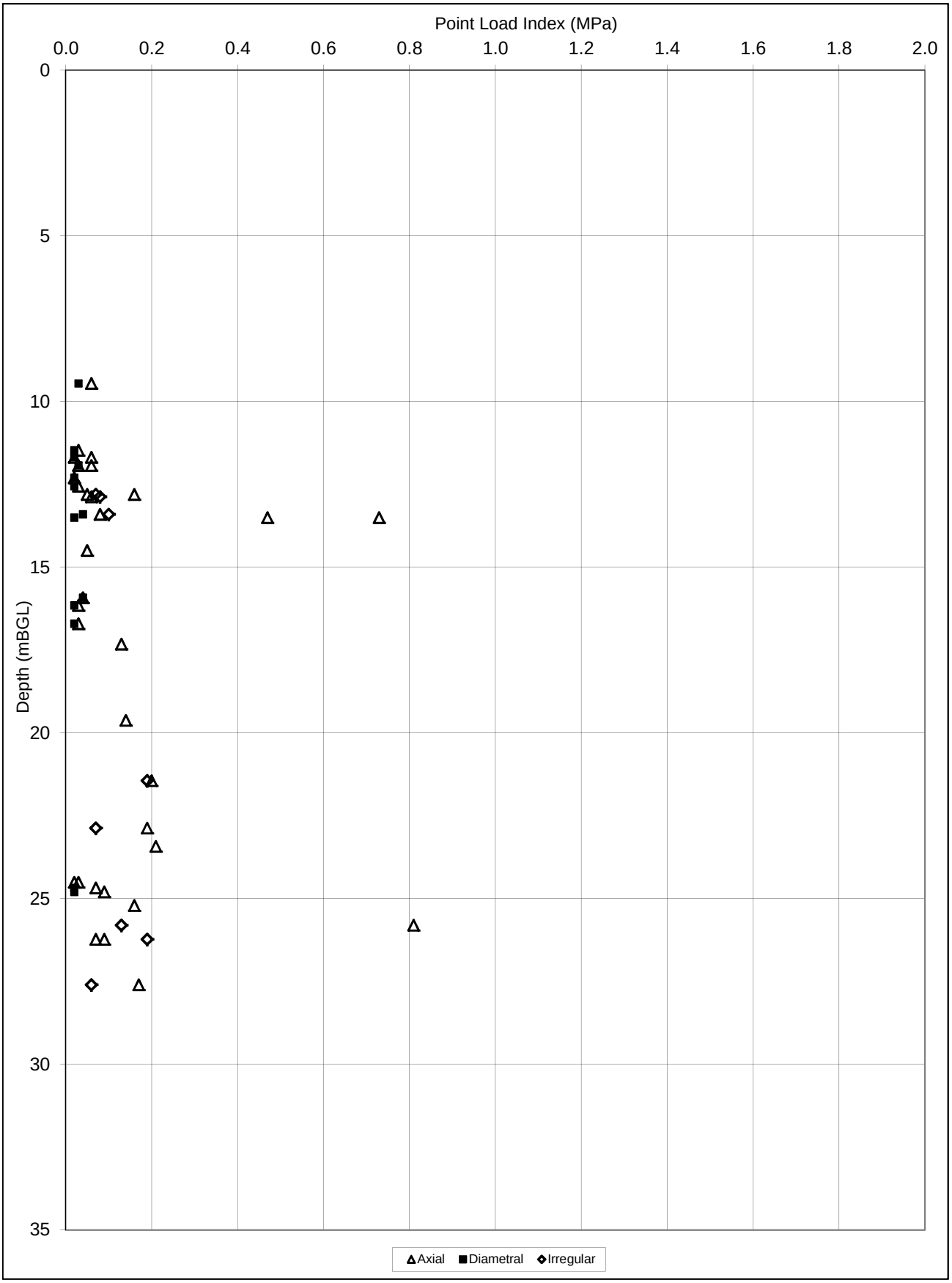


Little Eaton Milstone Grit Group

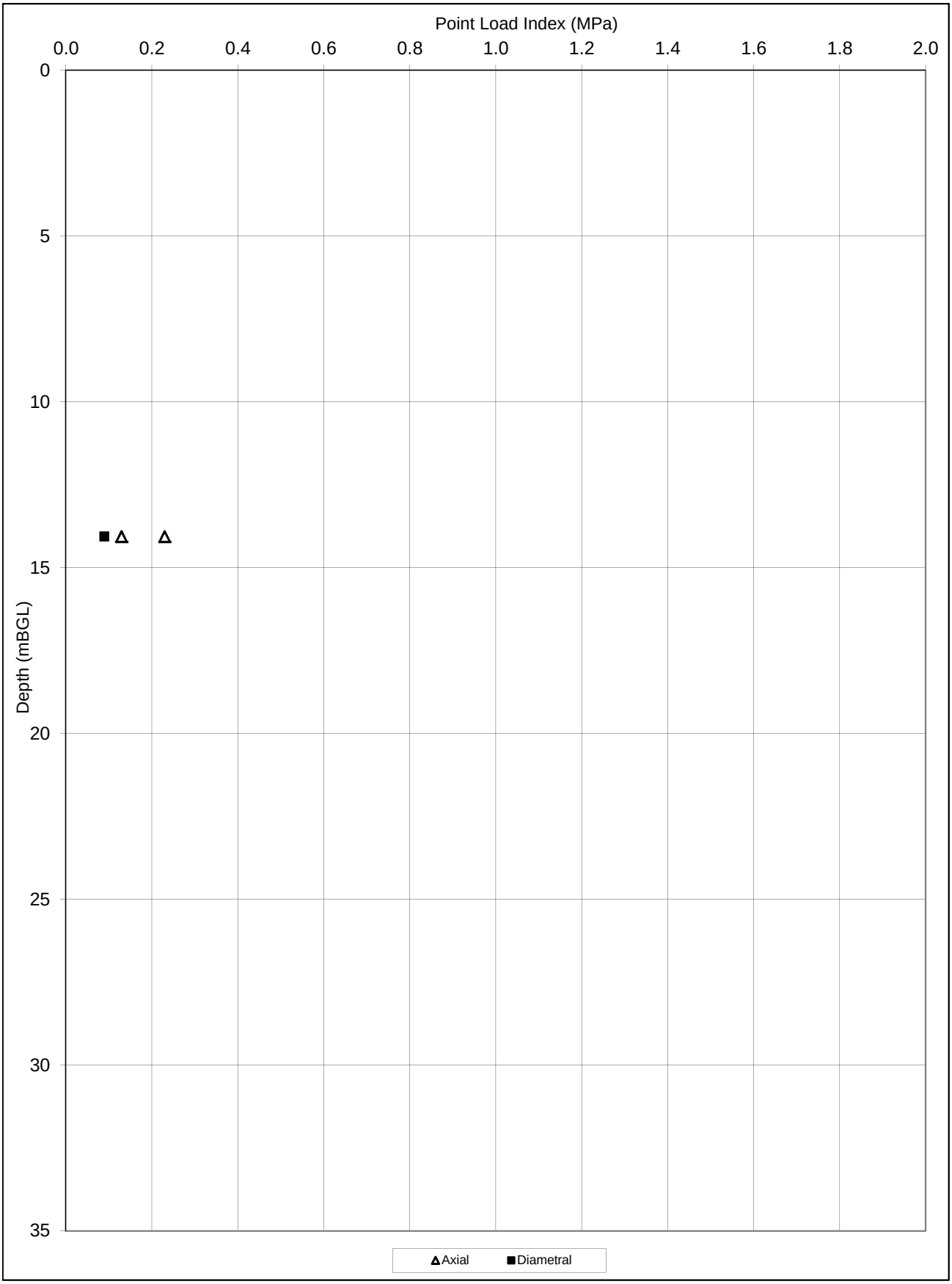
Client	Figure Title	Figure Number	Date
Highways England	**PLASTICITY CHART**	**L-MSGG3**	**17/08/17**
	Project Title	**Project Number**	
	A38 DERBY JUNCTIONS	**HE514503**	AECOM

PLASTICITY CHART 2017-06-27.GPJ AECOM AGS4.GDT 17/8/17



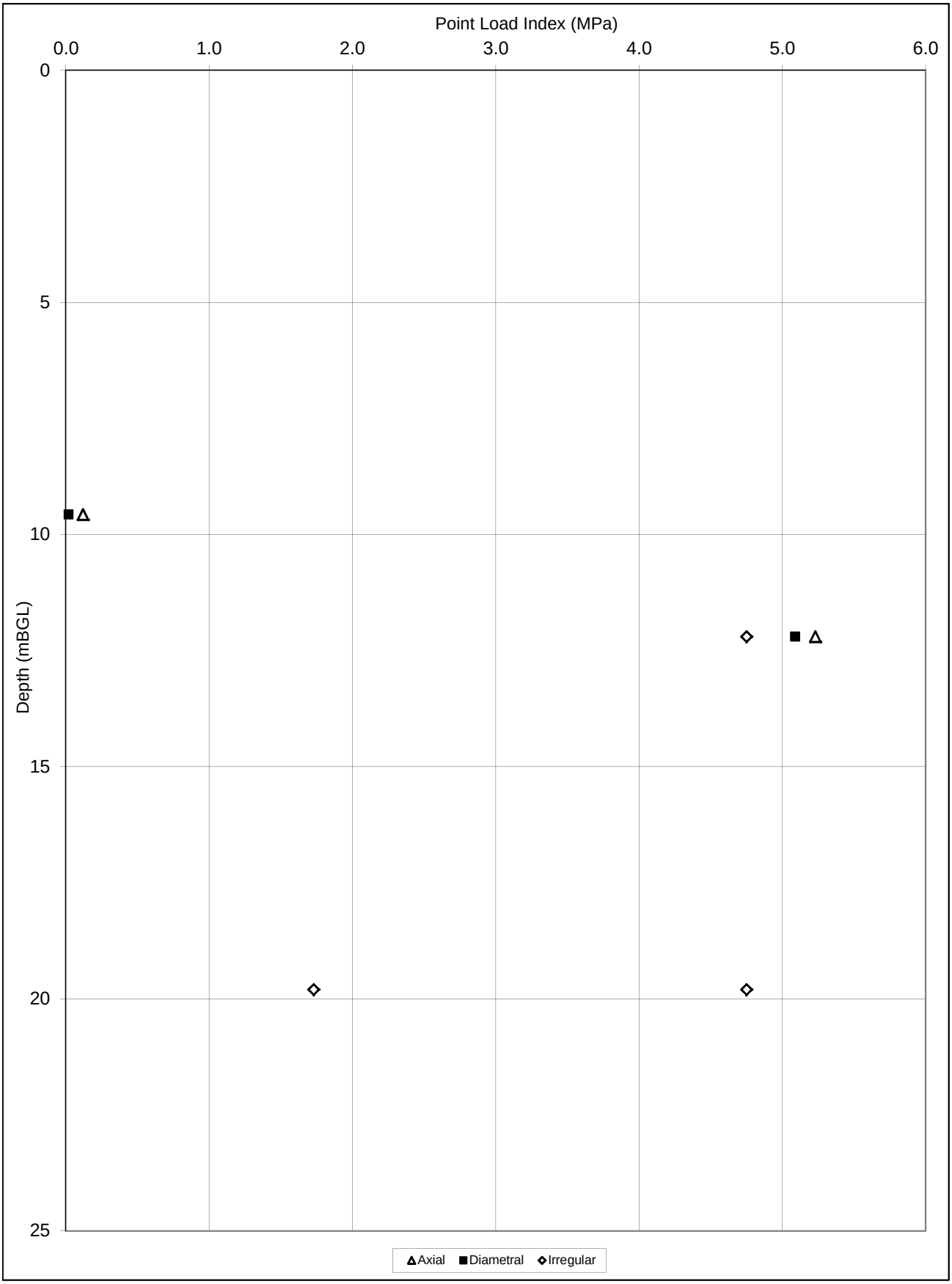
Little Eaton Milstone Grit Group (Mudstone)

Client	Figure Title		Figure Number	Date
Highways England	POINT LOAD INDEX (IS(50)) VS DEPTH		L-MSGG4	30/03/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



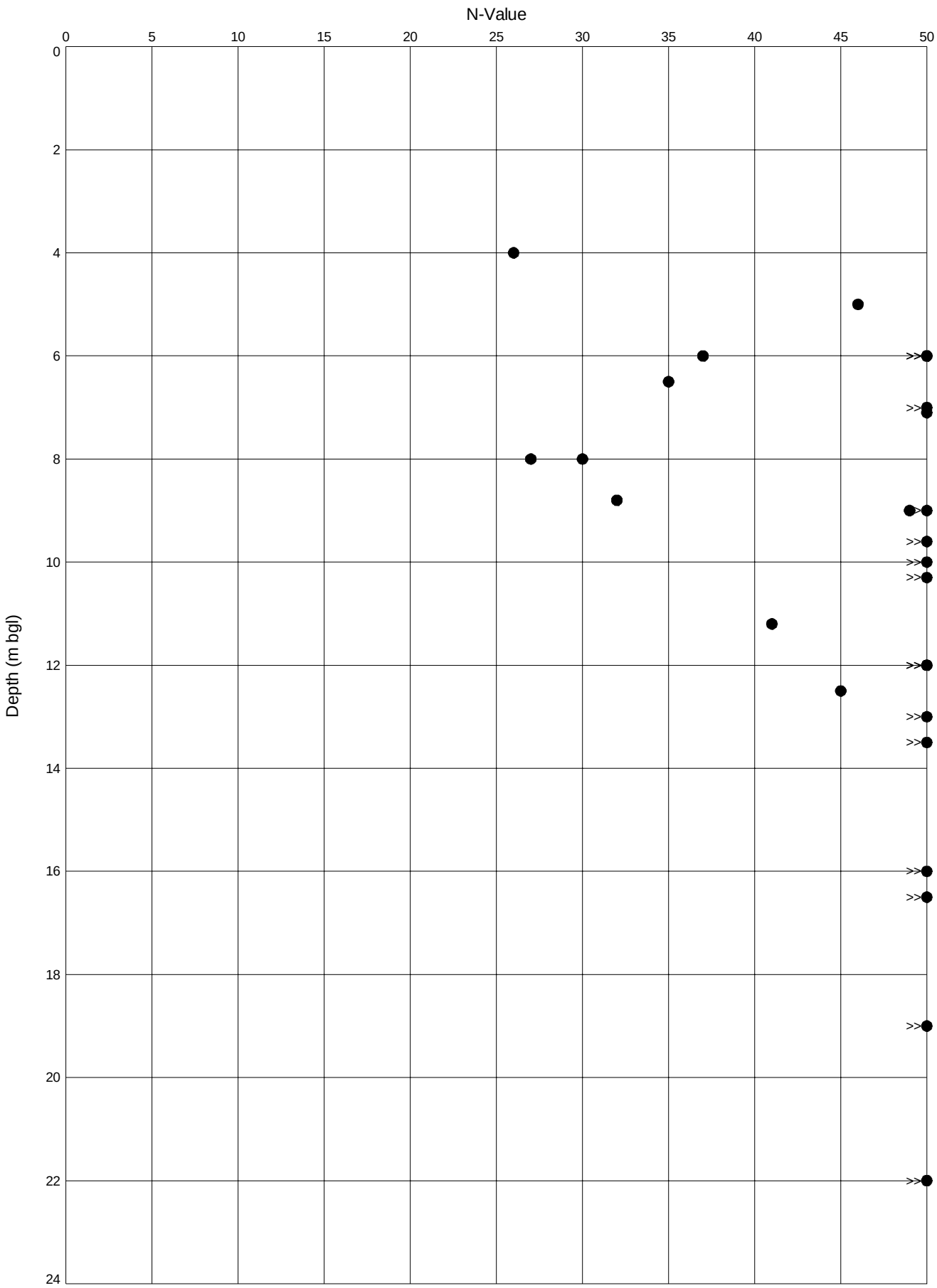
Little Eaton Milstone Grit Group (Sandstone)

Client	Figure Title		Figure Number	Date
Highways England	POINT LOAD INDEX (IS(50)) VS DEPTH		L-MSGG5	30/03/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



Little Eaton Milston Grit Group Group (Siltstone)

Client	Figure Title		Figure Number	Date
Highways England	POINT LOAD INDEX (IS(50)) VS DEPTH		L-MSGG6	30/03/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



Little Eaton Milston Grit Group Group (Siltstone)

Client	Figure Title		Figure Number	Date
Highways England	**SPT N VALUE VERSUS DEPTH**		**L-MSGG7**	**17/08/17**
	Project Title	**Project Number**		
	A38 DERBY JUNCTIONS	**HE514503**	AECOM	

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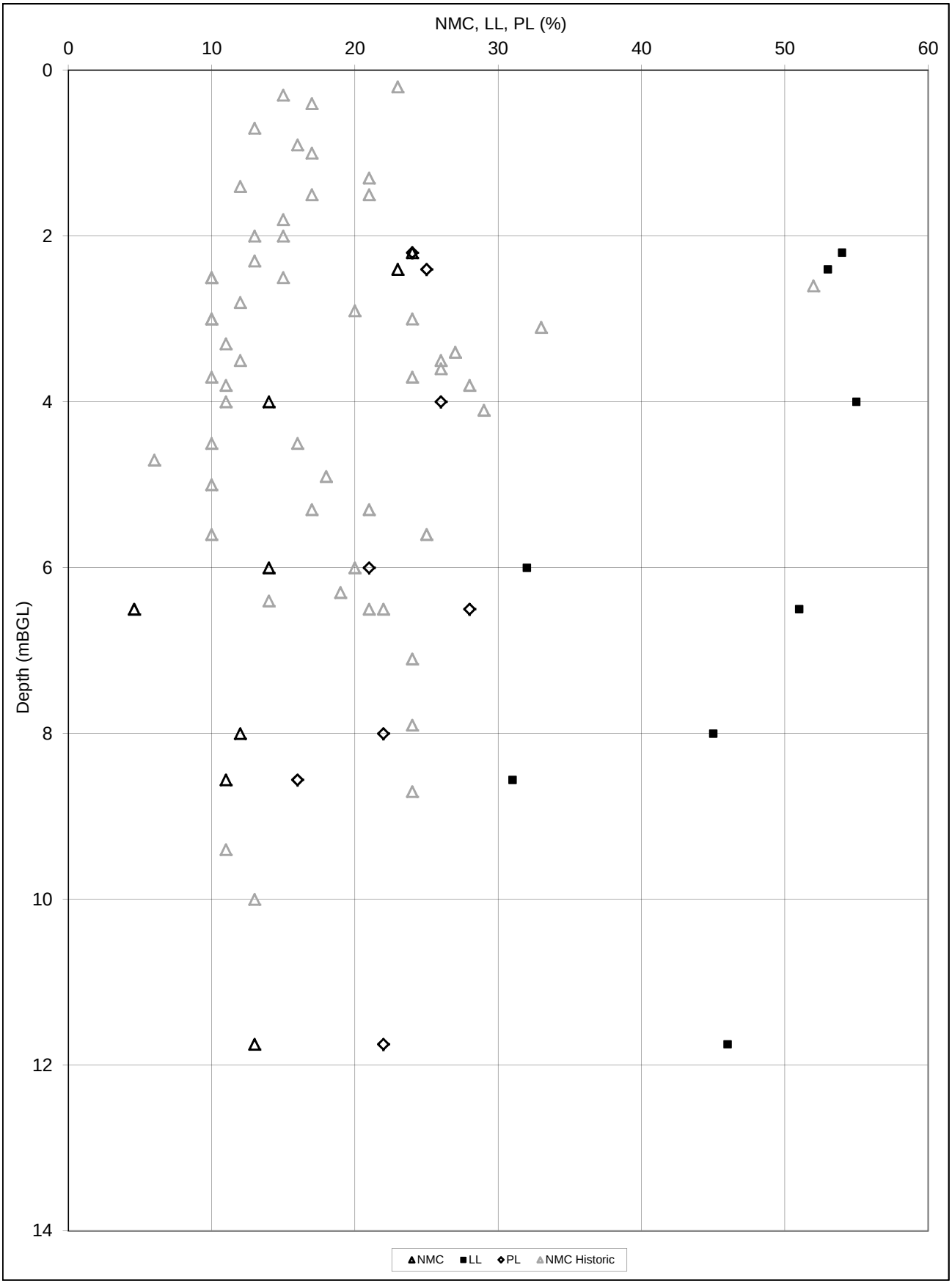
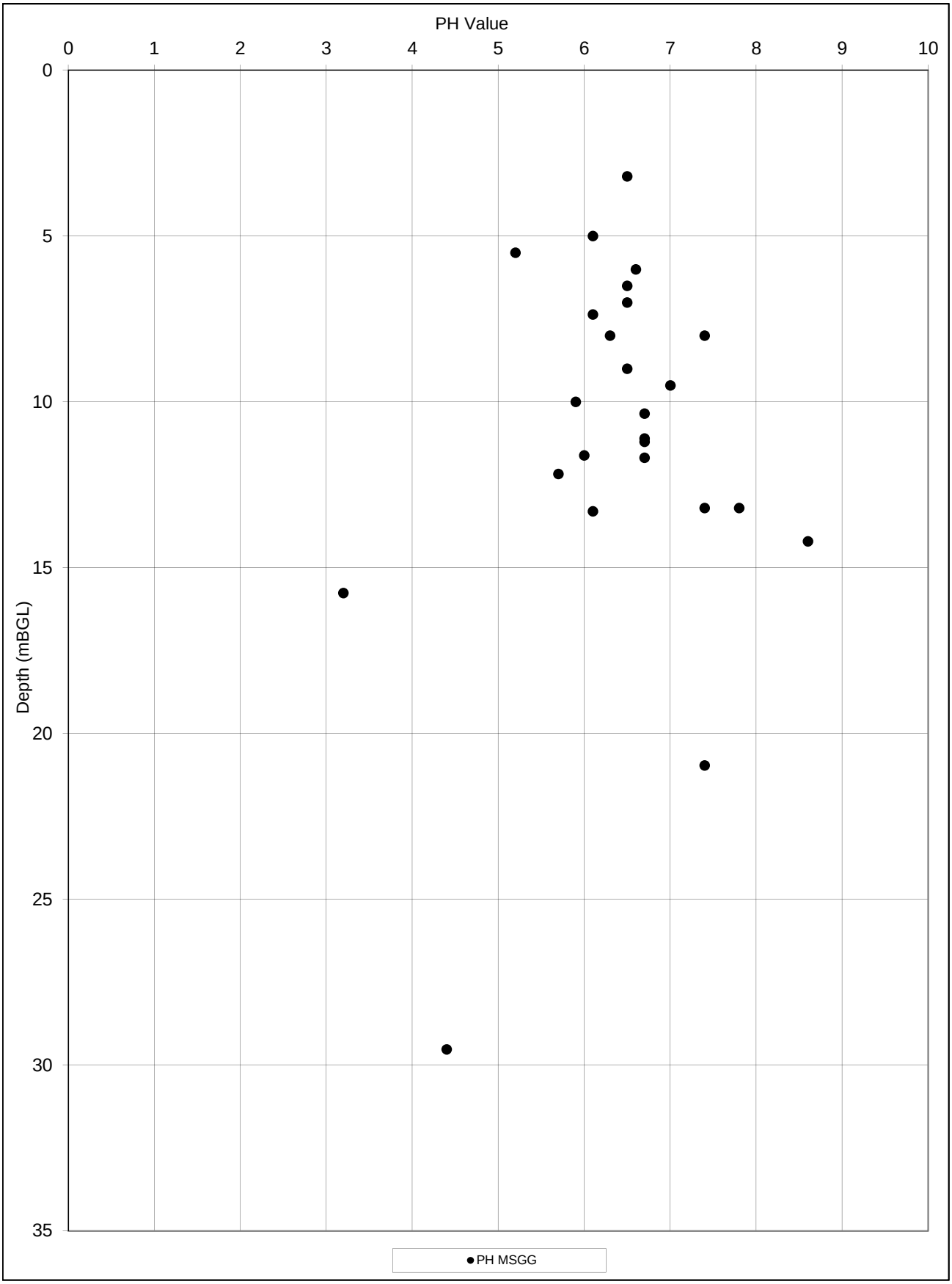


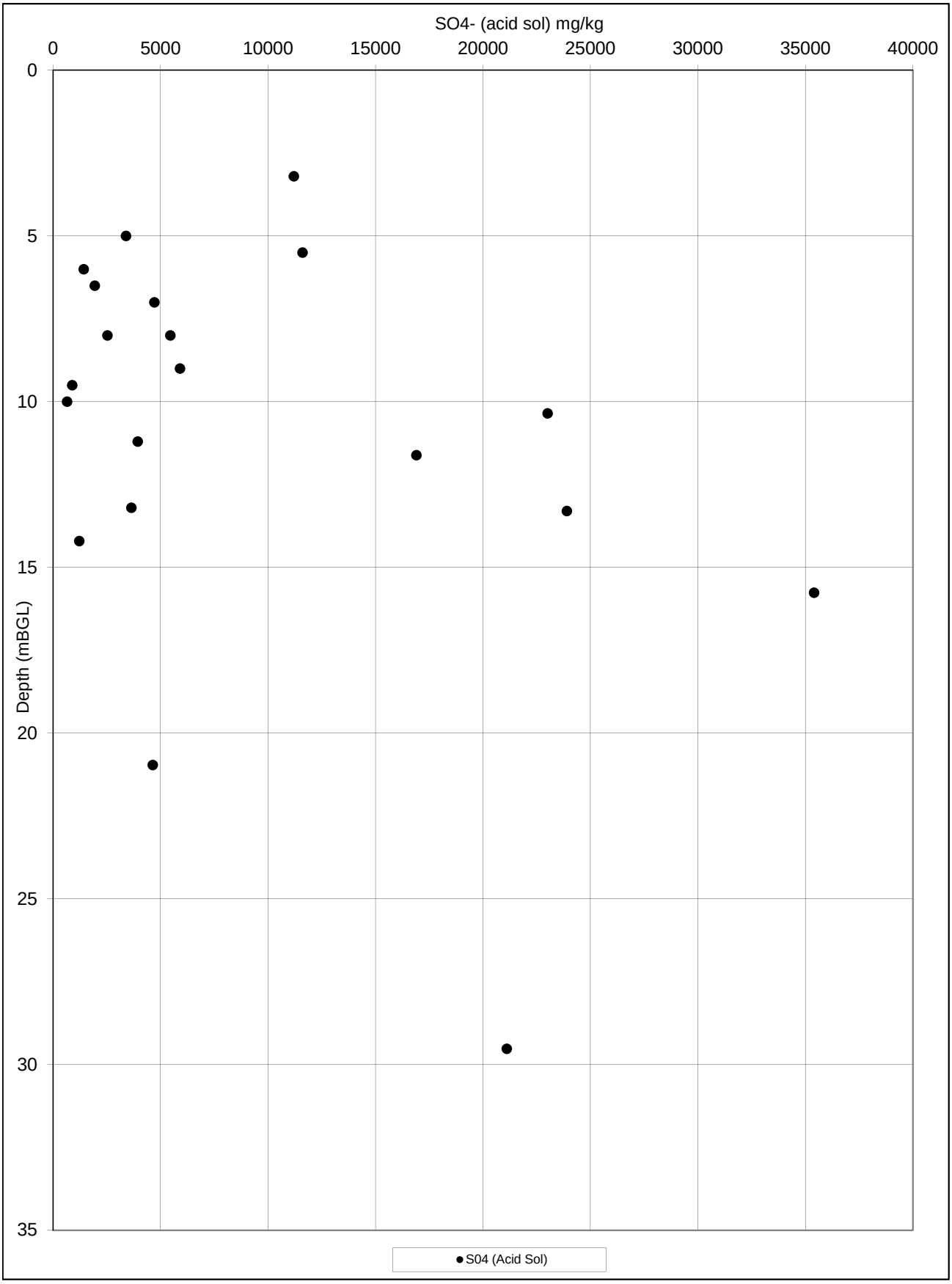
Little Eaton Milstone Grit Group (New + Historic)

Client	Figure Title		Figure Number	Date
Highways England	NMC, LL, PL (%) VERSUS DEPTH		L-MSGG8	30/03/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



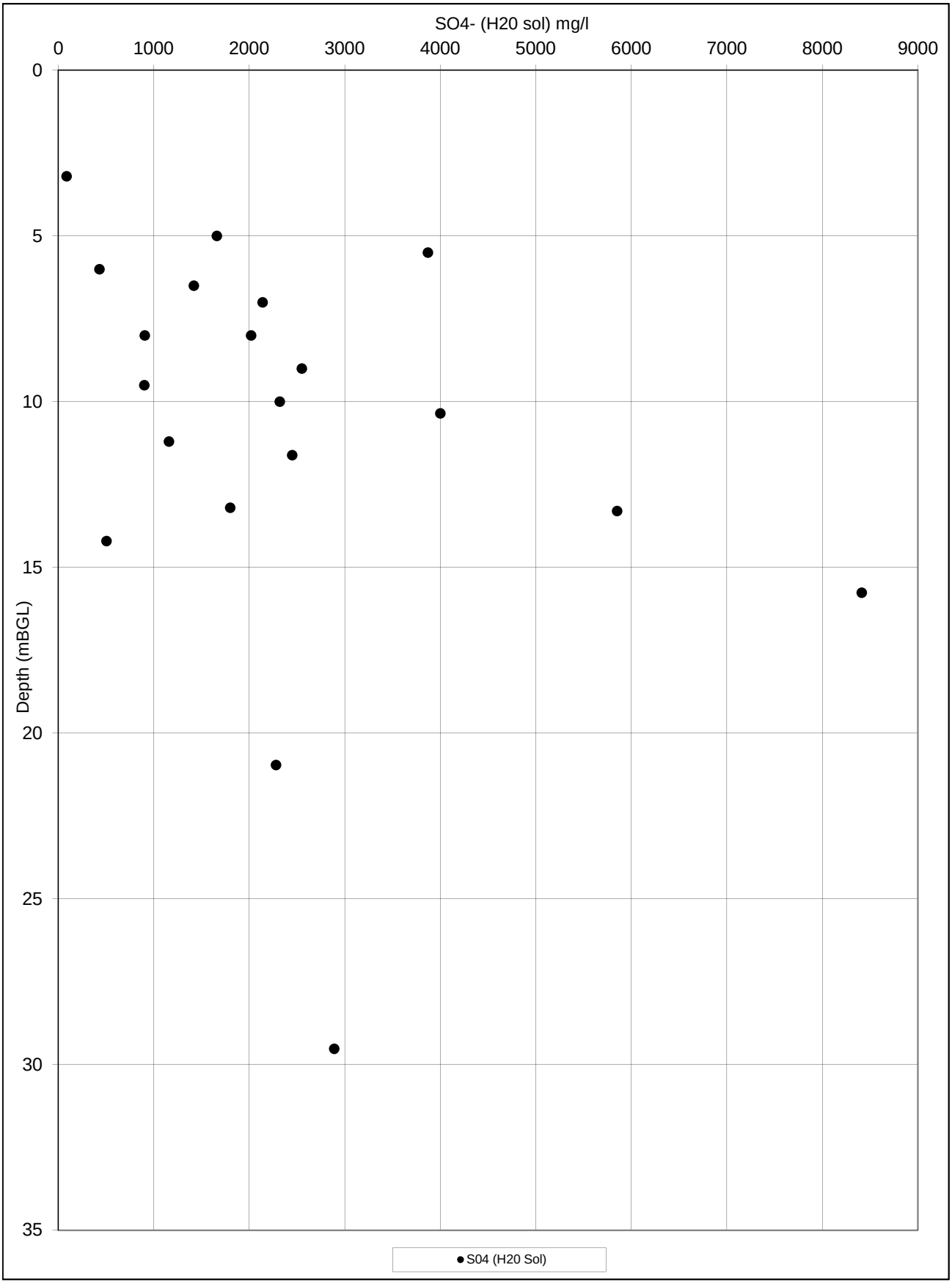
Little Eaton Milstone Grit Group

Client	Figure Title		Figure Number	Date
Highways England	PH VALUE VS DEPTH		L-MSGG9	15/08/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



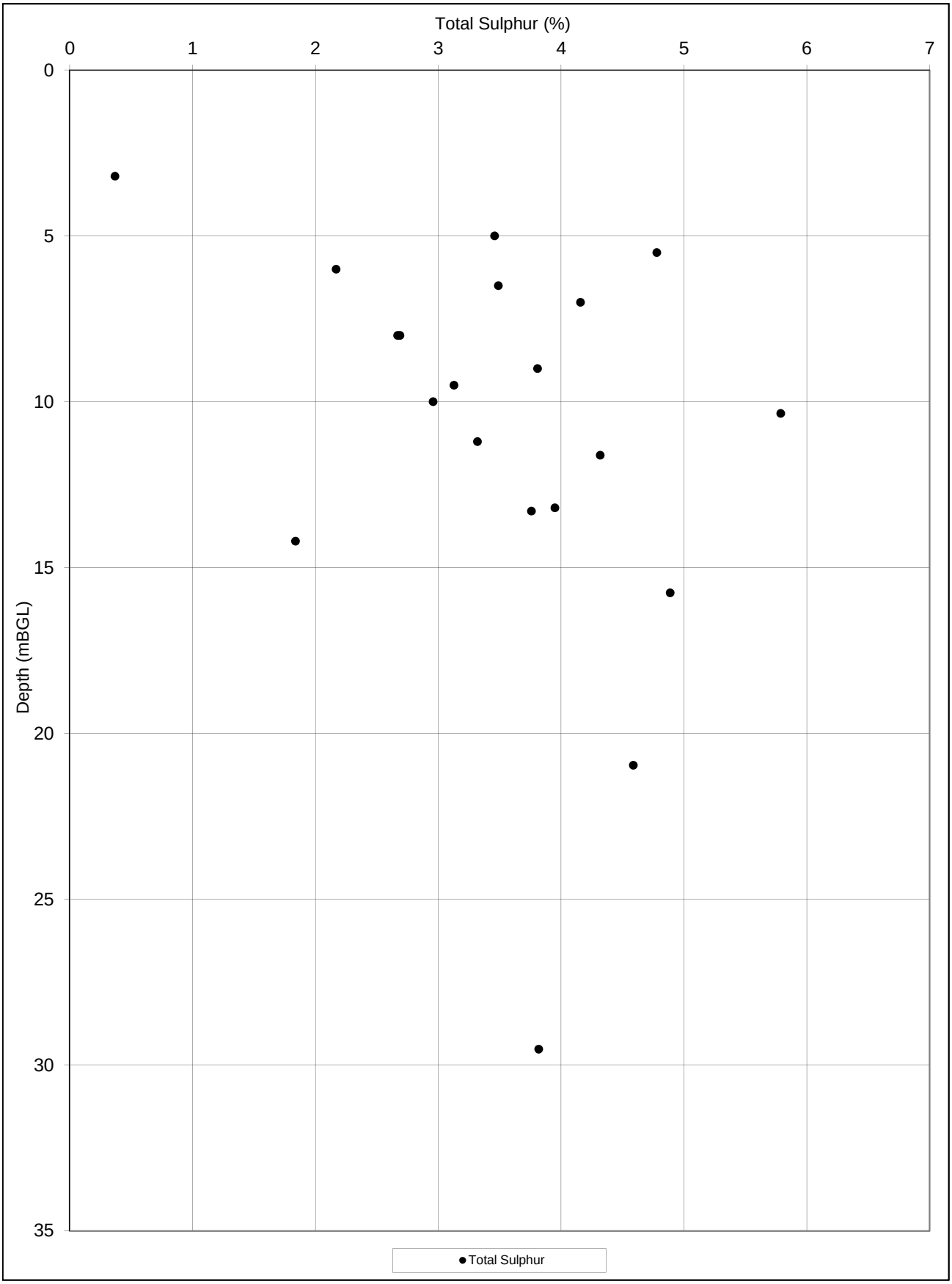
Little Eaton Milstone Grit Group

Client	Figure Title		Figure Number	Date
Highways England	S04 (Acid Sol) mg/kg VS DEPTH		L-MSGG10	15/08/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



Little Eaton Milstone Grit Group

Client	Figure Title		Figure Number	Date
Highways England	S04 (H20 Sol) mg/l VS DEPTH		L-MSGG11	15/08/2017
	Project Title	Project Number	AECOM	
	A38 DERBY JUNCTIONS	HE514503		



Little Eaton Milstone Grit Group

Client	Figure Title	Figure Number	Date
Highways England	TOTAL SULPHUR(%) VS DEPTH	L-MSGG12	15/08/2017
	Project Title: A38 DERBY JUNCTIONS	Project Number: HE514503	AECOM

Appendix B Combined Tier 1 Screening Tables

Kingsway Junction Soil Chemistry
Analytical Results
A38 Derby Junctions
Highways England

Location_Code	BK01	BK01	BK01	BK02	BK02	BK02	BK03	BK03	BK03	BK03	BK04	BK05	BK05	BK09	BK09	BK10	BK10	BK11	BK11
Sample_Depth_Range	0.2	1	3	0.2	0.5	1	0.2	0.5	1	3	0.5	1	2	0.2	0.5	1.2	3.5	0.5	3
Sampled_Date_Time	09/08/2016	09/08/2016	09/08/2016	24/08/2016	24/08/2016	24/08/2016	26/08/2016	26/08/2016	26/08/2016	26/08/2016	22/07/2016	22/07/2016	04/08/2016	31/08/2016	31/08/2016	16/08/2016	16/08/2016	02/08/2016	02/08/2016

Chem_Group	ChemName	output unit	EQL	GAC_HH_COMIND_SLOAM_1.45-3.48%TOC																		
	Diphenyl ether	mg/kg			-	<0.1	<0.1	-	<0.1	-	-	<0.6	-	<0.1	-	<0.1	-	-	-	-	<0.1	-	<0.1
	Methacriphos	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Boron (Water Soluble)	mg/kg			1	0.6	0.9	<0.5	1	1	0.5	0.5	-	0.6	0.9	1.1	1	<0.51	<0.5	6.11	9.3	0.5	0.6
	Chlorothalonil	mg/kg		740	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Permethrin II	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tecnazene	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Etrimphos	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Propetamphos	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TPH	>C5-C7	mg/kg			<0.01	<0.01	<0.01	-	<0.01	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	-	-	<0.01	<0.01	<0.01
	>C8-C44	mg/kg			<20	<20	<20	-	-	-	-	<0.01	-	<20	-	-	<20	-	-	-	1950	<24	<23
	GRO >C5-C6	mg/kg			<0.3	<0.2	<0.2	-	<0.2	-	-	<0.2	-	<0.2	-	<0.2	<0.2	-	-	-	<0.3	<0.2	<0.2
	GRO >C5-C10	mg/kg			<0.3	<0.2	<0.2	-	<0.2	-	-	<0.2	-	<0.2	-	<0.2	<0.2	-	-	-	2.21	<0.2	<0.2
	GRO >C6-C8	mg/kg			<0.3	<0.2	<0.2	-	<0.2	-	-	<0.2	-	<0.2	-	<0.2	<0.2	-	-	-	<0.3	<0.2	<0.2
	GRO >C7-C8	mg/kg			<0.01	<0.01	<0.01	-	<0.01	-	-	<0.01	-	<0.01	-	<0.01	<0.01	-	-	-	<0.01	<0.01	<0.01
	>C8-C10 Aliphatics	mg/kg		4800	<4	<4	<4	-	-	-	-	<0.01	-	<4	-	<5	<4	-	-	-	21.6	<5	<5
	>C10-C12 Aliphatics	mg/kg		23000	<4	<4	<4	-	-	-	-	<0.01	-	<4	-	<5	<4	-	-	-	42.2	<5	<5
	>C12-C16 Aliphatics	mg/kg		82000	<4	<4	<4	-	-	-	-	<0.01	-	<4	-	<5	<4	-	-	-	42.4	<5	<5
	>C16-C35 Aliphatics	mg/kg		1.7E6	<11.9	<11.9	<11.9	-	-	-	-	<0.01	-	<11.9	-	<13.7	<11.9	-	-	-	1640	<14.5	<13.8
	>C35-C44 Aliphatics	mg/kg		1.7E6	<5.62	<5.62	<5.62	-	-	-	-	<0.01	-	<5.62	-	<6.48	<5.62	-	-	-	201	<6.86	<6.53
	>EC8-EC10 Aromatics	mg/kg		8100	<4	<4	<4	-	-	-	-	<0.01	-	<4	-	<5	<4	-	-	-	20.6	<5	<5
	>EC10-EC12 Aromatics	mg/kg		28000	<4	<4	<4	-	-	-	-	<0.01	-	<4	-	<5	<4	-	-	-	18.1	<5	<5
	>EC12-EC16 Aromatics	mg/kg		37000	<4	<4	<4	-	-	-	-	<0.01	-	<4	-	<5	<4	-	-	-	14.6	<5	<5
	>EC16-EC21 Aromatics	mg/kg		28000	<4	<4	<4	-	-	-	-	<0.01	-	<4	-	<5	<4	-	-	-	79.7	6.97	<5
	>EC21-EC35 Aromatics	mg/kg		28000	8.86	<8.76	<8.76	-	-	-	-	<0.01	-	<8.76	-	<10.1	<8.76	-	-	-	502	<10.7	<10.17
	>EC35-EC44 Aromatics	mg/kg		28000	<5.62	<5.62	<5.62	-	-	-	-	<0.01	-	<5.62	-	<6.48	<5.62	-	-	-	25.8	<6.86	<6.53
BTEX	Benzene	mg/kg		47	<0.001	<0.012	<0.001	-	<0.001	-	-	<0.001	-	<0.012	-	<0.001	<0.012	-	-	-	<0.013 - 0.004	<0.001	<0.001
	Toluene	mg/kg		110000	<0.007	<0.012	<0.006	-	<0.006	-	-	<0.008	-	<0.012	-	<0.006	<0.012	-	-	-	<0.013 - 0.016	<0.006	<0.006
	Ethylbenzene	mg/kg		13000	<0.003	<0.012	<0.002	-	<0.002	-	-	<0.003	-	<0.012	-	<0.002	<0.012	-	-	-	0.09 - 0.329	<0.002	<0.002
	Xylene (m & p)	mg/kg			<0.005	-	<0.005	-	<0.005	-	-	<0.006	-	-	-	<0.005	-	-	-	-	1.09	<0.005	<0.005
	Xylene Total	mg/kg		14000	<0.026	<0.024	<0.023	-	<0.024	-	-	<0.022	-	<0.024	-	<0.023	<0.024	-	-	-	0.19	<0.024	<0.023
	Xylene (o)	mg/kg		15000	<0.003	-	<0.002	-	<0.002	-	-	<0.003	-	-	-	<0.002	-	-	-	-	0.012	<0.002	<0.002
Oxygenates	MTBE	mg/kg		13000	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
Chlorinated Hydrocarbons	Chloromethane	mg/kg		1.2	<0.004	-	<0.003	-	<0.004	-	-	<0.004	-	-	-	<0.003	-	-	-	-	<0.004	<0.004	<0.003
	Vinyl chloride	mg/kg		0.077	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	Chloroethane	mg/kg		1300	<0.003	-	<0.002	-	<0.002	-	-	<0.003	-	-	-	<0.002	-	-	-	-	<0.003	<0.002	<0.002
	1,1-dichloroethene	mg/kg		450	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	trans-1,2-dichloroethene	mg/kg		40	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	1,1-dichloroethane	mg/kg		190	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	cis-1,2-dichloroethene	mg/kg		24	<0.007	-	<0.006	-	<0.006	-	-	<0.008	-	-	-	<0.006	-	-	-	-	<0.006	<0.006	<0.006
	Chloroform	mg/kg		170	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	1,1,1-trichloroethane	mg/kg		1300	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	Carbon tetrachloride	mg/kg		6.3	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	Trichloroethene	mg/kg		2.6	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	0.003	<0.001	<0.001
	1,1,2-trichloroethane	mg/kg		190	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	Tetrachloroethene	mg/kg		42	<0.004	-	<0.003	-	<0.004	-	-	<0.004	-	-	-	<0.003	-	-	-	-	<0.004	<0.004	<0.003
VOC	2,2-dichloropropane	mg/kg			<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	Bromochloromethane	mg/kg		630	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	1,1-dichloropropene	mg/kg			<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	1,2-dichloroethane	mg/kg		0.97	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	1,2-dichloropropane	mg/kg		5.9	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	Dibromomethane	mg/kg		99	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	Bromodichloromethane	mg/kg		1.3	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	cis-1,3-dichloropropene	mg/kg			<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	trans-1,3-dichloropropene	mg/kg			<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	1,3-dichloropropane	mg/kg		23000	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	Chlorodibromomethane	mg/kg		39	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	1,1,1,2-tetrachloroethane	mg/kg		250	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	Styrene	mg/kg		6500	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	Bromoform	mg/kg		1500	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	Isopropylbenzene	mg/kg		3300	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	0.08	<0.001	<0.001
	1,1,2,2-tetrachloroethane	mg/kg		550	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	1,2,3-trichloropropane	mg/kg		0.11	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	n-propylbenzene	mg/kg		9700	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	0.241	<0.001	<0.001
	1,3,5-trimethylbenzene	mg/kg		12000	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	0.539	<0.001	<0.001
	tert-butylbenzene	mg/kg		120000	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	0.075	<0.001	<0.001
	1,2,4-trimethylbenzene	mg/kg		99	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	1.26	<0.001	<0.001
	sec-butylbenzene	mg/kg		120000	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	0.166	<0.001	<0.001
	p-isopropyltoluene	mg/kg			<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	0.207	<0.001	<0.001
	n-butylbenzene	mg/kg		58000	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	0.155	<0.001	<0.001
	1,2-dibromo-3-chloropropane	mg/kg		0.064	<0.001	-	<0.001	-	<0.001	-	-	<0.001	-	-	-	<0.001	-	-	-	-	<0.001	<0.001	<0.001
	Hexachlorobutadiene	mg/kg		66	<0.003	<0.1	<0.002	-	<0.002	-	-	<0.003	-	<0.1	-	<0.002	-	-	-	-	<0.003	<0.002	<0.002
PAH	Naphthalene	mg/kg		460	<0.007	<0.1	<0.006	<0.09	<0.006	-	-	<0.008	-	<0.1	-	<0.006	<0.1	-	-	-	<0.1 - 1.15	<0.006	<0.006
	Acenaphthylene	mg/kg		97000	<0.1	<0.1	<0.09	<0.09	<0.1	-	-	<0.6	-	<0.1	-	<0.09	<0.1	-	-	-	<0.1	<0.1	<0.1
	Acenaphthene	mg/kg		97000	<0.1	<0.1	<0.09	<0.09	<0.1	-	-	<0.6	-	<0.1	-	<0.09	<0.1	-	-	-	<0.1 - 0.3	<0.1	<0.1
	Fluorene	mg/kg		68000	<0.1	<0.1	<0.09	<0.09	<0.1	-	-	<0.6	-	<0.1	-	<0.09	<0.1	-	-	-	<0.1 - 0.3	<0.1	<0.1
	Phenanthrene	mg/kg		22000	<0.1	<0.1	<0.09	0.19	0.4	-	-	5.2	-	<0.1	-	<0.09	<0.1	-	-	-	0.5 - 1.41	<0.1	<0.1
	Anthracene	mg/kg		540000	<0.1	<0.1	<0.09	<0.09	<0.1	-	-	1.8	-	<0.1	-	<0.09	<0.1	-	-	-	0.3 - 0.38	<0.1	<0.1
	Fluoranthene	mg/kg		23000	0.16	<0.2	<0.09	0.86	0.7	-	-	11.7	-	<0.1	-	<0.09	<0.1	-	-	-	0.6 - 2.02	<0.1	<0.2
	Pyrene	mg/kg		54000	0.16	<0.2	<0.09	0.74	0.6	-	-	10.5	-	<0.1	-	<0.09	<0.1	-	-	-	0.6 - 1.72	<0.1	<0.2
	Benz(a)anthracene	mg/kg		170	<0.1	<0.2	<0.09	0.53	0.5	-	-	7.2	-	<0.1	-	<0.09	<0.1	-	-	-	0.3 - 0.8	<0.1	<0.2
	Chrysene	mg/kg		350	0.12	<0.2	<0.09	0.54	0.4	-	-	5.8	-	<0.1	-	<0.09	<0.1	-	-	-	<0.3 - 0.85	<0.1	<0.2
	Benzo(a) pyrene	mg/kg		35	<0.1	<0.2	<0.09	0.61	0.5	-	-	7.9	-	<0.1	-	<0.09	<0.1	-	-	-	0.3 - 0.67	<0.1	<0.2
	Indeno(1,2,3-c,d)pyrene	mg/kg		510	<0.1	<0.6	<0.09	0.42	<0.6	-	-	5.4	-	<0.1	-	<0.09	<0.1	-	-	-	<0.6 - 0.47	<0.1	<0.6
	Dibenz(a,h)anthracene	mg/kg		3.6	<0.1	<0.6	<0.09	<0.09	<0.6	-	-	<2.8	-	<0.1	-	<0.09	<0.1	-	-	-	<0.6 - 0.1	<0.1	<0.6
	Benzo(g,h,i)perylene	mg/kg		4000	<0.1	<0.6	<0.09	0.39	<0.6	-	-	4.3	-	<0.1	-	<0.09	<0.1	-	-	-	<0.6 - 0.43	<0.1	<0.6
	Benzo(b)fluoranthene	mg/kg		44	<0.1	<0.2	<0.09	0.75	0.6	-	-	9.3	-	<0.1	-	<0.09	<0.1	-	-	-	0.4 - 0.96	<0.1	<0.2
	Benzo(k)fluoranthene	mg/kg		1200	<0.1	<0.2	<0.09	0.27	<0.2	-	-	3.5	-	<0.1	-	<0.09	<0.1	-	-	-	<0.3 - 0.36	<0.1	<0.2
	PAH 16 Total	mg/kg			<1.79	-	<1.48	<5.88	-	-	-	-	-	<1.52	-	<1.48	<1.55	-	-	-	<11.98	<1.56	-
SVOC	Coronene	mg/kg			-	<0.4	<0.3	-	<0.4	-	-	<1.7	-	<0.4	-	<0.3	-	-	-	-	<0.4	-	<0.3
	2-methylnaphthalene	mg/kg		3000	-	<0.1	<0.1	-	<0.1	-	-	<0.6	-	<0.1	-	<0.1	-	-	-	-	<0.1	-	<0.1
	4-bromophenyl phenyl ether	mg/kg			-	<0.1	<0.1	-	<0.1	-	-	<0.6	-	<0.1	-	<0.1	-	-	-	-	<0.1	-	<0.1
	4-chlorophenyl phenyl ether	mg/kg			-	<0.1	<0.1	-	<0.1	-	-	<0.6	-	<0.1	-	<0.1	-	-	-	-	<0.1	-	<0.1
	Bis(2-chloroethoxy) methane	mg/kg		2500	-	<0.1	<0.1	-	<0.1	-	-	<0.6	-	<0.1	-	<0.1	-	-	-	-	<0.1	-	<0.1
	Bis(2-chloroethyl)ether	mg/kg		1	-	<0.1	<0.1	-	<0.1	-	-	<0.6	-	<0.1	-	<0.1	-	-	-	-	<0.1	-	<0.1
	Dibenzofuran	mg/kg		1000	-	<0.1	<0.1	-	<0.1	-	-	<0.6	-	<0.1	-	<0.1	-	-	-	-	<0.1	-	<0.1
	Hexachlorocyclopentadiene	mg/kg		7.5	-	<0.1	<0.1	-	<0.1	-	-	<0.6	-	<0.1	-	<0.1	-	-	-	-	<0.1	-	<0.1
	Hexachloroethane	mg/kg		53	-	<0.1	<0.1	-	<0.1	-	-	<0.6	-	<0.1	-	<0.1	-	-	-	-	<0.1	-	<0.1
	1-Methylnaphthalene	mg/kg		73	-	<0.1	<0.1	-	<0.1	-	-	<0.6	-	<0.1	-	<0.1	-	-	-	-	<0.1	-	<0.1
	3,3-Dichlorobenzidine	mg/kg		5.1	-	-	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	<0.6	-	-
	Benzoic Acid	mg/kg		3.3E6	-	<0.6	<0.6	-	<0.6	-	-	<2.8	-	<0.6	-	<0.6	-	-	-	-	<0.6	-	<0.6
	Benzyl alcohol	mg/kg		82000	-	<0.6	<0.6	-	<0.6	-	-	<2.8	-	<0.6	-	<0.6	-	-	-	-	<0.6	-	<0.6
	Bis(2-chloroisopropyl) ether	mg/kg		47000	-	<0.6	<0.6	-	<0.6	-	-	<2.8	-	<0.6	-	<0.6	-	-	-	-	<0.6	-	<0.6
Phenolics	Trimethylphenols	mg/kg			<0.4	<0.4	<0.3	<0.4	<0.4	<0.3	<0.3	<0.3	-	<0.4	<0.3	<0.3	<0.4	<0.32	<0.3	-	<0.4	<0.4	<0.3
	2-methylphenol	mg/kg		9.99000000000003E11	-	<0.1	<0.03	-	<0.04	-	-	<0.17	-	<0.04	<0.03	<0.1	-	-	<0.03	-	<0.1	-	<0.03
	2-nitrophenol	mg/kg			-	<0.1	<0.03	-	<0.04	-	-	<0.17	-	<0.04	<0.03	<0.1	-	-	<0.03	-	<0.1	-	<0.03
	2,4-dimethylphenol	mg/kg		24000	-	<0.1	<0.02	-	<0.02	-	-	<0.1	-	<0.02	<0.02	<0.1	-	-	<0.02	-	<0.1	-	<0.02
	4-chloro-3-methylphenol	mg/kg		82000	-	<0.1	<0.03	-	<0.04	-	-	<0.17	-	<0.04	<0.03	<0.1	-	-	<0.03	-	<0.1	-	<0.03
	4-nitrophenol	mg/kg			-	<0.6	<0.07	-	<0.07	-	-	<0.3	-	<0.07	<0.07	<0.6	-	-	<0.07	-	<0.6	-	<0.07
	Phenol	mg/kg		690	<0.4	<0.1	<0.03	<0.4	<0.04	<0.3	<0.3	<0.17	-	<0.04	<0.03	<0.1	<0.4	<0.32	<0.03	-	<0.1	<0.4	<0.03
	2-chloronaphthalene	mg/kg		960	-	<0.1	<0.1	-	<0.1	-	-	<0.6	-	<0.1	-	<0.1	-	-	-	-	<0.1	-	<0.1
	2,4-dinitrophenol	mg/kg		1600	-	<0.6	<0.05	-	<0.05	-	-	<0.2	-	<0.05	<0.05	<0.6	-	-	<0.04	-	<0.6	-	<0.05
	3-&4-methylphenol	mg/kg			-	<0.1	<0.02	-	<0.02	-	-	<0.1	-	<0.02	<0.02	<0.1	-	-	<0.02	-	<0.1	-	<0.02
	4,6-Dinitro-2-methylphenol	mg/kg		66	-	<0.2	<0.03	-	<0.04	-	-	<0.17	-	<0.04	<0.03	<0.2	-	-	<0.03	-	<0.3	-	<0.03
	4-chlorophenol	mg/kg			-	<0.6	<0.03	-	<0.04	-	-	<0.17	-	<0.04	<0.03	<0.6	-	-	<0.03	-	<0.6	-	<0.03
	Phenols	mg/kg			<1.6	<1.5	<1.4	<1.4	<1.4	<1.4	<1.3	<1.3	-	<1.4	<1.4	<1.4	<1.5	<1.3	<1.3	-	<1.6	<1.5	<1.4
	Cresols by HPLC (W)	mg/kg			<0.4	<0.4	<0.3	<0.4	<0.4	<0.3	<0.3	<0.3	-	<0.4	<0.3	<0.3	<0.4	<0.32	<0.3	-	<0.4	<0.4	<0.3
	Phenols Total by MS Moisture Corrected	mg/kg			-	-	<0.51	-	<0.52	-	-	<2.4	-	<0.52	<0.5	-	-	-	<0.48	-	-	-	<0.51
	Xylenols	mg/kg			<0.4	<0.4	<0.3	<0.4	<0.4	<0.3	<0.3	<0.3	-	<0.4	<0.3	<0.3	<0.4	<0.32	<0.3	-	<0.4	<0.4	<0.3
Fungicides	Triadimefon	mg/kg		25000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herbicides	Pendimethalin	mg/kg		33000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Triallate	mg/kg		15000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Trifluralin	mg/kg		420	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dichlobenil	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pronamide	mg/kg		62000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pesticides	Isodrin	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	cis-Permethrin	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Parathion	mg/kg		4900	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pirimiphos-methyl	mg/kg		8200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Permethrin	mg/kg		41000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pirimphos-ethyl	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides	Aldrin	mg/kg		170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	a-BHC	mg/kg		180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	b-BHC	mg/kg		65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chlordane (cis)	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dieldrin	mg/kg		170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Endosulfan I	mg/kg		7400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Endosulfan II	mg/kg		7800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Endosulfan sulphate	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Endrin	mg/kg		250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Heptachlor	mg/kg		0.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Heptachlor epoxide	mg/kg		0.33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	o,p''-DDE	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2,4-DDT	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	o,p-DDD	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4,4-DDE	mg/kg		9.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DDT	mg/kg		8.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Methoxychlor	mg/kg		4100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DDD	mg/kg		9.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chlordane (trans)	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	d-BHC	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Endrin ketone	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organophosphorous Pesticides	Azinphos Ethyl	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Azinophos methyl	mg/kg		2500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Carbophenothion	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chlorfenvinphos	mg/kg		570	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chlorpyrifos	mg/kg		820	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chlorpyrifos-methyl	mg/kg		8200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Diazinon	mg/kg		570	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dichlorvos	mg/kg		140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dimethoate	mg/kg		160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ethion	mg/kg		410	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fenitrothion	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Fenthion	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Malathion	mg/kg		16000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Methyl parathion	mg/kg		210	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mevinphos (Phosdrin)	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs	1,1-Biphenyl	mg/kg		33000	-	<0.1	<0.1	-	<0.1	-	-	<0.6	-	<0.1	-	<0.1	-	-	-	-	<0.1	-	<0.1
Amino Aliphatics	N-nitrosodi-n-propylamine	mg/kg		0.33	-	<1.1	<1	-	<1.1	-	-	<5	-	<1.1	-	<1	-	-	-	-	<1.2	-	<1
Amino Aromatics	n-Nitrosodiphenylamine	mg/kg		470	-	<0.1	<0.1	-	<0.1	-	-	<0.6	-	<0.1	-	<0.1	-	-	-	-	<0.1	-	<0.1
Anilines	2-nitroaniline	mg/kg		8000	-	<0.6	<0.6	-	<0.6	-	-	<2.8	-	<0.6	-	<0.6	-	-	-	-	<0.6	-	<0.6
	3-nitroaniline	mg/kg			-	<17.6	<16.8	-	<17.3	-	-	<80.2	-	<17.2	-	<16.7	-	-	-	-	<18.8	-	<16.8
	4-chloroaniline	mg/kg		11	-	<0.6	<0.6	-	<0.6	-	-	<2.8	-	<0.6	-	<0.6	-	-	-	-	<0.6	-	<0.6
	4-nitroaniline	mg/kg		110	-	<0.7	<0.7	-	<0.7	-	-	<3	-	<0.7	-	<0.7	-	-	-	-	<0.8	-	<0.7
Explosives	2,4-Dinitrotoluene	mg/kg		3700	-	<0.2	<0.2	-	<0.2

Kingsway Junction Soil Chemistry
Analytical Results
A38 Derby Junctions
Highways England

Location_Code	BK11	BK12	BK12	BK12	BK12	BK13	BK13	BK13	BK13	BK13	BK13	BK14	BK14	BK14	BK15	BK15	BK15	BK15	BK16	BK16	BK16	TK01	TK01	TK01
Sample_Depth_Range	4	0.2	1	2.5	8	1	1	2.5	4	6.2	7.5	1	3	6.5	1	5	6.5	8	0.5	3	9.82	0.2	0.6	1
Sampled_Date_Time	02/08/2016	31/08/2016	31/08/2016	31/08/2016	31/08/2016	29/07/2016	09/09/2016	09/09/2016	09/09/2016	09/09/2016	09/09/2016	13/09/2016	13/09/2016	13/09/2016	13/09/2016	13/09/2016	13/09/2016	13/09/2016	05/09/2016	05/09/2016	18/10/2016	22/08/2016	22/08/2016	22/08/2016

Chem_Group	ChemName	output unit	EQL	GAC_HH_COM/IND_SLOAM_1.45-3.48%TOC																								
	Diphenyl ether	mg/kg			-	-	-	<0.6	<0.1	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1
	Methacriphos	mg/kg			-	-	-	-	-	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Boron (Water Soluble)	mg/kg			0.5	0.8	3.8	7	4.1	1.3	2	11.1	1.7	10.5	2.8	0.9	<0.5	1.9	0.8	1.9	3.7	2.7	2.6	6	-	0.7	0.7	4.6
	Chlorothalonil	mg/kg		740	-	-	-	-	-	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Permethrin II	mg/kg			-	-	-	-	-	<0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tecnazene	mg/kg			-	-	-	-	-	<0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Etrimphos	mg/kg			-	-	-	-	-	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Propetamphos	mg/kg			-	-	-	-	-	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TPH	>C5-C7	mg/kg			-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	>C8-C44	mg/kg			-	-	429	5330	675	<20.2	106	1140	<20	4210	161	-	-	-	-	105	-	<20	512	604	<20	39	94.2	6210
	GRO >C5-C6	mg/kg			-	-	<0.2	<0.2	<0.2	<0.3	<0.2	<0.2	<0.2	<0.3	<0.2	-	-	-	-	<0.3	-	<0.2	<0.2	<0.3	<0.2	<0.2	<0.2	<0.2
	GRO >C5-C10	mg/kg			-	-	<0.2	0.35	0.56	<0.3	<0.2	0.94	<0.2	1.7	<0.2	-	-	-	-	<0.3	-	<0.2	<0.2	4.72	<0.2	<0.2	<0.2	<0.2
	GRO >C6-C8	mg/kg			-	-	<0.2	<0.2	<0.2	<0.3	<0.2	<0.2	<0.2	<0.3	<0.2	-	-	-	-	<0.3	-	<0.2	<0.2	<0.3	<0.2	<0.2	<0.2	<0.2
	GRO >C7-C8	mg/kg			-	-	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	<0.01	<0.01	<0.01	-	-	-	-	<0.01	-	<0.01	<0.01	0.07	<0.01	<0.01	<0.01	<0.01
	>C8-C10 Aliphatics	mg/kg		4800	-	-	<4	42.6	14.6	<4.04	<4	<4	<4	29	<4	-	-	-	-	<4	-	<4	<4	18.1	<4	<4	<4	10.83
	>C10-C12 Aliphatics	mg/kg		23000	-	-	<4	133	19.4	<4.04	<4	10.9	<4	102.5	<4	-	-	-	-	<4	-	<4	<4	38.9	<4	<4	<4	31
	>C12-C16 Aliphatics	mg/kg		82000	-	-	25.2	286	13.2	<4.04	<4	42.5	<4	165	<4	-	-	-	-	5.64	-	4.64	<4	16.4	<4	<4	5.51	124
	>C16-C35 Aliphatics	mg/kg		1.7E6	-	-	372	4610	615	<12	97.2	946	13.8	3410	147	-	-	-	-	97	-	<11.9	457	498	<11.9	36.1	81	5830
	>C35-C44 Aliphatics	mg/kg		1.7E6	-	-	26.1	262	12	<5.68	<5.62	136	<5.62	507	8.82	-	-	-	-	<5.62	-	<5.62	50.2	31.9	<5.62	<6.28	<6.14	204
	>EC8-EC10 Aromatics	mg/kg		8100	-	-	<4	4.9	6.12	<4	<4	4.42	<4	10.45	<4	-	-	-	-	<4	-	<4	<4	<4	<4	<4	<4	11.1
	>EC10-EC12 Aromatics	mg/kg		28000	-	-	<4	24.3	13	<4	<4	<4	<4	12.66	<4	-	-	-	-	<4	-	<4	<4	13	<4	<4	<4	25
	>EC12-EC16 Aromatics	mg/kg		37000	-	-	11	88.4	5.45	<4	<4	9.4	<4	55	<4	-	-	-	-	<4	-	<4	<4	4.31	<4	<4	<4	67.9
	>EC16-EC21 Aromatics	mg/kg		28000	-	-	25.7	423	131	7.04	5.76	55.5	<4	403	15.2	-	-	-	-	8.48	-	<4	27.2	32.1	<4	15.8	<4	176
	>EC21-EC35 Aromatics	mg/kg		28000	-	-	233	1820	275	26.2	34.4	246	<8.76	1220	73.7	-	-	-	-	43.8	-	<8.76	355	178	<8.76	15.3	10	1870
	>EC35-EC44 Aromatics	mg/kg		28000	-	-	<5.62	145	9.74	<5.62	<5.62	14.7	<5.62	73.8	13.5	-	-	-	-	<5.62	-	<5.62	31.4	6.35	<5.62	<6.28	<6.14	117.2
BTEX	Benzene	mg/kg		47	<0.001	-	<0.001	<0.001	<0.012	<0.013	<0.011	<0.012 - 0.004	<0.001	<0.014	<0.012	-	-	-	-	<0.001	-	<0.011	<0.012	<0.014	<0.011	<0.011	<0.001	<0.001
	Toluene	mg/kg		110000	<0.006	-	<0.012 - 0.017	<0.012 - 0.025	<0.012	<0.013	<0.011	0.06 - 0.07	<0.006	<0.014	<0.012	-	-	-	-	<0.007	-	<0.011	<0.012	0.07	<0.011	<0.011	<0.005	<0.006
	Ethylbenzene	mg/kg		13000	<0.002	-	<0.012 - 0.011	<0.012 - 0.02	0.04	<0.013	<0.011	0.11 - 1.55	<0.002	0.02	<0.012	-	-	-	-	<0.003	-	<0.011	<0.012	0.27	<0.011	<0.011	<0.002	<0.012 - 0.006
	Xylene (m & p)	mg/kg			<0.005	-	0.014	0.048	-	-	-	1.64	<0.005	-	-	-	-	-	-	<0.005	-	-	-	-	-	-	<0.004	0.017
	Xylene Total	mg/kg		14000	-	-	<0.024	<0.024	0.06	<0.027	<0.023	0.13	<0.024	0.05	<0.024	-	-	-	-	<0.026	-	<0.022	<0.023	0.84	<0.021	<0.022	<0.022	<0.024
	Xylene (o)	mg/kg		15000	<0.002	-	<0.002	<0.002	-	-	-	0.539	<0.002	-	-	-	-	-	-	<0.003	-	-	-	-	-	-	<0.002	<0.002
Oxygenates	MTBE	mg/kg		13000	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
Chlorinated Hydrocarbons	Chloromethane	mg/kg		1.2	<0.004	-	<0.004	<0.004	-	-	-	<0.004	<0.004	-	-	-	-	-	-	<0.004	-	-	-	-	-	-	<0.003	<0.004
	Vinyl chloride	mg/kg		0.077	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	Chloroethane	mg/kg		1300	<0.002	-	<0.002	<0.002	-	-	-	<0.002	<0.002	-	-	-	-	-	-	<0.003	-	-	-	-	-	-	<0.002	<0.002
	1,1-dichloroethene	mg/kg		450	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	trans-1,2-dichloroethene	mg/kg		40	<0.001	-	<0.001	<0.001	-	-	-	0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	1,1-dichloroethane	mg/kg		190	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	cis-1,2-dichloroethene	mg/kg		24	<0.006	-	<0.006	<0.006	-	-	-	<0.006	<0.006	-	-	-	-	-	-	<0.007	-	-	-	-	-	-	<0.005	<0.006
	Chloroform	mg/kg		170	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	1,1,1-trichloroethane	mg/kg		1300	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	Carbon tetrachloride	mg/kg		6.3	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	Trichloroethene	mg/kg		2.6	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	1,1,2-trichloroethane	mg/kg		190	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	Tetrachloroethene	mg/kg		42	<0.004	-	<0.004	<0.004	-	-	-	<0.004	<0.004	-	-	-	-	-	-	<0.004	-	-	-	-	-	-	<0.003	<0.004
VOC	2,2-dichloropropane	mg/kg			<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	Bromochloromethane	mg/kg		630	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	1,1-dichloropropene	mg/kg			<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	1,2-dichloroethane	mg/kg		0.97	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	1,2-dichloropropane	mg/kg		5.9	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	Dibromomethane	mg/kg		99	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	Bromodichloromethane	mg/kg		1.3	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	cis-1,3-dichloropropene	mg/kg			<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	trans-1,3-dichloropropene	mg/kg			<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	1,3-dichloropropane	mg/kg		23000	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	Chlorodibromomethane	mg/kg		39	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	1,1,1,2-tetrachloroethane	mg/kg		250	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	Styrene	mg/kg		6500	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	Bromoform	mg/kg		1500	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	Isopropylbenzene	mg/kg		3300	<0.001	-	<0.001	<0.001	-	-	-	0.166	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	1,1,2,2-tetrachloroethane	mg/kg		550	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	1,2,3-trichloropropane	mg/kg		0.11	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	n-propylbenzene	mg/kg		9700	<0.001	-	<0.001	0.008	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	1,3,5-trimethylbenzene	mg/kg		12000	<0.001	-	<0.001	0.062	-	-	-	0.666	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	tert-butylbenzene	mg/kg		120000	<0.001	-	<0.001	<0.001	-	-	-	0.056	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	1,2,4-trimethylbenzene	mg/kg		99	<0.001	-	<0.001	0.037	-	-	-	1.48	0.002	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	sec-butylbenzene	mg/kg		120000	<0.001	-	<0.001	0.026	-	-	-	0.154	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	p-isopropyltoluene	mg/kg			<0.001	-	<0.001	0.061	-	-	-	0.414	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	n-butylbenzene	mg/kg		58000	<0.001	-	<0.001	<0.001	-	-	-	0.199	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	1,2-dibromo-3-chloropropane	mg/kg		0.064	<0.001	-	<0.001	<0.001	-	-	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	-	-	-	<0.001	<0.001
	Hexachlorobutadiene	mg/kg		66	<0.002	-	<0.002	<0.002	<0.1	-	-	<0.002	<0.002	-	-	-	-	-	-	<0.003	-	-	-	-	-	-	<0.002	<0.002
PAH	Naphthalene	mg/kg		460	<0.006	-	0.448 - 0.82	0.112 - 1	<0.1 - 0.5	<0.11	<0.09	0.1 - 1.19	<0.006	0.27	0.16	-	-	<0.09	-	<0.007	-	<0.09	0.09	0.29	<0.09	<0.09	<0.005	0.228 - 8.68
	Acenaphthylene	mg/kg		97000	<0.09	-	<0.1	<0.6 - 0.21	<0.09	<0.11	<0.09	<0.1	<0.1	0.61	<0.09	-	-	<0.09	-	<0.1	-	<0.09	0.16	<0.11	<0.09	<0.09	<0.09	0.1 - 0.35
	Acenaphthene	mg/kg		97000	<0.09	-	0.43	1.3 - 1.5	<0.09	<0.11	<0.09	0.1 - 0.3	<0.1	0.73	0.27	-	-	<0.09	-	<0.1	-	<0.09	<0.09	0.11	<0.09	<0.09	<0.09	0.9 - 1.62
	Fluorene	mg/kg		68000	<0.09	-	0.4	1.1 - 1.5	<0.1 - 0.16	<0.11	<0.09	0.2 - 0.42	<0.1	2.24	0.27	-	-	<0.09	-	<0.1	-	<0.09	<0.09	0.15	<0.09	<0.09	<0.09	0.9 - 1.65
	Phenanthrene	mg/kg		22000	<0.09	-	2.17	5.3 - 13.9	0.1 - 0.69	0.48	0.27	1.1 - 1.4	<0.1	20	0.99	-	-	0.49	-	0.21	-	<0.09	1.19	0.84	<0.09	0.1	<0.1 - 0.1	2.7 - 5.83
	Anthracene	mg/kg		540000	<0.09	-	0.59	1.5 - 4.74	<0.1 - 0.18	0.11	<0.09	0.2 - 0.36	<0.1	5.25	0.26	-	-	0.1	-	<0.1	-	<0.09	0.4	0.17	<0.09	<0.09	<0.09	0.9 - 1.63
	Fluoranthene	mg/kg		23000	<0.09	-	2.92	5.6 - 30.6	<0.2 - 0.57	1.03	0.71	0.9 - 1.47	<0.1	23.2	1.01	-	-	0.48	-	0.25	-	<0.09	3.24	1.02	<0.09	0.32	<0.2 - 0.17	2.2 - 4.74
	Pyrene	mg/kg		54000	<0.09	-	2.44	5.5 - 25.8	<0.2 - 0.46	0.85	0.64	0.7 - 1.14	<0.1	18	0.95	-	-	0.42	-	0.21	-	<0.09	3.79	0.81	<0.09	0.26	<0.2 - 0.15	1.8 - 3.49
	Benz(a)anthracene	mg/kg		170	<0.09	-	1.49	2 - 17	<0.2 - 0.26	0.55	0.4	0.4 - 0.43	<0.1	9.46	0.4	-	-	0.2	-	0.1	-	<0.09	2.18	0.3	<0.09	0.2	<0.2 - 0.12	0.7 - 1.39
	Chrysene	mg/kg		350	<0.09	-	1	2.5 - 12.1	<0.2 - 0.19	0.55	0.41	0.4 - 0.48	<0.1	8.13	0.33	-	-	0.16	-	0.12	-	<0.09	2.15	0.3	<0.09	0.18	<0.2 - 0.1	0.7 - 1.05
	Benzo(a) pyrene	mg/kg		35	<0.09	-	1.18	2.3 - 12.7	<0.2 - 0.18	0.5	0.42	0.2 - 0.3	<0.1	6.37	0.25	-	-	0.14	-	<0.1	-	<0.09	2.69	0.19	<0.09	0.18	<0.2 - 0.1	0.5 - 0.8
	Indeno(1,2,3-c,d)pyrene	mg/kg		510	<0.09	-	0.7	<3 - 7	<0.6 - 0.11	0.45	0.3	<0.6 - 0.24	<0.1	3.63	0.19	-	-	<0.09	-	<0.1	-	<0.09	1.8	0.12	<0.09	0.15	<0.5 - 0.1	<0.6 - 0.48
	Dibenz(a,h)anthracene	mg/kg		3.6	<0.09	-	0.11	<3 - 1.12	<0.09	<0.11	<0.09	<0.1	<0.1	0.89	<0.09	-	-	<0.09	-	<0.1	-	<0.09	0.4	<0.11	<0.09	<0.09	<0.09	<0.1
	Benzo(g,h,i)perylene	mg/kg		4000	<0.09	-	0.54	<3 - 4.89	<0.09	0.35	0.27	<0.6 - 0.2	<0.1	3.01	0.15	-	-	<0.09	-	<0.1	-	<0.09	1.73	0.12	<0.09	0.12	<0.5 - 0.1	<0.6 - 0.35
	Benzo(b)fluoranthene	mg/kg		44	<0.09	-	1.28	2.7 - 13.9	<0.2 - 0.2	0.77	0.54	0.4 - 0.48	<0.1	7.62	0.38	-	-	0.2	-	0.12	-	<0.09	3.08	0.3	<0.09	0.26	<0.2 - 0.15	0.7 - 0.88
	Benzo(j)fluoranthene	mg/kg		1200	<0.09	-	0.46	1 - 5.37	<0.09	0.29	0.21	<0.2 - 0.16	<0.1	3.13	0.15	-	-	<0.09	-	<0.1	-	<0.09	1.08	0.12	<0.09	<0.09	<0.09	0.2 - 0.35
	PAH 16 Total	mg/kg			<1.51	-	<16.59	152.98	<3.92	<6.49	<4.75	<7.91	<1.54	112.32	<5.95	-	-	<2.92	-	<2.05	-	<1.42	<24.03	<5.06	<1.37	<2.4	<1.71	<33.4
SVOC	Coronene	mg/kg			-	-	-	<1.8	<0.4	-	-	<0.4	<0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.3	<0.4
	2-methylnaphthalene	mg/kg		3000	-	-	-	<0.6	<0.1	-	-	0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	1
	4-bromophenyl phenyl ether	mg/kg			-	-	-	<0.6	<0.1	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1
	4-chlorophenyl phenyl ether	mg/kg			-	-	-	<0.6	<0.1	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1
	Bis(2-chloroethoxy) methane	mg/kg		2500	-	-	-	<0.6	<0.1	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1
	Bis(2-chloroethyl)ether	mg/kg		1	-	-	-	<0.6	<0.1	-	-	<0.1	<0.1	-	-	-	-	10.9	-	-	-	-	-	-	-	-	<0.1	<0.1
	Dibenzofuran	mg/kg		1000	-	-	-	<0.6	<0.1	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	0.5
	Hexachlorocyclopentadiene	mg/kg		7.5	-	-	-	<0.6	<0.1	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1
	Hexachloroethane	mg/kg		53	-	-	-	<0.6	<0.1	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1
	1-Methylnaphthalene	mg/kg		73	-	-	-	<0.6	<0.1	-	-	0.2	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	0.9
	3,3-Dichlorobenzidine	mg/kg		5.1	-	-	-	-	-	-	-	<0.6	<0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Benzoic Acid	mg/kg		3.3E6	-	-	-	<3	<0.6	-	-	<0.6	<0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.6
	Benzyl alcohol	mg/kg		82000	-	-	-	<3	<0.6	-	-	<0.6	<0.6	-	-	-	-	117	-	-	-	-	-	-	-	-	<0.5	<0.6
	Bis(2-chloroisopropyl) ether	mg/kg		47000	-	-	-	<3	<0.6	-	-	<0.6	<0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.6
Phenolics	Trimethylphenols	mg/kg			<0.4	<0.3	<0.4	<0.36	<0.4	<0.4	<0.3	0.6	<0.4	<0.4	<0.4	<0.3	<0.3	<0.3	<0.3	<0.4	<0.4	<0.3	<0.4	<0.4	-	<0.3	<0.3	0.4
	2-methylphenol	mg/kg		9.99000000000003E11	<0.04	-	<0.7	<0.18	<0.1	<0.04	-	<0.1	<0.1	-	-	-	-	<0.011	-	-	-	-	-	-	-	-	<0.03	<0.04
	2-nitrophenol	mg/kg			<0.04	-	<0.7	<0.18	<0.1	<0.04	-	<0.1	<0.1	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	<0.03	<0.04
	2,4-dimethylphenol	mg/kg		24000	<0.02	-	<0.5	<0.1	<0.1	<0.03	-	<0.1	<0.1	-	-	-	-	<0.01	-	-	-	-	-	-	-	-	<0.02	<0.02
	4-chloro-3-methylphenol	mg/kg		82000	<0.04	-	<0.7	<0.18	<0.1	<0.04	-	<0.1	<0.1	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	<0.03	<0.04
	4-nitrophenol	mg/kg			<0.07	-	<1.4	<0.4	<0.6	<0.08	-	<0.6	<0.6	-	-	-	-	<4	-	-	-	-	-	-	-	-	<0.07	<0.07
	Phenol	mg/kg		690	<0.04	<0.3	<0.4	<0.18	<0.1	<0.04	<0.3	<0.1	<0.1	<0.4	<0.4	<0.3	<0.3	<0.011 - 26.2	<0.3	<0.4	<0.4	<0.3	<0.4	<0.4	-	<0.3	<0.03	<0.04
	2-chloronaphthalene	mg/kg		960	-	-	-	<0.6	<0.1	-	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.1
	2,4-dinitrophenol	mg/kg		1600	<0.05	-	<1	<0.2	<0.6	<0.05	-	<0.6	<0.6	-	-	-	-	<4	-	-	-	-	-	-	-	-	<0.04	<0.05
	3-&4-methylphenol	mg/kg			<0.02	-	<0.5	<0.1	<0.1	<0.03	-	<0.1	<0.1	-	-	-	-	<0.023	-	-	-	-	-	-	-	-	<0.02	<0.02
	4,6-Dinitro-2-methylphenol	mg/kg		66	<0.04	-	<0.7	<0.18	<0.2	<0.04	-	<0.2	<0.2	-	-	-	-	10.2	-	-	-	-	-	-	-	-	<0.03	<0.04
	4-chlorophenol	mg/kg			<0.04	-	<0.7	<0.18	<0.6	<0.04	-	<0.6	<0.6	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	<0.03	<0.04
	Phenols	mg/kg			<1.4	<1.4	<2.2	<1.43	<4.8	<1.6	<1.4	<1.7	<1.4	<2	<1.4	<1.4	<1.4	<1.4	<1.3	<1.6	<1.7	<1.3	<1.4	<1.7	-	<1.3	<1.3	<1.5
	Cresols by HPLC (W)	mg/kg			<0.4	<0.3	<0.4	<0.36	0.6	<0.4	<0.3	<0.4	<0.4	<0.4	<0.4	<0.3	<0.3	<0.3	<0.3	<0.4	<0.4	<0.3	<0.4	<0.4	-	<0.3	<0.3	<0.4
	Phenols Total by MS Moisture Corrected	mg/kg			<0.52	-	<10.6	<2.6	-	<0.59	-	-	-	-	-	-	-	243	-	-	-	-	-	-	-	-	<0.48	<0.54
	Xylenols	mg/kg			<0.4	<0.3	1.1	0.36	3.5	<0.4	<0.3	0.4	<0.4	0.7	<0.4	<0.3	<0.3	<0.3	<0.3	<0.4	<0.4	<0.3	<0.4	<0.4	-	<0.3	<0.3	0.4
Fungicides	Triadimefon	mg/kg		25000	-	-	-	-	-	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herbicides	Pendimethalin	mg/kg		33000	-	-	-	-	-	<0.013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Triallate	mg/kg		15000	-	-	-	-	-	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Trifluralin	mg/kg		420	-	-	-	-	-	<0.013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dichlobenil	mg/kg			-	-	-	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pronamide	mg/kg		62000	-	-	-	-	-	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pesticides	Isodrin	mg/kg			-	-	-	-	-	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	cis-Permethrin	mg/kg			-	-	-	-	-	<0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Parathion	mg/kg		4900	-	-	-	-	-	<0.007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pirimiphos-methyl	mg/kg		8200	-	-	-	-	-	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Permethrin	mg/kg		41000	-	-	-	-	-	<0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Pirimphos-ethyl	mg/kg			-	-	-	-	-	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides	Aldrin	mg/kg		170	-	-	-	-	-	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	a-BHC	mg/kg		180	-	-	-	-	-	<0.003	-	-	-	-	-	-	-	-	-

Kingsway Junction Soil Chemistry
Analytical Results
A38 Derby Junctions
Highways England

Location_Code	TK02	TK02	TK02	TK02	TK03	TK03	TK04	TK04	TK04	WK01	WK01	WK02	WK02	WK03	WK03	WK04	WK04	WK04	WK05	WK05	WK05	WK05	WK06	WK06	WK06
Sample_Depth_Range	0.5	1	1.6	2	0.2	0.6	0.2	1	1.9	0.5	1	0.5	3	0.5	1	0.5	1	3	0.2	0.5	3	5	0.2	0.5	1
Sampled_Date_Time	22/08/2016	22/08/2016	22/08/2016	22/08/2016	22/08/2016	22/08/2016	22/08/2016	22/08/2016	22/08/2016	14/09/2016	14/09/2016	26/08/2016	26/08/2016	26/08/2016	26/08/2016	26/08/2016	26/08/2016	26/08/2016	24/08/2016	24/08/2016	24/08/2016	24/08/2016	24/08/2016	24/08/2016	24/08/2016	24/08/2016

Chem_Group	ChemName	output unit	EQL	GAC_HH_COM/IND_SLOAM_1.45-3.48%TOC																								
	Diphenyl ether	mg/kg			<0.5	<0.1	<0.1	<0.1	-	<0.6	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-
	Methacriphos	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Boron (Water Soluble)	mg/kg			0.9	1.7	3	3.5	0.9	4.7	0.5	0.7	0.8	2	1.9	1.7	1.9	1.5	-	0.9	-	1.2	0.6	1.3	0.8	0.6	0.9	0.7	-
	Chlorothalonil	mg/kg		740	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Permethrin II	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tecnazene	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Etrimphos	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Propetamphos	mg/kg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TPH	>C5-C7	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-
	>C8-C44	mg/kg			140	<20	3680	8390	45.7	5050	253	49.8	4020	-	35.6	23	-	-	-	<22	-	36.7	-	427	27.4	-	-	122	-
	GRO >C5-C6	mg/kg			<0.2	<0.2	<0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	<0.2	-	-	<0.2	-
	GRO >C5-C10	mg/kg			<0.2	<0.2	1.9	5.7	<0.2	2.51	<0.2	<0.2	0.25	-	<0.2	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	<0.2	-	-	<0.2	-
	GRO >C6-C8	mg/kg			<0.2	<0.2	<0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	-	<0.2	-	<0.2	-	<0.2	<0.2	-	-	<0.2	-
	GRO >C7-C8	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	<0.01	-	-	<0.01	-
	>C8-C10 Aliphatics	mg/kg		4800	<4	<4	28.8	48	<5	12.2	<4.37	<4	9.03	-	<4	<4.46	-	<4	-	<4	-	<4	-	<4	<5	-	-	<4	-
	>C10-C12 Aliphatics	mg/kg		23000	<4	<4	79.6	151	<5	294	13.1	<4	56	-	<4	<4.46	-	<4	-	<4	-	<4	-	<4	<5	-	-	<4	-
	>C12-C16 Aliphatics	mg/kg		82000	9.8	<4	169	452	<5	933	52.2	<4	217	-	<4	<4.46	-	<4	-	<4	-	<4	-	<4	<5	-	-	<4	-
	>C16-C35 Aliphatics	mg/kg		1.7E6	120	13.1	3120	6980	39	3470	183	41.2	3320	-	28.8	21.5	-	<13.2	-	33.1	-	357	19.9	-	-	116	-
	>C35-C44 Aliphatics	mg/kg		1.7E6	9.09	<5.62	269	761	<6.62	335	<6.15	<6.14	424	-	<5.62	<6.27	-	<6.22	-	<5.62	-	67.9	<6.72	-	-	<5.62	-
	>EC8-EC10 Aromatics	mg/kg		8100	<4	<4	11.25	55.8	<5	8.2	<4	<4	<5	-	<4	<4	-	<4	-	<4	-	<4	<5	-	-	<4	-
	>EC10-EC12 Aromatics	mg/kg		28000	<4	<4	16.2	68.7	<5	37.4	<4	<4	<5	-	<4	<4	-	<4	-	<4	-	<4	<5	-	-	<4	-
	>EC12-EC16 Aromatics	mg/kg		37000	4.95	<4	65	63.5	<5	183	<4	<4	44	-	<4	<4	-	<4	-	<4	-	12.9	<5	-	-	<4	-
	>EC16-EC21 Aromatics	mg/kg		28000	25.4	<4	131	236	<5	257	<4	<4	193	-	9.3	<4	-	-	-	<4	-	<4	-	72.2	<5	-	-	11.5	-
	>EC21-EC35 Aromatics	mg/kg		28000	92.1	9.9	1060	1720	21.4	870	35.4	18.2	1090	-	52.4	20.2	-	<9.69	-	9.1	-	544	<10.48	-	-	127	-
	>EC35-EC44 Aromatics	mg/kg		28000	12	<5.62	171	301	<6.62	110.8	<6.08	<6.14	206	-	7.13	<6.24	-	-	-	<6.22	-	<5.62	-	146	<6.72	-	-	23.7	-
BTEX	Benzene	mg/kg		47	<0.001	<0.001	<0.013	<0.001	<0.012	<0.012 - 0.01	<0.011	<0.001	<0.001	-	<0.011	<0.011	-	<0.012	-	<0.001	-	<0.012	-	<0.001	<0.001	<0.001	-	<0.001	-
	Toluene	mg/kg		110000	<0.005	<0.006	<0.013	<0.012 - 0.015	<0.012	<0.012 - 0.024	<0.011	<0.005	<0.006	-	<0.011	<0.011	-	<0.012	-	<0.006	-	<0.012	-	<0.005	<0.006	<0.006	-	<0.005	-
	Ethylbenzene	mg/kg		13000	<0.002	<0.002	<0.013	0.07 - 0.193	<0.012	0.05 - 0.218	<0.011	<0.002	<0.012 - 0.002	-	<0.011	<0.011	-	<0.012	-	<0.002	-	<0.012	-	<0.002	<0.002	<0.002	-	<0.002	-
	Xylene (m & p)	mg/kg			<0.004	<0.005	-	11	-	0.385	-	<0.004	0.006	-	-	-	-	<0.004	-	<0.004	-	<0.004	-	<0.004	<0.005	<0.005	-	<0.004	-
	Xylene Total	mg/kg		14000	<0.022	<0.023	0.7	0.38	<0.024	0.15	<0.022	<0.022	<0.025	-	<0.022	<0.022	-	<0.024	-	<0.022	-	<0.023	-	<0.021	<0.024	-	-	<0.022	-
	Xylene (o)	mg/kg		15000	<0.002	<0.002	-	0.048	-	0.114	-	<0.002	<0.002	-	-	-	-	-	-	<0.002	-	-	-	<0.002	<0.002	<0.002	-	<0.002	-
Oxygenates	MTBE	mg/kg		13000	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
Chlorinated Hydrocarbons	Chloromethane	mg/kg		1.2	<0.003	<0.003	-	<0.004	-	<0.004	-	<0.003	<0.004	-	-	-	-	-	-	<0.003	-	-	-	<0.003	<0.004	<0.003	-	<0.003	-
	Vinyl chloride	mg/kg		0.077	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	Chloroethane	mg/kg		1300	<0.002	<0.002	-	<0.002	-	0.061	-	<0.002	<0.002	-	-	-	-	-	-	<0.002	-	-	-	<0.002	<0.002	<0.002	-	<0.002	-
	1,1-dichloroethene	mg/kg		450	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	trans-1,2-dichloroethene	mg/kg		40	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	1,1-dichloroethane	mg/kg		190	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	cis-1,2-dichloroethene	mg/kg		24	<0.005	<0.006	-	<0.006	-	<0.006	-	<0.005	<0.006	-	-	-	-	-	-	<0.006	-	-	-	<0.005	<0.006	<0.006	-	<0.005	-
	Chloroform	mg/kg		170	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	1,1,1-trichloroethane	mg/kg		1300	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	Carbon tetrachloride	mg/kg		6.3	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	Trichloroethene	mg/kg		2.6	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	1,1,2-trichloroethane	mg/kg		190	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	Tetrachloroethene	mg/kg		42	<0.003	<0.003	-	<0.004	-	<0.004	-	<0.003	<0.004	-	-	-	-	-	-	<0.003	-	-	-	<0.003	<0.004	<0.003	-	<0.003	-
VOC	2,2-dichloropropane	mg/kg			<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	Bromochloromethane	mg/kg		630	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	1,1-dichloropropene	mg/kg			<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	1,2-dichloroethane	mg/kg		0.97	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	1,2-dichloropropane	mg/kg		5.9	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	Dibromomethane	mg/kg		99	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	Bromodichloromethane	mg/kg		1.3	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	cis-1,3-dichloropropene	mg/kg			<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	trans-1,3-dichloropropene	mg/kg			<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	1,3-dichloropropane	mg/kg		23000	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	Chlorodibromomethane	mg/kg		39	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	1,1,1,2-tetrachloroethane	mg/kg		250	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	Styrene	mg/kg		6500	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	Bromoform	mg/kg		1500	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	Isopropylbenzene	mg/kg		3300	<0.001	<0.001	-	0.194	-	0.075	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	1,1,2,2-tetrachloroethane	mg/kg		550	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	0.046	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	1,2,3-trichloropropane	mg/kg		0.11	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	n-propylbenzene	mg/kg		9700	<0.001	<0.001	-	1.01	-	0.134	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	1,3,5-trimethylbenzene	mg/kg		12000	<0.001	<0.001	-	33.9	-	0.91	-	<0.001	0.007	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	tert-butylbenzene	mg/kg		120000	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	1,2,4-trimethylbenzene	mg/kg		99	<0.001	<0.001	-	33.9	-	0.91	-	<0.001	0.007	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	sec-butylbenzene	mg/kg		120000	<0.001	<0.001	-	0.203	-	0.16	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	p-isopropyltoluene	mg/kg			<0.001	<0.001	-	0.21	-	0.161	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	n-butylbenzene	mg/kg		58000	<0.001	<0.001	-	0.246	-	0.258	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	1,2-dibromo-3-chloropropane	mg/kg		0.064	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	-	-	-	-	-	-	<0.001	-	-	-	<0.001	<0.001	<0.001	-	<0.001	-
	Hexachlorobutadiene	mg/kg		66	<0.002	<0.002	<0.1	<0.002	-	<0.002	-	<0.002	<0.002	-	-	-	-	-	-	<0.002	-	-	-	<0.002	<0.002	<0.002	-	<0.002	-
PAH	Naphthalene	mg/kg		460	<0.005	<0.006	<0.1 - 0.15	0.194 - 1.1	<0.09	0.863 - 2.1	-	<0.005	<0.1 - 0.1	<0.09	0.15	<0.09	-	-	-	<0.008	-	<0.09	-	<0.005 - 0.19	<0.006	<0.006	-	<0.005	-
	Acenaphthylene	mg/kg		97000	<0.09	<0.09	<0.1	<0.1 - 0.14	<0.09	<0.6 - 0.25	-	<0.09	<0.1	0.18	0.1	<0.09	-	-	-	<0.09	-	<0.09	-	2.28	<0.1	<0.09	-	0.24	-
	Acenaphthene	mg/kg		97000	<0.5 - 0.39	<0.1 - 0.1	0.3 - 0.74	0.4 - 1.1	<0.09	<0.6 - 0.69	-	<0.09	<0.1 - 0.15	0.2	<0.09	<0.09	-	-	-	<0.09	-	<0.09	-	0.47	<0.1	<0.09	-	0.1	-
	Fluorene	mg/kg		68000	<0.5 - 0.31	<0.1 - 0.1	0.3 - 0.74	0.4 - 1.06	<0.09	0.93 - 1	-	<0.09	<0.1 - 0.2	0.17	<0.09	<0.09	-	-	-	<0.09	-	<0.09	-	1.72	<0.1	<0.09	-	<0.09	-
	Phenanthrene	mg/kg		22000	1.09 - 1.5	0.5	0.9 - 2.97	1.5 - 4.06	<0.09	3.4 - 5.31	-	<0.09	0.2 - 0.4	2.08	1	0.36	-	-	-	<0.09	-	0.1	-	15	<0.1	<0.09	-	1	-
	Anthracene	mg/kg		540000	0.31 - 0.5	0.2 - 0.21	0.3 - 0.66	0.4 - 0.71	<0.09	0.7 - 1.32	-	<0.09	0.1 - 0.17	0.58	0.3	0.13	-	-	-	<0.09	-	<0.09	-	4	<0.1	<0.09	-	0.39	-
	Fluoranthene	mg/kg		23000	2.17 - 2.7	1.3 - 2.1	1 - 2.38	1.5 - 3.82	0.13	2.5 - 6.97	-	<0.09	0.9 - 1.09	3.73	2.12	0.87	-	-	-	0.15	-	0.14	-	16	<0.2	<0.09	-	2.7	-
	Pyrene	mg/kg		54000	1.9 - 2.3	1 - 1.82	0.8 - 1.85	1 - 3.12	0.1	2.1 - 5.86	-	<0.09	0.9 - 1.19	3.02	1.76	0.69	-	-	-	0.14	-	0.14	-	11.9	<0.2	<0.09	-	2.3	-
	Benz(a)anthracene	mg/kg		170	<1 - 0.81	0.6 - 1.07	0.4 - 0.75	0.5 - 1.37	0.09	<1 - 3.18	-	<0.09	0.5 - 0.6	1.76	1.04	0.41	-	-	-	0.1	-	0.09	-	6.74	<0.2	<0.09	-	1.36	-
	Chrysene	mg/kg		350	0.61 - 1	0.6 - 0.82	0.4 - 0.56	0.5 - 1.18	0.11	<1 - 2.59	-	<0.09	0.6	1.67	0.89	0.3	-	-	-	<0.09	-	<0.09	-	5.37	<0.2	<0.09	-	1.23	-
	Benzo(a) pyrene	mg/kg		35	0.66 - 1.2	0.6 - 1.03	0.4 - 0.56	0.6 - 1.06	<0.09	<1 - 2.76	-	<0.09	0.45 - 0.5	1.9	1.02	0.32	-	-	-	0.1	-	<0.09	-	4.86	<0.2	<0.09	-	1.67	-
	Indeno(1,2,3-c,d)pyrene	mg/kg		510	<2.7 - 0.42	<0.6 - 0.74	<0.6 - 0.33	<0.6 - 0.78	<0.09	<3 - 1.85	-	<0.09	<0.6 - 0.34	1.45	0.75	0.2	-	-	-	<0.09	-	<0.09	-	2.9	<0.6	<0.09	-	1.17	-
	Dibenz(a,h)anthracene	mg/kg		3.6	<0.09	<0.6 - 0.1	<0.1	<0.6 - 0.14	<0.09	<3 - 0.34	-	<0.09	<0.1	0.27	0.13	<0.09	-	-	-	<0.09	-	<0.09	-	0.6	<0.6	<0.09	-	0.2	-
	Benzo(g,h,i)perylene	mg/kg		4000	<2.7 - 0.34	<0.6 - 0.54	<0.6 - 0.3	<0.6 - 0.67	<0.09	<3 - 1.61	-	<0.09	<0.6 - 0.31	1.28	0.64	0.18	-	-	-	<0.09	-	<0.09	-	2.2	<0.6	<0.09	-	1.25	-
	Benzo(b)fluoranthene	mg/kg		44	0.74 - 1.5	0.8 - 1.18	0.5 - 0.66	0.7 - 1.51	0.1	1.5 - 3.43	-	<0.09	0.7 - 0.73	2.26	1.25	0.36	-	-	-	0.09	-	0.1	-	6.09	<0.2	<0.09	-	2.16	-
	Benzo(k)fluoranthene	mg/kg		1200	<1 - 0.27	0.3 - 0.44	<0.3 - 0.24	0.2 - 0.45	<0.09	<1 - 1.22	-	<0.09	0.22 - 0.4	0.81	0.51	0.13	-	-	-	<0.09	-	<0.09	-	2.64	<0.2	<0.09	-	0.66	-
	PAH 16 Total	mg/kg			<10.28	<10.97	<13.03	22.26	<1.6	40.25	-	<1.4	<6.62	<21.51	<11.9	<4.41	-	-	-	<1.57	-	<1.59	-	82.87	-	<1.49	-	<16.72	-
SVOC	Coronene	mg/kg			<1.6	<0.3	<0.4	<0.4	-	<1.8	-	<0.3	<0.4	-	-	-	-	-	-	-	-	-	-	-	<0.4	-	-	-	-
	2-methylnaphthalene	mg/kg		3000	<0.5	<0.1	0.3	0.6	-	3	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-
	4-bromophenyl phenyl ether	mg/kg			<0.5	<0.1	<0.1	<0.1	-	<0.6	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-
	4-chlorophenyl phenyl ether	mg/kg			<0.5	<0.1	<0.1	<0.1	-	<0.6	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-
	Bis(2-chloroethoxy) methane	mg/kg		2500	<0.5	<0.1	<0.1	<0.1	-	<0.6	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-
	Bis(2-chloroethyl)ether	mg/kg		1	<0.5	<0.1	<0.1	<0.1	-	<0.6	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-
	Dibenzofuran	mg/kg		1000	<0.5	<0.1	<0.1	0.2	-	<0.6	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-
	Hexachlorocyclopentadiene	mg/kg		7.5	<0.5	<0.1	<0.1	<0.1	-	<0.6	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-
	Hexachloroethane	mg/kg		53	<0.5	<0.1	<0.1	<0.1	-	<0.6	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-
	1-Methylnaphthalene	mg/kg		73	<0.5	<0.1	0.3	0.6	-	2.3	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-
	3,3-Dichlorobenzidine	mg/kg		5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Benzoic Acid	mg/kg		3.3E6	<2.7	<0.6	<0.6	<0.6	-	<3	-	<0.5	<0.6	-	-	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-
	Benzyl alcohol	mg/kg		82000	<2.7	<0.6	<0.6	<0.6	-	<3	-	<0.5	<0.6	-	-	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-
	Bis(2-chloroisopropyl) ether	mg/kg		47000	<2.7	<0.6	<0.6	<0.6	-	<3	-	<0.5	<0.6	-	-	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-
Phenolics	Trimethylphenols	mg/kg			<0.3	1.6	3	0.6	<0.4	21.9	<0.3	<0.3	<0.4	<0.3	<0.3	<0.3	<0.4	<0.4	-	<0.3	-	<0.3	<0.3	<0.3	<0.4	<0.3	<0.3	<0.3	-
	2-methylphenol	mg/kg		9.9900000000003E11	<0.5	<0.03	<0.04	<0.04	-	1.1 - 3.09	-	<0.03	<0.1	-	-	-	-	<0.18	-	-	-	-	-	-	<0.04	<0.03	-	-	-
	2-nitrophenol	mg/kg			<0.5	<0.03	<0.04	<0.04	-	<0.18	-	<0.03	<0.1	-	-	-	-	<0.18	-	-	-	-	-	-	<0.04	<0.03	-	-	-
	2,4-dimethylphenol	mg/kg		24000	<0.5	<0.02	<0.03	<0.02	-	<0.6 - 2.08	-	<0.02	<0.1	-	-	-	-	<0.1	-	-	-	-	-	-	<0.02	<0.02	-	-	-
	4-chloro-3-methylphenol	mg/kg		82000	<0.5	<0.03	<0.04	<0.1 - 0.25	-	<0.18	-	<0.03	<0.1	-	-	-	-	<0.18	-	-	-	-	-	-	<0.04	<0.03	-	-	-
	4-nitrophenol	mg/kg			<2.7	<0.07	<0.08	<0.07	-	<0.4	-	<0.07	<0.4	-	-	-	-	<0.4	-	-	-	-	-	-	<0.07	<0.07	-	-	-
	Phenol	mg/kg		690	<0.3	<0.03	<0.04	<0.04	<0.4	<0.4 - 0.66	<0.3	<0.03	<0.1	<0.3	<0.3	<0.3	<0.4	<0.18	-	<0.3	-	<0.3	<0.3	<0.3	<0.04	<0.03	<0.3	<0.3	-
	2-chloronaphthalene	mg/kg		960	<0.5	<0.1	<0.1	<0.1	-	<0.6	-	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-
	2,4-dinitrophenol	mg/kg		1600	<2.7	<0.05	<0.05	<0.05	-	<0.2	-	<0.04	<0.2	-	-	-	-	<0.2	-	-	-	-	-	-	<0.05	<0.05	-	-	-
	3-&4-methylphenol	mg/kg			<0.5	<0.02	<0.03	0.13 - 0.2	-	<0.6 - 2.5	-	<0.02	<0.1	-	-	-	-	<0.1	-	-	-	-	-	-	<0.02	<0.02	-	-	-
	4,6-Dinitro-2-methylphenol	mg/kg		66	<1	<0.03	<0.04	<0.04	-	<0.18	-	<0.03	<0.19	-	-	-	-	<0.18	-	-	-	-	-	-	<0.04	<0.03	-	-	-
	4-chlorophenol	mg/kg			<2.7	<0.03	<0.04	<0.04	-	<3 - 4.21	-	<0.03	<0.19	-	-	-	-	<0.18	-	-	-	-	-	-	<0.04	<0.03	-	-	-
	Phenols	mg/kg			<1.3	<2.7	<4.2	<1.7	<1.4	<27.5	<1.3	<1.3	<1.5	<1.4	<1.3	<1.3	<1.5	<1.4	-	<1.3	-	<1.4	<1.3	<1.3	<1.4	<1.4	<1.3	<1.3	-
	Cresols by HPLC (W)	mg/kg			<0.3	<0.3	<0.4	<0.4	<0.4	0.7	<0.3	<0.3	<0.4	<0.3	<0.3	<0.3	<0.4	<0.4	-	<0.3	-	<0.3	<0.3	<0.3	<0.4	<0.3	<0.3	<0.3	-
	Phenols Total by MS Moisture Corrected	mg/kg			-	<0.51	<0.56	<0.86	-	<23.06	-	<0.48	<2.7	-	-	-	-	<2.6	-	-	-	-	-	-	<0.53	<0.51	-	-	-
	Xylenols	mg/kg			<0.3	<0.3	<0.4	<0.4	<0.4	4.5	<0.3	<0.3	<0.4	<0.3	<0.3	<0.3	<0.4	<0.4	-	<0.3	-	<0.3	<0.3	<0.3	<0.4	<0.3	<0.3	<0.3	-
Fungicides	Triadimefon	mg/kg		25000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herbicides	Pendimethalin	mg/kg		33000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Triallate	mg/kg		15000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Trifluralin	mg/kg		420	-	-	-	-	-	-	-	-	-	-	-

Kingsway Junction Soil Chemistry
Analytical Results
A38 Derby Junctions
Highways England

Location_Code	WK06	WK06
Sample_Depth_Range	3	5
Sampled_Date_Time	24/08/2016	24/08/2016

Chem_Group	ChemName	output unit	EQL	GAC_HH_COMIND_SLOAM_1.45-3.48%TOC		
	Diphenyl ether	mg/kg			-	<0.1
	Methacriphos	mg/kg			-	-
	Boron (Water Soluble)	mg/kg			0.6	<0.5
	Chlorothalonil	mg/kg		740	-	-
	Permethrin II	mg/kg			-	-
	Tecnazene	mg/kg			-	-
	Etrimphos	mg/kg			-	-
	Propetamphos	mg/kg			-	-
TPH	>C5-C7	mg/kg			<0.01	-
	>C8-C44	mg/kg			<24.2	-
	GRO >C5-C6	mg/kg			<0.2	-
	GRO >C5-C10	mg/kg			<0.2	-
	GRO >C6-C8	mg/kg			<0.2	-
	GRO >C7-C8	mg/kg			<0.01	-
	>C8-C10 Aliphatics	mg/kg		4800	<4.84	-
	>C10-C12 Aliphatics	mg/kg		23000	<4.84	-
	>C12-C16 Aliphatics	mg/kg		82000	<4.84	-
	>C16-C35 Aliphatics	mg/kg		1.7E6	15.3	-
	>C35-C44 Aliphatics	mg/kg		1.7E6	<6.8	-
	>EC8-EC10 Aromatics	mg/kg		8100	<5	-
	>EC10-EC12 Aromatics	mg/kg		28000	<5	-
	>EC12-EC16 Aromatics	mg/kg		37000	<5	-
	>EC16-EC21 Aromatics	mg/kg		28000	<5	-
	>EC21-EC35 Aromatics	mg/kg		28000	<10.54	-
	>EC35-EC44 Aromatics	mg/kg		28000	<6.76	-
BTEX	Benzene	mg/kg		47	<0.012	-
	Toluene	mg/kg		110000	<0.012	-
	Ethylbenzene	mg/kg		13000	<0.012	-
	Xylene (m & p)	mg/kg			-	-
	Xylene Total	mg/kg		14000	<0.024	-
	Xylene (o)	mg/kg		15000	-	-
Oxygenates	MTBE	mg/kg		13000	-	-
Chlorinated Hydrocarbons	Chloromethane	mg/kg		1.2	-	-
	Vinyl chloride	mg/kg		0.077	-	-
	Chloroethane	mg/kg		1300	-	-
	1,1-dichloroethene	mg/kg		450	-	-
	trans-1,2-dichloroethene	mg/kg		40	-	-
	1,1-dichloroethane	mg/kg		190	-	-
	cis-1,2-dichloroethene	mg/kg		24	-	-
	Chloroform	mg/kg		170	-	-
	1,1,1-trichloroethane	mg/kg		1300	-	-
	Carbon tetrachloride	mg/kg		6.3	-	-
	Trichloroethene	mg/kg		2.6	-	-
	1,1,2-trichloroethane	mg/kg		190	-	-
	Tetrachloroethene	mg/kg		42	-	-
VOC	2,2-dichloropropane	mg/kg			-	-
	Bromochloromethane	mg/kg		630	-	-
	1,1-dichloropropene	mg/kg			-	-
	1,2-dichloroethane	mg/kg		0.97	-	-
	1,2-dichloropropane	mg/kg		5.9	-	-
	Dibromomethane	mg/kg		99	-	-
	Bromodichloromethane	mg/kg		1.3	-	-
	cis-1,3-dichloropropene	mg/kg			-	-
	trans-1,3-dichloropropene	mg/kg			-	-
	1,3-dichloropropane	mg/kg		23000	-	-
	Chlorodibromomethane	mg/kg		39	-	-
	1,1,1,2-tetrachloroethane	mg/kg		250	-	-
	Styrene	mg/kg		6500	-	-
	Bromoform	mg/kg		1500	-	-
	Isopropylbenzene	mg/kg		3300	-	-
	1,1,2,2-tetrachloroethane	mg/kg		550	-	-
	1,2,3-trichloropropane	mg/kg		0.11	-	-
	n-propylbenzene	mg/kg		9700	-	-
	1,3,5-trimethylbenzene	mg/kg		12000	-	-
	tert-butylbenzene	mg/kg		120000	-	-
	1,2,4-trimethylbenzene	mg/kg		99	-	-
	sec-butylbenzene	mg/kg		120000	-	-
	p-isopropyltoluene	mg/kg			-	-
	n-butylbenzene	mg/kg		58000	-	-
	1,2-dibromo-3-chloropropane	mg/kg		0.064	-	-
	Hexachlorobutadiene	mg/kg		66	-	<0.1
PAH	Naphthalene	mg/kg		460	<0.1	<0.1
	Acenaphthylene	mg/kg		97000	<0.1	<0.1
	Acenaphthene	mg/kg		97000	<0.1	<0.1
	Fluorene	mg/kg		68000	<0.1	<0.1
	Phenanthrene	mg/kg		22000	<0.1	<0.1
	Anthracene	mg/kg		540000	<0.1	<0.1
	Fluoranthene	mg/kg		23000	<0.1	<0.2
	Pyrene	mg/kg		54000	<0.1	<0.2
	Benz(a)anthracene	mg/kg		170	<0.1	<0.2
	Chrysene	mg/kg		350	<0.1	<0.2
	Benzo(a) pyrene	mg/kg		35	<0.1	<0.2
	Indeno(1,2,3-c,d)pyrene	mg/kg		510	<0.1	<0.6
	Dibenz(a,h)anthracene	mg/kg		3.6	<0.1	<0.6
	Benzo(g,h,i)perylene	mg/kg		4000	<0.1	<0.6
	Benzo(b)fluoranthene	mg/kg		44	<0.1	<0.2
	Benzo(k)fluoranthene	mg/kg		1200	<0.1	<0.2
	PAH 16 Total	mg/kg			<1.54	-
SVOC	Coronene	mg/kg			-	<0.3
	2-methylnaphthalene	mg/kg		3000	-	<0.1
	4-bromophenyl phenyl ether	mg/kg			-	<0.1
	4-chlorophenyl phenyl ether	mg/kg			-	<0.1
	Bis(2-chloroethoxy) methane	mg/kg		2500	-	<0.1
	Bis(2-chloroethyl)ether	mg/kg		1	-	<0.1
	Dibenzofuran	mg/kg		1000	-	<0.1
	Hexachlorocyclopentadiene	mg/kg		7.5	-	<0.1
	Hexachloroethane	mg/kg		53	-	<0.1
	1-Methylnaphthalene	mg/kg		5.1	-	-
	3,3-Dichlorobenzidine	mg/kg		5.1	-	-
	Benzoic Acid	mg/kg		3.3E6	-	<0.6
	Benzyl alcohol	mg/kg		82000	-	<0.6
	Bis(2-chloroisopropyl) ether	mg/kg		47000	-	<0.6
Phenolics	Trimethylphenols	mg/kg			<0.4	<0.3
	2-methylphenol	mg/kg		9.99000000000003E11	<0.04	<0.03
	2-nitrophenol	mg/kg			<0.04	<0.03
	2,4-dimethylphenol	mg/kg		24000	<0.02	<0.02
	4-chloro-3-methylphenol	mg/kg		82000	<0.04	<0.03
	4-nitrophenol	mg/kg			<0.07	<0.07
	Phenol	mg/kg		690	<0.04	<0.03
	2-chloronaphthalene	mg/kg		960	-	<0.1
	2,4-dinitrophenol	mg/kg		1600	<0.05	<0.05
	3-&4-methylphenol	mg/kg			<0.02	<0.02
	4,6-Dinitro-2-methylphenol	mg/kg		66	<0.04	<0.03
	4-chlorophenol	mg/kg			<0.04	<0.03
	Phenols	mg/kg			<1.4	<1.4
	Cresols by HPLC (W)	mg/kg			<0.4	<0.3
	Phenols Total by MS Moisture Corrected	mg/kg			<0.53	<0.5
	Xylenols	mg/kg			<0.4	<0.3
Fungicides	Triadimefon	mg/kg		25000	-	-
Herbicides	Pendimethalin	mg/kg		33000	-	-
	Triallate	mg/kg		15000	-	-
	Trifluralin	mg/kg		420	-	-
	Dichlobenil	mg/kg			-	-
	Pronamide	mg/kg		62000	-	-
Pesticides	Isodrin	mg/kg			-	-
	cis-Permethrin	mg/kg			-	-
	Parathion	mg/kg		4900	-	-
	Pirimiphos-methyl	mg/kg		8200	-	-
	Permethrin	mg/kg		41000	-	-
	Pirimphos-ethyl	mg/kg			-	-
Organochlorine Pesticides	Aldrin	mg/kg		170	-	-
	a-BHC	mg/kg		180	-	-
	b-BHC	mg/kg		65	-	-
	Chlordane (cis)	mg/kg			-	-
	Dieldrin	mg/kg		170	-	-
	Endosulfan I	mg/kg		7400	-	-
	Endosulfan II	mg/kg		7800	-	-
	Endosulfan sulphate	mg/kg			-	-
	Endrin	mg/kg		250	-	-
	Heptachlor	mg/kg		0.63	-	-
	Heptachlor epoxide	mg/kg		0.33	-	-
	o,p'-DDE	mg/kg			-	-
	2,4-DDT	mg/kg			-	-
	o,p-DDD	mg/kg			-	-
	4,4-DDE	mg/kg		9.3	-	-
	DDT	mg/kg		8.5	-	-
	Methoxychlor	mg/kg		4100	-	-
	DDD	mg/kg		9.6	-	-
	Chlordane (trans)	mg/kg			-	-
	d-BHC	mg/kg			-	-
	Endrin ketone	mg/kg			-	-
Organophosphorous Pesticides	Azinphos Ethyl	mg/kg			-	-
	Azinophos methyl	mg/kg		2500	-	-
	Carbophenothion	mg/kg			-	-
	Chlorfenvinphos	mg/kg		570	-	-
	Chlorpyrifos	mg/kg		820	-	-
	Chlorpyrifos-methyl	mg/kg		8200	-	-
	Diazinon	mg/kg		570	-	-
	Dichlorvos	mg/kg		140	-	-
	Dimethoate	mg/kg		160	-	-
	Ethion	mg/kg		410	-	-
	Fenitrothion	mg/kg			-	-
	Fenthion	mg/kg			-	-
	Malathion	mg/kg		16000	-	-
	Methyl parathion	mg/kg		210	-	-
	Mevinphos (Phosdrin)	mg/kg			-	-
PCBs	1,1-Biphenyl	mg/kg		33000	-	<0.1
Amino Aliphatics	N-nitrosodi-n-propylamine	mg/kg		0.33	-	<1
Amino Aromatics	n-Nitrosodiphenylamine	mg/kg		470	-	<0.1
Anilines	2-nitroaniline	mg/kg		8000	-	<0.6
	3-nitroaniline	mg/kg			-	<16.4
	4-chloroaniline	mg/kg		11	-	<0.6
	4-nitroaniline	mg/kg		110	-	<0.7
Explosives	2,4-Dinitrotoluene	mg/kg		3700	-	<0.2
	2,6-dinitrotoluene	mg/kg		1900	-	<0.6
	Nitrobenzene	mg/kg		22	-	<0.6
Halogenated Benzenes	1,2,3,4-tetrachlorobenzene	mg/kg		3080	-	-
	1,3,5-Trichlorobenzene	mg/kg		55	-	-
	Chlorobenzene	mg/kg		130	-	-
	Bromobenzene	mg/kg		220	-	-
	2-chlorotoluene	mg/kg		23000	-	-
	4-chlorotoluene	mg/kg		23000	-	-
	1,3-dichlorobenzene	mg/kg		73	-	<0.1
	1,4-dichlorobenzene	mg/kg		10000	-	<0.1
	1,2-dichlorobenzene	mg/kg		4800	-	<0.1
	1,2,4-trichlorobenzene	mg/kg		530	-	<0.1
	1,2,3-trichlorobenzene	mg/kg		250	-	-
	Hexachlorobenzene	mg/kg		120	-	<0.1
	Pentachlorobenzene	mg/kg		770	-	-
Halogenated Hydrocarbons	Dichlorodifluoromethane	mg/kg		370	-	-
	Bromomethane	mg/kg		30	-	-
	Trichlorofluoromethane	mg/kg		350000	-	-
	1,2-dibromoethane	mg/kg		0.16	-	-
Halogenated Phenols	2-chlorophenol	mg/kg		5800	<0.04	<0.03
	2,4-dichlorophenol	mg/kg		2500	<0.02	<0.02
	2,4,5-trichlorophenol	mg/kg		82000	<0.02	<0.02
	2,4,6-trichlorophenol	mg/kg		210	<0.02	<0.02
	Pentachlorophenol	mg/kg		400	<0.04	<0.03
Phthalates	Bis(2-ethylhexyl) phthalate	mg/kg		86000	-	<0.2
	Butyl benzyl phthalate	mg/kg		940000	-	<0.2
	Di-n-butyl phthalate	mg/kg		15000	-	<0.1
	Di-n-octyl phthalate	mg/kg		89000	-	<0.2
	Diethylphthalate	mg/kg		220000	-	<0.1
	Dimethyl phthalate	mg/kg			-	<0.1
Solvents	Isophorone	mg/kg		2400	-	<0.1
Metals	Arsenic	mg/kg		640	12.1	7.8
	Cadmium	mg/kg		190	<0.21	<0.2
	Chromium (III+VI)	mg/kg		9.99000000000068E11	39.8	39.3
	Copper	mg/kg		68000	17.6	16
	Iron	mg/kg		820000	37,800	27,800
	Lead	mg/kg		2300	17	6.6
	Mercury	mg/kg			<0.5	<0.5
	Nickel	mg/kg		980	36.2	38.7
	Selenium	mg/kg		12000	<0.5	<0.5
	Zinc	mg/kg		730000	90.6	93.2
	Chromium (hexavalent)	mg/kg		33	<0.1	<0.1
Inorganics	Cyanide (Free)	mg/kg		12	<0.6	<0.6
	Moisture Content 105C	%			16.9	11.9
	Cyanide Total	mg/kg		1200	<0.6	<0.6
	Ammonium Ion	mg/kg			<0.6	<0.6
	pH (Lab)	pH_Units			8.5	9
Other	gamma-HCH	mg/kg			-	-
	Phosalone	mg/kg			-	-
	Triazophos	mg/kg			-	-
	Phosphamidon	mg/kg			-	-

Statistical Summary

Number of	Number of	Minimum	Minimum	Maximum	Maximum	Average	Median	Standard	Number of	Number of
23	0	<0.1	ND	<0.6	ND	0.091	0.05	0.093	0	0
1	0	<0.003	ND	<0.003	ND		0.0015		0	0
65	60	<0.5	0.5	11.1	11.1	2	1	2.4	0	0
1	0	<0.003	ND	<0.003	ND		0.0015		0	0
1	0	<0.004	ND	<0.004	ND		0.002		0	0
1	0	<0.004	ND	<0.004	ND		0.002		0	0
1	0	<0.003	ND	<0.003	ND		0.0015		0	0
1	0	<0.003	ND	<0.003	ND		0.0015		0	0
46	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
43	28	<0.01	23	8390	8390	1024	49.8	2023	0	0
46	0	<0.2	ND	<0.3	ND	0.11	0.1	0.018	0	0
46	10	<0.2	0.25	5.7	5.7	0.53	0.1	1.2	0	0
46	0	<0.2	ND	<0.3	ND	0.11	0.1	0.018	0	0
46	2	<0.01	0.06	0.07	0.07	0.0076	0.005	0.012	0	0
44	10	<0.01	9.03	48	48	6.9	2	11	0	0
44	12	<0.01	10.9	294	294	24	2	54	0	0
44	17	<0.01	4.64	933	933	60	2.46	162	0	0
44	31	<0.01	13.1	6980	6980	836	40.1	1687	0	0
44	16	<0.01	8.82	761	761	77	3.19	161	0	0
44	9	<0.01	4.42	55.8	55.8	4.6	2	8.7	0	0
44	9	<0.01	12.66	68.7	68.7	6.8	2	12	0	0
44	14	<0.01	4.31	183	183	16	2	34	0	0
44	23	<0.01	5.76	423	423	54	6.365	103	0	0
44	30	<0.01	8.86	1870	1870	287	23.8	520	0	0
44	17	<0.01	6.35	301	301	34	3.2525	66	0	0
48	3	<0.001	ND	<0.014	0.01	0.0032	0.00275	0.0028	0	0
48	7	<0.005	0.06	0.07	0.07	0.0079	0.0055	0.013	0	0
48	11	<0.002	0.02	1.55	1.55	0.037	0.0055	0.13	0	0
27	8	<0.004	0.006	11	11	0.53	0.0025	2.1	0	0
46	8	<0.021	0.05	0.84	0.84	0.064	0.012	0.17	0	0
27	4	<0.002	0.012	0.539	0.539	0.027	0.001	0.1	0	0
27	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
27	0	<0.003	ND	<0.004	ND	0.0018	0.002	0.00025	0	0
27	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
27	1	<0.002	0.061	0.061	0.061	0.0033	0.001	0.012	0	0
27	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
27	1	<0.001	0.001	0.001	0.001	0.00052	0.0005	0.000096	0	0
27	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
27	0	<0.005	ND	<0.008	ND	0.003	0.003	0.00032	0	0
27	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
27	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
27	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
27	1	<0.001	0.003	0.003	0.003	0.00059	0.0005	0.00048	0	0
27	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
27	0	<0.003	ND	<0.004	ND	0.0018	0.002	0.00025	0	0
27	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0

Markeaton Junction Soil Chemistry
Analytical Results
A38 Derby Junctions
Highways England

Location_Code	BM01	BM02	BM02	BM03	BM03	BM04	BM04	BM05	BM05	BM05	BM05	BM06A	BM06A	BM07	BM08	BM08
Sample_Depth_Range	0.5	1	2	0.5	1	0.5	3	3.5	4.83	6.75	7.7	1	1.2	1	0.5	1
Sampled_Date_Time	22/07/2016	22/07/2016	04/08/2016	22/07/2016	22/07/2016	15/08/2016	15/08/2016	16/08/2016	16/08/2016	16/08/2016	16/08/2016	14/09/2016	18/10/2016	02/08/2016	04/08/2016	04/08/2016

Chem_Group	ChemName	output unit	EQL	GAC_HH_COM/IND_SLOAM_1.45-3.48%TOC															
	Diphenyl ether	mg/kg			-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	Boron (Water Soluble)	mg/kg			0.7	1.3	1.3	1.2	1.4	1.4	1	1.2	1	0.9	0.73	1.3	1.2	0.8	1	1.7
TPH	>C5-C7	mg/kg			<0.01	-	<0.01	-	-	<0.01	-	<0.01	0.68	<0.01	<0.01	-	-	<0.01	<0.01	-
	>C8-C44	mg/kg			<20	-	<20.1	-	-	<24	-	23.3	131	<20	<22.9	-	-	<24	20.2	-
	GRO >C5-C6	mg/kg			<0.2	-	<0.2	-	-	<0.2	-	<0.2	0.44	<0.2	<0.2	-	-	<0.2	<0.2	-
	GRO >C5-C10	mg/kg			<0.2	-	<0.2	-	-	<0.2	-	<0.2	10.56	<0.2	<0.2	-	-	<0.2	<0.2	-
	GRO >C6-C8	mg/kg			<0.2	-	<0.2	-	-	<0.2	-	<0.2	2.45	<0.2	<0.2	-	-	<0.2	<0.2	-
	GRO >C7-C8	mg/kg			<0.01	-	<0.01	-	-	<0.01	-	<0.01	0.65	<0.01	<0.01	-	-	<0.01	<0.01	-
	>C8-C10 Aliphatics	mg/kg		4800	<4	-	<4.02	-	-	<5	-	<4	<4	<4	<4.58	-	-	<5	<4	-
	>C10-C12 Aliphatics	mg/kg		23000	<4	-	<4.02	-	-	<5	-	<4	9.3	<4	<4.58	-	-	<5	<4	-
	>C12-C16 Aliphatics	mg/kg		82000	<4	-	<4.02	-	-	<5	-	<4	<4	<4	<4.58	-	-	<5	<4	-
	>C16-C35 Aliphatics	mg/kg		1.7E6	<11.9	-	<11.9	-	-	<14.5	-	20.8	111	<11.9	17.1	-	-	<14	16.7	-
	>C35-C44 Aliphatics	mg/kg		1.7E6	<5.62	-	<5.65	-	-	<6.85	-	<5.62	<5.62	<5.62	<6.44	-	-	<6.64	<5.62	-
	>EC8-EC10 Aromatics	mg/kg		8100	<4	-	<4	-	-	<5	-	<4	<4	<4	<5	-	-	<5	<4	-
	>EC10-EC12 Aromatics	mg/kg		28000	<4	-	<4	-	-	<5	-	<4	15.2	<4	<5	-	-	<5	<4	-
	>EC12-EC16 Aromatics	mg/kg		37000	<4	-	7.51	-	-	5.7	-	<4	20.5	<4	<5	-	-	<5	<4	-
	>EC16-EC21 Aromatics	mg/kg		28000	<4	-	<4	-	-	7	-	<4	32.7	<4	<5	-	-	<5	7.69	-
	>EC21-EC35 Aromatics	mg/kg		28000	<8.76	-	16.8	-	-	11.7	-	<8.76	192	<8.76	<9.93	-	-	15	54	-
	>EC35-EC44 Aromatics	mg/kg		28000	<5.62	-	<5.62	-	-	<6.85	-	<5.62	8.82	<5.62	<6.37	-	-	<6.64	8.02	-
BTEX	Benzene	mg/kg		47	<0.012	-	<0.012	<0.001	-	<0.001	<0.001	<0.001	0.248 - 0.68	<0.001	<0.011	<0.001	<0.001	<0.012	<0.001	<0.001
	Toluene	mg/kg		110000	<0.012	-	<0.012	<0.006	-	<0.006	<0.005	<0.006	0.54 - 0.65	<0.006	<0.011	<0.006	<0.006	<0.012	<0.006	<0.006
	Ethylbenzene	mg/kg		13000	<0.012	-	<0.012	<0.003	-	<0.002	<0.002	<0.002	0.33 - 0.597	<0.002	<0.011	<0.002	<0.002	<0.012	<0.002	<0.002
	Xylene (m & p)	mg/kg			-	-	-	<0.005	-	<0.005	<0.004	<0.005	0.269	<0.005	-	<0.005	<0.004	-	<0.005	<0.005
	Xylene Total	mg/kg		14000	<0.023	-	<0.024	-	-	<0.024	-	<0.024	0.82	<0.024	<0.023	-	-	<0.024	<0.024	-
	Xylene (o)	mg/kg		15000	-	-	-	<0.003	-	<0.002	<0.002	<0.002	0.684	<0.002	-	<0.002	<0.002	-	<0.002	<0.002
Oxygenates	MTBE	mg/kg		13000	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
Chlorinated Hydrocarbons	Chloromethane	mg/kg		1.2	-	-	-	<0.004	-	<0.004	<0.003	<0.004	<0.004	<0.004	-	<0.004	<0.003	-	<0.004	<0.004
	Vinyl chloride	mg/kg		0.077	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	Chloroethane	mg/kg		1300	-	-	-	<0.003	-	<0.002	<0.002	<0.002	<0.003	<0.002	-	<0.002	<0.002	-	<0.002	<0.002
	1,1-dichloroethene	mg/kg		450	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	trans-1,2-dichloroethene	mg/kg		40	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	1,1-dichloroethane	mg/kg		190	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	cis-1,2-dichloroethene	mg/kg		24	-	-	-	<0.006	-	<0.006	<0.005	<0.006	<0.006	<0.006	-	<0.006	<0.006	-	<0.006	<0.006
	Chloroform	mg/kg		170	-	-	-	<0.001	-	<0.001	<0.001	<0.001	0.006	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	1,1,1-trichloroethane	mg/kg		1300	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	Carbon tetrachloride	mg/kg		6.3	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	Trichloroethene	mg/kg		2.6	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	1,1,2-trichloroethane	mg/kg		190	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	Tetrachloroethene	mg/kg		42	-	-	-	<0.004	-	<0.004	<0.003	<0.004	<0.004	<0.004	-	<0.004	<0.003	-	<0.004	<0.004
VOC	2,2-dichloropropane	mg/kg			-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	Bromochloromethane	mg/kg		630	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	1,1-dichloropropene	mg/kg			-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	1,2-dichloroethane	mg/kg		0.97	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	1,2-dichloropropane	mg/kg		5.9	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	Dibromomethane	mg/kg		99	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	Bromodichloromethane	mg/kg		1.3	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	cis-1,3-dichloropropene	mg/kg			-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	trans-1,3-dichloropropene	mg/kg			-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	1,3-dichloropropane	mg/kg		23000	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	Chlorodibromomethane	mg/kg		39	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	1,1,1,2-tetrachloroethane	mg/kg		250	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	Styrene	mg/kg		6500	-	-	-	<0.001	-	<0.001	<0.001	<0.001	0.313	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	Bromoform	mg/kg		1500	-	-	-	<0.001	-	<0.001	<0.001	<0.001	0.004	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	Isopropylbenzene	mg/kg		3300	-	-	-	<0.001	-	<0.001	<0.001	<0.001	0.113	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	1,1,2,2-tetrachloroethane	mg/kg		550	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	1,2,3-trichloropropane	mg/kg		0.11	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	n-propylbenzene	mg/kg		9700	-	-	-	<0.001	-	<0.001	<0.001	<0.001	0.239	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	1,3,5-trimethylbenzene	mg/kg		12000	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	tert-butylbenzene	mg/kg		120000	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	1,2,4-trimethylbenzene	mg/kg		99	-	-	-	0.001	-	<0.001	<0.001	<0.001	0.102	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	sec-butylbenzene	mg/kg		120000	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	p-isopropyltoluene	mg/kg			-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	n-butylbenzene	mg/kg		58000	-	-	-	<0.001	-	<0.001	<0.001	<0.001	0.48	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	1,2-dibromo-3-chloropropane	mg/kg		0.064	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	Hexachlorobutadiene	mg/kg		66	-	-	-	<0.003	-	<0.002	<0.002	<0.002	<0.003	<0.002	<0.1	<0.002	<0.002	<0.1	<0.002	<0.002
PAH	Naphthalene	mg/kg		460	<0.09	<0.1	-	<0.1 - 0.015	-	<0.006	<0.005	<0.006	<0.1 - 0.242	<0.006	<0.09	<0.006	<0.006	<0.09	<0.006	<0.006
	Acenaphthylene	mg/kg		97000	<0.09	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.09	<0.09	0.64	<0.1
	Acenaphthene	mg/kg		97000	<0.09	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.09	<0.09	<0.1	<0.1
	Fluorene	mg/kg		68000	<0.09	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.09	<0.09	0.1	<0.1
	Phenanthrene	mg/kg		22000	<0.09	<0.1	-	0.4	-	<0.1	<0.1	<0.1	<0.1 - 0.2	<0.09	<0.09	<0.1	<0.09	0.2 - 0.22	1.81	0.2
	Anthracene	mg/kg		540000	<0.09	<0.1	-	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.09	<0.09	<0.1	<0.09	<0.09	0.63	<0.1
	Fluoranthene	mg/kg		23000	<0.09	<0.1	-	0.8	-	<0.1	<0.2	<0.1	<0.3 - 0.31	<0.09	<0.09	<0.1	<0.09	0.5 - 0.52	4.08	0.7
	Pyrene	mg/kg		54000	<0.09	<0.1	-	0.6	-	<0.1	<0.2	<0.1	<0.3 - 0.97	<0.09	<0.09	<0.1	<0.09	0.4 - 0.41	3.41	0.7
	Benz(a)anthracene	mg/kg		170	<0.09	<0.1	-	0.4	-	<0.1	<0.2	<0.1	<0.1	<0.09	<0.09	<0.1	<0.09	0.2 - 0.33	1.89	0.4
	Chrysene	mg/kg		350	<0.09	<0.1	-	0.4	-	<0.1	<0.2	<0.1	<0.1	<0.09	<0.09	<0.1	<0.09	0.2 - 0.3	1.71	0.5
	Benzo(a) pyrene	mg/kg		35	<0.09	<0.1	-	0.4	-	<0.1	<0.2	<0.1	<0.1	<0.09	<0.09	<0.1	<0.09	0.2 - 0.28	2.08	0.5
	Indeno(1,2,3-c,d)pyrene	mg/kg		510	<0.09	<0.1	-	<0.6	-	<0.1	<0.5	<0.1	<0.1	<0.09	<0.09	<0.1	<0.09	<0.6 - 0.19	1.64	<0.6
	Dibenz(a,h)anthracene	mg/kg		3.6	<0.09	<0.1	-	<0.6	-	<0.1	<0.5	<0.1	<0.1	<0.09	<0.09	<0.1	<0.09	<0.09	0.2	<0.6
	Benzo(g,h,i)perylene	mg/kg		4000	<0.09	<0.1	-	<0.6	-	<0.1	<0.5	<0.1	<0.1	<0.09	<0.09	<0.1	<0.09	<0.6 - 0.15	1.32	<0.6
	Benzo(b)fluoranthene	mg/kg		44	<0.09	<0.1	-	0.6	-	<0.1	<0.2	<0.1	<0.1	<0.09	<0.09	<0.1	<0.09	0.4 - 0.41	2.51	0.6
	Benzo(k)fluoranthene	mg/kg		1200	<0.09	<0.1	-	<0.3	-	<0.1	<0.2	<0.1	<0.1	<0.09	<0.09	<0.1	<0.09	<0.2 - 0.17	0.99	<0.2
	PAH 16 Total	mg/kg			<1.48	<1.57	-	-	-	<1.56	-	<1.56	<2.84	<1.51	<1.45	<1.54	<1.44	<3.55	<23.3	-
SVOC	Coronene	mg/kg			-	-	-	<0.4	-	-	<0.3	<0.4	<0.4	<0.4	<0.3	-	-	<0.4	-	<0.4
	2-methylnaphthalene	mg/kg		3000	-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	4-bromophenyl phenyl ether	mg/kg			-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	4-chlorophenyl phenyl ether	mg/kg			-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	Bis(2-chloroethoxy) methane	mg/kg		2500	-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	Bis(2-chloroethyl)ether	mg/kg		1	-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	Dibenzofuran	mg/kg		1000	-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	Hexachlorocyclopentadiene	mg/kg		7.5	-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	Hexachloroethane	mg/kg		53	-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	1-Methylnaphthalene	mg/kg		73	-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	3,3-Dichlorobenzidine	mg/kg		5.1	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-	-	-
	Benzoic Acid	mg/kg		3.3E6	-	-	-	<0.6	-	-	<0.5	<0.6	<0.6	<0.6	<0.6	-	-	<0.6	-	<0.6
	Benzyl alcohol	mg/kg		82000	-	-	-	<0.6	-	-	<0.5	<0.6	<0.6	<0.6	<0.6	-	-	<0.6	-	<0.6
	Bis(2-chloroisopropyl) ether	mg/kg		47000	-	-	-	<0.6	-	-	<0.5	<0.6	<0.6	<0.6	<0.6	-	-	<0.6	-	<0.6
Phenolics	Trimethylphenols	mg/kg			<0.3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.3	<0.4	<0.4	<0.4	<0.34	<0.4	<0.3	<0.4	<0.4	<0.4
	2-methylphenol	mg/kg		Use Cresol Total[9.99000000000003E11]	-	<0.04	-	<0.1	-	-	<0.03	<0.04	<0.04	<0.04	<0.03	-	-	<0.04	<0.04	<0.1
	2-nitrophenol	mg/kg			-	<0.04	-	<0.1	-	-	<0.03	<0.04	<0.04	<0.04	<0.03	-	-	<0.04	<0.04	<0.1
	2,4-dimethylphenol	mg/kg		24000	-	<0.02	-	<0.1	-	-	<0.02	<0.02	<0.03	<0.02	<0.02	-	-	<0.02	<0.02	<0.1
	4-chloro-3-methylphenol	mg/kg		82000	-	<0.04	-	<0.1	-	-	<0.03	<0.04	<0.04	<0.04	<0.03	-	-	<0.04	<0.04	<0.1
	4-nitrophenol	mg/kg			-	<0.07	-	<0.6	-	-	<0.07	<0.07	<0.08	<0.07	<0.07	-	-	<0.07	<0.07	<0.6
	Phenol	mg/kg		690	<0.3	<0.04	<0.4	<0.1	<0.4	<0.4	<0.03	<0.04	<0.04 - 0.5	<0.04	<0.03	<0.4	<0.3	<0.04	<0.04	<0.1
	2-chloronaphthalene	mg/kg		960	-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	2,4-dinitrophenol	mg/kg		1600	-	<0.05	-	<0.6	-	-	<0.04	<0.05	<0.05	<0.05	<0.05	-	-	<0.05	<0.05	<0.6
	3-&4-methylphenol	mg/kg			-	<0.02	-	<0.1	-	-	<0.02	<0.02	<0.03	<0.02	<0.02	-	-	<0.02	<0.02	<0.1
	4,6-Dinitro-2-methylphenol	mg/kg		66	-	<0.04	-	<0.3	-	-	<0.03	<0.04	<0.04	<0.04	<0.03	-	-	<0.04	<0.04	<0.2
	4-chlorophenol	mg/kg			-	<0.04	-	<0.6	-	-	<0.03	<0.04	<0.04	<0.04	<0.03	-	-	<0.04	<0.04	<0.6
	Phenols	mg/kg			<1.4	<1.5	<1.5	<1.5	<1.5	<1.5	<1.3	<1.5	<2.5	<1.4	<1.36	<1.4	<1.3	<1.4	<1.5	<1.4
	Cresols by HPLC (W)	mg/kg			<0.3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.3	<0.4	<0.4	<0.4	<0.34	<0.4	<0.3	<0.4	<0.4	<0.4
	Phenols Total by MS Moisture Corrected	mg/kg			-	<0.54	-	-	-	-	<0.48	<0.53	<0.56	<0.52	<0.5	-	-	<0.52	<0.53	-
	Xylenols	mg/kg			<0.3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.3	<0.4	1.3	<0.4	<0.34	<0.4	<0.3	<0.4	<0.4	<0.4
PCBs	1,1-Biphenyl	mg/kg		33000	-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
Amino Aliphatics	N-nitrosodi-n-propylamine	mg/kg		0.33	-	-	-	<1.1	-	-	<1	<1.1	<1.1	<1.1	<1	-	-	<1.1	-	<1.1
Amino Aromatics	n-Nitrosodiphenylamine	mg/kg		470	-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
Anilines	2-nitroaniline	mg/kg		8000	-	-	-	<0.6	-	-	<0.5	<0.6	<0.6	<0.6	<0.6	-	-	<0.6	-	<0.6
	3-nitroaniline	mg/kg			-	-	-	<18.5	-	-	<15.8	<17.6	<18.5	<17.1	<16.4	-	-	<17.1	-	<17.4
	4-chloroaniline	mg/kg		11	-	-	-	<0.6	-	-	<0.5	<0.6	<0.6	<0.6	<0.6	-	-	<0.6	-	<0.6
	4-nitroaniline	mg/kg		110	-	-	-	<0.8	-	-	<0.7	<0.7	<0.8	<0.7	<0.7	-	-	<0.7	-	<0.7
Explosives	2,4-Dinitrotoluene	mg/kg		3700	-	-	-	<0.3	-	-	<0.2	<0.2	<0.3	<0.2	<0.2	-	-	<0.2	-	<0.2
	2,6-dinitrotoluene	mg/kg		1900	-	-	-	<0.6	-	-	<0.5	<0.6	<0.6	<0.6	<0.6	-	-	<0.6	-	<0.6
	Nitrobenzene	mg/kg		22	-	-	-	<0.6	-	-	<0.5	<0.6	<0.6	<0.6	<0.6	-	-	<0.6	-	<0.6
Halogenated Benzenes	Chlorobenzene	mg/kg		130	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	Bromobenzene	mg/kg		220	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	2-chlorotoluene	mg/kg		23000	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	4-chlorotoluene	mg/kg		23000	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	1,3-dichlorobenzene	mg/kg		73	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.1	<0.001	<0.001	<0.1	<0.001	<0.001
	1,4-dichlorobenzene	mg/kg		10000	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.1	<0.001	<0.001	<0.1	<0.001	<0.001
	1,2-dichlorobenzene	mg/kg		4800	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.1	<0.001	<0.001	<0.1	<0.001	<0.001
	1,2,4-trichlorobenzene	mg/kg		530	-	-	-	<0.004	-	<0.004	<0.003	<0.004	<0.004	<0.004	<0.1	<0.004	<0.003	<0.1	<0.004	<0.004
	1,2,3-trichlorobenzene	mg/kg		250	-	-	-	<0.004	-	<0.004	<0.003	<0.004	<0.004	<0.004	-	<0.004	<0.003	-	<0.004	<0.004
	Hexachlorobenzene	mg/kg		120	-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
Halogenated Hydrocarbons	Dichlorodifluoromethane	mg/kg		370	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	Bromomethane	mg/kg		30	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	Trichlorofluoromethane	mg/kg		350000	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
	1,2-dibromoethane	mg/kg		0.16	-	-	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
Halogenated Phenols	2-chlorophenol	mg/kg		5800	-	<0.04	-	<0.1	-	-	<0.03	<0.04	<0.04	<0.04	<0.03	-	-	<0.04	<0.04	<0.1
	2,4-dichlorophenol	mg/kg		2500	-	<0.02	-	<0.1	-	-	<0.02	<0.02	<0.03	<0.02	<0.02	-	-	<0.02	<0.02	<0.1
	2,4,5-trichlorophenol	mg/kg		82000	-	<0.02	-	<0.1	-	-	<0.02	<0.02	<0.03	<0.02	<0.02	-	-	<0.02	<0.02	<0.1
	2,4,6-trichlorophenol	mg/kg		210	-	<0.02	-	<0.1	-	-	<0.02	<0.02	<0.03	<0.02	<0.02	-	-	<0.02	<0.02	<0.1
	Pentachlorophenol	mg/kg		400	-	<0.04	-	<0.6	-	-	<0.03	<0.04	<0.04	<0.04	<0.03	-	-	<0.04	<0.04	<0.6
Phthalates	Bis(2-ethylhexyl) phthalate	mg/kg		86000	-	-	-	<0.3	-	-	<0.2	<0.2	<0.3	<0.2	<0.2	-	-	<0.2	-	<0.2
	Butyl benzyl phthalate	mg/kg		940000	-	-	-	<0.3	-	-	<0.2	<0.2	<0.3	<0.2	<0.2	-	-	<0.2	-	<0.2
	Di-n-butyl phthalate	mg/kg		15000	-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	Di-n-octyl phthalate	mg/kg		89000	-	-	-	<0.3	-	-	<0.2	<0.2	<0.3	<0.2	<0.2	-	-	<0.2	-	<0.2
	Diethylphthalate	mg/kg		220000	-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	Dimethyl phthalate	mg/kg			-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
Solvents	Isophorone	mg/kg		2400	-	-	-	<0.1	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
Metals	Arsenic	mg/kg		640	16.1	10	4.7	11.3	12.9	8.1	4.5	10.1	7.2	8.5	5.3	5.9	4	6.1	11	12.9
	Cadmium	mg/kg		190	0.45	5.7	0.29	0.46	0.56	0.36	0.32	0.29	0.29	<0.22	0.218	<0.21	<0.2	0.39	0.76	0.75
	Chromium (III+VI)	mg/kg		8,600	26	29.8	55	32.9	29.8	79	43.1	51.2	90.3	56.5	33.02	77	53.9	26.4	50.6	51.3
	Copper	mg/kg		68000	26.9	30	20	77.5	96.6	16.4	7.7	13.4	12.7	9.5	9.24	10.9	8.8	16.4	29.9	50.5
	Iron	mg/kg		820000	28,900	40,000	35,900	29,300	27,800	41,200	22,800	33,400	26,600	31,300	16,000	40,500	29,900	24,300	46,900	33,900
	Lead	mg/kg		2300	93	638.9	17.9	161.9	210.9	21	5.4	10.2	6.6	7.3	4.88	9.3	5.9	45.3	80.5	105.4
	Mercury	mg/kg			<0.52	<0.5	<0.5	<0.54	<0.53	<0.5	<0.5	<0.5	<0.5	<0.5	<0.52	<0.5	<0.5	<0.5	<0.5	<0.52

Markeaton Junction Soil Chemistry
Analytical Results
A38 Derby Junctions
Highways England

Location_Code	BM08	BM08	BM09	BM09	BM10	BM10	BM11	BM11	BM12	BM13	BM13	BM13	BM14	BM14	BM14	BM15
Sample_Depth_Range	2.5	4	1	2.5	0.5	7.98	0.5	3	1	0.5	3	4	1	5	6.5	1
Sampled_Date_Time	04/08/2016	04/08/2016	22/07/2016	02/08/2016	05/09/2016		16/08/2016	16/08/2016	06/09/2016	22/07/2016	16/08/2016	04/08/2016	04/08/2016	04/08/2016	04/08/2016	14/09/2016

Chem_Group	ChemName	output unit	EQL	GAC_HH_COM/IND_SLOAM_1.45-3.48%TOC															
	Diphenyl ether	mg/kg			<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
	Boron (Water Soluble)	mg/kg			1	1	1.7	1.5	2.2	1.6	2	1.1	0.8	1	1.1	0.6	0.7	0.54	0.6	1.7
TPH	>C5-C7	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-
	>C8-C44	mg/kg			<20	<20	-	<20.8	38.6	<20	49.9	<20	<20	-	-	<20.6	<23	-	<24	-
	GRO >C5-C6	mg/kg			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	-
	GRO >C5-C10	mg/kg			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	-
	GRO >C6-C8	mg/kg			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	-
	GRO >C7-C8	mg/kg			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-
	>C8-C10 Aliphatics	mg/kg		4800	<4	<4	<4	<4.16	<4	<4	<4	<4	<4	<5	-	<4.12	<5	-	<5	-
	>C10-C12 Aliphatics	mg/kg		23000	<4	<4	<4	<4.16	<4	<4	<4	<4	<4	<5	-	<4.12	<5	-	<5	-
	>C12-C16 Aliphatics	mg/kg		82000	<4	<4	<4	<4.16	<4	<4	5.41	4.32	<4	<5	-	<4.12	<5	-	<5	-
	>C16-C35 Aliphatics	mg/kg		1.7E6	<11.9	<11.9	<13.4	<12.4	26.6	<11.9	43.3	13.6	<11.9	<14.5	-	14.9	<13.5	-	<14.2	-
	>C35-C44 Aliphatics	mg/kg		1.7E6	<5.62	<5.62	<6.31	<5.84	8.19	<5.62	<5.62	<5.62	<5.62	<6.84	-	<5.79	<6.36	-	<6.71	-
	>EC8-EC10 Aromatics	mg/kg		8100	<4	<4	<4	<4	<4	<4	<4	<4	<4	<5	-	<4	<5	-	<5	-
	>EC10-EC12 Aromatics	mg/kg		28000	<4	<4	<4	<4	<4	<4	<4	<4	<4	<5	-	<4	<5	-	<5	-
	>EC12-EC16 Aromatics	mg/kg		37000	<4	<4	<4	<4	<4	<4	<4	<4	<4	<5	-	<4	<5	-	<5	-
	>EC16-EC21 Aromatics	mg/kg		28000	<4	<4	<4	<4	7.88	<4	36.2	<4	<4	6.42	-	<4	<5	-	<5	-
	>EC21-EC35 Aromatics	mg/kg		28000	<8.76	<8.76	26.7	<8.76	41.6	<8.76	170	11.6	<8.76	52	-	<8.76	11.8	-	<10.47	-
	>EC35-EC44 Aromatics	mg/kg		28000	<5.62	<5.62	12.2	<5.62	<5.62	<5.62	8.84	<5.62	<5.62	<6.84	-	<5.62	<6.36	-	<6.71	-
BTEX	Benzene	mg/kg		47	<0.012	<0.001	<0.001	<0.012	<0.001	<0.001	<0.001	<0.011	<0.001	<0.012	<0.001	<0.012	<0.001	-	<0.001	-
	Toluene	mg/kg		110000	<0.012	<0.006	<0.006	<0.012	<0.006	<0.005	<0.006	<0.011	<0.006	<0.012	<0.005	<0.012	<0.006	-	<0.006	-
	Ethylbenzene	mg/kg		13000	<0.012	<0.002	<0.002	<0.012	<0.002	<0.002	<0.002	<0.011	<0.002	<0.012	<0.002	<0.012	<0.002	-	<0.002	-
	Xylene (m & p)	mg/kg			-	<0.005	<0.004	-	<0.005	<0.004	<0.005	-	<0.005	-	<0.004	-	<0.005	-	<0.005	-
	Xylene Total	mg/kg		14000	<0.025	<0.024	<0.022	<0.024	<0.025	<0.022	<0.023	<0.022	<0.023	<0.024	-	<0.024	<0.023	-	<0.024	-
	Xylene (o)	mg/kg		15000	-	<0.002	<0.002	-	<0.002	<0.002	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.002	-
Oxygenates	MTBE	mg/kg		13000	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Chlorinated Hydrocarbons	Chloromethane	mg/kg		1.2	-	<0.004	<0.003	-	<0.004	<0.003	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.004	-
	Vinyl chloride	mg/kg		0.077	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	Chloroethane	mg/kg		1300	-	<0.002	<0.002	-	<0.002	<0.002	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.002	-
	1,1-dichloroethene	mg/kg		450	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	trans-1,2-dichloroethene	mg/kg		40	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,1-dichloroethane	mg/kg		190	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	cis-1,2-dichloroethene	mg/kg		24	-	<0.006	<0.006	-	<0.006	<0.005	<0.006	-	<0.006	-	<0.005	-	<0.006	-	<0.006	-
	Chloroform	mg/kg		170	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,1,1-trichloroethane	mg/kg		1300	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	Carbon tetrachloride	mg/kg		6.3	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	Trichloroethene	mg/kg		2.6	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,1,2-trichloroethane	mg/kg		190	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	Tetrachloroethene	mg/kg		42	-	<0.004	<0.003	-	<0.004	<0.003	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.004	-
VOC	2,2-dichloropropane	mg/kg			-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	Bromochloromethane	mg/kg		630	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,1-dichloropropene	mg/kg			-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,2-dichloroethane	mg/kg		0.97	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,2-dichloropropane	mg/kg		5.9	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	Dibromomethane	mg/kg		99	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	Bromodichloromethane	mg/kg		1.3	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	cis-1,3-dichloropropene	mg/kg			-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	trans-1,3-dichloropropene	mg/kg			-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,3-dichloropropane	mg/kg		23000	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	Chlorodibromomethane	mg/kg		39	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,1,1,2-tetrachloroethane	mg/kg		250	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	Styrene	mg/kg		6500	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	Bromoform	mg/kg		1500	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	Isopropylbenzene	mg/kg		3300	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,1,2,2-tetrachloroethane	mg/kg		550	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,2,3-trichloropropane	mg/kg		0.11	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	n-propylbenzene	mg/kg		9700	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,3,5-trimethylbenzene	mg/kg		12000	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	tert-butylbenzene	mg/kg		120000	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,2,4-trimethylbenzene	mg/kg		99	-	<0.001	<0.001	-	0.005	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	sec-butylbenzene	mg/kg		120000	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	p-isopropyltoluene	mg/kg			-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	n-butylbenzene	mg/kg		58000	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,2-dibromo-3-chloropropane	mg/kg		0.064	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	Hexachlorobutadiene	mg/kg		66	<0.1	<0.002	<0.002	<0.1	<0.002	<0.002	<0.002	-	<0.002	-	<0.002	-	<0.002	-	<0.002	-
PAH	Naphthalene	mg/kg		460	<0.1	<0.006	<0.006	<0.1	<0.1 - 0.007	<0.005	<0.006 - 0.1	<0.09	<0.006	<0.1	<0.005	<0.1	<0.006	<0.09	<0.006	0.14
	Acenaphthylene	mg/kg		97000	<0.1	<0.1	<0.1 - 0.12	<0.1	0.1	<0.1	1.17	<0.09	<0.09	<0.1	<0.08	<0.1	<0.09	<0.09	<0.1	1.4
	Acenaphthene	mg/kg		97000	<0.1	<0.1	<0.09	<0.1	0.1	<0.1	0.26	<0.09	<0.09	<0.1	<0.08	<0.1	<0.09	<0.09	<0.1	0.22
	Fluorene	mg/kg		68000	<0.1	<0.1	<0.09	<0.1	<0.1	<0.1	0.2	<0.09	<0.09	<0.1	<0.08	<0.1	<0.09	<0.09	<0.1	0.33
	Phenanthrene	mg/kg		22000	<0.1	<0.1	0.25 - 0.3	<0.1	1.04	<0.1	3.13	<0.09	<0.09	1.06	<0.08	<0.1	<0.09	<0.09	<0.1	3.11
	Anthracene	mg/kg		540000	<0.1	<0.1	<0.1 - 0.1	<0.1	0.36	<0.1	1.4	<0.09	<0.09	0.29	<0.08	<0.1	<0.09	<0.09	<0.1	1.64
	Fluoranthene	mg/kg		23000	<0.1	<0.2	0.6	<0.1	2.14	<0.2	8.76	0.14	<0.09	4.3	<0.08	<0.1	0.28	<0.09	<0.2	11.27
	Pyrene	mg/kg		54000	<0.1	<0.2	0.4 - 0.46	<0.1	1.79	<0.2	7.74	0.12	<0.09	3.8	<0.08	<0.1	0.26	<0.09	<0.2	9.53
	Benz(a)anthracene	mg/kg		170	<0.1	<0.2	0.3 - 0.36	<0.1	1.1	<0.2	4.8	<0.09	<0.09	2	<0.08	<0.1	<0.09	<0.09	<0.2	7.24
	Chrysene	mg/kg		350	<0.1	<0.2	0.3 - 0.33	<0.1	1.08	<0.2	4.15	<0.09	<0.09	2.1	<0.08	<0.1	<0.09	<0.09	<0.2	6.31
	Benzo(a) pyrene	mg/kg		35	<0.1	<0.2	0.3 - 0.31	<0.1	1.19	<0.2	5.22	<0.09	<0.09	1.98	<0.08	<0.1	0.26	<0.09	<0.2	8.22
	Indeno(1,2,3-c,d)pyrene	mg/kg		510	<0.1	<0.6	<0.6 - 0.29	<0.1	1.05	<0.5	3.62	<0.09	<0.09	1.42	<0.08	<0.1	0.28	<0.09	<0.6	5.83
	Dibenz(a,h)anthracene	mg/kg		3.6	<0.1	<0.6	<0.09	<0.1	0.22	<0.5	0.6	<0.09	<0.09	0.2	<0.08	<0.1	<0.09	<0.09	<0.6	1.06
	Benzo(g,h,i)perylene	mg/kg		4000	<0.1	<0.6	<0.6 - 0.25	<0.1	0.9	<0.5	3.17	<0.09	<0.09	1.31	<0.08	<0.1	0.2	<0.09	<0.6	4.62
	Benzo(b)fluoranthene	mg/kg		44	<0.1	<0.2	0.6 - 0.7	<0.1	1.33	<0.2	6.38	0.09	<0.09	2.63	<0.08	<0.1	0.43	<0.09	<0.2	10.47
	Benzo(k)fluoranthene	mg/kg		1200	<0.1	<0.2	0.2	<0.1	0.59	<0.2	2.25	<0.09	<0.09	1.19	<0.08	<0.1	0.17	<0.09	<0.2	4.08
	PAH 16 Total	mg/kg			<1.58	-	<4.19	<1.56	<13.18	-	52.98	<1.51	<1.48	<22.62	<1.32	<1.55	<2.73	<1.43	-	75.49
SVOC	Coronene	mg/kg			<0.4	<0.4	<0.3	<0.4	-	<0.3	-	-	-	-	<0.3	-	-	-	<0.4	-
	2-methylnaphthalene	mg/kg		3000	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
	4-bromophenyl phenyl ether	mg/kg			<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
	4-chlorophenyl phenyl ether	mg/kg			<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
	Bis(2-chloroethoxy) methane	mg/kg		2500	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
	Bis(2-chloroethyl)ether	mg/kg		1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
	Dibenzofuran	mg/kg		1000	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
	Hexachlorocyclopentadiene	mg/kg		7.5	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
	Hexachloroethane	mg/kg		53	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
	1-Methylnaphthalene	mg/kg		73	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
	3,3-Dichlorobenzidine	mg/kg		5.1	-	-	<0.6	-	-	-	-	-	-	-	-	-	-	-	-	-
	Benzoic Acid	mg/kg		3.3E6	<0.6	<0.6	<0.6	<0.6	-	<0.5	-	-	-	-	<0.5	-	-	-	<0.6	-
	Benzyl alcohol	mg/kg		82000	<0.6	<0.6	<0.6	<0.6	-	<0.5	-	-	-	-	<0.5	-	-	-	<0.6	-
	Bis(2-chloroisopropyl) ether	mg/kg		47000	<0.6	<0.6	<0.6	<0.6	-	<0.5	-	-	-	-	<0.5	-	-	-	<0.6	-
Phenolics	Trimethylphenols	mg/kg			<0.4	<0.4	<0.3	<0.4	<0.4	<0.3	<0.3	<0.3	<0.3	<0.4	<0.3	<0.4	<0.3	<0.34	<0.4	<0.4
	2-methylphenol	mg/kg		Use Cresol Total[3.99000000000003E11]	<0.04	<0.04	<0.03	<0.1	<0.04	<0.1	-	-	-	-	<0.1	<0.04	<0.03	<0.03	<0.1	-
	2-nitrophenol	mg/kg			<0.04	<0.04	<0.03	<0.1	<0.04	<0.1	-	-	-	-	<0.1	<0.04	<0.03	<0.03	<0.1	-
	2,4-dimethylphenol	mg/kg		24000	<0.02	<0.02	<0.02	<0.1	<0.02	<0.1	-	-	-	-	<0.1	<0.02	<0.02	<0.02	<0.1	-
	4-chloro-3-methylphenol	mg/kg		82000	<0.04	<0.04	<0.03	<0.1	<0.04	<0.1	-	-	-	-	<0.1	<0.04	<0.03	<0.03	<0.1	-
	4-nitrophenol	mg/kg			<0.07	<0.07	<0.07	<0.6	<0.07	<0.5	-	-	-	-	<0.5	<0.07	<0.07	<0.07	<0.6	-
	Phenol	mg/kg		690	<0.04	<0.04	<0.03	<0.1	<0.04	<0.1	<0.3	<0.3	<0.3	<0.4	<0.1	<0.04	<0.03	<0.03	<0.1	<0.4
	2-chloronaphthalene	mg/kg		960	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
	2,4-dinitrophenol	mg/kg		1600	<0.05	<0.05	<0.04	<0.6	<0.05	<0.5	-	-	-	-	<0.5	<0.05	<0.05	<0.04	<0.6	-
	3-&4-methylphenol	mg/kg			<0.02	<0.02	<0.02	<0.1	<0.02	<0.1	-	-	-	-	<0.1	<0.02	<0.02	<0.02	<0.1	-
	4,6-Dinitro-2-methylphenol	mg/kg		66	<0.04	<0.04	<0.03	<0.2	<0.04	<0.2	-	-	-	-	<0.2	<0.04	<0.03	<0.03	<0.2	-
	4-chlorophenol	mg/kg			<0.04	<0.04	<0.03	<0.6	<0.04	<0.5	-	-	-	-	<0.5	<0.04	<0.03	<0.03	<0.6	-
	Phenols	mg/kg			<1.5	<1.4	<1.3	<1.5	<1.5	<1.3	<1.4	<1.3	<1.4	<1.5	<1.2	<1.5	<1.4	<1.34	<1.4	<1.6
	Cresols by HPLC (W)	mg/kg			<0.4	<0.4	<0.3	<0.4	<0.4	<0.3	<0.3	<0.3	<0.3	<0.4	<0.3	<0.4	<0.3	<0.34	<0.4	<0.4
	Phenols Total by MS Moisture Corrected	mg/kg			<0.54	<0.52	<0.49	-	<0.54	-	-	-	-	-	-	<0.53	<0.5	<0.49	-	-
	Xylenols	mg/kg			<0.4	<0.4	<0.3	<0.4	<0.4	<0.3	<0.3	<0.3	<0.3	<0.4	<0.3	<0.4	<0.3	<0.34	<0.4	<0.4
PCBs	1,1-Biphenyl	mg/kg		33000	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
Amino Aliphatics	N-nitrosodi-n-propylamine	mg/kg		0.33	<1.1	<1.1	<1	<1.1	-	<1	-	-	-	-	<0.9	-	-	-	<1.1	-
Amino Aromatics	n-Nitrosodiphenylamine	mg/kg		470	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
Anilines	2-nitroaniline	mg/kg		8000	<0.6	<0.6	<0.6	<0.6	-	<0.5	-	-	-	-	<0.5	-	-	-	<0.6	-
	3-nitroaniline	mg/kg			<17.9	<17.1	<16.3	<17.6	-	<15.9	-	-	-	-	<14.9	-	-	-	<17.3	-
	4-chloroaniline	mg/kg		11	<0.6	<0.6	<0.6	<0.6	-	<0.5	-	-	-	-	<0.5	-	-	-	<0.6	-
	4-nitroaniline	mg/kg		110	<0.7	<0.7	<0.7	<0.7	-	<0.7	-	-	-	-	<0.6	-	-	-	<0.7	-
Explosives	2,4-Dinitrotoluene	mg/kg		3700	<0.2	<0.2	<0.2	<0.2	-	<0.2	-	-	-	-	<0.2	-	-	-	<0.2	-
	2,6-dinitrotoluene	mg/kg		1900	<0.6	<0.6	<0.6	<0.6	-	<0.5	-	-	-	-	<0.5	-	-	-	<0.6	-
	Nitrobenzene	mg/kg		22	<0.6	<0.6	<0.6	<0.6	-	<0.5	-	-	-	-	<0.5	-	-	-	<0.6	-
Halogenated Benzenes	Chlorobenzene	mg/kg		130	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	Bromobenzene	mg/kg		220	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	2-chlorotoluene	mg/kg		23000	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	4-chlorotoluene	mg/kg		23000	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,3-dichlorobenzene	mg/kg		73	<0.1	<0.001	<0.001	<0.1	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,4-dichlorobenzene	mg/kg		10000	<0.1	<0.001	<0.001	<0.1	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,2-dichlorobenzene	mg/kg		4800	<0.1	<0.001	<0.001	<0.1	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,2,4-trichlorobenzene	mg/kg		530	<0.1	<0.004	<0.003	<0.1	<0.004	<0.003	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.004	-
	1,2,3-trichlorobenzene	mg/kg		250	-	<0.004	<0.003	-	<0.004	<0.003	<0.003	-	<0.003	-	<0.003	-	<0.003	-	<0.004	-
	Hexachlorobenzene	mg/kg		120	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
Halogenated Hydrocarbons	Dichlorodifluoromethane	mg/kg		370	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	Bromomethane	mg/kg		30	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	Trichlorofluoromethane	mg/kg		350000	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
	1,2-dibromoethane	mg/kg		0.16	-	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-
Halogenated Phenols	2-chlorophenol	mg/kg		5800	<0.04	<0.04	<0.03	<0.1	<0.04	<0.1	-	-	-	-	<0.1	<0.04	<0.03	<0.03	<0.1	-
	2,4-dichlorophenol	mg/kg		2500	<0.02	<0.02	<0.02	<0.1	<0.02	<0.1	-	-	-	-	<0.1	<0.02	<0.02	<0.02	<0.1	-
	2,4,5-trichlorophenol	mg/kg		82000	<0.02	<0.02	<0.02	<0.1	<0.02	<0.1	-	-	-	-	<0.1	<0.02	<0.02	<0.02	<0.1	-
	2,4,6-trichlorophenol	mg/kg		210	<0.02	<0.02	<0.02	<0.1	<0.02	<0.1	-	-	-	-	<0.1	<0.02	<0.02	<0.02	<0.1	-
	Pentachlorophenol	mg/kg		400	<0.04	<0.04	<0.03	<0.6	<0.04	<0.5	-	-	-	-	<0.5	<0.04	<0.03	<0.03	<0.6	-
Phthalates	Bis(2-ethylhexyl) phthalate	mg/kg		86000	<0.2	<0.2	<0.2	<0.2	-	<0.2	-	-	-	-	<0.2	-	-	-	<0.2	-
	Butyl benzyl phthalate	mg/kg		940000	<0.2	<0.2	<0.2	<0.2	-	<0.2	-	-	-	-	<0.2	-	-	-	<0.2	-
	Di-n-butyl phthalate	mg/kg		15000	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
	Di-n-octyl phthalate	mg/kg		89000	<0.2	<0.2	<0.2	<0.2	-	<0.2	-	-	-	-	<0.2	-	-	-	<0.2	-
	Diethylphthalate	mg/kg		220000	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
	Dimethyl phthalate	mg/kg			<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
Solvents	Isophorone	mg/kg		2400	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	-	-	<0.1	-	-	-	<0.1	-
Metals	Arsenic	mg/kg		640	3.8	7.9	11	13.3	12.9	6.2	9.2	9.1	9.5	9.6	6.4	5.9	13.7	10.82	3.6	28.3
	Cadmium	mg/kg		190	0.3	<0.21	<0.2	0.45	0.8	13.72	0.77	0.4	0.32	0.68	0.2	<0.21	0.5	0.236	<0.21	1.99
	Chromium (III+VI)	mg/kg		8,600	120.6	68.6	61	70.5	29	47.3	31.9	36.3	31	25.3	39.5	54.9	32.9	20.25	40.8	22
	Copper	mg/kg		68000	16	12.8	25.5	15.5	48.7	41.4	41.1	31.9	40	72.3	7.3	9.2	18.8	10.18	7.9	67.9
	Iron	mg/kg		820000	46,600	40,800	39,800	54,600	34,600	23,500	23,800	34,500	33,700	22,500	24,000	31,600	34,500	21,100	23,300	39,600
	Lead	mg/kg		2300	9.2	12.5	19.4	19.9	238.1	189	112.2	63.1	56	67.7	5.4	8	37.9	40.5	6.1	182.7
	Mercury	mg/kg			<0.5	<0.5	<0.5	<0.5	<0.53	<0.51	<0.5	<0.5	<0.5	<0.52	<0.5	<0.5	<0.5	<0.54	<0.5	<0.53

Markeaton Junction Soil Chemistry
Analytical Results
A38 Derby Junctions
Highways England

Location_Code	BM16	BM16	BM17	BM17
Sample_Depth_Range	1	6	1.2	1.45
Sampled_Date_Time	05/08/2016	05/08/2016	18/10/2016	

Chem_Group	ChemName	output unit	EQL	GAC_HH_COM/IND_SLOAM_1.45-3.48%TOC				
	Diphenyl ether	mg/kg			<0.1	-	-	-
	Boron (Water Soluble)	mg/kg			<0.5	0.8	1.2	<0.5
TPH	>C5-C7	mg/kg			<0.01	-	<0.01	-
	>C8-C44	mg/kg			<23	-	<20	-
	GRO >C5-C6	mg/kg			<0.2	-	<0.2	-
	GRO >C5-C10	mg/kg			<0.2	-	<0.2	-
	GRO >C6-C8	mg/kg			<0.2	-	<0.2	-
	GRO >C7-C8	mg/kg			<0.01	-	<0.01	-
	>C8-C10 Aliphatics	mg/kg		4800	<5	-	<4	-
	>C10-C12 Aliphatics	mg/kg		23000	<5	-	<4	-
	>C12-C16 Aliphatics	mg/kg		82000	<5	-	<4	-
	>C16-C35 Aliphatics	mg/kg		1.7E6	<13.5	-	<11.9	-
	>C35-C44 Aliphatics	mg/kg		1.7E6	<6.38	-	<5.62	-
	>EC8-EC10 Aromatics	mg/kg		8100	<5	-	<4	-
	>EC10-EC12 Aromatics	mg/kg		28000	<5	-	<4	-
	>EC12-EC16 Aromatics	mg/kg		37000	<5	-	<4	-
	>EC16-EC21 Aromatics	mg/kg		28000	<5	-	<4	-
	>EC21-EC35 Aromatics	mg/kg		28000	<9.94	-	<8.76	-
	>EC35-EC44 Aromatics	mg/kg		28000	<6.38	-	<5.62	-
BTEX	Benzene	mg/kg		47	<0.011	-	<0.012	-
	Toluene	mg/kg		110000	<0.011	-	<0.012	-
	Ethylbenzene	mg/kg		13000	<0.011	-	<0.012	-
	Xylene (m & p)	mg/kg			-	-	-	-
	Xylene Total	mg/kg		14000	<0.023	-	<0.025	-
	Xylene (o)	mg/kg		15000	-	-	-	-
Oxygenates	MTBE	mg/kg		13000	-	-	-	-
Chlorinated Hydrocarbons	Chloromethane	mg/kg		1.2	-	-	-	-
	Vinyl chloride	mg/kg		0.077	-	-	-	-
	Chloroethane	mg/kg		1300	-	-	-	-
	1,1-dichloroethene	mg/kg		450	-	-	-	-
	trans-1,2-dichloroethene	mg/kg		40	-	-	-	-
	1,1-dichloroethane	mg/kg		190	-	-	-	-
	cis-1,2-dichloroethene	mg/kg		24	-	-	-	-
	Chloroform	mg/kg		170	-	-	-	-
	1,1,1-trichloroethane	mg/kg		1300	-	-	-	-
	Carbon tetrachloride	mg/kg		6.3	-	-	-	-
	Trichloroethene	mg/kg		2.6	-	-	-	-
	1,1,2-trichloroethane	mg/kg		190	-	-	-	-
	Tetrachloroethene	mg/kg		42	-	-	-	-
VOC	2,2-dichloropropane	mg/kg			-	-	-	-
	Bromochloromethane	mg/kg		630	-	-	-	-
	1,1-dichloropropene	mg/kg			-	-	-	-
	1,2-dichloroethane	mg/kg		0.97	-	-	-	-
	1,2-dichloropropane	mg/kg		5.9	-	-	-	-
	Dibromomethane	mg/kg		99	-	-	-	-
	Bromodichloromethane	mg/kg		1.3	-	-	-	-
	cis-1,3-dichloropropene	mg/kg			-	-	-	-
	trans-1,3-dichloropropene	mg/kg			-	-	-	-
	1,3-dichloropropane	mg/kg		23000	-	-	-	-
	Chlorodibromomethane	mg/kg		39	-	-	-	-
	1,1,1,2-tetrachloroethane	mg/kg		250	-	-	-	-
	Styrene	mg/kg		6500	-	-	-	-
	Bromoform	mg/kg		1500	-	-	-	-
	Isopropylbenzene	mg/kg		3300	-	-	-	-
	1,1,2,2-tetrachloroethane	mg/kg		550	-	-	-	-
	1,2,3-trichloropropane	mg/kg		0.11	-	-	-	-
	n-propylbenzene	mg/kg		9700	-	-	-	-
	1,3,5-trimethylbenzene	mg/kg		12000	-	-	-	-
	tert-butylbenzene	mg/kg		120000	-	-	-	-
	1,2,4-trimethylbenzene	mg/kg		99	-	-	-	-
	sec-butylbenzene	mg/kg		120000	-	-	-	-
	p-isopropyltoluene	mg/kg			-	-	-	-
	n-butylbenzene	mg/kg		58000	-	-	-	-
	1,2-dibromo-3-chloropropane	mg/kg		0.064	-	-	-	-
	Hexachlorobutadiene	mg/kg		66	<0.1	-	-	-
PAH	Naphthalene	mg/kg		460	<0.09	<0.1	<0.1	<0.09
	Acenaphthylene	mg/kg		97000	<0.09	<0.1	<0.1	<0.09
	Acenaphthene	mg/kg		97000	<0.09	<0.1	<0.1	<0.09
	Fluorene	mg/kg		68000	<0.09	<0.1	<0.1	<0.09
	Phenanthrene	mg/kg		22000	<0.09	<0.1	<0.1	<0.09
	Anthracene	mg/kg		540000	<0.09	<0.1	<0.1	<0.09
	Fluoranthene	mg/kg		23000	<0.2 - 0.1	<0.1	<0.1	<0.09
	Pyrene	mg/kg		54000	<0.09	<0.1	<0.1	<0.09
	Benz(a)anthracene	mg/kg		170	<0.09	<0.1	<0.1	<0.09
	Chrysene	mg/kg		350	<0.09	<0.1	<0.1	<0.09
	Benzo(a) pyrene	mg/kg		35	<0.09	<0.1	<0.1	<0.09
	Indeno(1,2,3-c,d)pyrene	mg/kg		510	<0.09	<0.1	<0.1	<0.09
	Dibenz(a,h)anthracene	mg/kg		3.6	<0.09	<0.1	<0.1	<0.09
	Benzo(g,h,i)perylene	mg/kg		4000	<0.09	<0.1	<0.1	<0.09
	Benzo(b)fluoranthene	mg/kg		44	<0.09	<0.1	<0.1	<0.09
	Benzo(k)fluoranthene	mg/kg		1200	<0.09	<0.1	<0.1	<0.09
	PAH 16 Total	mg/kg			<1.46	<1.55	<1.57	<1.52
SVOC	Coronene	mg/kg			<0.3	-	-	-
	2-methylnaphthalene	mg/kg		3000	<0.1	-	-	-
	4-bromophenyl phenyl ether	mg/kg			<0.1	-	-	-
	4-chlorophenyl phenyl ether	mg/kg			<0.1	-	-	-
	Bis(2-chloroethoxy) methane	mg/kg		2500	<0.1	-	-	-
	Bis(2-chloroethyl)ether	mg/kg		1	<0.1	-	-	-
	Dibenzofuran	mg/kg		1000	<0.1	-	-	-
	Hexachlorocyclopentadiene	mg/kg		7.5	<0.1	-	-	-
	Hexachloroethane	mg/kg		53	<0.1	-	-	-
	1-Methylnaphthalene	mg/kg		73	<0.1	-	-	-
	3,3-Dichlorobenzidine	mg/kg		5.1	-	-	-	-
	Benzoic Acid	mg/kg		3.3E6	<0.6	-	-	-
	Benzyl alcohol	mg/kg		82000	<0.6	-	-	-
	Bis(2-chloroisopropyl) ether	mg/kg		47000	<0.6	-	-	-
Phenolics	Trimethylphenols	mg/kg			<0.3	<0.4	<0.4	<0.4
	2-methylphenol	mg/kg		Use Cresol Total[9.99000000000003E11]	<0.03	-	-	-
	2-nitrophenol	mg/kg			<0.03	-	-	-
	2,4-dimethylphenol	mg/kg		24000	<0.02	-	-	-
	4-chloro-3-methylphenol	mg/kg		82000	<0.03	-	-	-
	4-nitrophenol	mg/kg			<0.07	-	-	-
	Phenol	mg/kg		690	<0.03	<0.4	<0.4	<0.4
	2-chloronaphthalene	mg/kg		960	<0.1	-	-	-
	2,4-dinitrophenol	mg/kg		1600	<0.05	-	-	-
	3-&4-methylphenol	mg/kg			<0.02	-	-	-
	4,6-Dinitro-2-methylphenol	mg/kg		66	<0.03	-	-	-
	4-chlorophenol	mg/kg			<0.03	-	-	-
	Phenols	mg/kg			<1.4	<1.5	<1.5	<1.4
	Cresols by HPLC (W)	mg/kg			<0.3	<0.4	<0.4	<0.4
	Phenols Total by MS Moisture Corrected	mg/kg			<0.5	-	-	-
	Xylenols	mg/kg			<0.3	<0.4	<0.4	<0.4
PCBs	1,1-Biphenyl	mg/kg		33000	<0.1	-	-	-
Amino Aliphatics	N-nitrosodi-n-propylamine	mg/kg		0.33	<1	-	-	-
Amino Aromatics	n-Nitrosodiphenylamine	mg/kg		470	<0.1	-	-	-
Anilines	2-nitroaniline	mg/kg		8000	<0.6	-	-	-
	3-nitroaniline	mg/kg			<16.5	-	-	-
	4-chloroaniline	mg/kg		11	<0.6	-	-	-
	4-nitroaniline	mg/kg		110	<0.7	-	-	-
Explosives	2,4-Dinitrotoluene	mg/kg		3700	<0.2	-	-	-
	2,6-dinitrotoluene	mg/kg		1900	<0.6	-	-	-
	Nitrobenzene	mg/kg		22	<0.6	-	-	-
Halogenated Benzenes	Chlorobenzene	mg/kg		130	-	-	-	-
	Bromobenzene	mg/kg		220	-	-	-	-
	2-chlorotoluene	mg/kg		23000	-	-	-	-
	4-chlorotoluene	mg/kg		23000	-	-	-	-
	1,3-dichlorobenzene	mg/kg		73	<0.1	-	-	-
	1,4-dichlorobenzene	mg/kg		10000	<0.1	-	-	-
	1,2-dichlorobenzene	mg/kg		4800	<0.1	-	-	-
	1,2,4-trichlorobenzene	mg/kg		530	<0.1	-	-	-
	1,2,3-trichlorobenzene	mg/kg		250	-	-	-	-
	Hexachlorobenzene	mg/kg		120	<0.1	-	-	-
Halogenated Hydrocarbons	Dichlorodifluoromethane	mg/kg		370	-	-	-	-
	Bromomethane	mg/kg		30	-	-	-	-
	Trichlorofluoromethane	mg/kg		350000	-	-	-	-
	1,2-dibromoethane	mg/kg		0.16	-	-	-	-
Halogenated Phenols	2-chlorophenol	mg/kg		5800	<0.03	-	-	-
	2,4-dichlorophenol	mg/kg		2500	<0.02	-	-	-
	2,4,5-trichlorophenol	mg/kg		82000	<0.02	-	-	-
	2,4,6-trichlorophenol	mg/kg		210	<0.02	-	-	-
	Pentachlorophenol	mg/kg		400	<0.03	-	-	-
Phthalates	Bis(2-ethylhexyl) phthalate	mg/kg		86000	<0.2	-	-	-
	Butyl benzyl phthalate	mg/kg		940000	<0.2	-	-	-
	Di-n-butyl phthalate	mg/kg		15000	<0.1	-	-	-
	Di-n-octyl phthalate	mg/kg		89000	<0.2	-	-	-
	Diethylphthalate	mg/kg		220000	<0.1	-	-	-
	Dimethyl phthalate	mg/kg			<0.1	-	-	-
Solvents	Isophorone	mg/kg		2400	<0.1	-	-	-
Metals	Arsenic	mg/kg		640	8.7	10	6	12
	Cadmium	mg/kg		190	0.58	<0.21	0.3	0.3
	Chromium (III+VI)	mg/kg		8,600	21.1	65.5	53.2	32
	Copper	mg/kg		68000	11	10.6	22.4	8.9
	Iron	mg/kg		820000	28,200	33,300	37,500	47,300
	Lead	mg/kg		2300	52	8.7	31.3	23.6
	Mercury	mg/kg			<0.5	<0.5	<0.6	<0.5
	Nickel	mg/kg		980	18.5	55.9	48	22.6
	Selenium	mg/kg		12000	0.5	<0.5	0.8	<0.5
	Zinc	mg/kg		730000	105.5	77.1	120.1	64
	Chromium (hexavalent)	mg/kg		33	<0.1	<0.1	<0.1	<0.1
Inorganics	Cyanide (Free)	mg/kg		12	<0.6	<0.6	<0.6	<0.6
	Moisture Content 105C	%			11.9	17.4	18.4	15.6
	Cyanide Total	mg/kg		1200	<0.6	<0.6	<0.6	<0.6
	Ammonium Ion	mg/kg			0.8	<0.6	<0.6	<0.6
	pH (Lab)	pH_Units			6.8	8.6	8.8	8.1

Statistical Summary

Number of	Number of	Minimum	Minimum	Maximum	Maximum	Average	Median	Standard	Number of
16	0	<0.1	ND	<0.1	ND	0.05	0.05	0	0
36	34	<0.5	0.54	2.2	2.2	1.1	1.05	0.45	0
24	1	<0.01	0.68	0.68	0.68	0.033	0.005	0.14	0
22	5	<20	20.2	131	131	20	10.925	27	0
24	1	<0.2	0.44	0.44	0.44	0.11	0.1	0.069	0
24	1	<0.2	10.56	10.56	10.56	0.54	0.1	2.1	0
24	1	<0.2	2.45	2.45	2.45	0.2	0.1	0.48	0
24	1	<0.01	0.65	0.65	0.65	0.032	0.005	0.13	0
24	0	<4	ND	<5	ND	2.1	2	0.22	0
24	1	<4	9.3	9.3	9.3	2.4	2	1.5	0
24	2	<4	4.32	5.41	5.41	2.4	2.005	0.81	0
24	8	<11.9	13.6	111	111	15	6.875	22	0
24	1	<5.62	8.19	8.19	8.19	3.2	2.8175	1.1	0
24	0	<4	ND	<5	ND	2.1	2	0.23	0
24	1	<4	15.2	15.2	15.2	2.7	2	2.7	0
24	3	<4	5.7	20.5	20.5	3.3	2	3.9	0
24	6	<4	6.42	36.2	36.2	5.7	2	9.1	0
24	11	<8.76	11.6	192	192	28	5.1025	50	0
24	4	<5.62	8.02	12.2	12.2	4.1	2.81	2.6	0
30	1	<0.001	0.248	0.68	0.68	0.018	0.0005	0.084	0
30	1	<0.005	0.54	0.65	0.65	0.024	0.003	0.11	0
30	1	<0.002	0.33	0.597	0.597	0.018	0.001	0.084	0
19	1	<0.004	0.269	0.269	0.269	0.016	0.0025	0.061	0
24	1	<0.022	0.82	0.82	0.82	0.045	0.012	0.16	0
19	1	<0.002	0.684	0.684	0.684	0.037	0.001	0.16	0
19	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0
19	0	<0.003	ND	<0.004	ND	0.0018	0.002	0.00025	0
19	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0
19	0	<0.002	ND	<0.003	ND	0.0011	0.001	0.00016	0
19	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0
19	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0
19	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0
19	0	<0.005	ND	<0.006	ND	0.0029	0.003	0.00019	0
19	1	<0.001	0.006	0.006	0.006	0.00079	0.0005	0.0013	0
19	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0
19	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0
19	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0
19	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0
19	0	<0.003	ND	<0.004	ND	0.0018	0.002	0.00025	0
19	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0

Little Eaton Soils Chemistry
Analytical Results
A38 Derby Junctions
Highways England

Location_Code	BL01	BL02	BL03	BL04	BL04	BL05	BL05	BL06	BL06	BL06	BL07	BL07	BL08	BL08C	BL08C
Sample_Depth_Range	1	0.5	0.2	0.5	4.5	1	8	0.5	3	9	0.5	4.5	0.2	3	5
Sampled_Date_Time	10/08/2016	29/07/2016	04/08/2016	22/07/2016	04/08/2016	04/08/2016	04/08/2016	15/09/2016	15/09/2016	15/09/2016	28/07/2016	04/08/2016	29/07/2016	15/09/2016	15/09/2016

Chem_Group	ChemName	output unit	EQL	GAC_HH_COM/IND_SLOAM_1.45-3.48%TOC															
	Diphenyl ether	mg/kg			<0.1	-	<0.1	-	-	-	-	-	<0.1	-	-	-	<0.6	-	-
	Methacriphos	mg/kg			-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	Boron (Water Soluble)	mg/kg			<0.5	2.3	1.4	1.3	0.7	1	2.7	1.8	0.7	2.3	1.1	<0.5	0.7	0.8	1.2
	Chlorothalonil	mg/kg		740	-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	Permethrin II	mg/kg			-	-	<0.004	<0.004	-	<0.003	-	-	-	-	<0.004	-	-	-	-
	Tecnazene	mg/kg			-	-	<0.004	<0.004	-	<0.003	-	-	-	-	<0.004	-	-	-	-
	Etrimphos	mg/kg			-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	Propetamphos	mg/kg			-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
TPH	>C5-C7	mg/kg			<0.01	<0.01	-	-	-	<0.01	-	<0.01	<0.01	-	-	-	<0.01	<0.01	<0.01
	>C8-C44	mg/kg			<25	26.9	-	-	-	21	-	33.2	<20	-	-	-	110	<20	<20.4
	GRO >C5-C6	mg/kg			<0.3	<0.3	-	-	-	<0.2	-	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2
	GRO >C5-C10	mg/kg			<0.3	<0.3	-	-	-	<0.2	-	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2
	GRO >C6-C8	mg/kg			<0.3	<0.3	-	-	-	<0.2	-	<0.2	<0.2	-	-	-	<0.2	<0.2	<0.2
	GRO >C7-C8	mg/kg			<0.01	<0.01	-	-	-	<0.01	-	<0.01	<0.01	-	-	-	<0.01	<0.01	<0.01
	>C8-C10 Aliphatics	mg/kg		4800	<5	<4	-	-	-	<4	-	<4	<4	-	-	-	<4	<4	<4.08
	>C10-C12 Aliphatics	mg/kg		23000	<5	<4	-	-	-	<4	-	<4	<4	-	-	-	<4	<4	<4.08
	>C12-C16 Aliphatics	mg/kg		82000	<5	5.57	-	-	-	<4	-	<4	<4	-	-	-	<4	5.32	5.8
	>C16-C35 Aliphatics	mg/kg		1.7E6	<15	20.4	-	-	-	17.9	-	31.3	<11.9	-	-	-	80.9	<11.9	<12.1
	>C35-C44 Aliphatics	mg/kg		1.7E6	<7.07	<5.62	-	-	-	<5.62	-	<5.62	<5.62	-	-	-	27.9	<5.62	<5.73
	>EC8-EC10 Aromatics	mg/kg		8100	<5	<4	-	-	-	<4	-	<4	<4	-	-	-	<4	<4	<4
	>EC10-EC12 Aromatics	mg/kg		28000	<5	<4	-	-	-	<4	-	<4	<4	-	-	-	<4	<4	<4
	>EC12-EC16 Aromatics	mg/kg		37000	<5	5.33	-	-	-	<4	-	<4	<4	-	-	-	4.39	<4	<4
	>EC16-EC21 Aromatics	mg/kg		28000	<5	11.3	-	-	-	4.57	-	5.59	<4	-	-	-	27.6	<4	<4
	>EC21-EC35 Aromatics	mg/kg		28000	<11.02	61.4	-	-	-	19.8	-	45.7	<8.76	-	-	-	235	<8.76	<8.76
	>EC35-EC44 Aromatics	mg/kg		28000	<7.07	<5.62	-	-	-	<5.62	-	<5.62	<5.62	-	-	-	130	<5.62	<5.62
BTEX	Benzene	mg/kg		47	<0.013	<0.014	<0.001	<0.001	-	<0.011	-	<0.012	<0.001	-	<0.001	-	<0.001	<0.011	<0.012
	Toluene	mg/kg		110000	<0.013	<0.014	<0.007	<0.006	-	<0.011	-	<0.012	<0.005	-	<0.006	-	<0.006	<0.011	<0.012
	Ethylbenzene	mg/kg		13000	<0.013	<0.014	<0.003	<0.003	-	<0.011	-	<0.012	<0.002	-	<0.003	-	<0.002	<0.011	<0.012
	Xylene (m & p)	mg/kg			-	-	<0.006	<0.005	-	-	-	-	<0.004	-	<0.005	-	<0.005	-	-
	Xylene Total	mg/kg		14000	<0.025	<0.027	-	-	-	<0.023	-	<0.024	<0.022	-	-	-	<0.023	<0.023	<0.024
	Xylene (o)	mg/kg		15000	-	-	<0.003	<0.003	-	-	-	-	<0.002	-	<0.003	-	<0.002	-	-
Oxygenates	MTBE	mg/kg		13000	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
Chlorinated Hydrocarbons	Chloromethane	mg/kg		1.2	-	-	<0.004	<0.004	-	-	-	-	<0.003	-	<0.004	-	<0.003	-	-
	Vinyl chloride	mg/kg		0.077	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	Chloroethane	mg/kg		1300	-	-	<0.003	<0.003	-	-	-	-	<0.002	-	<0.003	-	<0.002	-	-
	1,1-dichloroethene	mg/kg		450	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	trans-1,2-dichloroethene	mg/kg		40	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,1-dichloroethane	mg/kg		190	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	cis-1,2-dichloroethene	mg/kg		24	-	-	<0.007	<0.006	-	-	-	-	<0.005	-	<0.006	-	<0.006	-	-
	Chloroform	mg/kg		170	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,1,1-trichloroethane	mg/kg		1300	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	Carbon tetrachloride	mg/kg		6.3	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	Trichloroethene	mg/kg		2.6	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,1,2-trichloroethane	mg/kg		190	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	Tetrachloroethene	mg/kg		42	-	-	<0.004	<0.004	-	-	-	-	<0.003	-	<0.004	-	<0.003	-	-
VOC	2,2-dichloropropane	mg/kg			-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	Bromochloromethane	mg/kg		630	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,1-dichloropropene	mg/kg			-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,2-dichloroethane	mg/kg		0.97	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,2-dichloropropane	mg/kg		5.9	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	Dibromomethane	mg/kg		99	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	Bromodichloromethane	mg/kg		1.3	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	cis-1,3-dichloropropene	mg/kg			-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	trans-1,3-dichloropropene	mg/kg			-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,3-dichloropropane	mg/kg		23000	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	Chlorodibromomethane	mg/kg		39	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,1,1,2-tetrachloroethane	mg/kg		250	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	Styrene	mg/kg		6500	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	Bromoform	mg/kg		1500	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	Isopropylbenzene	mg/kg		3300	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,1,2,2-tetrachloroethane	mg/kg		550	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,2,3-trichloropropane	mg/kg		0.11	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	n-propylbenzene	mg/kg		9700	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,3,5-trimethylbenzene	mg/kg		12000	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	tert-butylbenzene	mg/kg		120000	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,2,4-trimethylbenzene	mg/kg		99	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	sec-butylbenzene	mg/kg		120000	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	p-isopropyltoluene	mg/kg			-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	n-butylbenzene	mg/kg		58000	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,2-dibromo-3-chloropropane	mg/kg		0.064	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	Hexachlorobutadiene	mg/kg		66	<0.1	-	<0.003	<0.003	-	-	-	-	<0.002	-	<0.003	-	<0.002	-	-
PAH	Naphthalene	mg/kg		460	<0.1	-	<0.007	<0.006	<0.09	-	<0.1	0.21	<0.005 - 0.49	-	<0.006	<0.09	<0.6 - 0.17	<0.09	<0.1
	Acenaphthylene	mg/kg		97000	<0.1	-	<0.1	-	<0.09	-	<0.1	0.18	<0.1 - 0.24	-	-	<0.09	0.37 - 0.7	<0.09	<0.1
	Acenaphthene	mg/kg		97000	<0.1	-	<0.1	-	<0.09	-	<0.1	<0.1	<0.09	-	-	<0.09	0.49 - 2.4	<0.09	<0.1
	Fluorene	mg/kg		68000	<0.1	-	<0.1	-	<0.09	-	<0.1	<0.1	<0.09	-	-	<0.09	0.37 - 2.1	<0.09	<0.1
	Phenanthrene	mg/kg		22000	<0.1	-	0.1	-	<0.09	-	<0.1	0.62	<0.09	-	-	<0.09	4.51 - 18.7	<0.09	<0.1
	Anthracene	mg/kg		540000	<0.1	-	<0.1	-	<0.09	-	<0.1	0.22	<0.09	-	-	<0.09	1.45 - 6.4	<0.09	<0.1
	Fluoranthene	mg/kg		23000	<0.3	-	0.4	-	<0.09	-	<0.1	1.6	<0.09	-	-	<0.09	8.93 - 19.8	<0.09	<0.1
	Pyrene	mg/kg		54000	<0.3	-	0.4	-	<0.09	-	<0.1	1.42	<0.09	-	-	<0.09	7.52 - 17	<0.09	<0.1
	Benz(a)anthracene	mg/kg		170	<0.3	-	<0.3	-	<0.09	-	<0.1	0.91	<0.09	-	-	<0.09	4.61 - 9.7	<0.09	<0.1
	Chrysene	mg/kg		350	<0.3	-	<0.3	-	<0.09	-	<0.1	1.05	<0.09	-	-	<0.09	4.55 - 8.7	<0.09	<0.1
	Benzo(a) pyrene	mg/kg		35	<0.3	-	<0.3	-	<0.09	-	<0.1	1	<0.09	-	-	<0.09	6.48 - 8.2	0.09	<0.1
	Indeno(1,2,3-c,d)pyrene	mg/kg		510	<0.6	-	<0.7	-	<0.09	-	<0.1	0.7	<0.09	-	-	<0.09	4.82 - 7.2	0.1	<0.1
	Dibenz(a,h)anthracene	mg/kg		3.6	<0.6	-	<0.7	-	<0.09	-	<0.1	0.15	<0.09	-	-	<0.09	<2.9 - 0.8	0.1	<0.1
	Benzo(g,h,i)perylene	mg/kg		4000	<0.6	-	<0.7	-	<0.09	-	<0.1	0.68	<0.09	-	-	<0.09	3.89 - 5.6	<0.09	<0.1
	Benzo(b)fluoranthene	mg/kg		44	<0.3	-	0.3	-	<0.09	-	<0.1	1.31	<0.09	-	-	<0.09	7.25 - 10.1	<0.09	<0.1
	Benzo(k)fluoranthene	mg/kg		1200	<0.3	-	<0.3	-	<0.09	-	<0.1	0.57	<0.09	-	-	<0.09	2.73 - 4.1	0.09	<0.1
	PAH 16 Total	mg/kg			-	-	-	-	<1.37	-	<1.62	<10.79	<1.96	-	-	<1.41	58.97	<1.49	<1.54
SVOC	Coronene	mg/kg			<0.4	-	<0.4	-	-	-	-	-	<0.3	-	-	-	<1.7	-	-
	2-methylnaphthalene	mg/kg		3000	<0.1	-	<0.1	-	-	-	-	-	<0.1	-	-	-	<0.6	-	-
	4-bromophenyl phenyl ether	mg/kg			<0.1	-	<0.1	-	-	-	-	-	<0.1	-	-	-	<0.6	-	-
	4-chlorophenyl phenyl ether	mg/kg			<0.1	-	<0.1	-	-	-	-	-	<0.1	-	-	-	<0.6	-	-
	Bis(2-chloroethoxy) methane	mg/kg		2500	<0.1	-	<0.1	-	-	-	-	-	<0.1	-	-	-	<0.6	-	-
	Bis(2-chloroethyl)ether	mg/kg		1	<0.1	-	<0.1	-	-	-	-	-	<0.1	-	-	-	<0.6	-	-
	Dibenzofuran	mg/kg		1000	<0.1	-	<0.1	-	-	-	-	-	<0.1	-	-	-	1.5	-	-
	Hexachlorocyclopentadiene	mg/kg		7.5	<0.1	-	<0.1	-	-	-	-	-	<0.1	-	-	-	<0.6	-	-
	Hexachloroethane	mg/kg		53	<0.1	-	<0.1	-	-	-	-	-	<0.1	-	-	-	<0.6	-	-
	1-Methylnaphthalene	mg/kg		73	<0.1	-	<0.1	-	-	-	-	-	<0.1	-	-	-	<0.6	-	-
	3,3-Dichlorobenzidine	mg/kg		5.1	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-
	Benzoic Acid	mg/kg		3.3E6	<0.6	-	<0.7	-	-	-	-	-	<0.5	-	-	-	<2.9	-	-
	Benzyl alcohol	mg/kg		82000	<0.6	-	<0.7	-	-	-	-	-	<0.5	-	-	-	<2.9	-	-
	Bis(2-chloroisopropyl) ether	mg/kg		47000	<0.6	-	<0.7	-	-	-	-	-	<0.5	-	-	-	<2.9	-	-
Phenolics	Trimethylphenols	mg/kg			<0.4	<0.4	<0.4	<0.4	<0.3	<0.3	<0.4	<0.4	<0.3	<0.4	<0.4	<0.33	<0.3	<0.3	<0.4
	2-methylphenol	mg/kg		9.9900000000003E11	<0.1	-	<0.04	-	-	-	-	-	<0.03	-	-	-	<0.17	-	-
	2-nitrophenol	mg/kg			<0.1	-	<0.04	-	-	-	-	-	<0.03	-	-	-	<0.17	-	-
	2,4-dimethylphenol	mg/kg		24000	<0.1	-	<0.03	-	-	-	-	-	<0.02	-	-	-	<0.1	-	-
	4-chloro-3-methylphenol	mg/kg		82000	<0.1	-	<0.04	-	-	-	-	-	<0.03	-	-	-	<0.17	-	-
	4-nitrophenol	mg/kg			<0.6	-	<0.08	-	-	-	-	-	<0.07	-	-	-	<0.3	-	-
	Phenol	mg/kg		690	<0.1	<0.4	<0.04	<0.4	<0.3	<0.3	<0.4	<0.04	<0.03	<0.4	<0.4	<0.33	<0.17	<0.3	<0.4
	2-chloronaphthalene	mg/kg		960	<0.1	-	<0.1	-	-	-	-	-	<0.1	-	-	-	<0.6	-	-
	2,4-dinitrophenol	mg/kg		1600	<0.6	-	<0.06	-	-	-	-	-	<0.05	-	-	-	<0.2	-	-
	3-&4-methylphenol	mg/kg			<0.1	-	<0.03	-	-	-	-	-	<0.02	-	-	-	<0.1	-	-
	4,6-Dinitro-2-methylphenol	mg/kg		66	<0.3	-	<0.04	-	-	-	-	-	<0.04	-	-	-	<0.17	-	-
	4-chlorophenol	mg/kg			<0.6	-	<0.04	-	-	-	-	-	<0.04	-	-	-	<0.17	-	-
	Phenols	mg/kg			<1.5	<1.6	<1.7	<1.6	<1.3	<1.4	<1.5	<1.5	<1.3	<1.5	<1.5	<1.33	<1.4	<1.4	<1.4
	Cresols by HPLC (W)	mg/kg			<0.4	<0.4	<0.4	<0.4	<0.3	<0.3	<0.4	<0.4	<0.3	<0.4	<0.4	<0.33	<0.3	<0.3	<0.4
	Phenols Total by MS Moisture Corrected	mg/kg			-	-	<0.62	-	-	-	-	<0.53	<0.48	-	-	-	<2.5	-	-
	Xylenols	mg/kg			<0.4	<0.4	<0.4	<0.4	<0.3	<0.3	<0.4	<0.4	<0.3	<0.4	<0.4	<0.33	<0.3	<0.3	<0.4
Fungicides	Triadimefon	mg/kg		25000	-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
Herbicides	Pendimethalin	mg/kg		33000	-	-	<0.014	<0.013	-	<0.011	-	-	-	-	<0.013	-	-	-	-
	Triallate	mg/kg		15000	-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	Trifluralin	mg/kg		420	-	-	<0.014	<0.013	-	<0.011	-	-	-	-	<0.013	-	-	-	-
	Dichlobenil	mg/kg			-	-	<0.001	<0.001	-	<0.001	-	-	-	-	<0.001	-	-	-	-
	Pronamide	mg/kg		62000	-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
Pesticides	Isodrin	mg/kg			-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	cis-Permethrin	mg/kg			-	-	<0.004	<0.004	-	<0.003	-	-	-	-	<0.004	-	-	-	-
	Parathion	mg/kg		4900	-	-	<0.007	<0.006	-	<0.006	-	-	-	-	<0.006	-	-	-	-
	Pirimiphos-methyl	mg/kg		8200	-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	Permethrin	mg/kg		41000	-	-	<0.004	<0.004	-	<0.003	-	-	-	-	<0.004	-	-	-	-
	Pirimphos-ethyl	mg/kg			-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
Organochlorine Pesticides	Aldrin	mg/kg		170	-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	a-BHC	mg/kg		180	-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	b-BHC	mg/kg		65	-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	Chlordane (cis)	mg/kg			-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	Dieldrin	mg/kg		170	-	-	<0.007	<0.006	-	<0.006	-	-	-	-	<0.006	-	-	-	-
	Endosulfan I	mg/kg		7400	-	-	<0.001	<0.001	-	<0.001	-	-	-	-	<0.001	-	-	-	-
	Endosulfan II	mg/kg		7800	-	-	<0.014	<0.013	-	<0.011	-	-	-	-	<0.013	-	-	-	-
	Endosulfan sulphate	mg/kg			-	-	<0.007	<0.006	-	<0.006	-	-	-	-	<0.006	-	-	-	-
	Endrin	mg/kg		250	-	-	<0.004	<0.004	-	<0.003	-	-	-	-	<0.004	-	-	-	-
	Heptachlor	mg/kg		0.63	-	-	<0.004	<0.004	-	<0.003	-	-	-	-	<0.004	-	-	-	-
	Heptachlor epoxide	mg/kg		0.33	-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	o,p'-DDE	mg/kg			-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	2,4-DDT	mg/kg			-	-	<0.004	<0.004	-	<0.003	-	-	-	-	<0.004	-	-	-	-
	o,p-DDD	mg/kg			-	-	<0.007	<0.006	-	<0.006	-	-	-	-	<0.006	-	-	-	-
	4,4-DDE	mg/kg		9.3	-	-	<0.007	<0.006	-	<0.006	-	-	-	-	<0.006	-	-	-	-
	DDT	mg/kg		8.5	-	-	<0.007	<0.006	-	<0.006	-	-	-	-	<0.006	-	-	-	-
	Methoxychlor	mg/kg		4100	-	-	<0.007	<0.006	-	<0.006	-	-	-	-	<0.006	-	-	-	-
	DDD	mg/kg		9.6	-	-	<0.007	<0.006	-	<0.006	-	-	-	-	<0.006	-	-	-	-
	Chlordane (trans)	mg/kg			<0.003	-	<0.003	-	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	d-BHC	mg/kg			-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	Endrin ketone	mg/kg			-	-	<0.042	<0.039	-	<0.034	-	-	-	-	<0.038	-	-	-	-
Organophosphorous Pesticides	Azinphos Ethyl	mg/kg			-	-	<0.007	<0.006	-	<0.006	-	-	-	-	<0.006	-	-	-	-
	Azinophos methyl	mg/kg		2500	-	-	<0.007	<0.006	-	<0.006	-	-	-	-	<0.006	-	-	-	-
	Carbophenothion	mg/kg			-	-	<0.004	<0.004	-	<0.003	-	-	-	-	<0.004	-	-	-	-
	Chlorfenvinphos	mg/kg		570	-	-	<0.004	<0.004	-	<0.003	-	-	-	-	<0.004	-	-	-	-
	Chlorpyrifos	mg/kg		820	-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	Chlorpyrifos-methyl	mg/kg		8200	-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	Diazinon	mg/kg		570	-	-	<0.001	<0.001	-	<0.001	-	-	-	-	<0.001	-	-	-	-
	Dichlorvos	mg/kg		140	-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	Dimethoate	mg/kg		160	-	-	<0.004	<0.004	-	<0.003	-	-	-	-	<0.004	-	-	-	-
	Ethion	mg/kg		410	-	-	<0.004	<0.004	-	<0.003	-	-	-	-	<0.004	-	-	-	-
	Fenitrothion	mg/kg			-	-	<0.007	<0.006	-	<0.006	-	-	-	-	<0.006	-	-	-	-
	Fenthion	mg/kg			-	-	<0.014	<0.013	-	<0.011	-	-	-	-	<0.013	-	-	-	-
	Malathion	mg/kg		16000	-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
	Methyl parathion	mg/kg		210	-	-	<0	<0.013	-	<0.011	-	-	-	-	<0.013	-	-	-	-
	Mevinphos (Phosdrin)	mg/kg			-	-	<0.003	<0.003	-	<0.002	-	-	-	-	<0.003	-	-	-	-
PCBs	1,1-Biphenyl	mg/kg		33000	<0.1	-	<0.1	-	-	-	-	-	<0.1	-	-	-	<0.6	-	-
Amino Aliphatics	N-nitroso-n-propylamine	mg/kg		0.33	<1.1	-	<1.3	-	-	-	-	-	<1	-	-	-	<5.2	-	-
Amino Aromatics	n-Nitrosodiphenylamine	mg/kg		470	<0.1	-	<0.1	-	-	-	-	-	<0.1	-	-	-	<0.6	-	-
Anilines	2-nitroaniline	mg/kg		8000	<0.6	-	<0.7	-	-	-	-	-	<0.5	-	-	-	<2.9	-	-
	3-nitroaniline	mg/kg			<18.2	-	<20.5	-	-	-	-	-	<15.8	-	-	-	<84	-	-
	4-chloroaniline	mg/kg		11	<0.6	-	<0.7	-	-	-	-	-	<0.5	-	-	-	<2.9	-	-
	4-nitroaniline	mg/kg		110	<0.8	-	<0.8	-	-	-	-	-	<0.7	-	-	-	<3	-	-
Explosives	2,4-Dinitrotoluene	mg/kg		3700	<0.3	-	<0.3	-	-	-	-	-	<0.2	-	-	-	<1	-	-
	2,6-dinitrotoluene	mg/kg		1900	<0.6	-	<0.7	-	-	-	-	-	<0.5	-	-	-	<2.9	-	-
	Nitrobenzene	mg/kg		22	<0.6	-	<0.7	-	-	-	-	-	<0.5	-	-	-	<2.9	-	-
Halogenated Benzenes	1,2,3,4-tetrachlorobenzene	mg/kg		3080	-	-	<0.001	<0.001	-	<0.001	-	-	-	-	<0.001	-	-	-	-
	1,3,5-Trichlorobenzene	mg/kg		55	-	-	<0.001	<0.001	-	<0.001	-	-	-	-	<0.001	-	-	-	-
	Chlorobenzene	mg/kg		130	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	Bromobenzene	mg/kg		220	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	2-chlorotoluene	mg/kg		23000	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	4-chlorotoluene	mg/kg		23000	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,3-dichlorobenzene	mg/kg		73	<0.1	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,4-dichlorobenzene	mg/kg		10000	<0.1	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,2-dichlorobenzene	mg/kg		4800	<0.1	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,2,4-trichlorobenzene	mg/kg		530	<0.1	-	<0.004	<0.004	-	-	-	-	<0.003	-	<0.004	-	<0.003	-	-
	1,2,3-trichlorobenzene	mg/kg		250	-	-	<0.001	<0.001	-	<0.001	-	-	<0.003	-	<0.001	-	<0.003	-	-
	Hexachlorobenzene	mg/kg		120	<0.1	-	<0.003	<0.003	-	<0.002	-	-	<0.1	-	<0.003	-	<0.6	-	-
	Pentachlorobenzene	mg/kg		770	-	-	<0.001	<0.001	-	<0.001	-	-	-	-	<0.001	-	-	-	-
Halogenated Hydrocarbons	Dichlorodifluoromethane	mg/kg		370	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	Bromomethane	mg/kg		30	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	Trichlorofluoromethane	mg/kg		350000	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
	1,2-dibromoethane	mg/kg		0.16	-	-	<0.001	<0.001	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-
Halogenated Phenols	2-chlorophenol	mg/kg		5800	<0.1	-	<0.04	-	-	-	-	<0.04	<0.03	-	-	-	<0.17	-	-
	2,4-dichlorophenol	mg/kg		2500	<0.1	-	<0.03	-	-	-	-	<0.02	<0.02	-	-	-	<0.1	-	-
	2,4,5-trichlorophenol	mg/kg		82000	<0.1	-	<0.03	-	-	-	-	<0.02	<0.02	-	-	-	<0.1	-	-
	2,4,6-trichlorophenol	mg/kg		210	<0.1	-	<0.03	-	-	-	-	<0.02	<0.02	-	-	-	<0.1	-	-
	Pentachlorophenol	mg/kg		400	<0.6	-	<0.04	-	-	-	-	<0.04	<0.03	-	-	-	<0.17	-	-
Phthalates	Bis(2-ethylhexyl) phthalate	mg/kg		86000	<0.3	-	<0.3	-	-	-	-	-	<0.2	-	-	-	<1	-	-
	Butyl benzyl phthalate	mg/kg

Little Eaton Soils Chemistry
Analytical Results
A38 Derby Junctions
Highways England

Location_Code	BL09	BL10	BL11	BL12	BL13	BL13	BL13	TL01	TL01	TL02	TL02	TL03	TL04	TL05	TL05	TL06	TL07	TL07	TL08	TL08	WL01	WL03	WL04	WL05	WL06	WL06
Sample_Depth_Range	3	1	0.2	1	0.2	1	5.5	0.3	1	0.2	1	1	1	0.3	3	1	1	3	0.5	1	1	1	2.8	2.9	0.2	0.5
Sampled_Date_Time	29/07/2016	16/08/2016	16/08/2016	15/08/2016	29/07/2016	29/07/2016	29/07/2016	22/08/2016	22/08/2016	22/08/2016	22/08/2016	22/08/2016	22/08/2016	18/08/2016	18/08/2016	18/08/2016	18/08/2016	18/08/2016	18/08/2016	18/08/2016	15/09/2016	15/09/2016	15/09/2016	15/09/2016	15/09/2016	15/09/2016

Chem_Group	ChemName	output unit	EQL	GAC_HH_COM/IND_SLOAM_1.45-3.48%TOC																										
	Diphenyl ether	mg/kg			-	-	<0.1	-	-	-	<0.1	-	-	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-
	Methacriphos	mg/kg			-	-	<0.003	-	-	-	<0.002	-	-	<0.003	-	<0.003	<0.003	<0.003	-	-	-	-	<0.002	-	-	-	-	-	-	-
	Boron (Water Soluble)	mg/kg			<0.5	0.8	0.9	0.82	-	2	<0.5	-	1.3	1.3	-	1.1	1.3	2	1	0.6	0.7	<0.5	0.7	0.5	1.1	0.7	0.8	<0.5	1.4	0.7
	Chlorothalonil	mg/kg		740	-	-	<0.003	-	-	<0.003	-	<0.002	-	<0.003	-	<0.003	<0.003	<0.003	-	-	-	-	<0.002	-	-	-	-	-	-	-	-
	Permethrin II	mg/kg			-	-	<0.004	-	-	<0.004	-	<0.004	-	<0.004	-	<0.004	<0.004	<0.005	-	-	-	-	<0.004	-	-	-	-	-	-	-	-
	Tecnazene	mg/kg			-	-	<0.004	-	-	<0.004	-	<0.004	-	<0.004	-	<0.004	<0.004	<0.005	-	-	-	-	<0.004	-	-	-	-	-	-	-	-
	Etrimphos	mg/kg			-	-	<0.003	-	-	<0.003	-	<0.002	-	<0.003	-	<0.003	<0.003	<0.003	-	-	-	-	<0.002	-	-	-	-	-	-	-	-
	Propetamphos	mg/kg			-	-	<0.003	-	-	<0.003	-	<0.002	-	<0.003	-	<0.003	<0.003	<0.003	-	-	-	-	<0.002	-	-	-	-	-	-	-	-
TPH	>C5-C7	mg/kg			<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	-	<0.02	-	<0.01	-	<0.01	-	<0.01	-	-	-	-	-	-	<0.01	<0.01
	>C8-C44	mg/kg			<20	<20	<20	27.2	-	<20	<20	-	<25	-	-	<29	-	<20	-	<20	-	<20	-	-	-	-	-	-	371	90.4
	GRO >C5-C6	mg/kg			<0.2	<0.2	<0.3	<0.3	-	<0.3	<0.2	-	<0.3	-	-	<0.3	-	<0.3	-	<0.2	-	<0.3	-	-	-	-	-	-	<0.2	<0.2
	GRO >C5-C10	mg/kg			<0.2	<0.2	<0.3	<0.3	-	<0.3	<0.2	-	<0.3	-	-	<0.3	-	<0.3	-	<0.2	-	<0.3	-	-	-	-	-	-	<0.2	<0.2
	GRO >C6-C8	mg/kg			<0.2	<0.2	<0.3	<0.3	-	<0.3	<0.2	-	<0.3	-	-	<0.3	-	<0.3	-	<0.2	-	<0.3	-	-	-	-	-	-	<0.2	<0.2
	GRO >C7-C8	mg/kg			<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	-	-	<0.01	-	<0.02	-	<0.01	-	<0.01	-	-	-	-	-	-	<0.01	<0.01
	>C8-C10 Aliphatics	mg/kg		4800	<4	<4	<4	<5	-	<4	<4	-	<5	-	-	<6	-	<4	-	<4	-	<4	-	-	-	-	-	-	<4	<4
	>C10-C12 Aliphatics	mg/kg		23000	<4	<4	<4	<5	-	<4	<4	-	<5	-	-	<6	-	<4	-	<4	-	<4	-	-	-	-	-	-	<4	<4
	>C12-C16 Aliphatics	mg/kg		82000	<4	<4	<4	<5	-	<4	<4	-	<5	-	-	<6	-	<4	-	<4	-	<4	-	-	-	-	-	-	<4	<4
	>C16-C35 Aliphatics	mg/kg		1.7E6	<11.9	<11.9	<11.9	22.6	-	<11.9	<11.9	-	<14.9	-	-	<17.1	-	<11.9	-	<11.9	-	<11.9	-	-	-	-	-	-	324	79.3
	>C35-C44 Aliphatics	mg/kg		1.7E6	<5.62	<5.62	<5.62	<7.36	-	<5.62	<5.62	-	<7.06	-	-	<8.1	-	<5.62	-	<5.62	-	<5.62	-	-	-	-	-	-	44.3	8.95
	>EC8-EC10 Aromatics	mg/kg		8100	<4	<4	<4	<5	-	<4	<4	-	<5	-	-	<6	-	<4	-	<4	-	<4	-	-	-	-	-	-	<4	<4
	>EC10-EC12 Aromatics	mg/kg		28000	<4	<4	<4	<5	-	<4	<4	-	<5	-	-	<6	-	<4	-	<4	-	<4	-	-	-	-	-	-	<4	<4
	>EC12-EC16 Aromatics	mg/kg		37000	<4	<4	<4	<5	-	<4	<4	-	<5	-	-	<6	-	<4	-	<4	-	<4	-	-	-	-	-	-	<4	<4
	>EC16-EC21 Aromatics	mg/kg		28000	<4	<4	<4	<5	-	<4	<4	-	<5	-	-	<6	-	<4	-	<4	-	<4	-	-	-	-	-	-	14.6	11.5
	>EC21-EC35 Aromatics	mg/kg		28000	<8.76	<8.76	<8.76	<11.47	-	20.3	<8.76	-	<11.01	-	-	<12.62	-	<8.76	-	<8.76	-	<8.76	-	-	-	-	-	-	227	90.8
	>EC35-EC44 Aromatics	mg/kg		28000	<5.62	<5.62	<5.62	<7.36	-	<5.62	<5.62	-	<7.06	-	-	<8.1	-	<5.62	-	<5.62	-	<5.62	-	-	-	-	-	-	28.1	10.2
BTEX	Benzene	mg/kg		47	<0.001	<0.012	<0.001	<0.001	-	<0.013	<0.001	-	<0.013	-	-	<0.014	-	<0.015	-	<0.012	-	<0.013	-	-	-	-	-	-	<0.001	<0.001
	Toluene	mg/kg		110000	<0.005	<0.012	<0.006	<0.007	-	<0.013	<0.006	-	<0.013	-	-	<0.014	-	<0.015	-	<0.012	-	<0.013	-	-	-	-	-	-	<0.006	<0.005
	Ethylbenzene	mg/kg		13000	<0.002	<0.012	<0.003	<0.003	-	<0.013	<0.002	-	<0.013	-	-	<0.014	-	<0.015	-	<0.012	-	<0.013	-	-	-	-	-	-	<0.002	<0.002
	Xylene (m & p)	mg/kg			<0.004	-	<0.005	<0.005	-	-	<0.004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.005	<0.004
	Xylene Total	mg/kg		14000	<0.02	<0.025	<0.025	<0.026	-	<0.026	<0.021	-	<0.025	-	-	<0.029	-	<0.031	-	<0.023	-	<0.026	-	-	-	-	-	-	<0.023	<0.021
	Xylene (o)	mg/kg		15000	<0.002	-	<0.003	<0.003	-	-	<0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002
Oxygenates	MTBE	mg/kg		13000	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
Chlorinated Hydrocarbons	Chloromethane	mg/kg		1.2	<0.003	-	<0.004	<0.004	-	-	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003
	Vinyl chloride	mg/kg		0.077	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	Chloroethane	mg/kg		1300	<0.002	-	<0.003	<0.003	-	-	<0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	<0.002
	1,1-dichloroethene	mg/kg		450	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	trans-1,2-dichloroethene	mg/kg		40	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	1,1-dichloroethane	mg/kg		190	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	cis-1,2-dichloroethene	mg/kg		24	<0.005	-	<0.006	<0.007	-	-	<0.006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.006	<0.005
	Chloroform	mg/kg		170	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	1,1,1-trichloroethane	mg/kg		1300	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	Carbon tetrachloride	mg/kg		6.3	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	Trichloroethene	mg/kg		2.6	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	1,1,2-trichloroethane	mg/kg		190	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	Tetrachloroethene	mg/kg		42	<0.003	-	<0.004	<0.004	-	-	<0.003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.003	<0.003
VOC	2,2-dichloropropane	mg/kg			<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	Bromochloromethane	mg/kg		630	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	1,1-dichloropropene	mg/kg			<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	1,2-dichloroethane	mg/kg		0.97	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	1,2-dichloropropane	mg/kg		5.9	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	Dibromomethane	mg/kg		99	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	Bromodichloromethane	mg/kg		1.3	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	cis-1,3-dichloropropene	mg/kg			<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	trans-1,3-dichloropropene	mg/kg			<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	1,3-dichloropropane	mg/kg		23000	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	Chlorodibromomethane	mg/kg		39	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	1,1,1,2-tetrachloroethane	mg/kg		250	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	Styrene	mg/kg		6500	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	Bromoform	mg/kg		1500	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	Isopropylbenzene	mg/kg		3300	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	1,1,2,2-tetrachloroethane	mg/kg		550	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	1,2,3-trichloropropane	mg/kg		0.11	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	n-propylbenzene	mg/kg		9700	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	1,3,5-trimethylbenzene	mg/kg		12000	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	tert-butylbenzene	mg/kg		120000	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	1,2,4-trimethylbenzene	mg/kg		99	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	sec-butylbenzene	mg/kg		120000	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	p-isopropyltoluene	mg/kg			<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	n-butylbenzene	mg/kg		58000	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	1,2-dibromo-3-chloropropane	mg/kg		0.064	<0.001	-	<0.001	<0.001	-	-	<0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001
	Hexachlorobutadiene	mg/kg		66	<0.002	-	<0.003	<0.003	-	-	<0.002	-	-	<0.1	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	<0.002	<0.002
PAH	Naphthalene	mg/kg		460	<0.005	<0.1	<0.1 - 0.008	<0.007	-	<0.1	<0.006	-	<0.1	-	-	<0.1	<0.11	-	<0.1	<0.11	<0.09	<0.1	-	-	<0.1	-	-	-	-	0.016 - 0.2	<0.005
	Acenaphthylene	mg/kg		97000	<0.08	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	-	-	<0.1	<0.11	-	<0.1	<0.11	<0.09	<0.1	-	-	<0.1	-	-	-	-	<0.09	<0.09
	Acenaphthene	mg/kg		97000	<0.08	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	-	-	<0.1	<0.11	-	<0.1	<0.11	<0.09	<0.1	-	-	<0.1	-	-	-	-	<0.09	0.12
	Fluorene	mg/kg		68000	<0.08	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	-	-	<0.1	<0.11	-	<0.1	<0.11	<0.09	<0.1	-	-	<0.1	-	-	-	-	<0.09	<0.09
	Phenanthrene	mg/kg		22000	<0.08	<0.1	<0.1	0.12	-	0.5	<0.1	-	<0.1	-	-	<0.1	<0.11	-	<0.1	<0.11	<0.09	<0.1	-	-	<0.1	-	-	-	-	1.08	1.46
	Anthracene	mg/kg		540000	<0.08	<0.1	<0.1	<0.1	-	0.16	<0.1	-	<0.1	-	-	<0.1	<0.11	-	<0.1	<0.11	<0.09	<0.1	-	-	<0.1	-	-	-	-	0.41	0.44
	Fluoranthene	mg/kg		23000	<0.08	<0.1	<0.3 - 0.1	0.24	-	1.21	<0.2	-	<0.1	-	-	<0.3	<0.11	-	<0.1	<0.09	<0.1	-	-	<0.2	-	-	-	-	2.55	2.87
	Pyrene	mg/kg		54000	<0.08	<0.1	<0.1	0.2	-	1	<0.2	-	<0.1	-	-	<0.3	<0.11	-	<0.1	<0.09	<0.1	-	-	<0.2	-	-	-	-	2.06	2.41
	Benz(a)anthracene	mg/kg		170	<0.08	<0.1	<0.1	0.14	-	0.5	<0.2	-	<0.1	-	-	<0.3	<0.11	-	<0.1	<0.09	<0.1	-	-	<0.2	-	-	-	-	1.18	1.43
	Chrysene	mg/kg		350	<0.08	<0.1	<0.1	0.1	-	0.55	<0.2	-	<0.1	-	-	<0.3	<0.11	-	<0.1	<0.09	<0.1	-	-	<0.2	-	-	-	-	1.09	1.26
	Benzo(a) pyrene	mg/kg		35	<0.08	<0.1	<0.1	0.12	-	0.45	<0.2	-	<0.1	-	-	<0.3	<0.11	-	<0.1	<0.09	<0.1	-	-	<0.2	-	-	-	-	1.08	1.46
	Indeno(1,2,3-c,d)pyrene	mg/kg		510	<0.08	<0.1	<0.1	<0.1	-	0.41	<0.5	-	<0.1	-	-	<0.7	<0.11	-	<0.1	<0.09	<0.1	-	-	<0.6	-	-	-	-	1.08	1.19
	Dibenz(a,h)anthracene	mg/kg		3.6	<0.08	<0.1	<0.1	<0.1	-	<0.1	<0.5	-	<0.1	-	-	<0.7	<0.11	-	<0.1	<0.09	<0.1	-	-	<0.6	-	-	-	-	0.17	0.18
	Benzo(g,h,i)perylene	mg/kg		4000	<0.08	<0.1	<0.1	<0.1	-	0.43	<0.5	-	<0.1	-	-	<0.7	<0.11	-	<0.1	<0.09	<0.1	-	-	<0.6	-	-	-	-	1.24	1.15
	Benzo(b)fluoranthene	mg/kg		44	<0.08	<0.1	<0.1	0.2	-	0.75	<0.2	-	<0.1	-	-	<0.3	<0.11	-	<0.1	<0.09	<0.1	-	-	<0.2	-	-	-	-	1.8	1.97
	Benzo(k)fluoranthene	mg/kg		1200	<0.08	<0.1	<0.1	<0.1	-	0.28	<0.2	-	<0.1	-	-	<0.3	<0.11	-	<0.1	<0.09	<0.1	-	-	<0.2	-	-	-	-	0.68	0.84
	PAH 16 Total	mg/kg			<1.3	<1.58	<1.6	<2.08	-	<6.76	-	-	<1.61	-	-	-	-	<1.75	-	<1.58	<1.5	<1.52	-	-	-	-	-	-	<14.91	<17
SVOC	Coronene	mg/kg			-	-	<0.4	-	-	-	<0.3	-	-	-	-	<0.4	-	-	-	-	-	-	<0.4	-	-	-	-	-	-	-	-
	2-methylnaphthalene	mg/kg		3000	-	-	<0.1	-	-	-	<0.1	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
	4-bromophenyl phenyl ether	mg/kg			-	-	<0.1	-	-	-	<0.1	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
	4-chlorophenyl phenyl ether	mg/kg			-	-	<0.1	-	-	-	<0.1	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
	Bis(2-chloroethoxy) methane	mg/kg		2500	-	-	<0.1	-	-	-	<0.1	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
	Bis(2-chloroethyl)ether	mg/kg		1	-	-	<0.1	-	-	-	<0.1	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
	Dibenzofuran	mg/kg		1000	-	-	<0.1	-	-	-	<0.1	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
	Hexachlorocyclopentadiene	mg/kg		7.5	-	-	<0.1	-	-	-	<0.1	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
	Hexachloroethane	mg/kg		53	-	-	<0.1	-	-	-	<0.1	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
	1-Methylnaphthalene	mg/kg		73	-	-	<0.1	-	-	-	<0.1	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
	3,3-Dichlorobenzidine	mg/kg		5.1	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Benzoic Acid	mg/kg		3.3E6	-	-	<0.6	-	-	-	<0.5	-	-	-	-	<0.7	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-
	Benzyl alcohol	mg/kg		82000	-	-	<0.6	-	-	-	<0.5	-	-	-	-	<0.7	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-
	Bis(2-chloroisopropyl) ether	mg/kg		47000	-	-	<0.6	-	-	-	<0.5	-	-	-	-	<0.7	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-
Phenolics	Trimethylphenols	mg/kg			<0.3	<0.4	<0.4	<0.39	-	<0.4	<0.3	-	<0.4	<0.4	-	<0.4	<0.4	<0.5	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.3	<0.3	<0.3
	2-methylphenol	mg/kg		9.9900000000003E11	<0.03	-	<0.04	<0.04	-	<0.04	<0.1	-	<0.04	-	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2-nitrophenol	mg/kg			<0.03	-	<0.04	<0.04	-	<0.04	<0.1	-	<0.04	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
	2,4-dimethylphenol	mg/kg		24000	<0.02	-	<0.03	<0.03	-	<0.03	<0.1	-	<0.03	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
	4-chloro-3-methylphenol	mg/kg		82000	<0.03	-	<0.04	<0.04	-	<0.04	<0.1	-	<0.04	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
	4-nitrophenol	mg/kg			<0.06	-	<0.08	<0.08	-	<0.08	<0.5	-	<0.08	-	-	<0.7	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-
	Phenol	mg/kg		690	<0.03	<0.4	<0.04	<0.04	-	<0.04	<0.1	-	<0.04	<0.4	-	<0.1	<0.4	<0.5	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.3	<0.011	<0.011
	2-chloronaphthalene	mg/kg		960	-	-	<0.1	-	-	-	<0.1	-	-	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
	2,4-dinitrophenol	mg/kg		1600	<0.04	-	<0.05	<0.05	-	<0.05	<0.5	-	<0.05	-	-	<0.7	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-
	3-&4-methylphenol	mg/kg			<0.02	-	<0.03	<0.03	-	<0.03	<0.1	-	<0.03	-	-	<0.1	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
	4,6-Dinitro-2-methylphenol	mg/kg		66	<0.03	-	<0.04	<0.04	-	<0.04	<0.2	-	<0.04	-	-	<0.3	-	-	-	-	-	-	<0.3	-	-	-	-	-	-	-	-
	4-chlorophenol	mg/kg			<0.03	-	<0.04	<0.04	-	<0.04	<0.5	-	<0.04	-	-	<0.7	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-
	Phenols	mg/kg			<1.2	<1.5	<1.5	<1.57	-	<1.6	<1.3	-	<1.5	<1.6	-	<1.7	<1.6	<1.8	<1.5	<1.4	<1.4	<1.5	<1.4	<1.4	<1.5	<1.4	<1.5	<1.4	<1.4	<1.3
	Cresols by HPLC (W)	mg/kg			<0.3	<0.4	<0.4	<0.39	-	<0.4	<0.3	-	<0.4	<0.4	-	<0.4	<0.4	<0.5	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.3	<0.3	<0.3
	Phenols Total by MS Moisture Corrected	mg/kg			<0.45	-	<0.56	<0.58	-	<0.58	-	-	<0.55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Xylenols	mg/kg			<0.3	<0.4	<0.4	<0.39	-	<0.4	<0.3	-	<0.4	<0.4	-	<0.4	<0.4	<0.5	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.3	<0.3	<0.3
Fungicides	Triadimefon	mg/kg		25000	-	-	<0.003	-	-	<0.003	-	<0.002	-	<0.003	-	<0.003	<0.003	<0.003	-	-	-	-	<0.002	-	-	-	-	-	-	-	-
Herbicides	Pendimethalin	mg/kg		33000	-	-	<0.013	-	-	<0.013	-	<0.012	-	<0.013	-	<0.014	<0.014	<0.015	-	-	-	-	<0.012	-	-	-	-	-	-	-	-
	Trialiate	mg/kg		15000	-	-	<0.003	-	-	<0.003	-	<0.002	-	<0.003	-	<0.003	<0.003	<0.003	-	-	-	-	<0.002	-	-	-	-	-	-	-	-
	Trifluralin	mg/kg		420	-	-	<0.013	-	-	<0.013	-	<0.012	-	<0.013	-	<0.014	<0.014	<0.015	-	-	-	-	<0.012	-	-	-	-	-	-	-	-
	Dichlobenil	mg/kg			-	-	<0.001	-	-	<0.001	-	<0.001	-	<0.001	-	<0.001	<0.001	<0.002	-	-	-	-	<0.001	-	-	-	-	-	-	-	-
	Pronamide	mg/kg		62000	-	-	<0.003	-	-	<0.003	-	<0.002	-	<0.003	-	<0.003	<0.003	<0.003	-	-	-	-	<0.002	-	-	-	-	-	-	-	-
Pesticides	Isodrin	mg/kg			-	-	<0.003	-	-	<0.003	-	<0.002	-	<0.003	-	<0.003	<0.003	<0.003	-	-	-	-	<0.002	-	-	-	-	-	-	-	-
	cis-Permethrin	mg/kg			-	-	<0.004	-	-	<0.004	-	<0.004	-	<0.004	-	<0.004	<0.004	<0.005	-	-	-	-	<0.004	-	-	-	-	-	-	-	-
	Parathion	mg/kg		4900	-	-	<0.006	-	-	<0.007	-	<0.006	-	<0.007	-	<0.007	<0.007	<0.008	-	-	-	-	<0.006	-	-	-	-	-	-	-	-
	Pirimiphos-methyl	mg/kg		8200	-	-	<0.003	-	-	<0.003	-	<0.002	-	<0.003	-	<0.003	<0.003	<0.003	-	-	-	-	<0.002	-	-	-	-	-	-	-	-
	Permethrin	mg/kg		41000	-	-	<0.004	-	-	<0.004	-	<0.004	-	<0.004	-	<0.004	<0.004	<0.005	-	-	-	-	<0.004	-	-	-	-	-	-	-	-
	Pirimphos-ethyl	mg/kg			-	-	<0.003	-	-	<0.003	-	<0.002	-	<0.003	-	<0.003	<0.003	<0.003	-	-	-	-	<0.002	-	-	-	-	-	-	-	-
Organochlorine Pesticides	Aldrin	mg/kg		170	-	-	<0.003	-	-	<0.003	-	<0.002	-	<0.003	-	<0.003	<0.003	<0.003	-	-	-	-	<0.002	-	-	-	-	-	-	-	-
	a-BHC	mg/kg		180	-	-	<0.003	-	-	<0.003	-	<0.002	-	<0.003	-	<0.003	<0.003	<0.003	-	-	-	-	<0.002	-	-	-	-	-	-	-	-
	b-BHC	mg/kg		65	-	-	<0.003	-	-	<0.003	-	<0.002	-	<0.003	-	<0.003	<0.003	<0.003	-	-	-	-	<0.002	-	-	-	-	-	-	-	-
	Chlordane (cis)	mg/kg			-	-	<0.003	-	-	<0.003	-	<0.002	-	<0.003	-	<0.003	<0.003	<0.003	-	-	-	-	<0.002	-	-	-	-	-	-	-	-
	Dieldrin	mg/kg		170	-	-	<0.006	-	-	<0.007	-	<0.006

Little Eaton Soils Chemistry
Analytical Results
A38 Derby Junctions
Highways England

Location_Code	WL09	WL11	WL12	WL13
Sample_Depth_Range	0.2	0.5	0.5	0.5
Sampled_Date_Time	15/09/2016	14/09/2016	14/09/2016	14/09/2016

Statistical Summary

Chem_Group	ChemName	output unit	EQL	GAC_HH_COMIND_SLOAM_1.45-3.48%TOC					Number of	Number of	Minimum	Minimum	Maximum	Maximum	Average	Median	Standard	Number of	Number of
	Diphenyl ether	mg/kg			-	-	-	-	8	0	<0.1	ND	<0.6	ND	0.081	0.05	0.088	0	0
	Methacriphos	mg/kg			-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	Boron (Water Soluble)	mg/kg			1.6	1.2	1.5	1.2	42	36	<0.5	0.5	2.7	2.7	1.1	1	0.6	0	0
	Chlorothalonil	mg/kg		740	-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	Permethrin II	mg/kg			-	-	-	-	12	0	<0.003	ND	<0.005	ND	0.002	0.002	0.00021	0	0
	Tecnazene	mg/kg			-	-	-	-	12	0	<0.003	ND	<0.005	ND	0.002	0.002	0.00021	0	0
	Etrimphos	mg/kg			-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	Propetamphos	mg/kg			-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
TPH	>C5-C7	mg/kg			-	-	-	-	21	0	<0.01	ND	<0.02	ND	0.0052	0.005	0.0011	0	0
	>C8-C44	mg/kg			-	-	-	-	21	7	<20	21	371	371	39	10.2	81	0	0
	GRO >C5-C6	mg/kg			-	-	-	-	21	0	<0.2	ND	<0.3	ND	0.12	0.1	0.025	0	0
	GRO >C5-C10	mg/kg			-	-	-	-	21	0	<0.2	ND	<0.3	ND	0.12	0.1	0.025	0	0
	GRO >C6-C8	mg/kg			-	-	-	-	21	0	<0.2	ND	<0.3	ND	0.12	0.1	0.025	0	0
	GRO >C7-C8	mg/kg			-	-	-	-	21	0	<0.01	ND	<0.02	ND	0.0052	0.005	0.0011	0	0
	>C8-C10 Aliphatics	mg/kg		4800	-	-	-	-	21	0	<4	ND	<6	ND	2.1	2	0.27	0	0
	>C10-C12 Aliphatics	mg/kg		23000	-	-	-	-	21	0	<4	ND	<6	ND	2.1	2	0.27	0	0
	>C12-C16 Aliphatics	mg/kg		82000	-	-	-	-	21	3	<4	5.32	<6	5.8	2.6	2	1.3	0	0
	>C16-C35 Aliphatics	mg/kg		1.7E6	-	-	-	-	21	7	<11.9	17.9	324	324	32	6.05	71	0	0
	>C35-C44 Aliphatics	mg/kg		1.7E6	-	-	-	-	21	3	<5.62	8.95	44.3	44.3	6.4	2.81	10	0	0
	>EC8-EC10 Aromatics	mg/kg		8100	-	-	-	-	21	0	<4	ND	<6	ND	2.1	2	0.27	0	0
	>EC10-EC12 Aromatics	mg/kg		28000	-	-	-	-	21	0	<4	ND	<6	ND	2.1	2	0.27	0	0
	>EC12-EC16 Aromatics	mg/kg		37000	-	-	-	-	21	2	<4	4.39	<6	5.33	2.4	2	0.88	0	0
	>EC16-EC21 Aromatics	mg/kg		28000	-	-	-	-	21	6	<4	4.57	27.6	27.6	5.1	2	6.4	0	0
	>EC21-EC35 Aromatics	mg/kg		28000	-	-	-	-	21	7	<8.76	19.8	235	235	37	5.505	69	0	0
	>EC35-EC44 Aromatics	mg/kg		28000	-	-	-	-	21	3	<5.62	10.2	130	130	11	2.81	28	0	0
BTEX	Benzene	mg/kg		47	-	-	-	-	24	0	<0.001	ND	<0.015	ND	0.0037	0.0055	0.003	0	0
	Toluene	mg/kg		110000	-	-	-	-	24	0	<0.005	ND	<0.015	ND	0.0048	0.0055	0.0018	0	0
	Ethylbenzene	mg/kg		13000	-	-	-	-	24	0	<0.002	ND	<0.015	ND	0.004	0.0055	0.0026	0	0
	Xylene (m & p)	mg/kg			-	-	-	-	11	0	<0.004	ND	<0.006	ND	0.0024	0.0025	0.00032	0	0
	Xylene Total	mg/kg		14000	-	-	-	-	21	0	<0.02	ND	<0.031	ND	0.012	0.012	0.0013	0	0
	Xylene (o)	mg/kg		15000	-	-	-	-	11	0	<0.002	ND	<0.003	ND	0.0012	0.001	0.00026	0	0
Oxygenates	MTBE	mg/kg		13000	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
Chlorinated Hydrocarbons	Chloromethane	mg/kg		1.2	-	-	-	-	11	0	<0.003	ND	<0.004	ND	0.0017	0.0015	0.00026	0	0
	Vinyl chloride	mg/kg		0.077	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	Chloroethane	mg/kg		1300	-	-	-	-	11	0	<0.002	ND	<0.003	ND	0.0012	0.001	0.00026	0	0
	1,1-dichloroethene	mg/kg		450	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	trans-1,2-dichloroethene	mg/kg		40	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	1,1-dichloroethane	mg/kg		190	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	cis-1,2-dichloroethene	mg/kg		24	-	-	-	-	11	0	<0.005	ND	<0.007	ND	0.003	0.003	0.00035	0	0
	Chloroform	mg/kg		170	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	1,1,1-trichloroethane	mg/kg		1300	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	Carbon tetrachloride	mg/kg		6.3	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	Trichloroethene	mg/kg		2.6	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	1,1,2-trichloroethane	mg/kg		190	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	Tetrachloroethene	mg/kg		42	-	-	-	-	11	0	<0.003	ND	<0.004	ND	0.0017	0.0015	0.00026	0	0
VOC	2,2-dichloropropane	mg/kg			-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	Bromochloromethane	mg/kg		630	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	1,1-dichloropropene	mg/kg			-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	1,2-dichloroethane	mg/kg		0.97	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	1,2-dichloropropane	mg/kg		5.9	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	Dibromomethane	mg/kg		99	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	Bromodichloromethane	mg/kg		1.3	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	cis-1,3-dichloropropene	mg/kg			-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	trans-1,3-dichloropropene	mg/kg			-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	1,3-dichloropropane	mg/kg		23000	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	Chlorodibromomethane	mg/kg		39	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	1,1,1,2-tetrachloroethane	mg/kg		250	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	Styrene	mg/kg		6500	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	Bromoform	mg/kg		1500	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	Isopropylbenzene	mg/kg		3300	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	1,1,2,2-tetrachloroethane	mg/kg		550	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	1,2,3-trichloropropane	mg/kg		0.11	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	n-propylbenzene	mg/kg		9700	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	1,3,5-trimethylbenzene	mg/kg		12000	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	tert-butylbenzene	mg/kg		120000	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	1,2,4-trimethylbenzene	mg/kg		99	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	sec-butylbenzene	mg/kg		120000	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	p-isopropyltoluene	mg/kg			-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	n-butylbenzene	mg/kg		58000	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	1,2-dibromo-3-chloropropane	mg/kg		0.064	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	Hexachlorobutadiene	mg/kg		66	-	-	-	-	14	0	<0.002	ND	<0.1	ND	0.012	0.0015	0.021	0	0
PAH	Naphthalene	mg/kg		460	-	-	-	-	27	5	<0.005	0.016	0.49	0.49	0.059	0.05	0.067	0	0
	Acenaphthylene	mg/kg		97000	-	-	-	-	25	3	<0.08	0.18	0.7	0.7	0.077	0.05	0.1	0	0
	Acenaphthene	mg/kg		97000	-	-	-	-	25	2	<0.08	0.12	2.4	2.4	0.11	0.05	0.28	0	0
	Fluorene	mg/kg		68000	-	-	-	-	25	1	<0.08	0.37	2.1	2.1	0.096	0.05	0.24	0	0
	Phenanthrene	mg/kg		22000	-	-	-	-	25	7	<0.08	0.1	18.7	18.7	0.65	0.05	2.3	0	0
	Anthracene	mg/kg		540000	-	-	-	-	25	5	<0.08	0.16	6.4	6.4	0.25	0.05	0.77	0	0
	Fluoranthene	mg/kg		23000	-	-	-	-	25	8	<0.08	0.24	19.8	19.8	0.98	0.055	2.9	0	0
	Pyrene	mg/kg		54000	-	-	-	-	25	7	<0.08	0.2	17	17	0.84	0.05	2.5	0	0
	Benz(a)anthracene	mg/kg		170	-	-	-	-	25	6	<0.08	0.14	9.7	9.7	0.51	0.05	1.4	0	0
	Chrysene	mg/kg		350	-	-	-	-	25	6	<0.08	0.1	8.7	8.7	0.48	0.05	1.3	0	0
	Benzo(a) pyrene	mg/kg		35	-	-	-	-	25	7	<0.08	0.09	8.2	8.2	0.51	0.055	1.5	0	0
	Indeno(1,2,3-c,d)pyrene	mg/kg		510	-	-	-	-	25	6	<0.08	0.1	7.2	7.2	0.47	0.05	1.2	0	0
	Dibenz(a,h)anthracene	mg/kg		3.6	-	-	-	-	25	5	<0.08	0.1	0.8	0.8	0.16	0.05	0.23	0	0
	Benzo(g,h,i)perylene	mg/kg		4000	-	-	-	-	25	5	<0.08	0.43	5.6	5.6	0.42	0.05	0.96	0	0
	Benzo(b)fluoranthene	mg/kg		44	-	-	-	-	25	7	<0.08	0.2	10.1	10.1	0.65	0.05	1.8	0	0
	Benzo(k)fluoranthene	mg/kg		1200	-	-	-	-	25	6	<0.08	0.09	4.1	4.1	0.29	0.05	0.69	0	0
	PAH 16 Total	mg/kg			-	-	-	-	20	1	<1.3	58.97	58.97	58.97	4.8	0.8025	13	0	0
SVOC	Coronene	mg/kg			-	-	-	-	8	0	<0.3	ND	<1.7	ND	0.27	0.2	0.24	0	0
	2-methylnaphthalene	mg/kg		3000	-	-	-	-	8	0	<0.1	ND	<0.6	ND	0.081	0.05	0.088	0	0
	4-bromophenyl phenyl ether	mg/kg			-	-	-	-	8	0	<0.1	ND	<0.6	ND	0.081	0.05	0.088	0	0
	4-chlorophenyl phenyl ether	mg/kg			-	-	-	-	8	0	<0.1	ND	<0.6	ND	0.081	0.05	0.088	0	0
	Bis(2-chloroethoxy) methane	mg/kg		2500	-	-	-	-	8	0	<0.1	ND	<0.6	ND	0.081	0.05	0.088	0	0
	Bis(2-chloroethyl)ether	mg/kg		1	-	-	-	-	8	0	<0.1	ND	<0.6	ND	0.081	0.05	0.088	0	0
	Dibenzofuran	mg/kg		1000	-	-	-	-	8	1	<0.1	1.5	1.5	1.5	0.23	0.05	0.51	0	0
	Hexachlorocyclopentadiene	mg/kg		7.5	-	-	-	-	8	0	<0.1	ND	<0.6	ND	0.081	0.05	0.088	0	0
	Hexachloroethane	mg/kg		53	-	-	-	-	8	0	<0.1	ND	<0.6	ND	0.081	0.05	0.088	0	0
	1-Methylnaphthalene	mg/kg		73	-	-	-	-	8	0	<0.1	ND	<0.6	ND	0.081	0.05	0.088	0	0
	3,3-Dichlorobenzidine	mg/kg		5.1	-	-	-	-	2	0	<0.5	ND	<0.5	ND		0.25		0	0
	Benzoic Acid	mg/kg		3.3E6	-	-	-	-	8	0	<0.5	ND	<2.9	ND	0.44	0.3	0.41	0	0
	Benzyl alcohol	mg/kg		82000	-	-	-	-	8	0	<0.5	ND	<2.9	ND	0.44	0.3	0.41	0	0
	Bis(2-chloroisopropyl) ether	mg/kg		47000	-	-	-	-	8	0	<0.5	ND	<2.9	ND	0.44	0.3	0.41	0	0
Phenolics	Trimethylphenols	mg/kg			<0.3	<0.3	<0.3	<0.3	42	0	<0.3	ND	<0.5	ND	0.18	0.2	0.026	0	0
	2-methylphenol	mg/kg		9.9900000000003E11	-	-	-	-	13	0	<0.03	ND	<0.17	ND	0.033	0.02	0.021	0	0
	2-nitrophenol	mg/kg			-	-	-	-	13	0	<0.03	ND	<0.17	ND	0.033	0.02	0.021	0	0
	2,4-dimethylphenol	mg/kg		24000	-	-	-	-	13	0	<0.02	ND	<0.1	ND	0.027	0.015	0.019	0	0
	4-chloro-3-methylphenol	mg/kg		82000	-	-	-	-	13	0	<0.03	ND	<0.17	ND	0.033	0.02	0.021	0	0
	4-nitrophenol	mg/kg			-	-	-	-	13	0	<0.06	ND	<0.7	ND	0.13	0.04	0.13	0	0
	Phenol	mg/kg		690	<0.3	<0.3	<0.3	<0.3	42	0	<0.011	ND	<0.5	ND	0.13	0.15	0.08	0	0
	2-chloronaphthalene	mg/kg		960	-	-	-	-	8	0	<0.1	ND	<0.6	ND	0.081	0.05	0.088	0	0
	2,4-dinitrophenol	mg/kg		1600	-	-	-	-	13	0	<0.04	ND	<0.7	ND	0.12	0.025	0.13	0	0
	3-&4-methylphenol	mg/kg			-	-	-	-	13	0	<0.02	ND	<0.1	ND	0.027	0.015	0.019	0	0
	4,6-Dinitro-2-methylphenol	mg/kg		66	-	-	-	-	13	0	<0.03	ND	<0.3	ND	0.057	0.02	0.053	0	0
	4-chlorophenol	mg/kg			-	-	-	-	13	0	<0.03	ND	<0.7	ND	0.11	0.02	0.13	0	0
	Phenols	mg/kg			<1.3	<1.3	<1.3	<1.3	42	0	<1.2	ND	<1.8	ND	0.73	0.725	0.065	0	0
	Cresols by HPLC (W)	mg/kg			<0.3	<0.3	<0.3	<0.3	42	0	<0.3	ND	<0.5	ND	0.18	0.2	0.026	0	0
	Phenols Total by MS Moisture Corrected	mg/kg			-	-	-	-	9	0	<0.45	ND	<2.5	ND	0.38	0.28	0.33	0	0
	Xylenols	mg/kg			<0.3	<0.3	<0.3	<0.3	42	0	<0.3	ND	<0.5	ND	0.18	0.2	0.026	0	0
Fungicides	Triadimefon	mg/kg		25000	-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
Herbicides	Pendimethalin	mg/kg		33000	-	-	-	-	12	0	<0.011	ND	<0.015	ND	0.0065	0.0065	0.00054	0	0
	Triallate	mg/kg		15000	-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	Trifluralin	mg/kg		420	-	-	-	-	12	0	<0.011	ND	<0.015	ND	0.0065	0.0065	0.00054	0	0
	Dichlobenil	mg/kg			-	-	-	-	12	0	<0.001	ND	<0.002	ND	0.00054	0.0005	0.00014	0	0
	Pronamide	mg/kg		62000	-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
Pesticides	Isodrin	mg/kg			-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	cis-Permethrin	mg/kg			-	-	-	-	12	0	<0.003	ND	<0.005	ND	0.002	0.002	0.00021	0	0
	Parathion	mg/kg		4900	-	-	-	-	12	0	<0.006	ND	<0.008	ND	0.0033	0.00325	0.00033	0	0
	Pirimiphos-methyl	mg/kg		8200	-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	Permethrin	mg/kg		41000	-	-	-	-	12	0	<0.003	ND	<0.005	ND	0.002	0.002	0.00021	0	0
	Pirimphos-ethyl	mg/kg			-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
Organochlorine Pesticides	Aldrin	mg/kg		170	-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	a-BHC	mg/kg		180	-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	b-BHC	mg/kg		65	-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	Chlordane (cis)	mg/kg			-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	Dieldrin	mg/kg		170	-	-	-	-	12	0	<0.006	ND	<0.008	ND	0.0033	0.00325	0.00033	0	0
	Endosulfan I	mg/kg		7400	-	-	-	-	12	0	<0.001	ND	<0.002	ND	0.00054	0.0005	0.00014	0	0
	Endosulfan II	mg/kg		7800	-	-	-	-	12	0	<0.011	ND	<0.015	ND	0.0065	0.0065	0.00054	0	0
	Endosulfan sulphate	mg/kg			-	-	-	-	12	0	<0.006	ND	<0.008	ND	0.0033	0.00325	0.00033	0	0
	Endrin	mg/kg		250	-	-	-	-	12	0	<0.003	ND	<0.005	ND	0.002	0.002	0.00021	0	0
	Heptachlor	mg/kg		0.63	-	-	-	-	12	0	<0.003	ND	<0.005	ND	0.002	0.002	0.00021	0	0
	Heptachlor epoxide	mg/kg		0.33	-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	o,p'-DDE	mg/kg			-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	2,4-DDT	mg/kg			-	-	-	-	12	0	<0.003	ND	<0.005	ND	0.002	0.002	0.00021	0	0
	o,p-DDD	mg/kg			-	-	-	-	12	0	<0.006	ND	<0.008	ND	0.0033	0.00325	0.00033	0	0
	4,4-DDE	mg/kg		9.3	-	-	-	-	12	0	<0.006	ND	<0.008	ND	0.0033	0.00325	0.00033	0	0
	DDT	mg/kg		8.5	-	-	-	-	12	0	<0.006	ND	<0.008	ND	0.0033	0.00325	0.00033	0	0
	Methoxychlor	mg/kg		4100	-	-	-	-	12	0	<0.006	ND	<0.008	ND	0.0033	0.00325	0.00033	0	0
	DDD	mg/kg		9.6	-	-	-	-	12	0	<0.006	ND	<0.008	ND	0.0033	0.00325	0.00033	0	0
	Chlordane (trans)	mg/kg			-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	d-BHC	mg/kg			-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	Endrin ketone	mg/kg			-	-	-	-	12	0	<0.034	ND	<0.046	ND	0.02	0.0195	0.0017	0	0
Organophosphorous Pesticides	Azinphos Ethyl	mg/kg			-	-	-	-	12	0	<0.006	ND	<0.008	ND	0.0033	0.00325	0.00033	0	0
	Azinophos methyl	mg/kg		2500	-	-	-	-	12	0	<0.006	ND	<0.008	ND	0.0033	0.00325	0.00033	0	0
	Carbophenothion	mg/kg			-	-	-	-	12	0	<0.003	ND	<0.005	ND	0.002	0.002	0.00021	0	0
	Chlorfenvinphos	mg/kg		570	-	-	-	-	12	0	<0.003	ND	<0.005	ND	0.002	0.002	0.00021	0	0
	Chlorpyrifos	mg/kg		820	-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	Chlorpyrifos-methyl	mg/kg		8200	-	-	-	-	12	0	<0	ND	<0.003	ND	0.00083	0.00125	0.00075	0	0
	Diazinon	mg/kg		570	-	-	-	-	12	0	<0.001	ND	<0.002	ND	0.00054	0.0005	0.00014	0	0
	Dichlorvos	mg/kg		140	-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	Dimethoate	mg/kg		160	-	-	-	-	12	0	<0.003	ND	<0.005	ND	0.002	0.002	0.00021	0	0
	Ethion	mg/kg		410	-	-	-	-	12	0	<0.003	ND	<0.005	ND	0.002	0.002	0.00021	0	0
	Fenitrothion	mg/kg			-	-	-	-	12	0	<0.006	ND	<0.008	ND	0.0033	0.00325	0.00033	0	0
	Fenthion	mg/kg			-	-	-	-	12	0	<0.011	ND	<0.015	ND	0.0065	0.0065	0.00054	0	0
	Malathion	mg/kg		16000	-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
	Methyl parathion	mg/kg		210	-	-	-	-	12	0	<0	ND	<0.014	ND	0.0027	0	0.0033	0	0
	Mevinphos (Phosdrin)	mg/kg			-	-	-	-	12	0	<0.002	ND	<0.003	ND	0.0014	0.0015	0.00023	0	0
PCBs	1,1-Biphenyl	mg/kg		33000	-	-	-	-	8	0	<0.1	ND	<0.6	ND	0.081	0.05	0.088	0	0
Amino Aliphatics	N-nitroso-n-propylamine	mg/kg		0.33	-	-	-	-	8	0	<0.9	ND	<5.2	ND	0.81	0.55	0.73	8	0
Amino Aromatics	n-Nitrosodiphenylamine	mg/kg		470	-	-	-	-	8	0	<0.1	ND	<0.6	ND	0.081	0.05	0.088	0	0
Anilines	2-nitroaniline	mg/kg		8000	-	-	-	-	8	0	<0.5	ND	<2.9	ND	0.44	0.3	0.41	0	0
	3-nitroaniline	mg/kg			-	-	-	-	8	0	<15.3	ND	<84	ND	13	9.125	12	0	0
	4-chloroaniline	mg/kg		11	-	-	-	-	8	0	<0.5	ND	<2.9	ND	0.44	0.3	0.41	0	0
	4-nitroaniline	mg/kg		110	-	-	-	-	8	0	<0.6	ND	<3	ND	0.52	0.4	0.4	0	0
Explosives	2,4-Dinitrotoluene	mg/kg		3700	-	-	-	-	8	0	<0.2	ND	<1	ND	0.18	0.15	0.13	0	0
	2,6-dinitrotoluene	mg/kg		1900	-	-	-	-	8	0	<0.5	ND	<2.9	ND	0.44	0.3	0.41	0	0
	Nitrobenzene	mg/kg		22	-	-	-	-	8	0	<0.5	ND	<2.9	ND	0.44	0.3	0.41	0	0
Halogenated Benzenes	1,2,3,4-tetrachlorobenzene	mg/kg		3080	-	-	-	-	12	0	<0.001	ND	<0.002	ND	0.00054	0.0005	0.00014	0	0
	1,3,5-Trichlorobenzene	mg/kg		55	-	-	-	-	12	0	<0.001	ND	<0.002	ND	0.00054	0.0005	0.00014	0	0
	Chlorobenzene	mg/kg		130	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	Bromobenzene	mg/kg		220	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0	0
	2-chlorotoluene	mg/kg		23000	-	-	-	-	11	0	<0.001	ND	<0.001	ND	0.0005	0.0005	0	0

Kingsway Junction Leachate Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	Units	Method Detection Limit	GAC_WTV_ENWA_EQS-Parish	Location	BK04		BK09		BK11		BK12		BK13		BK14		BK15		TK04	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
				Well																									
				Date	15/12/2016	20/03/2017	14/12/2016	21/03/2017	15/12/2016	20/03/2017	15/12/2016	23/03/2017	15/12/2016	23/03/2017	15/12/2016	21/03/2017	15/12/2016	21/03/2017	18/08/2016											
				Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal										
				Lab Report Number	392678	403189	392404	403745	392678	403189	392678	403804	392678	403804	392678	403745	392678	403745											
Diphenyl ether	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	1	0	<0.002	ND						
Dichloroacetic acid	µg/L				<0.04	-	<0.04	-	<0.04	-	<0.08	-	<0.04	-	<0.08	-	<0.04	-	-	7	0	<0.04	ND	<0.08	ND	0.026	0.02	0.0098	0	0
o,p'-Methoxychlor	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	14	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
TPH (Alt & Aro)	µg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	700	1	1	700	700	700	700	700	700		0	0
Benazolin	µg/L				<0.04	-	<0.04	-	<0.04	-	<0.08	-	<0.04	-	<0.08	-	<0.04	-	-	7	0	<0.04	ND	<0.08	ND	0.026	0.02	0.0098	0	0
2,4-DB	µg/L				<0.04	-	<0.04	-	<0.04	-	<0.08	-	<0.04	-	<0.08	-	<0.04	-	-	7	0	<0.04	ND	<0.08	ND	0.026	0.02	0.0098	0	0
2,3,6-Trichlorobenzoic acid	µg/L				<0.04	-	<0.06	-	<0.04	-	<0.7	-	<0.065	-	<0.9	-	<0.04	-	-	7	0	<0.04	ND	<0.9	ND	0.13	0.03	0.19	0	0
Aromatics >EC8-EC10	µg/L				<10	-	<10	-	<10	-	599	-	<10	-	45	-	<10	-	-	7	2	<10	45	599	599	96	5	222	0	0
Aromatics >EC7-EC8	µg/L				<10	-	<10	-	<10	-	32	-	<10	-	<10	-	<10	-	-	7	1	<10	32	32	32	8.9	5	10	0	0
TICS																													
Biphenylene	µg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	<2	1	0	<2	ND					1	0
TPH																													
>C5-C7	µg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5	1	0	<5	ND	<5	ND		2.5		0	0
>C8-C44	µg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	302	1	1	302	302	302	302		302		0	0
GRO >C5-C6	µg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	1	0	<100	ND	<100	ND		50		0	0
GRO >C5-C10	µg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	1	0	<100	ND	<100	ND		50		0	0
GRO >C5-C12	µg/L	50			<50	<50	<50	<50	<50	<50	1,580	683	<50	<50	359	276	<50	<50	-	14	4	<50	276	1580	1580	225	25	436	0	0
GRO >C6-C8	µg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	<100	1	0	<100	ND	<100	ND		50		0	0
GRO >C7-C8	µg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5	1	0	<5	ND	<5	ND		2.5		0	0
>C5-C6 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	10	<10	<10	<10	20	21	<10	<10	-	14	3	<10	10	21	21	7.6	5	5.6	0	0
>C6-C8 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	90	27	<10	<10	30	27	<10	<10	-	14	4	<10	27	90	90	16	5	23	0	0
>C8-C10 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	277	121	<10	<10	64	44	<10	<10	<10	15	4	<10	44	277	277	97	5	74	0	0
>C10-C12 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	331	173	<10	<10	119	89	<10	<10	<10	15	4	<10	89	331	331	51	5	94	0	0
>C12-C16 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	91	24	<10	<10	297	324	12	<10	<10	15	5	<10	12	324	324	53	5	107	0	0
>C16-C21 Aliphatics	µg/L	10			<10	<10	<10	<10	13	<10	485	290	<10	<10	542	514	16	<10	-	14	6	<10	13	542	542	136	5	218	0	0
>C16-C35 Aliphatics	µg/L				33	-	<20	-	115	-	4,165	-	37	-	6,302	-	61	-	258	8	7	<20	33	6302	6302	1373	88	2452	0	0
>C21-C35 Aliphatics	µg/L	10			23	<10	<10	<10	102	<10	3,680	2,610	27	<10	5,760	5,360	45	<10	-	14	8	<10	23	5760	5760	1260	25	2149	0	0
>C35-C44 Aliphatics	µg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	39	1	1	39	39	39	39		39		0	0
>C12-C35 Aliphatics	µg/L	10			23	<10	<10	<10	115	<10	4,250	2,930	27	<10	6,600	6,200	73	<10	-	14	8	<10	23	6600	6600	1446	25	2471	0	0
>C8 -C10 Aromatics	µg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	1	0	<10	ND	<10	ND		5		0	0
>EC5-EC7 Aromatics	µg/L	10	10[n6]		<10	<10	<10	<10	<10	<10	17	10	<10	<10	<10	<10	<10	<10	-	14	2	<10	10	17	17	6.2	5	3.4	1	1
>EC7-EC8 Aromatics	µg/L	10	74[n5]		-	<10	-	<10	-	<10	12	-	<10	-	-	<10	-	<10	-	7	1	<10	12	12	12	6	5	2.6	0	0
>EC8-EC10 Aromatics	µg/L	10			-	<10	-	<10	-	<10	-	220	-	<10	-	33	-	<10	-	7	2	<10	33	220	220	40	5	80	0	0
>EC10-EC12 Aromatics	µg/L	10			<10	<10	<10	<10	<10	<10	221	115	<10	<10	79	59	<10	<10	<10	15	4	<10	59	221	221	35	5	82	0	0
>EC12-EC16 Aromatics	µg/L	10			<10	<10	<10	<10	<10	<10	112	99	<10	<10	183	258	<10	<10	<10	15	4	<10	99	258	258	47	5	80	0	0
>EC16-EC21 Aromatics	µg/L	10			<10	<10	<10	<10	<10	<10	464	258	<10	<10	440	484	<10	<10	<10	15	4	<10	258	484	484	113	5	192	0	0
>EC21-EC35 Aromatics	µg/L	10			18	<10	<10	<10	<10	<10	1,380	994	<10	<10	1,850	1,790	<10	<10	111	15	6	<10	18	1850	1850	413	5	706	0	0
>EC35-EC44 Aromatics	µg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	1	1	17	17	17	17		17		0	0
>EC12-EC35 Aromatics	µg/L	10			18	<10	<10	<10	1,960	1,350	<10	<10	2,470	2,530	<10	<10	<10	<10	-	14	5	<10	18	2530	2530	598	5	1006	0	0
>C5-C35 Aliphatics & Aromatics	µg/L				41	-	<10	-	115	-	7,790	-	27	-	9,440	-	73	-	-	7	6	<10	27	9440	9440	2499	73	4205	0	0
4-Bromofluorobenzene	µg/L				1,090,000,000	-	1,080,000,000	-	1,100,000,000	-	1,070,000,000	-	1,110,000,000	-	974,000,000	-	1,100,000,000	-	-	7	7	974000000	974000000	1110000000	1110000000	1074857143	109000000	46459404	0	0
BTEX																													
Benzene	µg/L	1	10[n6]		<1	<1	<1	<1	<1	<1	17 - 24.2	10 - 13.4	<1	<1	<7 - 2.57	<7 - 2.2	<1	<1	<1	15	4	<1	10	24.2	24.2	2.9	0.5	5.7	2	2
Toluene	µg/L	1	74[n5]		<1	<1	<1	<1	<1	<1	28.9 - 30	12 - 15.3	<1	<1	<1	<1	<1	<1	<1	15	2	<1	12	32	32	3.4	0.5	8.2	0	0
Ethylbenzene	µg/L	1	20[n13]		<1	<1	<1	<1	<1	<1	34	9 - 9.29	<1	<1	<1	<1	<1	<1	<1	15	2	<1	9	34	34	3.3	0.5	8.8	1	1
Xylene (m & p)	µg/L	1			<1	<1	<1	<1	<1	<1	356 - 383	122 - 141	<1	<1	<8 - 1.17	<8 - 1.8	<1	<1	<1	15	4	<1	122	383	383	34	0.5	99	0	0
Xylene Total	µg/L	11			<11	<11	<11	<11	<11	<11	380	130	<11	<11	<11	<11	<11	<11	<10	15	2	<10	130	380	380	39	5.5	100	0	0
Xylene (o)	µg/L	1			<1	<1	<1	<1	<1	<1	24 - 24.9	6.81 - 8	<1	<1	<1	<1	<1	<1	<1	15	2	<1	6.81	24.9	24.9	2.6	0.5	6.3	0	0
Total BTEX	µg/L	28			<28	<28	<28	<28	<28	<28	463	161	<28	<28	<28	<28	<28	<28	-	14	2	<28	161	463	463	57	14	123	0	0
Oxygenates																													
MTBE	µg/L	1	510[n14]		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	14	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Tert Amyl Methyl Ether	µg/L	1	510[n14]		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	14	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chlorinated Hydrocarbons																													
Chloromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Vinyl chloride	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chloroethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.56	4.83	<1	<1	<5	15	2	<1	2.56	<5	4.83	1.1	0.5	1.3	0	0
1,1-dichloroethene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dichloromethane	µg/L	3	20[n6]		<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	-	14	0	<3	ND	<3	ND	1.5	1.5	0	0	0
trans-1,2-dichloroethene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1-dichloroethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	2.8	<1	<1	<1	<1	<1	<1	15	1	<1	2.8	2.8	2.8	0.65	0.5	0.59	0	0
cis-1,2-dichloroethene	µg/L	1			<1	<1	<1	<1	<1	<1	1.59	<1	<1	<1	<1	<1	6.94	13	<1	15	3	<1	1.59	13	13	1.8	0.5	3.5	0	0
Chloroform	µg/L	1	2.5[n6]		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,1-trichloroethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Carbon tetrachloride	µg/L	1	12[n6]		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Trichloroethene	µg/L	1	10[n6]		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	15	0	<1	ND	<5	ND	0.63	0.5	0.52	0	0
1,1,2-trichloroethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Tetrachloroethene	µg/L	1	10[n6]		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	15	0	<1	ND	<5	ND	0.63	0.5	0.52	0	0
Sum of PCE and TCE	µg/L				<2	-	<2	-	<2	-	<2	-	<2	-	<2	-	<2	-	-	7	0	<2	ND	<2	ND	1	1	0	0	0
TCE+DCE+VC	µg/L				<5	-	<5	-	<5	-	5.59	-	<5	-	<5	-	10.94	-	-	7	2	<5	5.59	10.94	10.94	4.1	2.5	3.2	0	0
PCE+TCE+DCE+VC	µg/L				<6	-	<6	-	<6	-	6.59	-	<6	-	<6	-	11.94	-	-	7	2	<6	6.59	11.94	11.94	4.8	3	3.4	0	0
VOC																													
2,2-dichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromochloromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1-dichloropropene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichloroethane	µg/L	1	10[n6]		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dibromomethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromodichloromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
cis-1,3-dichloropropene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
trans-1,3-dichloropropene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3-dichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chlorodibromomethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,1,2-tetrachloroethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Styrene	µg/L	1	67[n13]		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromoform	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Isopropylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	3.29	1.56	<1	<1	1.27	<1	<1	<1	<1	15	3	<1	1.27	3.29	3.29	0.81	0.5	0.76	0	0
1,1,2,2-tetrachloroethane	µg/L	1	140[n5]		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2,3-trichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
n-propylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	4.23	1.47	<1	<1	1.02	<1	<1	<1	<1	15	3	<1	1.02	4.23	4.23	0.85	0.5	0.97	0	0
1,3,5-trimethylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	16.2	8.48	<1	<1	<1	<1	<1	<1	<1	15	2	<1	8.48	16.2	16.2	2.1	0.5	4.4	0	0
tert-butylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2,4-trimethylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	71.8	48.2	<1	<1	2.99	1.5	<1	<1	<1	15	4	<1	1.5	71.8	71.8	8.6	0.5	21	0	0
sec-butylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	1.69	<1	<1	<1	<1	<1	<1	<1	<1	15	1	<1	1.69	1.69	1.69	0.58	0.5	0.31	0	0
p-isopropyltoluene	µg/L	1			<1	<1	<1	<1	<1	<1	4.08	1.46	<1	<1	5.19	3.36	<1	<1	<1	15	4	<1	1.46	5.19	5.19	1.3	0.5	1.6	0	0
n-butylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dibromo-3-chloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	15	0	<1	ND	<5	ND	0.63	0.5	0.52	0	0
Hexachlorobutadiene	µg/L	1	0.6[n4]		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	15	0	<1	ND	<5	ND	0.63	0.5	0.52	15	0
1,2-Dichloroethane	µg/L				<2	-	<2	-	<2	-	2.59	-	<2	-	<2	-	7.94	-	-	7	2	<2	2.59	7.94	7.94	2.2	1	2.6	0	0
Trihalomethanes	µg/L				<4	-	<4	-	<4	-	<4	-	<4	-	<4	-	<4	-	-	7	0	<4	ND	<4	ND	2	2	0	0	0
PAH																													
Naphthalene	µg/L	0.1	2[n6]		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.62 - 9.97	1.96 - 3.9	<0.1	<0.1	5.99 - 15.3	4.16 - 12.8	<0.1	<0.1	<0.02	15	4	<0.02	1.96	15.3	15.3	1.9	0.05	3.6	4	4
Acenaphthylene	µg/L	0.011			<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<1 - 0.279	<1 - 0.0966	<0.011	<1 - 0.0126	<8 - 1.02	<4 - 0.549	<0.011	<0.011	<0.01	15	5	<0.01	ND	1.02	1.02	0.32	0.0055	0.69	0	0
Acenaphthene	µg/L	0.015			<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<1 - 5.1	<1 - 2.85	<0.015	<1 - 0.768	25.2 - 28.3	15.8 - 20.6	<0.015	<0.015	<0.01	15	5	<0.01	ND	28.3	28.3	3.4	0.0075	8	0	0
Fluorene	µg/L	0.014			<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<1 - 5.36	1.72 - 2.79	<0.014	<1 - 0.356	17.2 - 20.3	11.2 - 16.8	<0.014	<0.014	<0.01	15	5	<0.01	1.72	20.3	20.3	2.6	0.007	5.8	0	0
Phenanthrene	µg/L	0.022			<0.022	<0.022	<2 - 0.0469	<2 - 0.0222	<0.022	<0.022	<1 - 19.7	3.79 - 9.47	<1 - 0.0542	<1 - 0.26	60.1 - 74.1	38.3 - 61.4	<0.022	<0.022	<2 - 0.023	15	9	<0.022	3.79	74.1	74.1	9.1	0.38	21	0	0
Anthracene	µg/L	0.015	0.1[n6]		<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.1485	0.813 - 2.48	<0.015	<0.015	15.4 - 21.8	8.44 - 19.8	<0.015	<0.015	<2 - 0.012	15	9	<0.015	0.813	21.8	21.8	2.5	0.0075	5.7	4	4
Fluoranthene	µg/L	0.017	0.0063[n6]		<0.017	<0.017	<2 - 0.198	<2 - 0.0686	<1 - 0.031	<0.017	<1 - 17.9	<1 - 3.16	<1 - 0.124	<1 - 0.0662	59.2 - 65.2	28.8 - 52.4	<0.017	<0.017	<2 - 0.064	15	10	<0.017	28.8	65.2	65.2	7.8	0.312	18	15	10
Pyrene	µg/L	0.015			<1 - 0.0153	<0.015	<2 - 0.195	<2 - 0.0756	<1 - 0.0341	<0.015	<1 - 13.3	2.61 - 8.74	<1 - 0.133	<1 - 0.0547	41.5 - 56.3	23.1 - 43.3	<0.015	<1 - 0.0191	<2 - 0.165	15	12	<0.015	2.61	55.3	55.3	6.5	0.3165	14	0	0
Benz(a)anthracene	µg/L	0.017			<0.017	<0.017	<2 - 0.122	<2 - 0.0495	<1 - 0.0186	<0.017	<1 - 6.75	1.11 - 2.9	<1 - 0.0957	<0.017	25.3 - 39.7	16.9 - 19.2	<0.017	<0.017	<2 - 0.048	15	9	<0.017	1.11	39.7	39.7	3.9	0.29785	9.2	0	0
Chrysene	µg/L	0.013			<0.013	<0.013	<2 - 0.12	<2 - 0.0295	<1 - 0.0168	<0.013	<1 - 5.95	0.951 - 2.79	<1 - 0.0753	<0.013	26.3 - 35.4	12.5 - 17.4	<0.013	<0.013	<2 - 0.058	15	9	<0.013	0.951	35.4	35.4	3.5	0.28765	8.5	0	0
Benzo(a) pyrene	µg/L	0.009	0.00017[n5]		<0.009	<0.009	<2 - 0.168	<2 - 0.0494	<1 - 0.0261	<0.009	<1 - 7.12	1.12 - 2.25	<1 - 0.0496	<0.009	22.4 - 29.9	16 - 31.7	<0.009	<1 - 0.0102	<2 - 0.059	15	10	<0.009	1.12	78.9	78.9	5.5	0.2748	14	15	10
Indeno(1,2,3-c,d)pyrene	µg/L	0.014	0.00017		<0.014	<0.014	<2 - 0.105	<2 - 0.0478	<1 - 0.016	<0.014	<1 - 3.81	<1 - 0.707	<1 - 0.0377	<0.014	11.6 - 43.5	7.65 - 16.8	<0.014	<0.014	<2 - 0.036	15	9	<0.014	7.65	43.5	43.5	3	0.26885	7.5	15	9
Dibenz(a,h)anthracene	µg/L	0.016			<0.016	<0.016	<2 - 0.0238	<0.016	<0.016	<0.016	<1 - 1.03	<1 - 0.153	<0.016	<0.016	<8 - 11.2	<4 - 3.63	<0.016	<0.016	<0.01	15	5	<0.01	ND	11.2	11.2	0.81	0.008	2	0	0
Benzo(g,h,i)perylene	µg/L	0.016	0.0082[n4]		<0.016	<0.016	<2 - 0.168	<2 - 0.0524	<1 - 0.0222	<0.016	<1 - 4.57	0.72 - 1.28	<1 - 0.0643	<0.016	12.3 - 45.8	9.29 - 16.7	<0.016	<0.016	<2 - 0.041	15	9	<0.016	0.72	45.8	45.8	3.2	0.28215	7.9	15	9
Benzo(b)fluoranthene	µg/L	0.023	0.017[n4]		<0.023	<0.023	<2 - 0.274	<2 - 0.0719	<1 - 0.0353	<0.023	<1 - 7.81	1.2 - 2.92	<1 - 0.0884	<0.023	25.1 - 89.3	18.9 - 19.5	<0.023	<0.023	<2 - 0.08	15	9	<0.023

Kingsway Junction Groundwater Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	Units	Method Detection Limit	GAC_WTV_ENWA EQS-Fresh	Location	BK04		BK09		BK11		BK12		BK13		BK14		BK15		TK04
				Well															
				Date	15/12/2016	20/03/2017	14/12/2016	21/03/2017	15/12/2016	20/03/2017	15/12/2016	23/03/2017	15/12/2016	23/03/2017	15/12/2016	21/03/2017	15/12/2016	21/03/2017	18/08/2016
				Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
				Lab Report Number	392678	403189	392404	403745	392678	403189	392678	403804	392678	403804	392678	403745	392678	403745	
Herbicides																			
Bentazone	µg/L		500[#12]		<0.04	-	<0.04	-	<0.04	-	<0.08	-	<0.04	-	<0.1	-	<0.04	-	-
Bromoxynil	µg/L		100[#13]		<0.04	-	<0.04	-	<0.04	-	<0.08	-	<0.04	-	<0.08	-	<0.04	-	-
Clopyralid	µg/L				<0.04	-	<0.04	-	<0.04	-	<0.5	-	<0.04	-	<0.4	-	<0.04	-	-
Dicamba	µg/L				<0.04		<0.04		<0.04		<1	-	<0.12	-	<1		<0.04		-
2,4-Dichlorprop	µg/L	0.04			<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.08	<0.08	<0.04	<0.04	<0.08	<0.0571	<0.04	<0.04	-
2-Methyl-4-chlorophenoxyacetic acid	µg/L		17[#12]		<0.04	-	<0.04	-	<0.04	-	<0.08	-	<0.04	-	<0.08	-	<0.04	-	-
2-Methyl-4-Chlorophenoxy Butanoic Acid	µg/L				<0.04	-	<0.04	-	<0.04	-	<0.08	-	<0.04	-	<0.08	-	<0.04	-	-
2,4,5-Trichlorophenoxy Acetic Acid	µg/L				<0.04	-	<0.04	-	<0.04	-	<0.08	-	<0.04	-	<0.08	-	<0.04	-	-
Triclopyr	µg/L				<0.04	-	<0.04	-	<0.04	-	<0.08	-	<0.04	-	<0.08	-	<0.04	-	-
Dinoseb	µg/L	4			<4	<8	<4	<4	<4	<8	<4	<4	<4	<4	<4	<4	<4	<4	-
Fluroxypyr	µg/L				<0.04	-	<0.04	-	<0.04	-	<0.08	-	<0.04	-	<0.18	-	<0.04	-	-
Mecoprop	µg/L		18[#5]		<0.04	-	<0.04	-	<0.04	-	0.619	-	<0.04	-	0.369	-	<0.04	-	-
Fenoprop	µg/L				<0.04		<0.04	-	<0.04	-	<0.08	-	<0.04	-	<0.08		<0.04		-
Pesticides																			
Parathion	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Aldrin+Dieldrin+Endrin+Isodrin	µg/L		0.01[#6]		<0.03	-	<0.03	-	<0.03	-	<0.03	-	<0.03	-	<0.03	-	<0.03	-	-
Organochlorine Pesticides																			
Aldrin	µg/L	0.01	9.9999999999649E11[#6]		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
a-BHC	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
b-BHC	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Dieldrin	µg/L	0.01	9.9999999999649E11[#6]		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Endosulfan I	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Endosulfan II	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Endosulfan sulphate	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Endrin	µg/L	0.01	9.9999999999649E11[#6]		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
g-BHC (Lindane)	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Heptachlor	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Heptachlor epoxide	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
o,p'-DDE	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
2,4-DDT	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
o,p-DDD	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
4,4-DDE	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
DDT	µg/L	0.01	0.01[#6]		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Methoxychlor	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
DDD	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Aldrin + Dieldrin	µg/L				<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	-
DDT+DDE+DDD	µg/L				<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	<0.02	-	-
Organophosphorous Pesticides																			
Azinophos methyl	µg/L	0.01	0.01[#12]		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Diazinon	µg/L	0.01	0.01[#5]		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Dichlorvos	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Ethion	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Fenitrothion	µg/L	0.01	0.01[#12]		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Malathion	µg/L	0.01	0.01[#12]		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Methyl parathion	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Mevinphos (Phosdrin)	µg/L	0.01	0.007[#10]		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Amino Aliphatics																			
N-nitrosodi-n-propylamine	µg/L	1			<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<8	<4	<1	<1	<5
Amino Aromatics																			
n-Nitrosodiphenylamine	µg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5
Anilines																			
2-nitroaniline	µg/L	1			<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<8	<4	<1	<1	<5
3-nitroaniline	µg/L	1			<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<8	<4	<1	<1	<5
4-chloroaniline	µg/L	1			<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<8	<4	<1	<1	<5
4-nitroaniline	µg/L	1			<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<8	<4	<1	<1	<5
Explosives																			
2,4-Dinitrotoluene	µg/L	1			<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<8	<4	<1	<1	<5
2,6-dinitrotoluene	µg/L	1			<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<8	<4	<1	<1	<5
Nitrobenzene	µg/L	1			<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<8	<4	<1	<1	<5
Halogenated Benzenes																			
1,3,5-Trichlorobenzene	µg/L	1	9.9999999999965E11[#7]		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-
Chlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	1.28	2.88	<1	<1	2.64	<1	<1	<1	<1
Bromobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-chlorotoluene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-chlorotoluene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-dichlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-dichlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1 - 1.42	<1	<1	<1	<1	<1	<1	<1
1,2-dichlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<8 - 1.19	<1	<1	<1	<5
1,2,4-trichlorobenzene	µg/L	1	9.9999999999965E11[#7]		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5
1,2,3-trichlorobenzene	µg/L	1	9.9999999999965E11[#7]		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5
Hexachlorobenzene	µg/L	1	0.05[#2]		<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<8	<4	<1	<1	<5
Halogenated Hydrocarbons																			
Dichlorodifluoromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5
Trichlorofluoromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dibromoethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromofluoromethane	µg/L				1,250,000,000	-	1,170,000,000	-	1,210,000,000	-	1,300,000,000	-	1,220,000,000	-	1,220,000,000	-	1,200,000,000	-	-
Halogenated Phenols																			
2,3,5,6-Tetrachlorophenol	µg/L	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<3.5	<0.5	<1	-
2-chlorophenol	µg/L	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<4 - 0.584	<0.5	<0.5	<20
2,4-dichlorophenol	µg/L	0.5	4.3[#5]		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.706 - 4.76	<0.5	<0.5	<20
2,4,5-trichlorophenol	µg/L	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.07 - 5.98	<0.5	<0.5	<20
2,4,6-trichlorophenol	µg/L	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.07 - 5.98	<0.5	<0.5	<20
Pentachlorophenol	µg/L	1	0.4[#5]		<0.04	<1	<0.04	<2	<0.04	<1	<1	<1	<0.04	<1	<0.8	<4	<0.04	<1	<50
Phthalates																			
Bis(2-ethylhexyl) phthalate	µg/L	2	1.3[#3]		<2	<2	<4	<4	<2	<2	<2	18.1	<2	<2	27.6	37.4	<2	<2	<5
Butyl benzyl phthalate	µg/L	1	7.5[#5]		<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<3	<4	<1	<1	<5
Di-n-butyl phthalate	µg/L	1	8[#13]		<1	<1	<2	<2	<1	<1	<1	1.75	<1	<1	<8	<4	<1	<1	<5
Di-n-octyl phthalate	µg/L	5	20[#13]		<5	<5	<10	<10	<5	<5	<5	<5	<5	<5	<40	<20	<5	<5	<2
Diethylphthalate	µg/L	1	200[#13]		<1	<1	<2	<2	<1	<1	1.58	1.32	<1	<1	<8	<4	<1	<1	<5
Dimethyl phthalate	µg/L	1	800[#13]		<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	31.1	26	<1	<1	<5
Solvents																			
Carbon disulfide	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.57	1.78	<1	<1	-
Isophorone	µg/L	1			<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<8	<4	<1	<1	<5
Metals																			
Arsenic	µg/L		50[#5]		1.26	-	4.78	-	<0.51	-	4.72	-	0.525	-	35.3	-	0.668	-	<1
Arsenic (Filtered)	µg/L	0.51	50[#5]		-	1.4	-	2.55	-	1.24	-	3.43	-	1.22	-	9.32	-	0.82	-
Boron	µg/L		2000[#12]		138	-	63	-	24.4	-	3,030	-	102	-	808	-	119	-	240
Boron (Filtered)	µg/L	5	2000[#12]		-	139	-	50.2	-	102	-	1,240	-	965	-	829	-	218	-
Cadmium	µg/L		0.08[#5]		<0.08	-	<0.08	-	<0.08	-	<0.08	-	<0.08	-	<0.08	-	<0.08	-	0.4
Cadmium (Filtered)	µg/L	0.08	0.08[#5]		-	<0.08	-	<0.08	-	<0.08	-	<0.08	-	<0.08	-	<0.08	-	<0.08	-
Calcium	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	164
Chromium (III+VI)	µg/L	3			21.8	11.8	36.7	14.7	258	49.3	791	192	21.8	11.9	872	377	18.9	11.8	<1
Copper	µg/L		1[#5]		1.79	-	<0.85	-	<0.85	-	<0.85	-	<0.85	-	<0.85	-	<0.85	-	6
Copper (Filtered)	µg/L	0.85	1[#5]		-	1.81	-	<0.85	-	<0.85	-	<0.85	-	<0.85	-	<0.85	-	<0.85	-
Iron	µg/L	24	1000[#5]		<19 - 14,000	4,550	32.3 - 21,300	6,490	<19 - 274,000	66,400	<24 - 23,700	92,400	27.4 - 5,580	10,700	16,300 - 429,000	300,000	<19 - 8,080	5,230	180 - 7,440
Iron (Filtered)	µg/L	19	1000[#5]		-	<19	-	92.6	-	<19	-	13,700	-	52.4	-	8,280	-	22.4	-
Lead	µg/L		1.2[#5]		<0.1	-	<0.1	-	<0.1	-	1.13	-	<0.1	-	<0.1	-	<0.1	-	11
Lead (Filtered)	µg/L	0.1	1.2[#5]		-	<0.1	-	<0.1	-	<0.1	-	0.927	-	0.52	-	<0.1	-	<0.1	-
Magnesium	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.4
Mercury	µg/L		0.07[#4]		<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.1
Mercury (Filtered)	µg/L	0.01	0.07[#4]		-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-	<0.01	-
Nickel	µg/L		4[#6]		1.08	-	1.26	-	1.13	-	50.3	-	10.8	-	5.46	-	1.17	-	16
Nickel (Filtered)	µg/L	0.44	4[#6]		-	1.27	-	1.63	-	1.54	-	39.6	-	16.7	-	8.1	-	1.75	-
Selenium	µg/L				<0.81	-	1.01	-	<0.81	-	1.1	-	1.11	-	<0.81	-	1.06	-	<1
Selenium (Filtered)	µg/L	0.81			-	<0.81	-	<0.81	-	1.36	-	<0.81	-	<0.81	-	<0.81	-	<0.81	-
Zinc	µg/L		10.9[#5]		2.3	-	<1.3	-	2.54	-	4.87	-	5.84	-	3.51	-	3.94	-	53
Zinc (Filtered)	µg/L	1.3	10.9[#5]		-	3.23	-	2.13	-	2.57	-	3.61	-	5.66	-	3.21	-	3.53	-
Chromium (hexavalent)	µg/L	30	3.4[#3]		<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	-
Organics																			
TOC	mg/L	3			4.18	<3	3.48	<3	3.15	<3	63.4	24.6	4.78	27.3	42.5	41.1	3.14	4.04	5.6
Inorganics																			
BOD	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	<3.6
Cyanide (Free)	mg/L	0.05	0.001[#12]		<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	<0.05	<0.02
Nitrogen (Total)	µg/L				<200	-	<200	-	<200	-	56,400	-	517	-	12,700	-	<200	-	-
Cyanide Total	mg/L	0.05	0.001[#5]		<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	<0.05	<0.02
Hardness as CaCO3	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	469
Ammoniacal Nitrogen as N	mg/L	0.2	0.3		-	<0.2	-	<0.2	-	<0.2	-	27.3	-	13.3	-	13.8	-	<0.2	0.01
Total Hardness	mg/l	0.35			-	584	-	675	-	2,460	-	1,570	-	651	-	1,870	-	721	-
COD	mg/L				-	-	-	-	-	-	-	-	-	-	-	-	-	-	18
pH (Lab)	pH Units	1			7.49	7.48	7.73	7.43	7.59	7.46	7.24	7.24	7.63	7.5	7.39	7.8	7.39	7.49	7.3
Other																			
Acrril (toxyril)	mg/L		0.01[#13]		<0.00004	-	<0.00004	-	<0.00004	-	<0.00008	-	<0.00004	-	<0.00008	-	<0.00004	-	-
Surrogate																			
Toluene-D8	%				110	-	110	-	109	-	108	-	111	-	105	-	110	-	-
GRO Surrogate	%				87	-	87	-	86	-	79	-	87	-	82	-	84	-	-

Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
7	0	<0.04	ND	<0.1	ND	0.027	0.02	0.013	0	0
7	0	<0.04	ND	<0.08	ND	0.026	0.02	0.0098	0	0
7	0	<0.04	ND	<0.5	ND	0.079	0.02	0.1	0	0
7	0	<0.04	ND	<1	ND	0.16	0.02	0.23	0	0
14	0	<0.04	ND	<0.08	ND	0.025	0.02	0.0085	0	0
7	0	<0.04	ND	<0.08	ND	0.026	0.02	0.0098	0	0
7	0	<0.04	ND	<0.08	ND	0.026	0.02	0.0098	0	0
7	0	<0.04	ND	<0.08	ND	0.026	0.02	0.0098	0	0
7	0	<0.04	ND	<0.08	ND	0.026	0.02	0.0098	0	0
14	0	<4	ND	<8	ND	2.3	0	0.73	0	0
7	0	<0.04	ND	<0.18	ND	0.033	0.02	0.026	0	0
7	2	<0.04	0.369	0.619	0.619	0.16	0.02	0.24	0	0
7	0	<0.04	ND	<0.08	ND	0.026	0.02	0.0098	0	0
14	0	<0.01	ND	<0.01	ND	0.005	0.005		0	0
7	0	<0.03	ND	<0.03	ND	0.015	0.015		0	0
14	0	<0.01	ND	<0.01	ND	0.005	0.005		0	0

Markeaton Junction Leachate Chemistry
Analytical Results
A38 Derby Junctions
Highways England

Location_Code	BM01	BM01	BM02	BM02	BM03	BM04	BM04	BM05	BM05	BM05	BM05	BM06A	BM07	BM08	BM08	BM09	BM09
Sample_Depth_Range	0.500-0.500	3.000-3.000	1.000-1.000	2.000-2.000	0.500-0.500	0.500-0.500	3.000-3.000	3.500-3.500	4.830-4.830	6.750-6.750	7.700-7.700	1.200-1.200	1.000-1.000	0.500-0.500	1.000-1.000	1.000-1.000	2.500-2.500
Sampled_Date_Time	11/08/2016	25/08/2016	01/08/2016	05/08/2016	01/08/2016	25/08/2016	25/08/2016	30/08/2016	30/08/2016	30/08/2016	30/08/2016	20/10/2016	25/08/2016	25/08/2016	25/08/2016	01/08/2016	25/08/2016

Chem_Group	ChemName	output unit	EQL	GAC_WTV_EN/WA_EQS-Fresh																
	Diphenyl ether	mg/L			-	-	-	-	-	-	-	<0.002	<0.002	<0.002	<0.002	-	<0.002	-	-	<0.002	-
TPH	>C5-C7	µg/L			<5	<5	-	-	-	<5	-	<5	20	<5	-	-	-	-	<5	<5	<5
	>C8-C10	µg/L			-	-	-	-	-	<10	-	<10	40	<10	<10	-	-	-	<10	-	-
	>C10-C12	µg/L			-	-	-	-	-	<10	-	<10	183	<10	<10	-	-	-	<10	-	-
	>C12-C16	µg/L			-	-	-	-	-	14	-	16	1130	40	127	-	-	-	20	-	-
	>C16-C21	µg/L			-	-	-	-	-	<10	-	12	960	153	853	-	-	-	12	-	-
	>C21-C35	µg/L			-	-	-	-	-	<10	-	13	309	162	950	-	-	-	25	-	-
	GRO >C5-C6	µg/L			<100	<100	-	-	-	<100	-	<100	<100	<100	-	-	-	-	<100	<100	<100
	GRO >C5-C10	µg/L			<100	<100	-	-	-	<100	-	<100	180	<100	-	-	-	-	<100	<100	<100
	GRO >C6-C8	µg/L			<100	<100	-	-	-	<100	-	<100	<100	<100	-	-	-	-	<100	<100	<100
	GRO >C7-C8	µg/L			<5	<5	-	-	-	<5	-	<5	20	<5	-	-	-	-	<5	<5	<5
	>C8-C10 Aliphatics	µg/L			<10	<12	-	-	-	<10	-	<10	<10	<10	-	-	-	-	<10	<10	<10
	>C10-C12 Aliphatics	µg/L			<10	<12	-	-	-	<10	-	<10	<10	<10	-	-	-	-	<10	<10	<10
	>C12-C16 Aliphatics	µg/L			<10	<12	-	-	-	<10	-	<10	<10	<10	-	-	-	-	<10	<10	<10
	>C16-C35 Aliphatics	µg/L			<10	<12	-	-	-	<10	-	<10	<10	<10	-	-	-	-	<10	11	107
	>C35-C44 Aliphatics	µg/L			<10	<12	-	-	-	<10	-	<10	<10	<10	-	-	-	-	<10	<10	<10
	>EC8-EC10 Aromatics	µg/L			<10	<12	-	-	-	<10	-	<10	<10	<10	-	-	-	-	<10	<10	<10
	>EC10-EC12 Aromatics	µg/L			<10	<12	-	-	-	<10	-	<10	65	<10	-	-	-	-	<10	15	<10
	>EC12-EC16 Aromatics	µg/L			<10	<12	-	-	-	<10	-	<10	14	<10	-	-	-	-	<10	28	<10
	>EC16-EC21 Aromatics	µg/L			<10	<12	-	-	-	<10	-	<10	<10	<10	-	-	-	-	<10	49	<10
	>EC21-EC35 Aromatics	µg/L			<10	<12	-	-	-	<10	-	<10	<10	<10	-	-	-	-	<10	141	18
	>EC35-EC44 Aromatics	µg/L			<10	<12	-	-	-	<10	-	<10	<10	<10	-	-	-	-	<10	<10	<10
	Gasoline Range Organics	µg/L			-	<100	-	-	-	-	-	<100	800	<100	<100	-	<100	-	-	-	<100
BTEX	Benzene	µg/L		10	<5	<5	-	-	-	<5	<1	<1	20 - 21	<1	<1	-	<1	-	<1	<1	<5
	Toluene	µg/L		74	<5	<5	-	-	-	<5	<1	<1	18 - 20	<1	<1	-	<1	-	<1	<1	<5
	Ethylbenzene	µg/L		20	<5	<5	-	-	-	<5	<1	<1	8 - 10	<1	<1	-	<1	-	<1	<1	<5
	Xylene (m & p)	µg/L			-	-	-	-	-	-	<1	<1	4	<1	<1	-	<1	-	<1	<1	-
	Xylene Total	µg/L			<10	<10	-	-	-	<10	-	<10	20	<10	-	-	-	-	<10	<10	<10
	Xylene (o)	µg/L			-	-	-	-	-	-	<1	<1	9	<1	<1	-	<1	-	<1	<1	-
Chlorinated Hydrocarbons	Chloromethane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	Vinyl chloride	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	Chloroethane	µg/L			-	-	-	-	-	-	<5	<5	<5	<5	<5	-	<5	-	<5	<5	-
	1,1-dichloroethene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	trans-1,2-dichloroethene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	1,1-dichloroethane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	cis-1,2-dichloroethene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	Chloroform	µg/L		2.5	-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	1,1,1-trichloroethane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	Carbon tetrachloride	µg/L		12	-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	Trichloroethene	µg/L		10	-	-	-	-	-	-	<5	<5	<5	<5	<5	-	<5	-	<5	<5	-
	1,1,2-trichloroethane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	Tetrachloroethene	µg/L		10	-	-	-	-	-	-	<5	<5	<5	<5	<5	-	<5	-	<5	<5	-
VOC	2,2-dichloropropane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	Bromochloromethane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	1,1-dichloropropene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	1,2-dichloroethane	µg/L		10	-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	1,2-dichloropropane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	Dibromomethane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	Bromodichloromethane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	cis-1,3-dichloropropene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	trans-1,3-dichloropropene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	1,3-dichloropropane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	Chlorodibromomethane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	1,1,1,2-tetrachloroethane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	Styrene	µg/L		50	-	-	-	-	-	-	<1	<1	5	<1	<1	-	<1	-	<1	<1	-
	Bromoform	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	Isopropylbenzene	µg/L			-	-	-	-	-	-	<1	<1	1	<1	<1	-	<1	-	<1	<1	-
	1,1,2,2-tetrachloroethane	µg/L		140	-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	1,2,3-trichloropropane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	n-propylbenzene	µg/L			-	-	-	-	-	-	<1	<1	2	<1	<1	-	<1	-	<1	<1	-
	1,3,5-trimethylbenzene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	tert-butylbenzene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	1,2,4-trimethylbenzene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	sec-butylbenzene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	p-isopropyltoluene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	n-butylbenzene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	1,2-dibromo-3-chloropropane	µg/L			-	-	-	-	-	-	<5	<5	<5	<5	<5	-	<5	-	<5	<5	-
	Hexachlorobutadiene	µg/L		0.6	-	-	-	-	-	-	<5	<5	<5	<5	<5	-	<5	-	<5	<5	-
PAH	Naphthalene	µg/L		2	0.044	0.035	-	0.027	-	-	<0.02	<2 - 0.116	<2 - 0.332	<2 - 0.062	<2 - 0.478	0.062	<2 - 0.037	<0.02	<5 - 0.059	<2 - 0.129	0.028
	Acenaphthylene	µg/L			<0.01	<0.01	-	<0.01	-	-	<0.01	<2 - 0.024	<2 - 0.044	<0.01	<2 - 0.022	<0.01	<0.01	0.025	0.013	<0.01	<0.01
	Acenaphthene	µg/L			0.081	0.024	-	0.016	-	-	<0.01	<2 - 0.101	<2 - 0.172	<2 - 0.033	<2 - 0.256	0.047	<2 - 0.224	<0.01	0.03	<2 - 0.046	0.038
	Fluorene	µg/L			0.037	0.022	-	0.011	-	-	<0.01	<2 - 0.091	<2 - 0.08	<2 - 0.015	<2 - 0.103	0.011	<2 - 0.193	<0.01	0.017	<2 - 0.035	0.021
	Phenanthrene	µg/L			0.073	0.05	-	<0.01	-	-	<0.01	<2 - 0.244	<2 - 0.111	<2 - 0.036	<2 - 0.138	0.028	<2 - 0.545	<0.01	0.031	<2 - 0.082	0.05
	Anthracene	µg/L		0.1	0.028	0.013	-	<0.01	-	-	<0.01	<2 - 0.048	<2 - 0.02	<0.01	<2 - 0.023	<0.01	<2 - 0.05	0.022	0.057	<2 - 0.017	0.011
	Fluoranthene	µg/L		0.0063	0.111	0.028	-	0.025	-	-	0.032	<2 - 0.138	<2 - 0.073	<2 - 0.018	<0.01	<0.01	<2 - 0.076	0.027	0.042	<2 - 0.03	0.089
	Pyrene	µg/L			0.088	0.022	-	0.018	-	-	0.024	<2 - 0.105	<2 - 0.06	<2 - 0.014	<0.01	<0.01	<2 - 0.048	0.111	0.035	<2 - 0.034	0.086
	Benz(a)anthracene	µg/L			0.027	0.013	-	<0.01	-	-	<0.01	<2 - 0.022	<0.01	<0.01	<0.01	<0.01	<2 - 0.012	0.029	<0.01	<2 - 0.019	0.026
	Chrysene	µg/L			0.028	<0.01	-	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<2 - 0.018	0.024
	Benzo(a) pyrene	µg/L		0.00017	0.015	<0.01	-	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.034	<0.01	<0.01	0.021
	Indeno(1,2,3-c,d)pyrene	µg/L		0.00017	0.026	<0.01	-	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.041	<0.01	<0.01	0.02
	Dibenz(a,h)anthracene	µg/L			<0.01	<0.01	-	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Benzo(g,h,i)perylene	µg/L		0.0082	0.025	<0.01	-	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.038	<0.01	<2 - 0.03	0.017
	Benzo(b)fluoranthene	µg/L		0.017	0.034	<0.01	-	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.054	<0.01	<0.01	0.03
	Benzo(k)fluoranthene	µg/L		0.017	0.011	<0.01	-	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.022	<0.01	<0.01	0.014
	PAH 16 Total	µg/L			<0.648	<0.287	-	<0.207	-	-	<0.206	<0.959	<0.972	<0.278	<1.12	<0.268	<1.265	<0.473	<0.364	<0.5	<0.495
SVOC	Coronene	µg/L			-	-	-	-	-	-	-	<50	<50	<50	<50	-	<60	-	-	<50	-
	2-methylnaphthalene	µg/L			-	-	-	-	-	-	-	<2	<2	<2	<2	-	<2	-	-	<2	-
	4-bromophenyl phenyl ether	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	4-chlorophenyl phenyl ether	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	Bis(2-chloroethoxy) methane	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	Bis(2-chloroethyl)ether	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	Dibenzofuran	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	Hexachlorocyclopentadiene	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	Hexachloroethane	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	1-Methylnaphthalene	µg/L			-	-	-	-	-	-	-	<2	<2	<2	<2	-	<2	-	-	<2	-
	3,3-Dichlorobenzidine	µg/L			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-
	Benzoic Acid	µg/L			-	-	-	-	-	-	-	<100	<100	<100	<100	-	<120	-	-	<100	-
	Benzyl alcohol	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
Phenolics	Trimethylphenols	µg/L			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	2-methylphenol	µg/L			-	-	-	-	-	<5	-	<5	<5	<5	<5	-	<6	-	<5	<5	-
	2-nitrophenol	µg/L			-	-	-	-	-	<20	-	<20	<20	<20	<20	-	<24	-	<20	<20	-
	2,4-dimethylphenol	µg/L			-	-	-	-	-	<20	-	<20	<20	<20	<20	-	<24	-	<20	<20	-
	4-chloro-3-methylphenol	µg/L			-	-	-	-	-	<5	-	<5	<5	<5	<5	-	<6	-	<5	<5	-
	4-nitrophenol	µg/L			-	-	-	-	-	<50	-	<50	<50	<50	<50	-	<60	-	<50	<50	-
	Phenol	µg/L		7.7	8.5	<0.5	2.4	<0.5	2.8	<20 - 8	-	<20 - 2.2	<20 - 10.8	<20 - 1.6	<20 - 4.4	3.2	<24 - 0.6	<0.5	<20 - 7.1	<20 - 1.5	<0.5
	2-chloronaphthalene	µg/L			-	-	-	-	-	-	-	<2	<2	<2	<2	-	<2	-	-	<2	-
	2,4-dinitrophenol	µg/L			-	-	-	-	-	<10	-	<10	<10	<10	<10	-	<12	-	<10	<10	-
	2,6-Dimethylphenol	µg/L			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	5.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	3-&4-methylphenol	µg/L			-	-	-	-	-	<20	-	<20	<20	<20	<20	-	<24	-	<20	<20	-
	4,6-Dinitro-2-methylphenol	µg/L			-	-	-	-	-	<50	-	<50	<50	<50	<50	-	<60	-	<50	<50	-
	4-chlorophenol	µg/L			-	-	-	-	-	<20	-	<20	<20	<20	<20	-	<24	-	<20	<20	-
	Cresols by HPLC (W)	µg/L			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<2.5	0.9	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Total Phenols	µg/L			-	-	-	-	-	<350	-	<350	<350	<350	<350	-	<420	-	<350	-	-
Amino Aliphatics	N-nitrosodi-n-propylamine	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
Amino Aromatics	n-Nitrosodiphenylamine	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
Anilines	2-nitroaniline	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	3-nitroaniline	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	4-chloroaniline	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	4-nitroaniline	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
Explosives	2,4-Dinitrotoluene	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	2,6-dinitrotoluene	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	Nitrobenzene	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
Halogenated Benzenes	Chlorobenzene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	Bromobenzene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	2-chlorotoluene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	4-chlorotoluene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	1,3-dichlorobenzene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	1,4-dichlorobenzene	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	1,2-dichlorobenzene	µg/L			-	-	-	-	-	-	<5	<5	<5	<5	<5	-	<5	-	<5	<5	-
	1,2,4-trichlorobenzene	µg/L		9.99000000000065E11	-	-	-	-	-	-	<5	<5	<5	<5	<5	-	<5	-	<5	<5	-
	1,2,3-trichlorobenzene	µg/L		9.99000000000065E11	-	-	-	-	-	-	<5	<5	<5	<5	<5	-	<5	-	<5	<5	-
	Hexachlorobenzene	µg/L		0.05	-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
Halogenated Hydrocarbons	Dichlorodifluoromethane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	Bromomethane	µg/L			-	-	-	-	-	-	<5	<5	<5	<5	<5	-	<5	-	<5	<5	-
	Trichlorofluoromethane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
	1,2-dibromoethane	µg/L			-	-	-	-	-	-	<1	<1	<1	<1	<1	-	<1	-	<1	<1	-
Halogenated Phenols	2-chlorophenol	µg/L			-	-	-	-	-	<20	-	<20	<20	<20	<20	-	<24	-	<20	<20	-
	2,4-dichlorophenol	µg/L		4.2	-	-	-	-	-	<20	-	<20	<20	<20	<20	-	<24	-	<20	<20	-
	2,4,5-trichlorophenol	µg/L			-	-	-	-	-	<20	-	<20	<20	<20	<20	-	<24	-	<20	<20	-
	2,4,6-trichlorophenol	µg/L			-	-	-	-	-	<20	-	<20	<20	<20	<20	-	<24	-	<20	<20	-
	Pentachlorophenol	µg/L		0.4	-	-	-	-	-	<50	-	<50	<50	<50	<50	-	<60	-	<50	<50	-
Phthalates	Bis(2-ethylhexyl) phthalate	µg/L		1.3	-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	Butyl benzyl phthalate	µg/L		7.5	-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	Di-n-butyl phthalate	µg/L		8	-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	Di-n-octyl phthalate	µg/L		20	-	-	-	-	-	-	-	<2	<2	<2	<2	-	<2	-	-	<2	-
	Diethylphthalate	µg/L		200	-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
	Dimethyl phthalate	µg/L		800	-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
Solvents	Isophorone	µg/L			-	-	-	-	-	-	-	<5	<5	<5	<5	-	<6	-	-	<5	-
Metals	Arsenic	µg/L		50	6	5	2	2	8	1	-	2	3	4	3	1	3	2	3	1	<1
	Boron	µg/L		2000	110	70	100	160	90	150	-	90	80	60	70	120	230	90	290	260	270
	Cadmium	µg/L		0.08	0.9	<0.1	0.3	2.3	0.4	0.2	-	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	0.2	0.2	0.4	0.1
	Chromium (III+VI)	µg/L			1	4	3	<1	5	2	-	3	1	1	1	<1	2	3	<1	1	1
	Copper	µg/L		1	34	3	10	14	35	13	-	3	4	2	4	3	46	7	12	17	2
	Iron	µg/L		1000	760	1020	390	250	180	440	-	1100	130	260	130	110	1450	380	250	220	130
	Lead	µg/L		1.2	34	<1	6	31	3	6	-	3	5	<1	<1	1	7	2	<1	9	<1
	Mercury	µg/L		0.07	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Nickel	µg/L		4	4	2	4	2	2	1	-	3	<1	<1	<1	1	5	2	2	9	<1
	Selenium	µg/L			<1	<1	<1	<1	1	<1	-	<1	<1	<1	<1	13	<1	<1	2	<1	<1
	Zinc	µg/L		10.9	173	-	95	61	56	27	-	29	31	27	27	50	-	9	88	134	-
	Chromium (hexavalent)	µg/L		3.4	10	<10	<10	<10	<10	40	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Organics	Dissolved Organic Carbon	mg/l			17	1.8	11	13	21	4	-	3.6	13	6.2	35	7.2	24	5.6	6.3	25	2.9
Inorganics	Cyanide (Free)	mg/L			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	Cyanide Total	mg/L		0.001	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	0.02	0.03	<0.02	<0.02
	Ammoniacal Nitrogen as N	mg/L		0.3	<0.01	<0.01	0.01	0.02	0.01	<0.01	-	0.02	0.01	<0.01	<0.01	<0.01	<0.01	0.04	0.05	0.01	<0.01
	pH (Lab)	pH_Units			7.6	7.3	8.4	7.7	8.4	7.5	-	7.8	8	7.9	8.1	8.8	7.4	7.6	7.8	7.3	7

Markeaton Junction Leachate Chemistry
Analytical Results
A38 Derby Junctions
Highways England

Location_Code	BM11	BM13	BM13	BM14	BM14	BM16
Sample_Depth_Range	0.500-0.500	0.500-0.500	4.000-4.000	1.000-1.000	6.500-6.500	6.000-6.000
Sampled_Date_Time	23/09/2016	01/08/2016	26/08/2016	25/08/2016	25/08/2016	25/08/2016

Chem_Group	ChemName	output unit	EQL	GAC_WTV_EN/WA_EQS-Fresh							Statistical Summary									
											Number of	Number of	Minimum	Minimum	Maximum	Maximum	Average	Median	Standard	Number of
	Diphenyl ether	mg/L			-	-	-	<0.003	-	-	7	0	<0.002	ND	<0.003	ND	0.0011	0.001	0.00019	0
TPH	>C5-C7	µg/L			-	-	<5	-	<5	-	11	1	<5	20	20	20	4.1	2.5	5.3	0
	>C8-C10	µg/L			-	-	-	-	-	-	6	1	<10	40	40	40	11	5	14	0
	>C10-C12	µg/L			-	-	-	-	-	-	6	1	<10	183	183	183	35	5	73	0
	>C12-C16	µg/L			-	-	-	-	-	-	6	6	14	14	1130	1130	225	30	446	0
	>C16-C21	µg/L			-	-	-	-	-	-	6	5	<10	12	960	960	333	82.5	449	0
	>C21-C35	µg/L			-	-	-	-	-	-	6	5	<10	13	950	950	244	93.5	365	0
	GRO >C5-C6	µg/L			-	-	<100	-	<100	-	11	0	<100	ND	<100	ND	50	50	0	0
	GRO >C5-C10	µg/L			-	-	<100	-	<100	-	11	1	<100	180	180	180	62	50	39	0
	GRO >C6-C8	µg/L			-	-	<100	-	<100	-	11	0	<100	ND	<100	ND	50	50	0	0
	GRO >C7-C8	µg/L			-	-	<5	-	<5	-	11	1	<5	20	20	20	4.1	2.5	5.3	0
	>C8-C10 Aliphatics	µg/L			-	45	-	-	<10	-	11	1	<10	45	45	45	8.7	5	12	0
	>C10-C12 Aliphatics	µg/L			-	107	-	-	<10	-	11	1	<10	107	107	107	14	5	31	0
	>C12-C16 Aliphatics	µg/L			-	256	-	-	<10	-	11	1	<10	256	256	256	28	5	76	0
	>C16-C35 Aliphatics	µg/L			-	67	-	-	15	-	11	4	<10	11	107	107	21	5	34	0
	>C35-C44 Aliphatics	µg/L			-	<10	-	-	<10	-	11	0	<10	ND	<12	ND	5.1	5	0.3	0
	>EC8-EC10 Aromatics	µg/L			-	53	-	-	<10	-	11	1	<10	53	53	53	9.5	5	14	0
	>EC10-EC12 Aromatics	µg/L			-	130	-	-	<10	-	11	3	<10	15	130	130	23	5	40	0
	>EC12-EC16 Aromatics	µg/L			-	158	-	-	<10	-	11	3	<10	14	158	158	22	5	46	0
	>EC16-EC21 Aromatics	µg/L			-	35	-	-	<10	-	11	2	<10	35	49	49	12	5	15	0
	>EC21-EC35 Aromatics	µg/L			-	25	-	-	<10	-	11	3	<10	18	141	141	20	5	41	0
	>EC35-EC44 Aromatics	µg/L			-	<10	-	-	<10	-	11	0	<10	ND	<12	ND	5.1	5	0.3	0
	Gasoline Range Organics	µg/L			-	-	<100	-	<100	-	9	1	<100	800	800	800	133	50	250	0
BTEX	Benzene	µg/L		10	-	-	<1	<1	<5	-	15	1	<1	20	21	21	2.5	0.5	5.1	1
	Toluene	µg/L		74	-	-	<1	<1	<5	-	15	1	<1	18	20	20	2.4	0.5	4.7	0
	Ethylbenzene	µg/L		20	-	-	<1	<1	<5	-	15	1	<1	8	10	10	1.7	0.5	2.2	0
	Xylene (m & p)	µg/L			-	-	<1	<1	-	-	10	1	<1	4	4	4	0.85	0.5	1.1	0
	Xylene Total	µg/L			-	-	<10	-	<10	-	11	1	<10	20	20	20	6.4	5	4.5	0
	Xylene (o)	µg/L			-	-	<1	<1	-	-	10	1	<1	9	9	9	1.4	0.5	2.7	0
Chlorinated Hydrocarbons	Chloromethane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	Vinyl chloride	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	Chloroethane	µg/L			-	-	<5	<5	-	-	10	0	<5	ND	<5	ND	2.5	2.5	0	0
	1,1-dichloroethene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	trans-1,2-dichloroethene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	1,1-dichloroethane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	cis-1,2-dichloroethene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	Chloroform	µg/L		2.5	-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	1,1,1-trichloroethane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	Carbon tetrachloride	µg/L		12	-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	Trichloroethene	µg/L		10	-	-	<5	<5	-	-	10	0	<5	ND	<5	ND	2.5	2.5	0	0
	1,1,2-trichloroethane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	Tetrachloroethene	µg/L		10	-	-	<5	<5	-	-	10	0	<5	ND	<5	ND	2.5	2.5	0	0
VOC	2,2-dichloropropane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	Bromochloromethane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	1,1-dichloropropene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	1,2-dichloroethane	µg/L		10	-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	1,2-dichloropropane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	Dibromomethane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	Bromodichloromethane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	cis-1,3-dichloropropene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	trans-1,3-dichloropropene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	1,3-dichloropropane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	Chlorodibromomethane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	1,1,1,2-tetrachloroethane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	Styrene	µg/L		50	-	-	<1	<1	-	-	10	1	<1	5	5	5	0.95	0.5	1.4	0
	Bromoform	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	Isopropylbenzene	µg/L			-	-	<1	<1	-	-	10	1	<1	1	1	1	0.55	0.5	0.16	0
	1,1,2,2-tetrachloroethane	µg/L		140	-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	1,2,3-trichloropropane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	n-propylbenzene	µg/L			-	-	<1	<1	-	-	10	1	<1	2	2	2	0.65	0.5	0.47	0
	1,3,5-trimethylbenzene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	tert-butylbenzene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	1,2,4-trimethylbenzene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	sec-butylbenzene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	p-isopropyltoluene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	n-butylbenzene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	1,2-dibromo-3-chloropropane	µg/L			-	-	<5	<5	-	-	10	0	<5	ND	<5	ND	2.5	2.5	0	0
	Hexachlorobutadiene	µg/L		0.6	-	-	<5	<5	-	-	10	0	<5	ND	<5	ND	2.5	2.5	0	10
PAH	Naphthalene	µg/L		2	-	-	<5 - 9.81	<3 - 0.042	0.022	0.04	18	16	<0.02	0.022	9.81	9.81	0.67	0.29025	1.4	1
	Acenaphthylene	µg/L			-	-	0.206	<0.01	<0.01	<0.01	18	6	<0.01	0.013	0.206	0.206	0.1	0.005	0.2	0
	Acenaphthene	µg/L			-	-	0.44	<3 - 0.038	0.059	<0.01	18	15	<0.01	0.016	0.44	0.44	0.27	0.07	0.29	0
	Fluorene	µg/L			-	-	0.888	<3 - 0.018	0.023	0.015	18	16	<0.01	0.011	0.888	0.888	0.28	0.03	0.32	0
	Phenanthrene	µg/L			-	-	0.522	<3 - 0.062	0.032	0.066	18	15	<0.01	0.028	0.545	0.545	0.29	0.0695	0.3	0
	Anthracene	µg/L		0.1	-	-	0.078	<0.01	<0.01	0.075	18	12	<0.01	0.011	0.078	0.078	0.16	0.025	0.23	0
	Fluoranthene	µg/L		0.0063	-	-	0.228	<3 - 0.05	0.036	0.012	18	16	<0.01	0.012	0.228	0.228	0.23	0.0655	0.26	18
	Pyrene	µg/L			-	-	0.272	<3 - 0.033	0.03	<0.01	18	15	<0.01	0.018	0.272	0.272	0.23	0.087	0.26	0
	Benz(a)anthracene	µg/L			-	-	0.044	<3 - 0.01	0.012	<0.01	18	10	<0.01	0.012	0.044	0.044	0.14	0.0125	0.24	0
	Chrysene	µg/L			-	-	0.047	<3 - 0.01	<0.01	<0.01	18	5	<0.01	0.024	0.047	0.047	0.079	0.005	0.21	0
	Benzo(a) pyrene	µg/L		0.00017	-	-	0.054	<0.01	<0.01	<0.01	18	4	<0.01	0.015	0.054	0.054	0.011	0.005	0.013	18
	Indeno(1,2,3-c,d)pyrene	µg/L		0.00017	-	-	0.044	<0.01	<0.01	<0.01	18	4	<0.01	0.02	0.044	0.044	0.011	0.005	0.013	18
	Dibenz(a,h)anthracene	µg/L			-	-	<0.01	<0.01	<0.01	<0.01	18	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0
	Benzo(g,h,i)perylene	µg/L		0.0082	-	-	0.088	<0.01	<0.01	<0.01	18	5	<0.01	0.017	0.088	0.088	0.042	0.005	0.12	18
	Benzo(b)fluoranthene	µg/L		0.017	-	-	0.074	<0.01	<0.01	<0.01	18	4	<0.01	0.03	0.074	0.074	0.015	0.005	0.02	4
	Benzo(k)fluoranthene	µg/L		0.017	-	-	0.027	<0.01	<0.01	<0.01	18	4	<0.01	0.011	0.027	0.027	0.008	0.005	0.0065	2
	PAH 16 Total	µg/L			-	-	<12.832	<0.343	<0.304	<0.318	18	0	<0.206	ND	<12.832	ND	0.61	0.20925	1.5	0
SVOC	Coronene	µg/L			-	-	-	<70	-	-	7	0	<50	ND	<70	ND	27	25	3.9	0
	2-methylnaphthalene	µg/L			-	-	-	<3	-	-	7	0	<2	ND	<3	ND	1.1	1	0.19	0
	4-bromophenyl phenyl ether	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
	4-chlorophenyl phenyl ether	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
	Bis(2-chloroethoxy) methane	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
	Bis(2-chloroethyl)ether	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
	Dibenzofuran	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
	Hexachlorocyclopentadiene	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
	Hexachloroethane	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
	1-Methylnaphthalene	µg/L			-	-	-	<3	-	-	7	0	<2	ND	<3	ND	1.1	1	0.19	0
	3,3-Dichlorobenzidine	µg/L			-	-	-	-	-	-	1	0	<20	ND	<20	ND		10		0
	Benzoic Acid	µg/L			-	-	-	<140	-	-	7	0	<100	ND	<140	ND	54	50	7.9	0
	Benzyl alcohol	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
Phenolics	Trimethylphenols	µg/L			<0.5	<0.5	<0.5	<0.5	<0.5	<2.5	22	0	<0.5	ND	<2.5	ND	0.34	0.25	0.29	0
	2-methylphenol	µg/L			-	-	-	<7	<5	-	10	0	<5	ND	<7	ND	2.7	2.5	0.34	0
	2-nitrophenol	µg/L			-	-	-	<28	<20	-	10	0	<20	ND	<28	ND	11	10	1.3	0
	2,4-dimethylphenol	µg/L			-	-	-	<28	<20	-	10	0	<20	ND	<28	ND	11	10	1.3	0
	4-chloro-3-methylphenol	µg/L			-	-	-	<7	<5	-	10	0	<5	ND	<7	ND	2.7	2.5	0.34	0
	4-nitrophenol	µg/L			-	-	-	<70	<50	-	10	0	<50	ND	<70	ND	27	25	3.4	0
	Phenol	µg/L		7.7	5.5	13	<0.5	<0.5	<0.5	31.9	22	15	<0.5	2.4	31.9	31.9	5.8	5.625	7	5
	2-chloronaphthalene	µg/L			-	-	-	<3	-	-	7	0	<2	ND	<3	ND	1.1	1	0.19	0
	2,4-dinitrophenol	µg/L			-	-	-	<14	<10	-	10	0	<10	ND	<14	ND	5.3	5	0.67	0
	2,6-Dimethylphenol	µg/L			<0.5	<0.5	<0.5	<0.5	<0.5	<2.5	22	1	<0.5	5.2	5.2	5.2	0.52	0.25	1.1	0
	3-&4-methylphenol	µg/L			-	-	-	<28	<20	-	10	0	<20	ND	<28	ND	11	10	1.3	0
	4,6-Dinitro-2-methylphenol	µg/L			-	-	-	<70	<50	-	10	0	<50	ND	<70	ND	27	25	3.4	0
	4-chlorophenol	µg/L			-	-	-	<28	<20	-	10	0	<20	ND	<28	ND	11	10	1.3	0
	Cresols by HPLC (W)	µg/L			<0.5	<0.5	0.6	<0.5	0.6	3.8	22	5	<0.5	0.6	3.8	3.8	0.54	0.25	0.78	0
	Total Phenols	µg/L			-	-	-	-	<350	-	8	0	<350	ND	<420	ND	179	175	12	0
Amino Aliphatics	N-nitrosodi-n-propylamine	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
Amino Aromatics	n-Nitrosodiphenylamine	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
Anilines	2-nitroaniline	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
	3-nitroaniline	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
	4-chloroaniline	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
	4-nitroaniline	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
Explosives	2,4-Dinitrotoluene	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
	2,6-dinitrotoluene	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
	Nitrobenzene	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
Halogenated Benzenes	Chlorobenzene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	Bromobenzene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	2-chlorotoluene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	4-chlorotoluene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	1,3-dichlorobenzene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	1,4-dichlorobenzene	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	1,2-dichlorobenzene	µg/L			-	-	<5	<5	-	-	10	0	<5	ND	<5	ND	2.5	2.5	0	0
	1,2,4-trichlorobenzene	µg/L		9.99000000000065E11	-	-	<5	<5	-	-	10	0	<5	ND	<5	ND	2.5	2.5	0	0
	1,2,3-trichlorobenzene	µg/L		9.99000000000065E11	-	-	<5	<5	-	-	10	0	<5	ND	<5	ND	2.5	2.5	0	0
	Hexachlorobenzene	µg/L		0.05	-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	7
Halogenated Hydrocarbons	Dichlorodifluoromethane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	Bromomethane	µg/L			-	-	<5	<5	-	-	10	0	<5	ND	<5	ND	2.5	2.5	0	0
	Trichlorofluoromethane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
	1,2-dibromoethane	µg/L			-	-	<1	<1	-	-	10	0	<1	ND	<1	ND	0.5	0.5	0	0
Halogenated Phenols	2-chlorophenol	µg/L			-	-	-	<28	<20	-	10	0	<20	ND	<28	ND	11	10	1.3	0
	2,4-dichlorophenol	µg/L		4.2	-	-	-	<28	<20	-	10	0	<20	ND	<28	ND	11	10	1.3	10
	2,4,5-trichlorophenol	µg/L			-	-	-	<28	<20	-	10	0	<20	ND	<28	ND	11	10	1.3	0
	2,4,6-trichlorophenol	µg/L			-	-	-	<28	<20	-	10	0	<20	ND	<28	ND	11	10	1.3	0
	Pentachlorophenol	µg/L		0.4	-	-	-	<70	<50	-	10	0	<50	ND	<70	ND	27	25	3.4	10
Phthalates	Bis(2-ethylhexyl) phthalate	µg/L		1.3	-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	7
	Butyl benzyl phthalate	µg/L		7.5	-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
	Di-n-butyl phthalate	µg/L		8	-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
	Di-n-octyl phthalate	µg/L		20	-	-	-	<3	-	-	7	0	<2	ND	<3	ND	1.1	1	0.19	0
	Diethylphthalate	µg/L		200	-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
	Dimethyl phthalate	µg/L		800	-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
Solvents	Isophorone	µg/L			-	-	-	<7	-	-	7	0	<5	ND	<7	ND	2.7	2.5	0.39	0
Metals	Arsenic	µg/L		50	4	3	4	3	2	6	22	21	<1	1	8	8	3.1	3	1.9	0
	Boron	µg/L		2000	80	180	20	390	20	110	22	22	20	20	390	390	138	105	95	0
	Cadmium	µg/L		0.08	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	22	11	<0.1	0.1	2.3	2.3	0.28	0.075	0.49	22
	Chromium (III+VI)	µg/L			<1	2	<1	3	<1	<1	22	15	<1	1	5	5	1.7	1	1.3	0
	Copper	µg/L		1	13	62	2	17	<1	4	22	21	<1	2	62	62	14	8.5	16	21
	Iron	µg/L		1000	400	2940	120	1700	110	120	22	22	110	110	2940	2940	572	255	700	5
	Lead	µg/L		1.2	<1	46	<1	4	<1	<1	22	13	<1	1	46	46	7.3	2.5	13	12
	Mercury	µg/L		0.07	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	22	1	<0.1	0.1	0.1	0.1	0.052	0.05	0.011	22
	Nickel	µg/L		4	1	3	<1	2	<1	<1	22	15	<1	1	9	9	2.1	2	2	4
	Selenium	µg/L			1	<1	<1	<1	<1	<1	22	4	<1	1	13	13	1.2	0.5	2.7	0
	Zinc	µg/L		10.9	8	254	16	-	-	67	17	17	8	8	254	254	68	50	66	15
	Chromium (hexavalent)	µg/L		3.4	<10	20	<10	<10	<10	<10	22	3	<10	10	40	40	7.5	5	8	22
Organics	Dissolved Organic Carbon	mg/l			14	27	1.6	9	0.56	1.5	22	22	0.56	0.56	35	35	11	8.1	9.7	0
Inorganics	Cyanide (Free)	mg/L			<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	22	1	<0.02	0.02	0.02	0.02	0.01	0.01	0.0021	0
	Cyanide Total	mg/L		0.001	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	22	4	<0.02	0.02	0.03	0.03	0.013	0.01	0.0063	22
	Ammoniacal Nitrogen as N	mg/L		0.3	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	22	9	<0.01	0.01	0.05	0.05	0.011	0.005	0.012	0
	pH (Lab)	pH_Units			8.1	7.9	7.4	7.1	7.4	7.8	22	22	7	7	8.8	8.8	7.7	7.75	0.45	0

Location_Code	
Sample_Depth_Range	
Sampled_Date_Time	

Chem_Group	ChemName	output unit	EQL	GAC_WTV_EN/WA_EQS-Fresh	Number of
	Diphenyl ether	mg/L			0
TPH	>C5-C7	µg/L			0
	>C8-C10	µg/L			0
	>C10-C12	µg/L			0
	>C12-C16	µg/L			0
	>C16-C21	µg/L			0
	>C21-C35	µg/L			0
	GRO >C5-C6	µg/L			0
	GRO >C5-C10	µg/L			0
	GRO >C6-C8	µg/L			0
	GRO >C7-C8	µg/L			0
	>C8-C10 Aliphatics	µg/L			0
	>C10-C12 Aliphatics	µg/L			0
	>C12-C16 Aliphatics	µg/L			0
	>C16-C35 Aliphatics	µg/L			0
	>C35-C44 Aliphatics	µg/L			0
	>EC8-EC10 Aromatics	µg/L			0
	>EC10-EC12 Aromatics	µg/L			0
	>EC12-EC16 Aromatics	µg/L			0
	>EC16-EC21 Aromatics	µg/L			0
	>EC21-EC35 Aromatics	µg/L			0
	>EC35-EC44 Aromatics	µg/L			0
	Gasoline Range Organics	µg/L			0
BTEX	Benzene	µg/L		10	1
	Toluene	µg/L		74	0
	Ethylbenzene	µg/L		20	0
	Xylene (m & p)	µg/L			0
	Xylene Total	µg/L			0
	Xylene (o)	µg/L			0
Chlorinated Hydrocarbons	Chloromethane	µg/L			0
	Vinyl chloride	µg/L			0
	Chloroethane	µg/L			0
	1,1-dichloroethene	µg/L			0
	trans-1,2-dichloroethene	µg/L			0
	1,1-dichloroethane	µg/L			0
	cis-1,2-dichloroethene	µg/L			0
	Chloroform	µg/L		2.5	0
	1,1,1-trichloroethane	µg/L			0
	Carbon tetrachloride	µg/L		12	0
	Trichloroethene	µg/L		10	0
	1,1,2-trichloroethane	µg/L			0
	Tetrachloroethene	µg/L		10	0
VOC	2,2-dichloropropane	µg/L			0
	Bromochloromethane	µg/L			0
	1,1-dichloropropene	µg/L			0
	1,2-dichloroethane	µg/L		10	0
	1,2-dichloropropane	µg/L			0
	Dibromomethane	µg/L			0
	Bromodichloromethane	µg/L			0
	cis-1,3-dichloropropene	µg/L			0
	trans-1,3-dichloropropene	µg/L			0
	1,3-dichloropropane	µg/L			0
	Chlorodibromomethane	µg/L			0
	1,1,1,2-tetrachloroethane	µg/L			0
	Styrene	µg/L		50	0
	Bromoform	µg/L			0
	Isopropylbenzene	µg/L			0
	1,1,2,2-tetrachloroethane	µg/L		140	0
	1,2,3-trichloropropane	µg/L			0
	n-propylbenzene	µg/L			0
	1,3,5-trimethylbenzene	µg/L			0
	tert-butylbenzene	µg/L			0
	1,2,4-trimethylbenzene	µg/L			0
	sec-butylbenzene	µg/L			0
	p-isopropyltoluene	µg/L			0
	n-butylbenzene	µg/L			0
	1,2-dibromo-3-chloropropane	µg/L			0
	Hexachlorobutadiene	µg/L		0.6	0
PAH	Naphthalene	µg/L		2	1
	Acenaphthylene	µg/L			0
	Acenaphthene	µg/L			0
	Fluorene	µg/L			0
	Phenanthrene	µg/L			0
	Anthracene	µg/L		0.1	0
	Fluoranthene	µg/L		0.0063	16
	Pyrene	µg/L			0
	Benz(a)anthracene	µg/L			0
	Chrysene	µg/L			0
	Benzo(a) pyrene	µg/L		0.00017	4
	Indeno(1,2,3-c,d)pyrene	µg/L		0.00017	4
	Dibenz(a,h)anthracene	µg/L			0
	Benzo(g,h,i)perylene	µg/L		0.0082	5
	Benzo(b)fluoranthene	µg/L		0.017	4
	Benzo(k)fluoranthene	µg/L		0.017	2
	PAH 16 Total	µg/L			0
SVOC	Coronene	µg/L			0
	2-methylnaphthalene	µg/L			0
	4-bromophenyl phenyl ether	µg/L			0
	4-chlorophenyl phenyl ether	µg/L			0
	Bis(2-chloroethoxy) methane	µg/L			0
	Bis(2-chloroethyl)ether	µg/L			0
	Dibenzofuran	µg/L			0
	Hexachlorocyclopentadiene	µg/L			0
	Hexachloroethane	µg/L			0
	1-Methylnaphthalene	µg/L			0
	3,3-Dichlorobenzidine	µg/L			0
	Benzoic Acid	µg/L			0
	Benzyl alcohol	µg/L			0
Phenolics	Trimethylphenols	µg/L			0
	2-methylphenol	µg/L			0
	2-nitrophenol	µg/L			0
	2,4-dimethylphenol	µg/L			0
	4-chloro-3-methylphenol	µg/L			0
	4-nitrophenol	µg/L			0
	Phenol	µg/L		7.7	5
	2-chloronaphthalene	µg/L			0
	2,4-dinitrophenol	µg/L			0
	2,6-Dimethylphenol	µg/L			0
	3-&4-methylphenol	µg/L			0
	4,6-Dinitro-2-methylphenol	µg/L			0
	4-chlorophenol	µg/L			0
	Cresols by HPLC (W)	µg/L			0
	Total Phenols	µg/L			0
Amino Aliphatics	N-nitrosodi-n-propylamine	µg/L			0
Amino Aromatics	n-Nitrosodiphenylamine	µg/L			0
Anilines	2-nitroaniline	µg/L			0
	3-nitroaniline	µg/L			0
	4-chloroaniline	µg/L			0
	4-nitroaniline	µg/L			0
Explosives	2,4-Dinitrotoluene	µg/L			0
	2,6-dinitrotoluene	µg/L			0
	Nitrobenzene	µg/L			0
Halogenated Benzenes	Chlorobenzene	µg/L			0
	Bromobenzene	µg/L			0
	2-chlorotoluene	µg/L			0
	4-chlorotoluene	µg/L			0
	1,3-dichlorobenzene	µg/L			0
	1,4-dichlorobenzene	µg/L			0
	1,2-dichlorobenzene	µg/L			0
	1,2,4-trichlorobenzene	µg/L		9.99000000000065E11	0
	1,2,3-trichlorobenzene	µg/L		9.99000000000065E11	0
	Hexachlorobenzene	µg/L		0.05	0
Halogenated Hydrocarbons	Dichlorodifluoromethane	µg/L			0
	Bromomethane	µg/L			0
	Trichlorofluoromethane	µg/L			0
	1,2-dibromoethane	µg/L			0
Halogenated Phenols	2-chlorophenol	µg/L			0
	2,4-dichlorophenol	µg/L		4.2	0
	2,4,5-trichlorophenol	µg/L			0
	2,4,6-trichlorophenol	µg/L			0
	Pentachlorophenol	µg/L		0.4	0
Phthalates	Bis(2-ethylhexyl) phthalate	µg/L		1.3	0
	Butyl benzyl phthalate	µg/L		7.5	0
	Di-n-butyl phthalate	µg/L		8	0
	Di-n-octyl phthalate	µg/L		20	0
	Diethylphthalate	µg/L		200	0
	Dimethyl phthalate	µg/L		800	0
Solvents	Isophorone	µg/L			0
Metals	Arsenic	µg/L		50	0
	Boron	µg/L		2000	0
	Cadmium	µg/L		0.08	11
	Chromium (III+VI)	µg/L			0
	Copper	µg/L		1	21
	Iron	µg/L		1000	5
	Lead	µg/L		1.2	12
	Mercury	µg/L		0.07	1
	Nickel	µg/L		4	4
	Selenium	µg/L			0
	Zinc	µg/L		10.9	15
	Chromium (hexavalent)	µg/L		3.4	3
Organics	Dissolved Organic Carbon	mg/l			0
Inorganics	Cyanide (Free)	mg/L			0
	Cyanide Total	mg/L		0.001	4
	Ammoniacal Nitrogen as N	mg/L		0.3	0
	pH (Lab)	pH Units			0

Little Eaton Leachate Chemistry
Analytical Results
A38 Derby Junctions
Highways England

		Limit of Detection Limit	WS Regs 2016 (Eng/Wal)	Location	BL01	BL013		BL03	BL04			BL05		BL06	BL07	BL08	BL08C		BL09	BL10	BL11	TL01		TL02	TL03	TL04	TL05			TL06	TL08		WL06
				Average Depth (m)	1	0.2	1	0.2	0.5	4.5		1	8	0.5	0.5	0.2	3	5	3	1	0.2	0.3	1	1	1	1	0.3	3	1	0.5	1	0.2
				Date	25/08/2016	26/08/2016	26/08/2016	25/08/2016	01/08/2016	05/08/2016		05/08/2016	05/08/2016	19/09/2016	28/07/2016	25/08/2016	23/09/2016	23/09/2016	19/09/2016	25/08/2016	26/08/2016	12/09/2016	12/09/2016	12/09/2016	12/09/2016	12/09/2016	12/09/2016	12/09/2016	12/09/2016	12/09/2016	12/09/2016	12/09/2016	23/09/2016
				Sample Type	Normal	Normal	Normal	Normal	Normal	Normal		Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
	Units			Lab Report Number																												
Diphenyl ether	mg/L				-	-	-	-	-	-	-	-	-	-	-	<0.004	-	-	<0.002	-	<0.002			<0.002							<0.002	-
Methacriphos	mg/L				-	<0.00001	<0.00002	<0.00002	-	-	-	-	-	-	-	-	-	-	-	-	<0.00002			<0.00005	<0.00005	-	<0.00005			-	<0.00002	-	-
Chlorothalonil	µg/L				-	<0.01	<0.02	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.05	-	<0.05	<0.05	-	<0.05	-	-	-	<0.02	-	-
Tecnazene	mg/L			0.0001[1]	-	<0.00001	<0.00002	<0.00002	-	-	-	-	-	-	-	-	-	-	-	-	<0.00001	<0.00005	-	<0.00005	<0.00005	-	<0.00005	-	-	-	<0.00002	-	-
Etrimphos	mg/L			0.0001[1]	-	<0.00001	<0.00002	<0.00002	-	-	-	-	-	-	-	-	-	-	-	-	<0.00001	<0.00005	-	<0.00005	<0.00005	-	<0.00005	-	-	-	<0.00002	-	-
Propetamphos	mg/L			0.0001[1]	-	<0.00002	<0.00004	<0.00004	-	-	-	-	-	-	-	-	-	-	-	-	<0.00002	<0.0001	-	<0.0001	<0.0001	-	<0.0001	-	-	-	<0.00004	-	-
HCH -alpha	µg/l				-	<0.1	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	<0.5	-	<0.5	<0.5	-	<0.5	-	-	-	<0.2	-	-
HCH -beta	µg/l				-	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.1	-	<0.1	<0.1	-	<0.1	-	-	-	<0.04	-	-
HCH -delta	µg/l				-	<0.01	<0.02	<0.02	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	<0.05	-	<0.05	<0.05	-	<0.05	-	-	-	<0.02	-	-
TPH																																
>C5-C7	µg/L				-	-	-	<5	-	-	-	<5	<5	-	<5	<5	<5	-	-	<5	<5	-	-	<5	-	-	-	-	-	-	-	-	-
>C8-C10	µg/L				-	-	-	<10	-	-	-	-	<10	-	-	<10	-	-	-	-	-	-	<10	-	<10	-	-	-	-	-	-	-	-
>C10-C12	µg/L				-	-	-	<10	-	-	-	-	<10	-	-	11	-	-	-	-	-	-	<10	-	<10	-	-	-	-	-	-	-	-
>C12-C16	µg/L				-	-	-	<10	-	-	-	-	<10	-	-	28	-	-	-	-	-	-	<10	-	<10	-	-	-	-	-	-	-	-
>C16-C21	µg/L				-	-	-	198	-	-	-	-	<10	-	-	14	-	-	-	-	-	-	<10	-	<10	-	-	-	-	-	-	-	-
>C21-C35	µg/L				-	-	-	305	-	-	-	-	23	-	-	34	-	-	-	-	-	-	12	-	11	-	-	-	-	-	-	-	-
GRO >C5-C6	µg/L				-	-	-	<100	-	-	-	<100	<100	-	<100	<100	-	-	-	<100	<100	-	<100	-	-	-	-	-	-	-	-	-	-
GRO >C6-C8	µg/L				-	-	-	<100	-	-	-	<100	<100	-	<100	<100	-	-	-	<100	<100	-	<100	-	-	-	-	-	-	-	-	-	-
GRO >C8-C9	µg/L				-	-	-	<100	-	-	-	<100	<100	-	<100	<100	-	-	-	<100	<100	-	<100	-	-	-	-	-	-	-	-	-	-
GRO >C7-C8	µg/L				-	-	-	<5	-	-	-	<5	<5	-	<5	<5	-	-	-	<5	<5	-	<5	-	-	-	-	-	-	-	-	-	-
>C8-C10 Aliphatics	µg/L			300[2]	-	-	-	<10	-	-	-	<10	<10	-	<22	-	-	-	-	<10	<10	-	<10	-	-	-	-	-	-	-	-	-	-
>C10-C12 Aliphatics	µg/L			300[2]	-	-	-	<10	-	-	-	<10	<10	-	<22	-	-	-	-	<10	<10	-	<10	-	-	-	-	-	-	-	-	-	-
>C12-C16 Aliphatics	µg/L			300[2]	-	-	-	<10	-	-	-	<10	<10	-	<22	-	-	-	-	<10	<10	-	<10	-	-	-	-	-	-	-	-	-	-
>C16-C35 Aliphatics	µg/L				-	-	-	302	-	-	-	<10	<10	-	491	-	-	-	-	<10	<10	-	<10	-	-	-	-	-	-	-	-	-	-
>C35-C44 Aliphatics	µg/L			300[2]	-	-	-	<10	-	-	-	<10	<10	-	<22	-	-	-	-	<10	<10	-	<10	-	-	-	-	-	-	-	-	-	-
>EC8-EC10 Aromatics	µg/L			300[2]	-	-	-	<10	-	-	-	<10	<10	-	<22	-	-	-	-	<10	<10	-	<10	-	-	-	-	-	-	-	-	-	-
>EC10-EC12 Aromatics	µg/L			90[2]	-	-	-	<10	-	-	-	<10	<10	-	<22	-	-	-	-	<10	<10	-	<10	-	-	-	-	-	-	-	-	-	-
>EC12-EC16 Aromatics	µg/L			90[2]	-	-	-	<10	-	-	-	<10	<10	-	<22	-	-	-	-	<10	<10	-	<10	-	-	-	-	-	-	-	-	-	-
>EC16-EC21 Aromatics	µg/L			90[2]	-	-	-	23	-	-	-	<10	<10	-	30	-	-	-	-	<10	<10	-	<10	-	-	-	-	-	-	-	-	-	-
>EC21-EC35 Aromatics	µg/L			90[2]	-	-	-	43	-	-	-	<10	<10	-	67	-	-	-	-	<10	<10	-	<10	-	-	-	-	-	-	-	-	-	-
>EC35-EC44 Aromatics	µg/L			90[2]	-	-	-	<10	-	-	-	<10	<10	-	<22	-	-	-	-	<10	<10	-	<10	-	-	-	-	-	-	-	-	-	-
Gasoline Range Organics	µg/L				-	-	-	-	-	-	-	<100	-	-	<100	-	-	-	-	<100	<100	-	<100	-	-	<100	-	-	-	-	-	-	-
BTEX																																
Benzene	µg/L			1[4]	<1	-	-	<5	-	-	-	<5	<1	<1	<1	<1	<5	-	<1	<1	<1	-	<5	-	-	-	-	-	-	-	-	-	-
Toluene	µg/L			700[2]	<1	-	-	<5	-	-	-	<5	<1	<1	<1	<5	-	-	<1	<1	<1	-	<5	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	µg/L			300[2]	<1	-	-	<5	-	-	-	<5	<1	<1	<1	<5	-	-	<1	<1	<1	-	<5	-	-	-	-	-	-	-	-	-	-
Xylene (m & p)	µg/L				<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Xylene Total	µg/L			500[2]	<2	-	-	<10	-	-	-	<10	<2	<10	<2	<10	<10	-	<2	<10	<10	-	<10	-	-	-	-	-	-	-	-	-	-
Xylene (o)	µg/L			100[2]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Total BTEX	µg/L				<5	-	-	<15	-	-	-	<15	<5	<5	<5	<5	<15	-	<5	<5	<5	-	<15	-	-	-	-	-	-	-	-	-	-
Chlorinated Hydrocarbons																																
Chloromethane	µg/L			150[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl chloride	µg/L			0.5[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	µg/L			21000[4]	<5	-	-	-	-	-	-	-	<5	<5	<5	-	-	-	<5	<5	<5	-	-	-	-	-	-	-	-	-	-	-	-
1,1-dichloroethene	µg/L			140[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-dichloroethene	µg/L			360[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
1,1-dichloroethane	µg/L			2.8[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-dichloroethene	µg/L			30[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform	µg/L			0.99000000000015E11[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1-trichloroethane	µg/L			2000[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Carbon tetrachloride	µg/L			3[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	µg/L			0.99000000000042E11[4]	<5	-	-	-	-	-	-	-	<5	<5	<5	-	-	-	<5	<5	<5	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-trichloroethane	µg/L			0.28[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	µg/L			0.99000000000042E11[4]	<5	-	-	-	-	-	-	-	<5	<5	<5	-	-	-	<5	<5	<5	-	-	-	-	-	-	-	-	-	-	-	-
Sum of PCE and TCE	µg/L			10[4]	<10	-	-	-	-	-	-	-	<10	<10	<10	-	-	-	<10	<10	<10	-	-	-	-	-	-	-	-	-	-	-	-
TCE+DCE+VC	µg/L				<9	-	-	-	-	-	-	-	<9	<9	<9	-	-	-	<9	<9	<9	-	-	-	-	-	-	-	-	-	-	-	-
PCE+TCE+DCE+VC	µg/L				<14	-	-	-	-	-	-	-	<14	<14	<14	-	-	-	<14	<14	<14	-	-	-	-	-	-	-	-	-	-	-	-
VOC																																
2,2-dichloropropane	µg/L				<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Bromochloromethane	µg/L			83[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
1,1-dichloropropene	µg/L				<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
1,2-dichloroethane	µg/L			3[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
1,2-dichloropropane	µg/L			40[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Dibromomethane	µg/L			8.3[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	µg/L			0.99000000000015E11[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-dichloropropene	µg/L				<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-dichloropropene	µg/L				<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
1,3-dichloropropane	µg/L			370[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Chlorodibromomethane	µg/L			0.99000000000015E11[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1,2-tetrachloroethane	µg/L			0.37[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	µg/L			20[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Bromoform	µg/L			0.99000000000015E11[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Isopropylbenzene	µg/L			450[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2,2-tetrachloroethane	µg/L			0.078[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3-trichloropropane	µg/L			0.00075[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
n-propylbenzene	µg/L			660[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-trimethylbenzene	µg/L			170[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
tert-butylbenzene	µg/L			660[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-trimethylbenzene	µg/L			15[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
sec-butylbenzene	µg/L			2600[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
p-isopropyltoluene	µg/L				<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
n-butylbenzene	µg/L			1000[4]	<1	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-
1,2-dibromo-3-chloropropane	µg/L			1[4]	<5	-	-	-	-	-	-	-	<5	<5	<5	-	-	-	<5	<5	<5	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	µg/L			0.1[4]	<5	-	-	-	-	-	-	-	<5	<5	<5	-	-	-	<5	<5	<5	-	-	<5	-	-	-	-	-	-	<5	-	-
1,2-Dichloroethene	µg/L			50[4]	<2	-	-	-	-	-	-	-	<2	<2	<2	-	-	-	<2	<2	<2	-	-	-	-	-	-	-	-	-	-	-	-
Trihalomethanes	µg/L			100[4]	<4	-	-	-	-	-	-	-	<4	<4	<4	-	-	-	<4	<4	<4	-	-	-	-	-	-	-	-	-	-	-	-
PAH																																
Naphthalene	µg/L			2[16]	<5 - 0.057	-	0.044	0.04	-	-	-	-	<5 - 0.022	<5 - 0.029	<0.02	<0.02	0.028	<2 - 0.021	<5 - 0.035	<2 - 0.053	-	-	-	<2	<0.02	-	0.045	-	-	<2	<0.02
Acenaphthylene	µg/L			16[16]	<0.01	-	<0.01	<0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<2	<0.01	-	0.01	-	-	<2	<0.01
Acenaphthene	µg/L			18[16]	0.018	-	0.015	0.031	-	-	-	-	<0.01	0.028	<0.01	<0.01	0.012	<0.01	0.011	<0.01	<0.01	-	-	-	<2	<0.01	-	<0.01	-	-	<2	0.028
Fluorene	µg/L			12[16]	0.019	-	0.013	0.011	-	-	-	-	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<2	<0.01	-	<0.01	-	-	<2	0.015
Phenanthrene	µg/L			4[16]	0.115	-	0.068	0.041	-	-	-	-	0.014	0.05	<4 - 0.023	<0.01	0.016	<2 - 0.012	0.029	<0.01	<0.01	-	-	-	<2	<0.01	-	0.012	-	-	<2	0.103
Anthracene	µg/L			80[16]	<0.01	-	0.01	<0.01	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	-	-	-	<2	<0.01	-	<0.01	-	-	<2	0.018
Fluoranthene	µg/L			4[16]	0.016	-	0.048	0.055	-	-	-	-	0.013	0.028	<4 - 0.048	<0.01	<0.01	<2 - 0.039	0.027	<2 - 0.019	-	-	-	-	<2	<0.01	-	0.012	-	-	<2	0.072
Pyrene	µg/L			8.2[16]	<0.01	-	0.038	0.037	-	-	-	-	0.01	0.019	<4 - 0.047	<0.01	<0.01	<2 - 0.046	0.023	<2 - 0.014	-	-	-	-	<2	<0.01	-	<0.01	-	-	<2	0.061
Benz(a)anthracene	µg/L			3.5[16]	<0.01	-	0.017	<0.01	-	-	-	-	0.016	<0.01	<4 - 0.046	<0.01	<0.01	<2 - 0.024	0.011	<2 - 0.011	-	-	-	-	<2	<0.01	-	<0.01	-	-	<2	0.034
Chrysene	µg/L			12[16]	<0.01	-	0.012	<0.01	-	-	-	-	<0.01	<0.01	<4 - 0.055	<0.01	<0.01	<2 - 0.017	<0.01	<0.01	-	-	-	-	<2	<0.01	-	<0.01	-	-	<2	0.032
Benzo(e) pyrene	µg/L			0.01[16]	<0.01	-	0.013	<0.01	-	-	-	-	<0.01	<0.01	<4 - 0.058	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<2	<0.01	-	<0.01	-	-	<2	0.039
Indeno(1,2,3-c,d)pyrene	µg/L			0.1	<0.01	-	0.012	<0.01	-	-	-	-	<0.01	<0.01	<4 - 0.081	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<2	<0.01	-	<0.01	-	-	<2	0.045
Dibenz(a,h)anthracene	µg/L			0.1[16]	<0.01	-	<0.01	<0.01	-	-	-	-	<0.01	<0.01	<4 - 0.014	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<2	<0.01	-	<0.01	-	-	<2	<0.01
Benzo(g,h,i)perylene	µg/L			0.1	<0.01	-	0.012	<0.01	-	-	-	-	<0.01	<0.01	<4 - 0.073	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<2	<0.01	-	<0.01	-	-	<2	0.046
Benzo(b)fluoranthene	µg/L			0.1	<0.01	-	0.017	<0.01	-	-	-	-	<0.01	<0.01	0.14	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<2	<0.01	-	<0.01	-	-	<2	0.048
Benzo(k)fluoranthene	µg/L			0.1	<0.01	-	<0.01	<0.01	-	-	-	-	<0.01	<0.01	<4 - 0.046	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<2	<0.01	-	<0.01	-	-	<2	0.019
Benzo(b&k)fluoranthene	µg/L				<0.02	-	0.027	<0.02	-	-	-	-	<0.02	<0.02	0.148	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-	<4	<0.02	-	<0.02	-	-	<4	0.067
PAHs (sum of 4)	µg/L			0.1[16]	<0.04	-	0.051	<0.04	-	-	-	-	<0.04	<0.04	0.188	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	-	-	-	<8	<0.04	-	<0.04	-	-	<8	0.184
PAH 16 Total	µg/L				<0.336	-	<0.337	0.315	-	-	-	-	<0.185	0.274	<0.681	<0.17	<0.186	<0.259	<0.236	<0.217	-	-	-	-	-	-	<0.117	-	-	-	<0.202	-	<0.596
benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene	µg/L				<0.02	-	0.024	<0.02	-	-	-	-	<0.02	<0.02	0.154	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-	<4	<0.02	-	<0.02	-	-	<4	0.091
Coal Tar (Bap as surrogate marker)	µg/L				<0.01	-	0.011	<0.01	-	-	-	-	<0.01	<0.01	0.086	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	<2	<0.01	-	<0.01	-	-	<2	0.035
SVOC																																
Coronene	µg/L				-	-	-	-	-	-	-	-	-	-	<100	-	-	<50	-	<50	-	-	-	-	<50	-	-	-	-	-	<50	-
2-methylnaphthalene	µg/L			36[16]	-	-	-	-	-	-	-	-	-	-	<4	-	-	<2	-	<2	-	-	-	-	<2	-	-	-	-	-	<2	-
4-bromophenyl phenyl ether	µg/L				-	-	-	-	-	-	-	-	-	-	<10	-	-	<5	-	<5	-	-	-	-	<5	-	-	-	-	-	<5	-
4-chlorophenyl phenyl ether	µg/L				-	-	-	-	-	-	-	-	-	-	<10	-	-	<5	-	<5	-	-	-	-	<5	-	-	-	-	-	<5	-
Bis(2-chloroethoxy) methane	µg/L			59[16]	-	-	-	-	-	-	-	-	-	-	<10	-	-	<5	-	<5	-	-	-	-	<5	-	-	-	-	-	<5	-
Bis(2-chloroethyl)ether	µg/L			0.014[4]	-	-	-	-	-	-	-	-	-	-	<10	-	-	<5	-	<5	-	-	-	-	<5	-	-	-	-	-	<5	-
Dibenzofuran	µg/L			7.9[16]	-	-	-	-	-	-	-	-	-	-	<10	-	-	<5	-	<5	-	-	-	-	<5	-	-	-	-	-	<5	-
Hexachlorocyclopentadiene	µg/L			0.41[16]	-	-	-	-	-	-	-	-	-	-	<10	-	-	<5	-	<5	-	-	-	-	<5	-	-	-	-	-	<5	-
Hexachloroethane	µg/L			0.33[4]	-	-	-	-	-	-	-	-	-	-	<10	-	-	<5	-	<5	-	-	-	-	<5	-	-	-	-	-	<5	-
1-Methylnaphthalene	µg/L			1.1[16]	-	-	-	-	-	-	-	-	-	-	<4	-	-	<2	-	<2	-	-	-	-	<2	-	-	-	-	-	<2	-
Benzoic Acid	µg/L			75000[16]	-	-	-	-	-	-	-	-	-	-	<200	-	-	<100	-	<100	-	-	-	-	<100	-	-	-	-	-	<100	-
Benzyl alcohol	µg/L			2600[16]	-	-	-	-	-	-	-	-	-	-	<10	-	-	<5	-	<5	-	-	-	-	<5	-	-	-	-	-	<5	-
Phenolics																																
Trimethylphenols	µg/L				<2.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-methylphenol	µg/L			930[16]	-	-	-	-	-	-	-	-	-	-	<10	-	-	<5	-	<5	-	-	-	-	<5	-	-	-	-	-	<5	-
2-nitrophenol	µg/L				-	-	-	-	-	-	-	-	-	-	<40	-	-	<20	-	<20	-	-	-	-	<20	-	-	-	-	-	<20	-
2,4-dimethylphenol	µg/L			360[16]	-	-	-	-	-	-	-	-	-	-	<40	-	-	<20	-	<20	-	-	-	-	<20	-	-	-	-	-	<20	-
4-chloro-3-methylphenol	µg/L			1400[16]	-	-	-	-	-	-	-	-	-	-	<10	-	-	<5	-	<5	-	-	-	-	<5	-	-	-	-	-	<5	-
4-nitrophenol	µg/L				-	-	-	-	-	-	-	-	-	-	<100	-	-	<50	-	<50	-	-	-	-	<50	-	-	-	-	-	<50	-
Phenol	µg/L			5800[16]	45.1	-	<0.5	7	10.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	1.5	<20 - 0.9	<0.5	<0.5	-	5	3.8	<20 - 3.1	6.3	5.1	3	7.6	2.9	<20 - 6.3	3.1
2-chloronaphthalene	µg/L			750[16]	-	-	-	-	-	-	-	-	-	-	<4	-	-	<2	-	<2	-	-	-	-	<2	-	-	-	-	-	<2	-
2,4-dinitrophenol	µg/L			39[16]	-	-	-	-	-	-	-	-	-	-	<20	-	-	<10	-	<10	-	-	-	-	<10	-	-	-	-	-	<10	-
2,6-Dimethylphenol	µg/L			11[16]	<2.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
3-&4-methylphenol	µg/L				-	-	-	-	-	-	-	-	-	-	<40	-	-	<20	-	<20	-	-	-	-	<20	-	-	-	-	-	<20	-
4,6-Dinitro-2-methylphenol	µg/L			1.9[16]	-	-	-	-	-	-	-	-	-	-	<100	-	-	<50	-	<50	-	-	-	-	<50	-	-	-	-	-	<50	-
4-chlorophenol	µg/L				-	-	-	-	-	-	-	-	-	-	<40	-	-	<20	-	<20	-	-	-	-	<20	-	-	-	-	-	<20	-
Cresols by HPLC (W)	µg/L				<2.5	-	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Phenols	µg/L				-	-	-	-	-	-	-	-	-	-	<700	-	-	<350	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fungicides																																
Triadimefon	µg/L			0.1[16]	-	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.1	-	<0.1	<0.1	-	<0.1	-	-	-	<0.04	-	-
Herbicides																																
Pendimethalin	µg/L			0.1[16]	-	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.1	-	<0.1	<0.1	-	<0.1	-	-	-	<0.04	-	-
Triallate	µg/L			0.1[16]	-	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.1	-	<0.1	<0.1	-	<0.1	-	-	-	<0.04	-	-
Trifluralin	µg/L			0.1[16]	-	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.1	-	<0.1	<0.1	-	<0.1	-	-	-	<0.04	-	-
Dichlobenil	µg/L			0.1[16]	-	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.1	-	<0.1	<0.1	-	<0.1	-	-	-

	Units	Method Detection Limit	G:\AC_WIT_BNWA_DATA\WS	Location Average Depth (m) Date Sample Type Lab Report Number	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
Diphenyl ether	mg/L				5	0	<0.002	ND	<0.004	ND	0.0012	0.001	0.00045	0	0
Methacriphos	mg/L				9	0	<0.00001	ND	<0.00005	ND	0.000016	0.00001	0.0000092	0	0
Chlorothalonil	µg/L				9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Tecnazene	mg/L				9	0	<0.00001	ND	<0.00005	ND	0.000016	0.00001	0.0000092	0	0
Etrimphos	mg/L				9	0	<0.00001	ND	<0.00005	ND	0.000016	0.00001	0.0000092	0	0
Propetamphos	mg/L				9	0	<0.00002	ND	<0.0001	ND	0.000031	0.00002	0.000018	0	0
HCH -alpha	µg/l				9	0	<0.1	ND	<0.5	ND	0.16	0.1	0.092	0	0
HCH -beta	µg/l				9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
HCH -delta	µg/l				9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
TPH															
>C5-C7	µg/L				8	0	<5	ND	<5	ND	2.5	2.5	0	0	0
>C8-C10	µg/L				5	0	<10	ND	<10	ND	5	5	0	0	0
>C10-C12	µg/L				5	1	<10	11	11	11	6.2	5	2.7	0	0
>C12-C16	µg/L				6	1	<10	28	28	28	9.6	5	10	0	0
>C16-C21	µg/L				5	2	<10	14	198	198	45	5	85	0	0
>C21-C35	µg/L				5	5	11	11	305	305	77	23	128	0	0
GRO >C5-C6	µg/L				8	0	<100	ND	<100	ND	50	50	0	0	0
GRO >C5-C10	µg/L				8	0	<100	ND	<100	ND	50	50	0	0	0
GRO >C8-C9	ug/L				8	0	<100	ND	<100	ND	50	50	0	0	0
GRO >C7-C8	µg/L				8	0	<5	ND	<5	ND	2.5	2.5	0	0	0
>C8-C10 Aliphatics	µg/L			300[15]	7	0	<10	ND	<22	ND	5.9	5	2.3	0	0
>C10-C12 Aliphatics	µg/L			300[15]	7	0	<10	ND	<22	ND	5.9	5	2.3	0	0
>C12-C16 Aliphatics	µg/L			300[15]	7	0	<10	ND	<22	ND	5.9	5	2.3	0	0
>C16-C35 Aliphatics	µg/L				7	2	<10	302	491	491	117	5	199	0	0
>C35-C44 Aliphatics	µg/L			300[15]	7	0	<10	ND	<22	ND	5.9	5	2.3	0	0
>EC8-EC10 Aromatics	µg/L			300[15]	7	0	<10	ND	<22	ND	5.9	5	2.3	0	0
>EC10-EC12 Aromatics	µg/L			90[15]	7	0	<10	ND	<22	ND	5.9	5	2.3	0	0
>EC12-EC16 Aromatics	µg/L			90[15]	7	0	<10	ND	<22	ND	5.9	5	2.3	0	0
>EC16-EC21 Aromatics	µg/L			90[15]	7	2	<10	23	30	30	11	5	11	0	0
>EC21-EC35 Aromatics	µg/L			90[15]	7	2	<10	43	67	67	19	5	25	0	0
>EC35-EC44 Aromatics	µg/L			90[15]	7	0	<10	ND	<22	ND	5.9	5	2.3	0	0
Gasoline Range Organics	µg/L				6	0	<100	ND	<100	ND	50	50	0	0	0
BTEX															
Benzene	µg/L			1[4]	11	0	<1	ND	<5	ND	1.2	0.5	1	4	0
Toluene	µg/L			700[15]	11	0	<1	ND	<5	ND	1.2	0.5	1	0	0
Ethylbenzene	µg/L			300[15]	11	0	<1	ND	<5	ND	1.2	0.5	1	0	0
Xylene (m & p)	µg/L				7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Xylene Total	µg/L			500[15]	11	0	<2	ND	<10	ND	3.9	5	1.9	0	0
Xylene (o)	µg/L			100[15]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Total BTEX	µg/L				11	0	<5	ND	<15	ND	4.3	2.5	2.5	0	0
Chlorinated Hydrocarbons															
Chloromethane	µg/L			180[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Vinyl chloride	µg/L			0.5[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	7	0
Chloroethane	µg/L			21000[16]	7	0	<5	ND	<5	ND	2.5	2.5	0	0	0
1,1-dichloroethene	µg/L			140[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
trans-1,2-dichloroethene	µg/L			360[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1-dichloroethane	µg/L			2.8[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
cis-1,2-dichloroethene	µg/L			30[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chloroform	µg/L			0.99000000000015E11[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,1-trichloroethane	µg/L			2000[15]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Carbon tetrachloride	µg/L			3[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Trichloroethene	µg/L			0.99000000000042E11[4]	7	0	<5	ND	<5	ND	2.5	2.5	0	0	0
1,1,2-trichloroethane	µg/L			0.28[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	7	0
Tetrachloroethene	µg/L			0.99000000000042E11[4]	7	0	<5	ND	<5	ND	2.5	2.5	0	0	0
Sum of PCE and TCE	µg/L			10[15]	7	0	<10	ND	<10	ND	5	5	0	0	0
TCE+DCE+VC	µg/L				7	0	<9	ND	<9	ND	4.5	4.5	0	0	0
PCE+TCE+DCE+VC	µg/L				7	0	<14	ND	<14	ND	7	7	0	0	0
VOC															
2,2-dichloropropane	µg/L				7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromochloromethane	µg/L			83[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1-dichloropropene	µg/L				7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichloroethane	µg/L			3[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichloropropane	µg/L			40[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dibromomethane	µg/L			8.3[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromodichloromethane	µg/L			0.99000000000015E11[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
cis-1,3-dichloropropene	µg/L				7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
trans-1,3-dichloropropene	µg/L				7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3-dichloropropane	µg/L			370[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chlorodibromomethane	µg/L			0.99000000000015E11[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,1,2-tetrachloroethane	µg/L			0.57[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	7	0
Styrene	µg/L			20[15]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromoform	µg/L			0.99000000000015E11[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Isopropylbenzene	µg/L			450[15]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,2,2-tetrachloroethane	µg/L			0.078[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	7	0
1,2,3-trichloropropane	µg/L			0.00075[16]	7	0	<1	ND	<1	ND	0.5	0.5	0	7	0
n-propylbenzene	µg/L			660[15]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3,5-trimethylbenzene	µg/L			190[15]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
tert-butylbenzene	µg/L			680[15]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2,4-trimethylbenzene	µg/L			15[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
sec-butylbenzene	µg/L			2600[15]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
p-isopropyltoluene	µg/L				7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
n-butylbenzene	µg/L			1000[15]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dibromo-3-chloropropane	µg/L			1[4]	7	0	<5	ND	<5	ND	2.5	2.5	0	7	0
Hexachlorobutadiene	µg/L			0.1[4]	9	0	<5	ND	<5	ND	2.5	2.5	0	9	0
1,2-Dichloroethene	µg/L			50[15]	7	0	<2	ND	<2	ND	1	1	0	0	0
Trihalomethanes	µg/L			100[15]	7	0	<4	ND	<4	ND	2	2	0	0	0
PAH															
Naphthalene	µg/L			6[15]	16	10	<0.02	0.028	<2	0.057	0.52	0.27775	0.56	0	0
Acenaphthylene	µg/L			18[15]	16	1	<0.01	0.01	<2	0.01	0.13	0.005	0.34	0	0
Acenaphthene	µg/L			18[15]	16	7	<0.01	0.011	<2	0.031	0.14	0.0115	0.34	0	0
Fluorene	µg/L			12[15]	16	5	<0.01	0.011	<2	0.02	0.13	0.005	0.34	0	0
Phenanthrene	µg/L			4[16]	16	11	<0.01	0.014	<2	0.115	0.25	0.0455	0.39	0	0
Anthracene	µg/L			80[15]	16	3	<0.01	0.01	<2	0.018	0.13	0.005	0.34	0	0
Fluoranthene	µg/L			0.4[4]	16	11	<0.01	0.012	<2	0.072	0.27	0.038	0.4	0	0
Pyrene	µg/L			8[15]	16	9	<0.01	0.01	<2	0.061	0.27	0.03	0.4	0	0
Benz(a)anthracene	µg/L			3.5[15]	16	7	<0.01	0.011	<2	0.046	0.26	0.0135	0.41	0	0
Chrysene	µg/L			15[15]	16	4	<0.01	0.012	<2	0.055	0.23	0.005	0.41	0	0
Benzo(a) pyrene	µg/L			0.01[4]	16	3	<0.01	0.011	<2	0.086	0.2	0.005	0.41	5	3
Indeno(1,2,3-c,d)pyrene	µg/L			0.1	16	3	<0.01	0.012	<2	0.081	0.2	0.005	0.41	2	0
Dibenz(a,h)anthracene	µg/L			0.07[16]	16	1	<0.01	ND	<2	0.014	0.19	0.005	0.4	2	0
Benzo(g,h,i)perylene	µg/L			0.1	16	3	<0.01	0.012	<2	0.073	0.2	0.005	0.4	2	0
Benzo(b)fluoranthene	µg/L			0.1	16	3	<0.01	0.017	<2	0.102	0.2	0.005	0.41	3	1
Benzo(k)fluoranthene	µg/L			0.1	16	2	<0.01	0.019	<2	0.046	0.19	0.005	0.4	2	0
Benzo(b&k)fluoranthene	µg/L				16	3	<0.02	0.027	<4	0.148	0.27	0.01	0.68	0	0
PAHs (sum of 4)	µg/L			0.1[4]	16	3	<0.04	0.051	<8	0.302	0.55	0.02	1.4	4	2
PAH 16 Total	µg/L				14	0	<0.17	ND	<0.681	ND	0.15	0.12375	0.078	0	0
benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene	µg/L				16	3	<0.02	0.024	<4	0.154	0.27	0.01	0.68	0	0
Coal Tar (Bap as surrogate marker)	µg/L				16	3	<0.01	0.011	<2	0.086	0.14	0.005	0.34	0	0
SVOC															
Coronene	µg/L				5	0	<50	ND	<100	ND	30	25	11	0	0
2-methylnaphthalene	µg/L			36[4]	5	0	<2	ND	<4	ND	1.2	1	0.45	0	0
4-bromophenyl phenyl ether	µg/L				5	0	<5	ND	<10	ND	3	2.5	1.1	0	0
4-chlorophenyl phenyl ether	µg/L				5	0	<5	ND	<10	ND	3	2.5	1.1	0	0
Bis(2-chloroethoxy) methane	µg/L			59[16]	5	0	<5	ND	<10	ND	3	2.5	1.1	0	0
Bis(2-chloroethyl)ether	µg/L			0.014[4]	5	0	<5	ND	<10	ND	3	2.5	1.1	5	0
Dibenzofuran	µg/L			7.9[16]	5	0	<5	ND	<10	ND	3	2.5	1.1	1	0
Hexachlorocyclopentadiene	µg/L			0.41[4]	5	0	<5	ND	<10	ND	3	2.5	1.1	5	0
Hexachloroethane	µg/L			0.33[4]	5	0	<5	ND	<10	ND	3	2.5	1.1	5	0
1-Methylnaphthalene	µg/L			1.1[4]	5	0	<2	ND	<4	ND	1.2	1	0.45	5	0
Benzoic Acid	µg/L			75000[16]	5	0	<100	ND	<200	ND	60	50	22	0	0
Benzyl alcohol	µg/L			2600[16]	5	0	<5	ND	<10	ND	3	2.5	1.1	0	0
Phenolics															
Trimethylphenols	µg/L				25	0	<0.5	ND	<2.5	ND	0.29	0.25	0.2	0	0
2-methylphenol	µg/L			930[16]	5	0	<5	ND	<10	ND	3	2.5	1.1	0	0
2-nitrophenol	µg/L				5	0	<20	ND	<40	ND	12	10	4.5	0	0
2,4-dimethylphenol	µg/L			360[16]	5	0	<20	ND	<40	ND	12	10	4.5	0	0
4-chloro-3-methylphenol	µg/L			1400[16]	5	0	<5	ND	<10	ND	3	2.5	1.1	0	0
4-nitrophenol	µg/L				5	0	<50	ND	<100	ND	30	25	11	0	0
Phenol	µg/L			5800[16]	25	16	<0.5	1	45.1	45.1	5	3	8.9	0	0
2-chloronaphthalene	µg/L			750[16]	5	0	<2	ND	<4	ND	1.2	1	0.45	0	0
2,4-dinitrophenol	µg/L			39[4]	5	0	<10	ND	<20	ND	6	5	2.2	0	0
2,6-Dimethylphenol	µg/L			11[16]	25	0	<0.5	ND	<2.5	ND	0.29	0.25	0.2	0	0
3-&4-methylphenol	µg/L				5	0	<20	ND	<40	ND	12	10	4.5	0	0
4,6-Dinitro-2-methylphenol	µg/L			1.5[4]	5	0	<50	ND	<100	ND	30	25	11	5	0
4-chlorophenol	µg/L				5	0	<20	ND	<40	ND	12	10	4.5	0	0
Cresols by HPLC (W)	µg/L				25	1	<0.5	1.4	<2.5	1.4	0.34	0.25	0.3	0	0
Total Phenols	µg/L				2	0	<350	ND	<700	ND		262.5		0	0
Fungicides															
Triadimefon	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Herbicides															
Pendimethalin	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Triallate	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Trifluralin	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Dichlobenil	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Propanil	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Pesticides															
Iodrin	µg/L			0.1[16]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
cis- Permethrin	µg/L				9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Parathion	µg/L			0.1[4]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Pirimphos -methyl	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Permethrin	µg/L			0.1[4]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Pirimphos -ethyl	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Aldrin+Dieldrin+Endrin+Isodrin	µg/L				9	0	<0.06	ND	<0.3	ND	0.093	0.06	0.055	0	0
Organochlorine Pesticides															
Aldrin	µg/L			0.03[16]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	7	0
Chlordane (cis)	µg/L			0.1[16]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Dieldrin	µg/L			0.03[16]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	4	0
Endosulfan I	µg/L			0.1[16]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Endosulfan II	µg/L			0.1[16]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Endosulfan sulphate	µg/L			0.1[16]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Endrin	µg/L			0.1[16]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Heptachlor	µg/L			0.03[16]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	4	0
Heptachlor epoxide	µg/L			0.03[16]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	7	0
o,p'-DDE	µg/L				9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
2,4-DDT	µg/L				9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
o,p-DDD	µg/L				9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
4,4-DDE	µg/L			0.046[16]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	4	0
DDT	µg/L			0.1[16]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Methoxychlor	µg/L			0.1[16]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
DDD	µg/L			0.1[16]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Chlordane (trans)	µg/L			0.1[16]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Aldrin + Dieldrin	µg/L			0.03[16]	9	0	<0.03	ND	<0.15	ND	0.047	0.03	0.028	7	0
DDT+DDE+DDD	µg/L				9	0	<0.03	ND	<0.15	ND	0.047	0.03	0.028	0	0
Endrin ketone	µg/L				9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Organophosphorous Pesticides															
Azinophos Ethyl	µg/L			0.1[4]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Azinophos methyl	µg/L			0.1[4]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Chlorfenvinphos	µg/L			0.1[4]	9	0	<0.03	ND	<0.15	ND	0.047	0.03	0.028	4	0
Chlorpyrifos	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Chlorpyrifos -methyl	µg/L			0.1[4]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Diazinon	µg/L			0.1[4]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Dichlorvos	µg/L			0.1[4]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Dimethoate	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Ethion	µg/L			0.1[4]	9	0	<0.01	ND	<0.05	ND	0.016	0.01	0.0092	0	0
Fenitrothion	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Fenthion	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Malathion	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Methyl parathion	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Mevinphos (Phosdrin)	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Amino Aliphatics															
N-nitrosodi-n-propylamine	µg/L			0.014[4]	5	0	<5	ND	<10	ND	3	2.5	1.1	5	0
Amino Aromatics															
n-Nitrosodiphenylamine	µg/L			19[16]	5	0	<5	ND	<10	ND	3	2.5	1.1	0	0
Anilines															
2-nitroaniline	µg/L			190[16]	5	0	<5	ND	<10	ND	3	2.5	1.1	0	0
3-nitroaniline	µg/L				5	0	<5	ND	<10	ND	3	2.5	1.1	0	0
4-chloroaniline	µg/L			0.37[4]	5	0	<5	ND	<10	ND	3	2.5	1.1	5	0
4-nitroaniline	µg/L			3.6[4]	5	0	<5	ND	<10	ND	3	2.5	1.1	5	0
Explosives															
2,4-Dinitrotoluene	µg/L			0.24[4]	5	0	<5	ND	<10	ND	3	2.5	1.1	5	0
2,6-dinitrotoluene	µg/L			0.049[4]	5	0	<5	ND	<10	ND	3	2.5	1.1	5	0
Nitrobenzene	µg/L			30[4]	5	0	<5	ND	<10	ND	3	2.5	1.1	0	0
Halogenated Benzenes															
1,2,3,4-tetrachlorobenzene	µg/L				9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
1,3,5-Trichlorobenzene	µg/L			0.1[16]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Chlorobenzene	µg/L			300[15]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromobenzene	µg/L			62[16]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
2-chlorotoluene	µg/L			240[16]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
4-chlorotoluene	µg/L			250[16]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3-dichlorobenzene	µg/L				9	0	<1	ND	<5	ND	0.94	0.5	0.88	0	0
1,4-dichlorobenzene	µg/L			300[15]	9	0	<1	ND	<5	ND	0.94	0.5	0.88	0	0
1,2-dichlorobenzene	µg/L			1000[15]	9	0	<5	ND	<5	ND	2.5	2.5	0	0	0
1,2,4-trichlorobenzene	µg/L			0.1[4]	9	0	<5	ND	<5	ND	2.5	2.5	0	9	0
1,2,3-trichlorobenzene	µg/L			0.1[4]	15	0	<0.01	ND	<5	ND	1	0.025	1.3	6	0
Hexachlorobenzene	µg/L			0.1[4]	12	0	<0.02	ND	<10	ND	0.86	0.05	1.6	3	0
Pentachlorobenzene	µg/L			0.1[4]	9	0	<0.02	ND	<0.1	ND	0.031	0.02	0.018	0	0
Halogenated Hydrocarbons															
Dichlorodifluoromethane	µg/L			200[15]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromomethane	µg/L			7.5[16]	7	0	<5	ND	<5	ND	2.5	2.5	0	0	0
Trichlorofluoromethane	µg/L			5000[15]	7	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dibromoethane	µg/L			0.4[4]	7	0	<1	ND	<1	ND	0.5	0.5	0	7	0
Halogenated Phenols															
2-chlorophenol	µg/L			0.1[16]	5	0	<20	ND	<40	ND	12	10	4.5	5	0
2,4-dichlorophenol	µg/L			0.3[4]	5	0	<20	ND	<40	ND	12	10	4.

Kingsway Junction Groundwater Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	output unit	EQL	GAC_WTV_E NVIA_EQS_Freshwater	Field_ID		BK02	BK04	BK04	BK04	BK04	BK09	BK09	BK09	BK11	BK11	BK11	BK11	BK12	BK12	BK12	BK13	BK13	BK13	BK14	BK14	BK14	BK14	BK15	BK15	BK15
				Location_Code		BK02	BK04	BK04	BK04	BK04	BK09	BK09	BK09	BK11	BK11	BK11	BK11	BK12	BK12	BK12	BK13	BK13	BK13	BK14	BK14	BK14	BK14	BK15	BK15	BK15
				Sampled_Date_Time		06/07/2017	15/12/2016	20/03/2017	06/07/2017	14/12/2016	21/03/2017	04/07/2017	15/12/2016	20/03/2017	06/07/2017	15/12/2016	23/03/2017	05/07/2017	15/12/2016	23/03/2017	05/07/2017	15/12/2016	21/03/2017	05/07/2017	15/12/2016	21/03/2017	05/07/2017	15/12/2016	21/03/2017	05/07/2017
Diphenyl ether	mg/L			TK04	18/06/2016	<0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichloroacetic acid	µg/L				-	-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	-	<0.08	-	-	<0.04	-	-	<0.08	-	-	-	<0.04	-	-	-
o,p'-Methoxychlor	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH (Ali & Aro)	µg/L				700	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benazolin	µg/L				-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04	-	<0.08	-	-	<0.04	-	-	<0.08	-	-	-	<0.04	-	-	-
2,4-DB	µg/L				-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04	-	<0.08	-	-	<0.04	-	-	<0.08	-	-	-	<0.04	-	-	-
2,3,6-Trichlorobenzoic acid	µg/L				-	-	<0.04	-	-	<0.06	-	-	<0.04	-	-	<0.7	-	-	-	<0.065	-	-	<0.9	-	-	-	<0.04	-	-	-
Aromatics >EC8-EC10	µg/L				-	-	<10	-	-	<10	-	-	<10	-	-	599	-	-	-	<10	-	-	45	-	-	-	<10	-	-	-
Aromatics >EC7-EC8	µg/L				-	-	<10	-	-	<10	-	-	<10	-	-	32	-	-	-	<10	-	-	<10	-	-	-	<10	-	-	-
DNOC - (4,6-dinitro-o-cresol)	µg/L				-	-	<3	-	-	<3	-	-	<3	-	-	<3	-	-	-	<3	-	-	<3	-	-	-	<3	-	-	-
TICS																														
Biphenylene	µg/L					<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TPH																														
>C5-C7	µg/L					<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C8-C44	µg/L					302	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GRO >C5-C6	µg/L					<100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GRO >C5-C10	µg/L					<100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GRO >C5-C12	µg/L	50				-	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	1580	683	928	<50	<50	<50	359	276	131	<50	<50	<50	<50	<50
GRO >C6-C8	µg/L					<100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GRO >C7-C8	µg/L					<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C5-C6 Aliphatics	µg/L	10				-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	<10	<10	<10	<10	<10	20	21	23	<10	<10	<10	<10
>C6-C8 Aliphatics	µg/L	10				-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	90	27	49	<10	<10	<10	30	27	15	<10	<10	<10	<10	<10
>C8-C10 Aliphatics	µg/L	10				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	277	171	143	<10	<10	<10	64	44	15	<10	<10	<10	<10	<10
>C10-C12 Aliphatics	µg/L	10				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	331	173	186	<10	<10	<10	119	89	39	<10	<10	<10	<10	<10
>C12-C16 Aliphatics	µg/L	10				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	91	24	70	<10	<10	<10	297	324	323	12	<10	<10	<10	<10
>C16-C21 Aliphatics	µg/L	10				-	<10	<10	<10	<10	<10	13	<10	<10	<10	<10	<10	485	290	476	<10	<10	<10	542	514	525	16	<10	<10	<10	<10
>C16-C35 Aliphatics	µg/L				258	-	33		<20		115			4165				4165			37	-	-	6302			61	-	-	-
>C21-C35 Aliphatics	µg/L	10				<10	23	<10	27	<10	<10	<10	17	102	<10	28	28	3680	2610	3850	27	<10	<10	5760	5360	5370	45	<10	<10	<10
>C35-C44 Aliphatics	µg/L				39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>C12-C35 Aliphatics	µg/L	10				-	<10	23	<10	<10	<10	<10	17	115	<10	28	28	4250	2930	4400	27	<10	<10	6600	6200	6220	73	<10	<10	<10
>C8 -C10 Aromatics	µg/L				<10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>EC5-EC7 Aromatics	µg/L	10	10			-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	17	10	16	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
>EC7-EC8 Aromatics	µg/L	10	74			-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	-	12	10	-	<10	<10	-	<10	<10	-	<10	<10	<10	<10
>EC8-EC10 Aromatics	µg/L	10				-	<10	<10	-	<10	<10	-	<10	<10	<10	<10	<10	-	220	391	-	<10	<10	-	33	12	-	<10	<10	<10	<10
>EC10-EC12 Aromatics	µg/L	10				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	221	115	124	<10	<10	<10	79	59	26	<10	<10	<10	<10	<10
>EC12-EC16 Aromatics	µg/L	10				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	112	99	230	<10	<10	<10	183	258	362	<10	<10	<10	<10	<10
>EC16-EC21 Aromatics	µg/L	10				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	464	258	446	<10	<10	<10	440	484	448	<10	<10	<10	<10	<10
>EC21-EC35 Aromatics	µg/L	10				111	<10	18	<10	<10	<10	<10	<10	<10	<10	28	28	1380	994	1180	<10	<10	<10	1850	1790	1160	<10	<10	<10	<10	<10
>EC35-EC44 Aromatics	µg/L				17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
>EC12-EC35 Aromatics	µg/L	10				-	<10	18	<10	<10	<10	<10	<10	<10	<10	28	28	1960	1350	1860	<10	<10	<10	2470	2530	1960	<10	<10	<10	<10
>C5-C35 Aliphatics & Aromatics	µg/L	10				-	<10	41	<10	<10	<10	<10	17	115	56	56	56	7790	-	7180	27	-	-	9440	-	8310	73	-	-	<10
4-Bromofluorobenzene	µg/L					-	##########	##########	-	##########	##########	-	##########	##########	-	-	-	##########	-	-	##########	-	-	974.000000	-	-	##########	-	-	-	-
BTEX																														
Benzene	µg/L	1	10			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	17 - 24.2	10 - 13.4	16 - 20.6	<1	<1	<1	<7 - 2.57	<7 - 2.2	<7 - 2.79	<1	<1	<1	<1
Toluene	µg/L	1	74			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	28.9 - 32	12 - 15.3	10 - 11.7	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	1	20			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	74	9 - 9.76	24 - 24.4	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Xylene (m & p)	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	356 - 383	122 - 141	258 - 324	<1	<1	<1	<1	<8 - 1.17	<8 - 1.8	<1	<1	<1	<1	<1
Xylene Total	µg/L	1	30			<10	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	380	130	271	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11
Xylene (o)	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	24 - 24.9	6.81 - 8	11.2 - 13	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total BTEX	µg/L	28					<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	463	161	322	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28
Oxygenates																														
MTBE	µg/L	1	5100			-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tert Amyl Methyl Ether	µg/L	1	510			-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorinated Hydrocarbons																														
Chloromethane	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Vinyl chloride	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	µg/L	1				<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.56	4.83	6.27	<1	<1	<1	1.5	<1
1,1-dichloroethene	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dichloromethane	µg/L	3	20			<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
trans-1,2-dichloroethene	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-dichloroethane	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2.8	<1	<1	<1	<1	<1	<1	2.1	0.5	0.48	0
cis-1,2-dichloroethene	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	1.4q	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	6.6q	13	13	1.4q	n.a.	5.37
Chloroform	µg/L	1	2.5			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-trichloroethane	µg/L	1	100			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	1	12			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	µg/L	1	10			<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2-trichloroethane	µg/L	1	400			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	1	10			<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sum of PCE and TCE	µg/L					-	-	<5	-	-	<5	-	-	<5	-	-	-	<5	-	-	<5	-	-	<5	-	-	10.94	-	-	-
TCE+DCE+VC	µg/L					-	-	<5	-	-	<5	-	-	<5	-	-	-	5.59	-	-	<5	-	-	<5	-	-	10.94	-	-	-
PCE+TCE+DCE+VC	µg/L					-	-	<6	-	-	<6	-	-	<6	-	-	-	6.59	-	-	<6	-	-	<6	-	-	11.94	-	-	-
VOC																														
2,2-dichloropropane	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromochloromethane	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-dichloropropene	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dichloroethane	µg/L	1	10			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dichloropropane	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromomethane	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,3-dichloropropene	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,3-dichloropropene	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-dichloropropane	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorodibromomethane	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1,2-tetrachloroethane	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Styrene	µg/L	1	50			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromoform	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isopropylbenzene	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	3.29	1.56	3.24	<1	<1	<1	1.27	<1	<1	<1	<1	<1	<1	<1
1,1,2,2-tetrachloroethane	µg/L	1	140			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-trichloropropane	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
n-propylbenzene	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4.23	1.47	4.54	<1	<1	<1	1.02	<1	<1	<1	<1	<1	<1	<1
1,3,5-trimethylbenzene	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	16.2	8.48	6.24	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
tert-butylbenzene	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-trimethylbenzene	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	71.8	48.2	57.4	<1	<1	<1	2.39	1.5	1.04	<1	<1	<1	<1	<1
sec-butylbenzene	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.69	<1	1.66	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
p-isopropyltoluene	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4.08	1.46	1.76	<1	<1	<1	5.19	3.36	<1	<1	<1	<1	<1	<1
n-butylbenzene	µg/L	1				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.76	<1	1.76	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dibromo-3-chloropropane	µg/L	1				<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	1	0.6			<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethene	µg/L					-	-	<7	-	-	<7	-	-	<7	-	-	-	7.58	-	-	<7	-	-	<7	-	-	7.94	-	-	-
Trihalomethanes	µg/L					-	-	<4	-	-	<4	-	-	<4	-	-	-	<4	-	-	<4	-	-	<4	-	-	<4	-	-	-
PAH																														
Naphthalene	µg/L	0.1	2			<0.02	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.62 - 9.97	1.96 - 3.9	<8 - 7.44	<0.1	<0.1	<0.1	5.99 - 15.3	4.16 - 12.8	<4 - 2.35	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	0.011				<0.01	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<1 - 0.279	<1 - 0.0966	<8 - 0.251	<0.011	<1 - 0.0126	<0.011	<8 - 1.02	<4 - 0.549	<4 - 0.646	<0.011	<0.011	<0.011	<0.011
Acenaphthene	µg/L	0.015				<0.01	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	1.06 - 5.1	2.26 - 2.85	<8 - 6.37	<0.015	<1 - 0.0776	<0.015	25.2 - 28.3	15.8 - 20.6	9.55 - 9.69	<0.015	<0.015	<0.015	<0.015
Fluorene	µg/L	0.014				<0.01	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<1 - 3.36	1.47 - 1.76	<8 - 6.02	<0.014	<1 - 0.0344	<0.014	17.2 - 20.3	11.2 - 16.8	7.47 - 7.68	<0.014	<0.014	<0.014	<0.014
Phenanthrene	µg/L	0.022				<2 - 0.023	<0.022	<0.022	<0.022	<0.022	<2 - 0.0469	<2 - 0.0222	<1 - 0.0321	<0.022	<0.022	<0.022	<0.022	<1 - 19.7	3.79 - 9.47	23.4 - 25.5	<1 - 0.0542	<1 - 0.26	<1 - 0.0313	60.1 - 74.1	38.3 - 61.4	21.9 - 22.8	<0.022	<0.022	<0.022	<0.022
Anthracene	µg/L	0.1	0.1			<2 - 0.012	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<1 - 3.9	0.813 - 2.48	<8 - 3.52	<0.015	<1 - 0.0456	<0.015	15.4 - 21.6	8.44 - 19.8	6.08 - 6.29	<0.015	<0.015	<0.015	<0.015
Fluoranthene	µg/L	0.017	0.0063			<2 - 0.054	<0.017	<0.017	<0.017	<0.017	<2 - 0.188	<2 - 0.0686	<1 - 0.116	<0.017	<0.017	<0.017	<0.017	<1 - 17.6	3.7 - 9.1	39.4 - 39.6	<0.017	<1 - 0.124	<1 - 0.0663	<1 - 0.0954	49.7 - 66.7	28.7 - 49.4	20.1 - 21.7	<0.017	<0.017	<0.017	<0.017
Pyrene	µg/L	0.015				<2 - 0.165	<1 - 0.0328	<1 - 0.0153	<0.015	<1 - 0.0164	<2 - 0.195	<2 - 0.0756	<1 - 0.135	<1 - 0.0341	<0.015	<0.015	<0.015	<1 - 13.3	2.61 - 8.74	13.9 - 25.2	<1 - 0.133	<1 - 0.0547	<1 - 0.0262	41.5 - 56.3	23.1 - 43.3	17.3 - 18.3	<0.015	<1 - 0.0191	<0.015	
Benz(a)anthracene	µg/L	0.012				<2 - 0.045	<0.017	<0.017	<0.017	<0.017	<1 - 0.122	<2 - 0.0495	<1 - 0.076	<0.017	<0.017	<0.017	<0.017	<1 - 6.75	<1 - 2.8	<8 - 5.52	<1 - 0.0957	<1 - 0.0187	<0.017	25.3 - 39.7	16.9 - 19.2	7.41 - 7.62	<0.017	<0.017	<0.017	<0.017
Chrysene	µg/L	0.018				<2 - 0.058	<1 - 0.0136	<0.013	<0.013	<0.013	<2 - 0.272	<2 - 0.0295	<1 - 0.0718	<1 - 0.0168	<0.013	<0.013	<0.013	<1 - 5.95	0.951 - 2.79	<8 - 4.7	<1 - 0.0753	<0.013	<0.013	26.3 - 35.4	12.5 - 17.4	6.98 - 7.39	<0.013	<0.013	<0.013	<0.013
Benzo(a) pyrene	µg/L	0.009	0.00017			<2 - 0.059	<1 - 0.0178	<0.009	<0.009	<0.009	<2 - 0.166	<2 - 0.0494	<1 - 0.0918	<1 - 0.0261	<0.009	<0.009	<0.009	<1 - 7.12	1.12 - 2.25	<8 - 5.65	<1 - 0.0496	<0.009	<0.009	22.4 - 28.9	16 - 31.2	6 - 14.3	<0.009	<1 - 0.0102	<0.009	
Indeno(1,2,3-c,d)pyrene	µg/L	0.014	0.00017			<2 - 0.036	<1 - 0.0198	<0.014	<0.014	<0.014	<2 - 0.105	<2 - 0.0476	<1 - 0.0747	<1 - 0.016	<0.014	<0.014	<0.014	<1 - 3.81	<1 - 0.707	<8 - 2.48	<1 - 0.0377	<0.014	<0.014	11.6 - 43.5	7.65 - 16.8	4.4 - 8.59	<0.014	<0.014	<0.014	<0.014
Dibenz(a,h)anthracene	µg/L					<0.01	<0.016	<0.016	<0.016	<0.016	<2 - 0.0238	<0.016	<1 - 0.0163	<0.016	<0.016	<0.016	<0.016	<1 - 1.03	<1 - 0.153	<8 - 0.619	<0.016	<0.016	<0.016	<8 - 11.2	<4 - 3.63	<4 - 1.73	<0.016	<0.016	<0.016	<0.016
Benzo(g,h,i)perylene	µg/L	0.016	0.0082			<2 - 0.041	<1 - 0.018	<0.016	<0.016	<0.016	<2 - 0.168	<2 - 0.0634	<1 - 0.0736	<1 - 0.0222	<0.016	<0.016	<0.016	<1 - 4.57	0.77 - 1.78	<8 - 2.47	<1 - 0.0643	<0.016	<0.016	12.3 - 16.5	8.39 - 10.7	<4 - 3.85	<0.016	<0.016	<0.016	<0.016
Benzo(b)fluoranthene	µg/L	0.023	0.017			<2 - 0.08	<1 - 0.0332	<0.023	<0.023	<0.023	<2 - 0.274	<2 - 0.0718	<1 - 0.178	<1 - 0.0353	<0.023	<0.023	<0.023	<1 - 7.81	1.2 - 2.92	<8 - 6.8	<1 - 0.0884	<0.023	<0.023	25.1 - 89.3	18.9 - 19.5	7.21 - 16.9	<0.023	<0.023	<0.023	<0.023
Benzo(k)fluoranthene	µg/L	0.027	0.017			<2 - 0.021	<0.027	<0.027	<0.027	<0.027	<2 - 0.115	<2 - 0.029	<1 - 0.0568	<0.027	<0.027	<0.027	<0.027	<1 - 2.95	0.531 - 1.08	<8 - 2.6	<1 - 0.038	<0.027	<0.027	10.8 - 35.4	7.64 - 11.5	<4 - 7.13	<0.027	<0.027	<0.027	<0.027
Benzo(b)&k)fluoranthene

Kingsway Junction Groundwater Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	output unit	EQL	GAC_WTV_E NVIA_EQS_ mean	Field_ID		BK02	BK04	BK04	BK04	BK04	BK09	BK09	BK09	BK11	BK11	BK11	BK12	BK12	BK12	BK12	BK13	BK13	BK13	BK14	BK14	BK14	BK14	BK15	BK15	BK15
				Location_Code		BK02	BK04	BK04	BK04	BK04	BK09	BK09	BK09	BK11	BK11	BK11	BK12	BK12	BK12	BK12	BK13	BK13	BK13	BK14	BK14	BK14	BK14	BK15	BK15	BK15
				Sampled_Date_Time		18/08/2016	06/07/2017	15/12/2016	20/03/2017	06/07/2017	14/12/2016	21/03/2017	04/07/2017	15/12/2016	20/03/2017	06/07/2017	15/12/2016	23/03/2017	05/07/2017	15/12/2016	23/03/2017	05/07/2017	15/12/2016	21/03/2017	05/07/2017	15/12/2016	21/03/2017	05/07/2017	15/12/2016	21/03/2017	05/07/2017
2,4-Dichlorprop	ug/L	0.04			-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.08	<0.08	0.05	<0.04	<0.04	<0.04	<0.04	<0.0571	0.062	<0.04	<0.04	<0.04	<0.04
2,4,5-TP (Silvex)	ug/L	0.04			-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.04	-	-	<0.04	-	-	<0.15	-	-	<0.04		
2-Methyl-4-chlorophenoxyacetic acid	ug/L	0.04	12		-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.08	-	<0.04	<0.04	-	<0.04	<0.04	<0.08	-	<0.04	<0.04	-	<0.04	
2-Methyl-4-Chlorophenoxy Butanoic Acid	ug/L	0.04			-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	<0.08	-	<0.04	<0.04	-	<0.04	<0.04	<0.08	-	<0.04	<0.04	-	<0.04	
2,4,5-Trichlorophenoxy Acetic Acid	ug/L	0.04			-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	<0.08	-	<0.04	<0.04	-	<0.04	<0.04	<0.08	-	<0.04	<0.04	-	<0.04	
Triclopyr	ug/L	0.04			-	<0.04	<0.04	-	-	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	<0.08	-	<0.04	<0.04	-	<0.04	<0.04	<0.08	-	<0.04	<0.04	-	<0.04	
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	ug/L	0.04			-	<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04	-	<0.14	-	-	<0.04					-	<0.04	-	-	<0.04	
Dinoseb	ug/L	4			-	<16	<4	<8	<17	<4	<4	<17	<4	<4	<9	<17	<4	<4	<17	<4	<4	<17	<4	<4	<17	<4	<4	<16	N/1	5.7
Fluroxypyr	ug/L	0.04			-	-	<0.04	-	-	<0.04	-	<0.04	<0.04	-	-	-	<0.08	-	<0.04	<0.04	-	<0.04	<0.04	<0.18	-	<1.2	<0.04	-	<0.04	
Mecoprop	ug/L	0.04	18		-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	0.619	-	-	0.547	<0.04	-	<0.04	0.369	-	0.649	<0.04	-	<0.04	
Fenoprop	ug/L				-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.08	-	-	-	<0.04	-	-	<0.08	-	-	<0.04	-	-	<0.04	
Pesticides																														
Parathion	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aldrin+Dieldrin+Endrin+Isodrin	ug/L		0.01		-	-	<0.03	-	-	<0.03	-	-	<0.03	-	-	<0.03	-	-	<0.03	-	-	<0.03	-	-	<0.03	-	-	<0.03	-	-
Organochlorine Pesticides																														
Aldrin	ug/L	0.01	9.99000000000049E11		-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
a-BHC	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
b-BHC	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	ug/L	0.01	9.99000000000049E11		-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan II	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan sulphate	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/1	<0.01	<0.01
Endrin	ug/L	0.01	9.99000000000049E11		-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
g-BHC (Lindane)	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor epoxide	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o,p''-DDE	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
p,p'-DDT	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o,p-DDD	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,4-DDE	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DDT	ug/L	0.01	0.01		-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	N/1	<0.01	<0.01
Methoxychlor	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DDD	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aldrin + Dieldrin	ug/L				-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02		
DDT+DDE+DDD	ug/L				-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02		
Organophosphorous Pesticides																														
Azinophos methyl	ug/L	0.01	0.01		-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Diazinon	ug/L	0.01	0.01		-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dichlorvos	ug/L	0.01	2.2		-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ethion	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fenitrothion	ug/L	0.01	0.01		-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Malathion	ug/L	0.01	0.01		-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Methyl parathion	ug/L	0.01			-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mevinphos (Phosdrin)	ug/L	0.01	0.02		-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Amino Aliphatics																														
N-nitrosodi-n-propylamine	ug/L	1			<5	<1	<1	<1	<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<8	<1	<1	<1	<1	<8	<4	<4	<1	<1	<1	<1
Amino Aromatics																														
n-Nitrosodiphenylamine	ug/L				<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anilines																														
2-nitroaniline	ug/L	1			<5	<1	<1	<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<1	<8	<1	<1	<1	<1	<8	<4	<4	<1	<1	<1	<1
3-nitroaniline	ug/L	1			<5	<1	<1	<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<1	<8	<1	<1	<1	<1	<8	<4	<4	<1	<1	<1	<1
4-chloroaniline	ug/L	1			<5	<1	<1	<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<1	<8	<1	<1	<1	<1	<8	<4	<4	<1	<1	N/1	<1
4-nitroaniline	ug/L	1			<5	<1	<1	<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<1	<8	<1	<1	<1	<1	<8	<4	<4	<1	<1	<1	<1
Explosives																														
2,4-Dinitrotoluene	ug/L	1			<5	<1	<1	<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<1	<8	<1	<1	<1	<1	<8	<4	<4	<1	<1	<1	<1
2,6-dinitrotoluene	ug/L	1			<5	<1	<1	<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<1	<8	<1	<1	<1	<1	<8	<4	<4	<1	<1	<1	<1
Nitrobenzene	ug/L	1			<5	<1	<1	<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<1	<8	<1	<1	<1	<1	<8	<4	<4	<1	<1	<1	<1
Halogenated Benzenes																														
1,3,5-Trichlorobenzene	ug/L	1	9.99000000000065E11		-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	ug/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.28	1.28	2.88	<1	<1	<1	<1	<1	2.64	<1	<1	<1	1.28	2.88
Benzene	ug/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/1	<1
2-chlorotoluene	ug/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/1	<1
4-chlorotoluene	ug/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/1	<1
1,3-dichlorobenzene	ug/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-dichlorobenzene	ug/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1 - 1.42	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.42	1.42
1,2-dichlorobenzene	ug/L	1			<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<8 - 1.19	<1	<4 - 1.23	<1	<1	<1
1,2,4-trichlorobenzene	ug/L	1	9.99000000000065E11		<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-trichlorobenzene	ug/L	1	9.99000000000065E11		<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobenzene	ug/L	1	0.05		<5	<1	<1	<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<1	<8	<1	<1	<1	<1	<8	<4	<4	<1	<1	<1	<1
Halogenated Hydrocarbons																														
Dichlorodifluoromethane	ug/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane	ug/L	1			<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	ug/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dibromoethane	ug/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/1	<1
Dibromofluoromethane	ug/L	1			-	##########	##########	##########	##########	##########	##########	##########	##########	##########	##########	##########	##########	##########	##########	##########	##########	##########	##########	##########	1,220,000,000	##########	##########	##########	##########	##########
Halogenated Phenols																														
2,3,5,6-Tetrachlorophenol	ug/L	0.5			-	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<3.5	<0.5	<0.5	<0.5	<1	<0.5
2-chlorophenol	ug/L	0.5	50		<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<4 - 0.584	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-dichlorophenol	ug/L	0.5	4.2		<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.706 - 4.76	<0.5	<0.5	<0.5	0.706	4.76
2,4,5-trichlorophenol	ug/L	0.5			<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<4 - 1.07	<0.5	<0.5	ND	<20	1.07
2,4,6-trichlorophenol	ug/L	0.5			<20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.07 - 5.98	<0.5	<0.5	<0.5	1.07	<20
Pentachlorophenol	ug/L	0.04	0.4		<50	<0.04	<0.04	<1	<0.04	<0.04	<2	<0.04	<0.04	<1	<0.04	<1	<1	<2 - 0.089	<0.04	<1	<0.04	<0.8	<4	<0.1	<0.04	<1	<0.04	ND	<50	0.089
Phthalates																														
Bis(2-ethylhexyl) phthalate	ug/L	2	1.3		<5	<2	<2	<7	8.26	<4	<4	<2	<2	<2	<2	<2	18.1	22.2	<2	<2	<2	27.6	37.4	17.2	<2	<2	<2	<2	<2	<2
Butyl benzyl phthalate	ug/L	1	7.5		<5	<1	<1	<3	<1	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<8	<4	<4	<1	<1	<1
Di-n-butyl phthalate	ug/L	1	8		<5	<1	<1	<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	1.75	<8	<1	<1	<1	<1	<8	<4	<4	<1	<1	<1	<1
Di-n-octyl phthalate	ug/L	5	20		<2	<5	<5	<5	<5	<10	<10	<5	<5	<5	<5	<5	<5	<5	<40	<5	<5	<5	<5	<40	<20	<20	<5	<5	<5	<5
Diethylphthalate	ug/L	1	200		<5	<1	<1	<1	<1	<2	<2	<1	<1	<1	<1	<1	1.58	1.32	<8	<1	<1	<1	<1	<8	<4	<4	<1	<1	<1	<1
Dimethyl phthalate	ug/L	1	800		<5	<1	<1	<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<1	<8	<1	<1	<1	31.1	26	12.9	<1	<1	<1	31.1	3.8
Solvents																														
Carbon disulfide	ug/L	1			-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.57	1.78	<1	<1	<1	<1	0.61
Isophorone	ug/L	1			<5	<1	<1	<1	<1	<2	<2	<1	<1	<1	<1	<1	<1	<1	<8	<1	<1	<1	<1	<8	<4	<4	<1	<1	<1	<1	<1
Metals																														
Arsenic	ug/L		50		<1	-	1.26	-	-	-	4.78	-	-	<0.51	-	-	4.72	-	-	0.525	-	-	35.3	-	-	0.668	-	-		
Arsenic (Filtered)	ug/L	0.5	50		-	1.1	-	1.4	1.32	-	-	2.55	2.04	-	-	1.24	1.29	-	3.43	5.74	-	1.22	<0.5	-	9.32	13.1	-	0.82	0.685	
Boron	ug/L	5	2000		240	260	138	-	63	-	-	24.4	-	-	3030	-	-	102	-	-	808	-	-	119	-	-				
Boron (Filtered)	ug/L	5	2000		-	-	-	139	106	-	50.2	48	-	102	117	-	-	1240	2850	-	965	69.4	-	829	1190	-	218	123		
Cadmium	ug/L		0.08		0.4	-	<0.08	-	-	<0.08	-	-	<0.08	-	-	<0.08	-	-	<0.08	-	-	<0.08	-	-	<0.08	-	-	<0.08	-	-
Cadmium (Filtered)	ug/L	0.08	0.08		-	0.274	-	<0.08	<0.08	-	<0.08	<0.08	-	<0.08	<0.08	-	<0.08	<0.08	-	<0.08	<0.08	-	<0.08	<0.08	-	<0.08	<0.08	-	<0.08	<0.08
Calcium	mg/L				164	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (III+VI)	ug/L	3			<1	16.7	21.8	11.8	8.59	36.7	14.7	<3	258	49.3	46.2	791	192	411	21.8	11.9	7.04	872	377	278	18.9	11.8	14.6		
Copper	ug/L	1			6	-	1.79	-	-	<0.85	-	-	<0.85	-	-	<0.85	-	-	<0.85	-	-	<0.85	-	-	<0.85	-	-	<0.85	-	-
Copper (Filtered)	ug/L	0.3	1		-	<0.3	-	1.81	0.693	-	<0.85	<0.3	-	<0.85	<0.3	-	<0.85	<0.3	-	<0.85	<0.3	-	<0.85	<0.3	-	<0.85	<0.3	-	<0.85	<0.3
Iron	ug/L	24	1000		180 - 7440	36,800	<19 - 14,000	4550	6270	32 3 - 21 300	6490	1280	<19 - 274,000	66,400	37,200	<24 - 23,700	92,400	428,000	27.4 - 5580	10,700	6750	16,300 - 429,000	300,000	169,000	<19 - 8080	5230	8780		
Iron (Filtered)	ug/L	19	1000		-	2030	-	<19	<19	-	92.6	<19	-	<19	<19	-	13,700	32,100	-	52.4	76.3	-	8280	<19	-	22.4	<19		
Lead	ug/L		1.2		11	-	<0.1	-	-	<0.1	-	-	2.72	-	-	1.13	-	-	<0.1	-	-	<0.1	-	-	<0.1	-	-		
Lead (Filtered)	ug/L	0.1	1.2		-	0.209	-	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	-	0.927	0.683	-	0.52	<0.1	-	<0.1	0.506	-	<0.1	<0.1		
Magnesium	mg/L				14.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	ug/L		0.07		<0.1	-	<0.01	-	-	<0.01	-	-	<0.01	-	-	<0.01	-	-	<0.01	-	-	<0.01	-	-	<0.01	-	-	<0.01	-	-
Mercury (Filtered)	ug/L	0.01	0.07		-	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01		
Nickel	ug/L		4		16	-	1.08	-	-	1.26	-	-	1.13	-	-	50.3	-	-	10.8	-	-	5.46	-	-	1.17	-	-			
Nickel (Filtered)	ug/L	0.4	4		-	7	-	1.27	0.454	-	1.63	0.853	-	1.54	1.69	-	39.6	30.5	-	16.7	2.03	-	8.1	8.62	-	1.75	0.492		
Selenium	ug/L				<1	-	<0.81	-	-	1.01	-	-	<0.81	-	-	1.1	-	-	1.11	-	-	<0.81	-	-	1.06	-	-			
Selenium (Filtered)	ug/L	0.5			-	<0.5	-	<0.81	<0.5	-	<0.81	0.687	-	1.36	<0.5	-	<0.81	<0.5	-	<0.81	0.548	-	<0.81	<0.5	-	<0.81	<0.5		
Zinc	ug/L		10.9		53	-	2.3	-	-	<1.3	-	-	2.54	-	-	4.87	-	-	5.84	-	-	3.51	-	-	3.94	-	-			
Zinc (Filtered)	ug/L	1	10.9		-	1.64	-	3.23	1.09	-	2.13	2.72	-	2.57	<1	-	3.21	11.2	-	5.66	4.75	-	3.21	2

Markeaton Junction Groundwater Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	output unit	EQL	GAC_WTV_E NWA_EQS_ Fresh	Field_ID		BM05	BM06A	BM06A	BM06A
				Location_Code	BM05	BM05	BM06A	BM06A	BM06A
				Sampled_Date_Time	04/08/2016	23/03/2017	14/12/2016	21/03/2017	04/07/2017
Diphenyl ether	mg/L				<0.04	-	-	-	-
Dichloroacetic acid	µg/L				-	-	<0.04	-	-
o,p"-Methoxychlor	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
Benazolin	µg/L				-	-	<0.04	-	-
2,4-DB	µg/L				-	-	<0.04	-	-
2,3,6-Trichlorobenzoic acid	µg/L				-	-	<0.04	-	-
Aromatics >EC8-EC10	µg/L				-	-	<10	-	-
Aromatics >EC7-EC8	µg/L				-	-	<10	-	-
DNOC :- (4,6-dinitro-o-cresol)	ug/l				-	-	<3	-	-
TICS									
Biphenylene	µg/L				<40	-	-	-	-
TPH									
>C5-C7	µg/L				10	-	-	-	-
GRO >C5-C6	µg/L				<100	-	-	-	-
GRO >C5-C10	µg/L				<100	-	-	-	-
GRO >C5-C12	µg/L	50			-	<50	<50	<50	<50
GRO >C6-C8	µg/L				<100	-	-	-	-
GRO >C7-C8	µg/L				10	-	-	-	-
>C5-C6 Aliphatics	µg/L	10			-	<10	<10	<10	<10
>C6-C8 Aliphatics	µg/L	10			-	<10	<10	<10	<10
>C8-C10 Aliphatics	µg/L	10			-	<10	<10	<10	<10
>C10-C12 Aliphatics	µg/L	10			-	<10	<10	<10	<10
>C12-C16 Aliphatics	µg/L	10			-	<20	<10	<10	<10
>C16-C21 Aliphatics	µg/L	10			-	25	<10	<10	<10
>C16-C35 Aliphatics	µg/L				-	-	<20	-	-
>C21-C35 Aliphatics	µg/L	10			-	1250	<10	<10	<10
>C12-C35 Aliphatics	µg/L	10			-	1270	<10	<10	<10
>EC5-EC7 Aromatics	µg/L	10	10		-	<10	<10	<10	<10
>EC7-EC8 Aromatics	µg/L	10	74		-	<10	-	<10	<10
>EC8-EC10 Aromatics	µg/L	10			-	<10	-	<10	<10
>EC10-EC12 Aromatics	µg/L	10			-	<10	<10	<10	<10
>EC12-EC16 Aromatics	µg/L	10			-	<20	<10	<10	<10
>EC16-EC21 Aromatics	µg/L	10			-	26	<10	<10	<10
>EC21-EC35 Aromatics	µg/L	10			-	591	<10	<10	<10
>EC12-EC35 Aromatics	µg/L	10			-	617	<10	<10	<10
>C5-C35 Aliphatics & Aromatics	µg/L	10			-	-	<10	-	<10
4-Bromofluorobenzene	µg/L				-	-	1,100,000,000	-	-
BTEX									
Benzene	µg/L	1	10		10 - 11	<1	<1	<1	<1
Toluene	µg/L	1	74		4 - 10	<1	<1	<1	<1
Ethylbenzene	µg/L	1	20		<1	<1	<1	<1	<1
Xylene (m & p)	µg/L	1			<1	<1	<1	<1	<1
Xylene Total	µg/L	11	30		<10	<11	<11	<11	<11
Xylene (o)	µg/L	1			2	<1	<1	<1	<1
Total BTEX	µg/L	28			-	<28	<28	<28	<28
Oxygenates									
MTBE	µg/L	1	5100		-	<1	<1	<1	<1
Tert Amyl Methyl Ether	µg/L	1	510		-	<1	<1	<1	<1
Chlorinated Hydrocarbons									
Chloromethane	µg/L	1			<1	<1	<1	<1	<1
Vinyl chloride	µg/L	1			<1	<1	<1	<1	<1
Chloroethane	µg/L	1			<5	<1	<1	<1	<1
1,1-dichloroethene	µg/L	1			<1	<1	<1	<1	<1
Dichloromethane	µg/L	3	20		-	<3	<3	<3	<3
trans-1,2-dichloroethene	µg/L	1			<1	<1	<1	<1	<1
1,1-dichloroethane	µg/L	1			<1	<1	<1	<1	<1
cis-1,2-dichloroethene	µg/L	1			<1	<1	<1	<1	<1
Chloroform	µg/L	1	2.5		15	<1	<1	<1	<1
1,1,1-trichloroethane	µg/L	1	100		<1	<1	<1	<1	<1
Carbon tetrachloride	µg/L	1	12		<1	<1	<1	<1	<1
Trichloroethene	µg/L	1	10		<5	<1	<1	<1	<1
1,1,2-trichloroethane	µg/L	1	400		<1	<1	<1	<1	<1
Tetrachloroethene	µg/L	1	10		<5	<1	<1	<1	<1
Sum of PCE and TCE	µg/L				-	-	<2	-	-
TCE+DCE+VC	µg/L				-	-	<5	-	-
PCE+TCE+DCE+VC	µg/L				-	-	<6	-	-
VOC									
2,2-dichloropropane	µg/L	1			<1	<1	<1	<1	<1
Bromochloromethane	µg/L	1			<1	<1	<1	<1	<1
1,1-dichloropropene	µg/L	1			<1	<1	<1	<1	<1
1,2-dichloroethane	µg/L	1	10		<1	<1	<1	<1	<1
1,2-dichloropropane	µg/L	1			<1	<1	<1	<1	<1
Dibromomethane	µg/L	1			<1	<1	<1	<1	<1
Bromodichloromethane	µg/L	1			6	<1	<1	<1	<1
cis-1,3-dichloropropene	µg/L	1			<1	<1	<1	<1	<1
trans-1,3-dichloropropene	µg/L	1			<1	<1	<1	<1	<1
1,3-dichloropropane	µg/L	1			<1	<1	<1	<1	<1
Chlorodibromomethane	µg/L	1			6	<1	<1	<1	<1
1,1,1,2-tetrachloroethane	µg/L	1			<1	<1	<1	<1	<1
Styrene	µg/L	1	50		<1	<1	<1	<1	<1
Bromoform	µg/L	1			3	<1	<1	<1	<1
Isopropylbenzene	µg/L	1			<1	<1	<1	<1	<1
1,1,2,2-tetrachloroethane	µg/L	1	140		<1	<1	<1	<1	<1
1,2,3-trichloropropane	µg/L	1			<1	<1	<1	<1	<1
n-propylbenzene	µg/L	1			<1	<1	<1	<1	<1
1,3,5-trimethylbenzene	µg/L	1			<1	<1	<1	<1	<1
tert-butylbenzene	µg/L	1			<1	<1	<1	<1	<1
1,2,4-trimethylbenzene	µg/L	1			<1	<1	<1	<1	<1
sec-butylbenzene	µg/L	1			<1	<1	<1	<1	<1
p-isopropyltoluene	µg/L	1			<1	<1	<1	<1	<1
n-butylbenzene	µg/L	1			<1	<1	<1	<1	<1
1,2-dibromo-3-chloropropane	µg/L	1			<5	<1	<1	<1	<1
Hexachlorobutadiene	µg/L	1	0.6		<5	<1	<1	<1	<1
1,2-Dichloroethene	µg/L				-	-	<2	-	-
Trihalomethanes	µg/L				-	-	<4	-	-
PAH									
Naphthalene	µg/L	0.1	2		<5 - 0.486	<0.2	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	0.011			<0.2	<1 - 0.0473	<0.011	<0.011	<1 - 0.0578
Acenaphthene	µg/L	0.015			<0.2	<0.03	<2 - 0.04	<0.015	<1 - 0.059
Fluorene	µg/L	0.014			<0.2	<0.028	<2 - 0.0313	<0.014	<1 - 0.0569
Phenanthrene	µg/L	0.022			<40 - 0.978	<1 - 0.358	<2 - 0.0994	<0.022	<1 - 0.0617
Anthracene	µg/L	0.015	0.1		<0.2	<1 - 0.0665	<0.015	<0.015	<1 - 0.0545
Fluoranthene	µg/L	0.017	0.0063		<40 - 0.77	<1 - 0.839	<2 - 0.0302	<0.017	<1 - 0.0533
Pyrene	µg/L	0.015			<40 - 2.42	<1 - 0.812	<2 - 0.0306	<0.015	<1 - 0.0507
Benz(a)anthracene	µg/L	0.017			<40 - 0.29	<1 - 0.562	<0.017	<0.017	<1 - 0.0632

Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
1	0	<0.04	ND	<0.04	ND		0.02		0	0
1	0	<0.04	ND	<0.04	ND		0.02		0	0
4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
1	0	<0.04	ND	<0.04	ND		0.02		0	0
1	0	<0.04	ND	<0.04	ND		0.02		0	0
1	0	<0.04	ND	<0.04	ND		0.02		0	0
1	0	<10	ND	<10	ND		5		0	0
1	0	<10	ND	<10	ND		5		0	0
1	0	<3	ND	<3	ND		1.5		0	0
1	0	<40	ND	<40	ND		20		0	0
1	1	10	10	10	10		10		0	0
1	0	<100	ND	<100	ND		50		0	0
1	0	<100	ND	<100	ND		50		0	0
4	0	<50	ND	<50	ND	25	25	0	0	0
1	0	<100	ND	<100	ND		50		0	0
1	1	10	10	10	10		10		0	0
4	0	<10	ND	<10	ND	5	5	0	0	0
4	0	<10	ND	<10	ND	5	5	0	0	0
4	0	<10	ND	<10	ND	5	5	0	0	0
4	0	<10	ND	<20	ND	6.3	5	2.5	0	0
4	1	<10	25	25	25	10	5	10	0	0
1	0	<20	ND	<20	ND		10		0	0
4	1	<10	1250	1250	1250	316	5	623	0	0
4	1	<10	1270	1270	1270	321	5	633	0	0
4	0	<10	ND	<10	ND	5	5	0	0	0
3	0	<10	ND	<10	ND	5	5	0	0	0
3	0	<10	ND	<10	ND	5	5	0	0	0
4	0	<10	ND	<10	ND	5	5	0	0	0
4	0	<10	ND	<20	ND	6.3	5	2.5	0	0
4	1	<10	26	26	26	10	5	11	0	0
4	1	<10	591	591	591	152	5	293	0	0
4	1	<10	617	617	617	158	5	306	0	0
2	0	<10	ND	<10	ND		5		0	0
1	1	1100000000	1100000000	1100000000	1100000000		1100000000		0	0
5	1	<1	10	11	11	2.5	0.5	4.5	1	1
5	1	<1	4	10	10	1.8	0.5	2.9	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<10	ND	<11	ND	5.4	5.5	0.22	0	0
5	1	<1	2	2	2	0.8	0.5	0.67	0	0
4	0	<28	ND	<28	ND	14	14	0	0	0
4	0	<1	ND	<1	ND	0.5	0.5	0	0	0
4	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<5	ND	0.9	0.5	0.89	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	1	<1	15	15	15	3.4	0.5	6.5	1	1
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<5	ND	0.9	0.5	0.89	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<5	ND	0.9	0.5	0.89	0	0
1	0	<2	ND	<2	ND		1		0	0
1	0	<5	ND	<5	ND		2.5		0	0
1	0	<6	ND	<6	ND		3		0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	1	<1	6	6	6	1.6	0.5	2.5	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	1	<1	6	6	6	1.6	0.5	2.5	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	1	<1	3	3	3	1	0.5	1.1	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
5	0	<1	ND	<5	ND	0.9	0.5	0.89	0	0
5	0	<1	ND	<5	ND	0.9	0.5	0.89	5	0
1	0	<2	ND	<2	ND		1		0	0
1	0	<4	ND	<4	ND		2		0	0
5	1	<0.1	ND	0.486	0.486	0.35	0.05	0.64	0	0
5	2	<0.011	ND	<0.2	0.0578	0.13	0.1	0.14	0	0
5	2	<0.015	ND	<0.2	0.059	0.18	0.1	0.22	0	0
5	2	<0.014	ND	<0.2	0.0569	0.18	0.1	0.22	0	0
5	4	<0.022	ND	0.978	0.978	2.4	0.429	4.6	0	0
5	2	<0.015	ND	<0.2	0.0665	0.14	0.1	0.14	1	0
5	4	<0.017	ND	0.839	0.839	2.4	0.5151	4.5	5	4
5	4	<0.015	ND	2.42	2.42	2.5	0.5153	4.9	0	0
5	3	<0.017	ND	0.562	0.562	2.2	0.2816	4.4	0	0

Markeaton Junction Groundwater Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	output unit	EQL	GAC_WTV_E NWA_EQS-Fresh	Field_ID		BM05	BM06A	BM06A	BM06A
				Location_Code	BM05	BM05	BM06A	BM06A	BM06A
				Sampled_Date_Time	04/08/2016	23/03/2017	14/12/2016	21/03/2017	04/07/2017
Chrysene	µg/L	0.013			<0.2	<1 - 0.496	<0.013	<0.013	<1 - 0.0572
Benzo(a) pyrene	µg/L	0.009	0.00017		<0.2	<1 - 1.05	<0.009	<0.009	<1 - 0.0869
Indeno(1,2,3-c,d)pyrene	µg/L	0.014	0.00017		<0.2	<1 - 0.76	<0.014	<0.014	<1 - 0.075
Dibenz(a,h)anthracene	µg/L	0.016			<0.2	<1 - 0.12	<0.016	<0.016	<1 - 0.0618
Benzo(g,h,i)perylene	µg/L	0.016	0.0082		<0.2	<1 - 0.73	<0.016	<0.016	<1 - 0.0703
Benzo(b)fluoranthene	µg/L	0.023	0.017		<0.2	<1 - 1.26	<0.023	<0.023	<1 - 0.103
Benzo(k)fluoranthene	µg/L	0.027	0.017		<0.2	<1 - 0.532	<0.027	<0.027	<1 - 0.0961
Benzo(b)&(k)fluoranthene	µg/L				-	-	<0.05	-	-
PAHs (sum of 4)	µg/L				-	-	<0.08	-	-
PAH 16 Total	µg/L	0.344			<7.144	7.68	<0.344	<0.344	1.01
benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene	µg/L				-	-	<0.03	-	-
Coal Tar (Bap as surrogate marker)	µg/L				-	-	<0.009	-	-
SVOC									
Coronene	µg/L				<1000	-	-	-	-
2-methylnaphthalene	µg/L	1			<40	<1	<2	<2	<1
4-bromophenyl phenyl ether	µg/L	1			<100	<1	<2	<2	<1
4-chlorophenyl phenyl ether	µg/L	1			<100	<1	<2	<2	<1
Azobenzene	µg/L	1			-	<1	<2	<2	<1
Bis(2-chloroethoxy) methane	µg/L	1			<100	<1	<2	<2	<1
Bis(2-chloroethyl)ether	µg/L	1			<100	<1	<2	<2	<1
Carbazole	µg/L	1			-	<1	<2	<2	<1
Dibenzofuran	µg/L	1			<100	<1	<2	<2	<1
Hexachlorocyclopentadiene	µg/L	1			<100	<1	<2	<2	<1
Hexachloroethane	µg/L	1			<100	<1	<2	<2	<1
1-Methylnaphthalene	µg/L				<40	-	-	-	-
3,3-Dichlorobenzidine	µg/L				<400	-	-	-	-
Benzoic Acid	µg/L				<2000	-	-	-	-
Benzyl alcohol	µg/L				<100	-	-	-	-
Phenolics									
2-methylphenol	µg/L	0.5			<100	<0.5	<0.5	<0.5	<0.5
2-nitrophenol	µg/L	0.5			<400	<0.5	<0.5	<0.5	<0.5
2,4-dimethylphenol	µg/L	0.5			<400	<0.5	<0.5	<0.5	<0.5
4-chloro-3-methylphenol	µg/L	0.5	40		<100	<0.5	<0.5	<0.5	<0.5
4-methylphenol	µg/L	0.5			-	<0.5	<0.5	<0.5	<0.5
4-nitrophenol	µg/L	0.5			<1000	<0.5	<0.5	<0.5	<0.5
Phenol	µg/L	0.5	7.7		<400	<1	<2	<2	<1
2-chloronaphthalene	µg/L	1			<40	<1	<2	<2	<1
2,4-dinitrophenol	µg/L	2.5			<200	<2.5	<2.5	<2.5	<5
3-&4-methylphenol	µg/L				<400	-	-	-	-
3-Methylphenol	µg/L	0.5			-	<0.5	<0.5	<0.5	<0.5
4,6-Dinitro-2-methylphenol	µg/L	3			<1000	<3	-	<3	<6
4-chlorophenol	µg/L	0.5			<400	<0.5	<0.5	<0.5	<0.5
Phenols	µg/L				-	-	<16	-	-
Cresols by HPLC (W)	µg/L	6			-	<6	<6	<6	<6
Total Monohydric Phenols (S) Corrected	µg/L	16			-	<16	-	<16	<16
Xylenols	µg/L	8			-	-	<8	-	<8
Herbicides									
Bentazone	µg/L	0.04	500		-	-	<0.04	-	<0.04
Bromoxynil	µg/L	0.04	100		-	-	<0.04	-	<0.04
Clopyralid	µg/L	0.04			-	-	<0.04	-	<0.04
Hedonal	µg/L	0.04	0.3		-	-	-	-	<0.04
Dicamba	µg/L	0.04			-	-	<0.04	-	<0.04
2,4-Dichlorprop	µg/L	0.04			-	<0.04	<0.04	<0.04	<0.04
2,4,5-TP (Silvex)	µg/L	0.04			-	-	-	-	<0.04
2-Methyl-4-chlorophenoxyacetic acid	µg/L	0.04	12		-	-	<0.04	-	<0.04
2-Methyl-4-Chlorophenoxy Butanoic Acid	µg/L	0.04			-	-	<0.04	-	<0.04
2,4,5-Trichlorophenoxy Acetic Acid	µg/L	0.04			-	-	<0.04	-	<0.04
Triclopyr	µg/L	0.04			-	-	<0.04	-	<0.04
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	µg/L	0.04			-	-	-	-	<0.04
Dinoseb	µg/L	4			-	<4	<4	<4	<8
Fluroxypyr	µg/L	0.04			-	-	<0.04	-	<0.04
Mecoprop	µg/L	0.04	18		-	-	<0.04	-	<0.04
Fenoprop	µg/L				-	-	<0.04	-	-
Pesticides									
Parathion	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
Aldrin+Dieldrin+Endrin+Isodrin	µg/L		0.01		-	-	<0.03	-	-
Organochlorine Pesticides									
Aldrin	µg/L	0.01	9.99000000000049E11		-	<0.01	<0.01	<0.01	<0.01
a-BHC	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
b-BHC	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
Dieldrin	µg/L	0.01	9.99000000000049E11		-	<0.01	<0.01	<0.01	<0.01
Endosulfan I	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
Endosulfan II	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
Endosulfan sulphate	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
Endrin	µg/L	0.01	9.99000000000049E11		-	<0.01	<0.01	<0.01	<0.01
g-BHC (Lindane)	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
Heptachlor	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
Heptachlor epoxide	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
o,p"-DDE	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
2,4-DDT	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
o,p-DDD	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
4,4-DDE	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
DDT	µg/L	0.01	0.01		-	<0.01	<0.01	<0.01	<0.01
Methoxychlor	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
DDD	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
Aldrin + Dieldrin	µg/L				-	-	<0.02	-	-
DDT+DDE+DDD	µg/L				-	-	<0.02	-	-
Organophosphorous Pesticides									
Azinophos methyl	µg/L	0.01	0.01		-	<0.01	<0.01	<0.01	<0.01
Diazinon	µg/L	0.01	0.01		-	<0.01	<0.01	<0.01	<0.01
Dichlorvos	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
Ethion	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
Fenitrothion	µg/L	0.01	0.01		-	<0.01	<0.01	<0.01	<0.01
Malathion	µg/L	0.01	0.01		-	<0.01	<0.01	<0.01	<0.01
Methyl parathion	µg/L	0.01			-	<0.01	<0.01	<0.01	<0.01
Mevinphos (Phosdrin)	µg/L	0.01	0.02		-	<0.01	<0.01	<0.01	<0.01
Amino Aliphatics									
N-nitrosodi-n-propylamine	µg/L	1			<100	<1	<2	<2	<1
Amino Aromatics									
n-Nitrosodiphenylamine	µg/L				<100	-	-	-	-
Anilines									
2-nitroaniline	µg/L	1			<100	<1	<2	<2	<1
3-nitroaniline	µg/L	1			<100	<1	<2	<2	<1
4-chloroaniline	µg/L	1			<100	<1	<2	<2	<1
4-nitroaniline	µg/L	1			<100	<1	<2	<2	<1

	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
Chrysene	5	2	<0.013	ND	0.496	0.496	0.18	0.1	0.21	0	0
Benzo(a) pyrene	5	2	<0.009	ND	1.05	1.05	0.24	0.1	0.32	5	2
Indeno(1,2,3-c,d)pyrene	5	2	<0.014	ND	0.76	0.76	0.21	0.1	0.26	5	2
Dibenz(a,h)anthracene	5	2	<0.016	ND	<0.2	0.12	0.14	0.1	0.15	0	0
Benzo(g,h,i)perylene	5	2	<0.016	ND	0.73	0.73	0.2	0.1	0.26	5	2
Benzo(b)fluoranthene	5	2	<0.023	ND	1.26	1.26	0.26	0.1	0.37	5	2
Benzo(k)fluoranthene	5	2	<0.027	ND	0.532	0.532	0.19	0.1	0.22	5	2
Benzo(b)&(k)fluoranthene	1	0	<0.05	ND	<0.05	ND		0.025		0	0
PAHs (sum of 4)	1	0	<0.08	ND	<0.08	ND		0.04		0	0
PAH 16 Total	5	2	<0.344	1.01	7.68	7.68	2.5	1.01	3.2	0	0
benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene	1	0	<0.03	ND	<0.03	ND		0.015		0	0
Coal Tar (Bap as surrogate marker)	1	0	<0.009	ND	<0.009	ND		0.0045		0	0
SVOC											
Coronene	1	0	<1000	ND	<1000	ND		500		0	0
2-methylnaphthalene	5	0	<1	ND	<40	ND	4.6	1	8.6	0	0
4-bromophenyl phenyl ether	5	0	<1	ND	<100	ND	11	1	22	0	0
4-chlorophenyl phenyl ether	5	0	<1	ND	<100	ND	11	1	22	0	0
Azobenzene	4	0	<1	ND	<2	ND	0.75	0.75	0.29	0	0
Bis(2-chloroethoxy) methane	5	0	<1	ND	<100	ND	11	1	22	0	0
Bis(2-chloroethyl)ether	5	0	<1	ND	<100	ND	11	1	22	0	0
Carbazole	4	0	<1	ND	<2	ND	0.75	0.75	0.29	0	0
Dibenzofuran	5	0	<1	ND	<100	ND	11	1	22	0	0
Hexachlorocyclopentadiene	5	0	<1	ND	<100	ND	11	1	22	0	0
Hexachloroethane	5	0	<1	ND	<100	ND	11	1	22	0	0
1-Methylnaphthalene	1	0	<40	ND	<40	ND		20		0	0
3,3-Dichlorobenzidine	1	0	<400	ND	<400	ND		200		0	0
Benzoic Acid	1	0	<2000	ND	<2000	ND		1000		0	0
Benzyl alcohol	1	0	<100	ND	<100	ND		50		0	0
Phenolics											
2-methylphenol	5	0	<0.5	ND	<100	ND	10	0.25	22	0	0
2-nitrophenol	5	0	<0.5	ND	<400	ND	40	0.25	89	0	0
2,4-dimethylphenol	5	0	<0.5	ND	<400	ND	40	0.25	89	0	0
4-chloro-3-methylphenol	5	0	<0.5	ND	<100	ND	10	0.25	22	1	0
4-methylphenol	4	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
4-nitrophenol	5	0	<0.5	ND	<1000	ND	100	0.25	223	0	0
Phenol	5	0	<1	ND	<400	ND	41	1	89	1	0
2-chloronaphthalene	5	0	<1	ND	<40	ND	4.6	1	8.6	0	0
2,4-dinitrophenol	5	0	<2.5	ND	<200	ND	21	1.25	44	0	0
3-&4-methylphenol	1	0	<400	ND	<400	ND		200		0	0
3-Methylphenol	4	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
4,6-Dinitro-2-methylphenol	4	0	<3	ND	<1000	ND	127	2.25	249	0	0
4-chlorophenol	5	0	<0.5	ND	<400	ND	40	0.25	89	0	0
Phenols	1	0	<16	ND	<16	ND		8		0	0
Cresols by HPLC (W)	4	0	<6	ND	<6	ND	3	3	0	0	0
Total Monohydric Phenols (S) Corrected	3	0	<16	ND	<16	ND	8	8	0	0	0
Xylenols	2	0	<8	ND	<8	ND		4		0	0
Herbicides											
Bentazone	2	0	<0.04	ND	<0.04	ND		0.02		0	0
Bromoxynil	2	0	<0.04	ND	<0.04	ND		0.02		0	0
Clopyralid	2	0	<0.04	ND	<0.04	ND		0.02		0	0
Hedonal	1	0	<0.04	ND	<0.04	ND		0.02		0	0
Dicamba	2	0	<0.04	ND	<0.04	ND		0.02		0	0
2,4-Dichlorprop	4	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
2,4,5-TP (Silvex)	1	0	<0.04	ND	<0.04	ND		0.02		0	0
2-Methyl-4-chlorophenoxyacetic acid	2	0	<0.04	ND	<0.04	ND		0.02		0	0
2-Methyl-4-Chlorophenoxy Butanoic Acid	2	0	<0.04	ND	<0.04	ND		0.02		0	0
2,4,5-Trichlorophenoxy Acetic Acid	2	0	<0.04	ND	<0.04	ND		0.02		0	0
Triclopyr	2	0	<0.04	ND	<0.04	ND		0.02		0	0
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	1	0	<0.04	ND	<0.04	ND		0.02		0	0
Dinoseb	4	0	<4	ND	<8	ND	2.5	2	1	0	0
Fluroxypyr	2	0	<0.04	ND	<0.04	ND		0.02		0	0
Mecoprop	2	0	<0.04	ND	<0.04	ND		0.02		0	0
Fenoprop	1	0	<0.04	ND	<0.04	ND		0.02		0	0
Pesticides											
Parathion	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Aldrin+Dieldrin+Endrin+Isodrin	1	0	<0.03	ND	<0.03	ND		0.015		1	0
Organochlorine Pesticides											
Aldrin	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
a-BHC	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
b-BHC	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Dieldrin	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endosulfan I	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endosulfan II	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endosulfan sulphate	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endrin	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
g-BHC (Lindane)	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Heptachlor	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Heptachlor epoxide	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
o,p"-DDE	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
2,4-DDT	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
o,p-DDD	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
4,4-DDE	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
DDT	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Methoxychlor	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
DDD	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Aldrin + Dieldrin	1	0	<0.02	ND	<0.02	ND		0.01		0	0
DDT+DDE+DDD	1	0	<0.02	ND	<0.02	ND		0.01		0	0
Organophosphorous Pesticides											
Azinophos methyl	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Diazinon	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Dichlorvos	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Ethion	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Fenitrothion	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Malathion	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Methyl parathion	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Mevinphos (Phosdrin)	4	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Amino Aliphatics											
N-nitrosodi-n-propylamine	5	0	<1	ND	<100	ND	11	1	22	0	0
Amino Aromatics											
n-Nitrosodiphenylamine	1	0	<100	ND	<100	ND		50		0	0
Anilines											
2-nitroaniline	5	0	<1	ND	<100	ND	11	1	22	0	0
3-nitroaniline	5	0	<1	ND	<100	ND	11	1	22	0	0
4-chloroaniline	5	0	<1	ND	<100	ND	11	1	22	0	0
4-nitroaniline	5	0	<1	ND	<100	ND	11	1	22	0	0

Markeaton Junction Groundwater Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	output unit	EQL	GAC_WTV_E NWA_EQS-Fresh	Field_ID		BM05	BM06A	BM06A	BM06A
				Location_Code	BM05	BM05	BM06A	BM06A	BM06A
				Sampled_Date_Time	04/08/2016	23/03/2017	14/12/2016	21/03/2017	04/07/2017
Explosives									
2,4-Dinitrotoluene	µg/L	1			<100	<1	<2	<2	<1
2,6-dinitrotoluene	µg/L	1			<100	<1	<2	<2	<1
Nitrobenzene	µg/L	1			<100	<1	<2	<2	<1
Halogenated Benzenes									
1,3,5-Trichlorobenzene	µg/L	1	9.99000000000065E11		-	<1	<1	<1	<1
Chlorobenzene	µg/L	1			<1	<1	<1	<1	<1
Bromobenzene	µg/L	1			<1	<1	<1	<1	<1
2-chlorotoluene	µg/L	1			<1	<1	<1	<1	<1
4-chlorotoluene	µg/L	1			<1	<1	<1	<1	<1
1,3-dichlorobenzene	µg/L	1			<1	<1	<1	<1	<1
1,4-dichlorobenzene	µg/L	1			<1	<1	<1	<1	<1
1,2-dichlorobenzene	µg/L	1			<5	<1	<1	<1	<1
1,2,4-trichlorobenzene	µg/L	1	9.99000000000065E11		<5	<1	<1	<1	<1
1,2,3-trichlorobenzene	µg/L	1	9.99000000000065E11		<5	<1	<1	<1	<1
Hexachlorobenzene	µg/L	1	0.05		<100	<1	<2	<2	<1
Halogenated Hydrocarbons									
Dichlorodifluoromethane	µg/L	1			<1	<1	<1	<1	<1
Bromomethane	µg/L	1			<5	<1	<1	<1	<1
Trichlorofluoromethane	µg/L	1			<1	<1	<1	<1	<1
1,2-dibromoethane	µg/L	1			<1	<1	<1	<1	<1
Dibromofluoromethane	µg/L				-	-	1,160,000,000	-	-
Halogenated Phenols									
2,3,5,6-Tetrachlorophenol	µg/L	0.5			-	<0.5	<0.5	<0.5	<2
2-chlorophenol	µg/L	0.5	50		<400	<0.5	<0.5	<0.5	<0.5
2,4-dichlorophenol	µg/L	0.5	4.2		<400	<0.5	<0.5	<0.5	<0.5
2,4,5-trichlorophenol	µg/L	0.5			<400	<0.5	<0.5	<0.5	<0.5
2,4,6-trichlorophenol	µg/L	0.5			<400	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	µg/L	0.04	0.4		<1000	<1	<0.04	<2	<0.04
Phthalates									
Bis(2-ethylhexyl) phthalate	µg/L	2	1.3		<100	<2	<4	<4	<2
Butyl benzyl phthalate	µg/L	1	7.5		<100	<1	<2	<2	<1
Di-n-butyl phthalate	µg/L	1	8		<100	<1	<2	<2	<1
Di-n-octyl phthalate	µg/L	5	20		<40	<5	<10	<10	<5
Diethylphthalate	µg/L	1	200		<100	<1	<2	<2	<1
Dimethyl phthalate	µg/L	1	800		<100	<1	<2	<2	<1
Solvents									
Carbon disulfide	µg/L	1			-	<1	<1	<1	<1
Isophorone	µg/L	1			<100	<1	<2	<2	<1
Metals									
Arsenic	µg/L		50		3	-	2.38	-	-
Arsenic (Filtered)	µg/L	0.5	50		-	0.677	-	1.97	1.85
Boron	µg/L		2000		140	-	33.5	-	-
Boron (Filtered)	µg/L	5	2000		-	107	-	38.9	26.2
Cadmium	µg/L		0.08		<0.1	-	<0.08	-	-
Cadmium (Filtered)	µg/L	0.08	0.08		-	<0.08	-	<0.08	<0.08
Chromium (III+VI)	µg/L	3			1	76.4	60.7	27.6	17.6
Copper	µg/L		1		17	-	<0.85	-	-
Copper (Filtered)	µg/L	0.3	1		-	1.68	-	<0.85	0.312
Iron	µg/L	24	1000		120 - 990	70,400	<19 - 27,800	13,100	9280
Iron (Filtered)	µg/L	19	1000		-	<19	-	19.1	<19
Lead	µg/L		1.2		<1	-	<0.1	-	-
Lead (Filtered)	µg/L	0.1	1.2		-	<0.1	-	<0.1	<0.2
Mercury	µg/L		0.07		0.4	-	<0.01	-	-
Mercury (Filtered)	µg/L	0.01	0.07		-	<0.01	-	<0.01	<0.01
Nickel	µg/L		4		3	-	<0.44	-	-
Nickel (Filtered)	µg/L	0.4	4		-	1.39	-	<0.44	0.451
Selenium	µg/L				<1	-	<0.81	-	-
Selenium (Filtered)	µg/L	0.5			-	4.51	-	<0.81	<0.5
Zinc	µg/L		10.9		<2	-	3.57	-	-
Zinc (Filtered)	µg/L	1	10.9		-	1.92	-	4.53	1.08
Chromium (hexavalent)	µg/L	30	3.4		-	<30	<30	<30	<30
Organics									
TOC	mg/L	3			5.5	5.54	<3	<3	<3
Inorganics									
Cyanide (Free)	mg/L	0.05	0.001		-	<0.05	<0.05	<0.05	<0.05
Nitrogen (Total)	µg/L				-	-	<200	-	-
Cyanide Total	mg/L	0.05	0.001		-	<0.05	<0.05	<0.05	<0.05
Ammoniacal Nitrogen as N	mg/L	0.2	9.99000000000059E8		-	<0.2	-	<0.2	<0.2
Total Hardness	mg/l	0.35			-	6650	-	1120	-
COD	mg/L	7			-	-	-	-	119
pH (Lab)	pH_Units	1			7.6	7.51	7.61	7.81	7.25
TSS	mg/L	2			-	-	-	-	1110
Other									
Actril (loxynil)	mg/L	4E-05	0.01		-	-	<0.00004	-	<0.00004
Surrogate									
Toluene-D8	%				-	-	110	-	-
GRO Surrogate	%				-	-	85	-	-

	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
Explosives											
2,4-Dinitrotoluene	5	0	<1	ND	<100	ND	11	1	22	0	0
2,6-dinitrotoluene	5	0	<1	ND	<100	ND	11	1	22	0	0
Nitrobenzene	5	0	<1	ND	<100	ND	11	1	22	0	0
Halogenated Benzenes											
1,3,5-Trichlorobenzene	4	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chlorobenzene	5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromobenzene	5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
2-chlorotoluene	5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
4-chlorotoluene	5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3-dichlorobenzene	5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,4-dichlorobenzene	5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichlorobenzene	5	0	<1	ND	<5	ND	0.9	0.5	0.89	0	0
1,2,4-trichlorobenzene	5	0	<1	ND	<5	ND	0.9	0.5	0.89	0	0
1,2,3-trichlorobenzene	5	0	<1	ND	<5	ND	0.9	0.5	0.89	0	0
Hexachlorobenzene	5	0	<1	ND	<100	ND	11	1	22	5	0
Halogenated Hydrocarbons											
Dichlorodifluoromethane	5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromomethane	5	0	<1	ND	<5	ND	0.9	0.5	0.89	0	0
Trichlorofluoromethane	5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dibromoethane	5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dibromofluoromethane	1	1	1160000000	1160000000	1160000000	1160000000		1160000000		0	0
Halogenated Phenols											
2,3,5,6-Tetrachlorophenol	4	0	<0.5	ND	<2	ND	0.44	0.25	0.38	0	0
2-chlorophenol	5	0	<0.5	ND	<400	ND	40	0.25	89	1	0
2,4-dichlorophenol	5	0	<0.5	ND	<400	ND	40	0.25	89	1	0
2,4,5-trichlorophenol	5	0	<0.5	ND	<400	ND	40	0.25	89	0	0
2,4,6-trichlorophenol	5	0	<0.5	ND	<400	ND	40	0.25	89	0	0
Pentachlorophenol	5	0	<0.04	ND	<1000	ND	100	0.5	223	3	0
Phthalates											
Bis(2-ethylhexyl) phthalate	5	0	<2	ND	<100	ND	11	2	22	5	0
Butyl benzyl phthalate	5	0	<1	ND	<100	ND	11	1	22	1	0
Di-n-butyl phthalate	5	0	<1	ND	<100	ND	11	1	22	1	0
Di-n-octyl phthalate	5	0	<5	ND	<40	ND	7	5	7.4	1	0
Diethylphthalate	5	0	<1	ND	<100	ND	11	1	22	0	0
Dimethyl phthalate	5	0	<1	ND	<100	ND	11	1	22	0	0
Solvents											
Carbon disulfide	4	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Isophorone	5	0	<1	ND	<100	ND	11	1	22	0	0
Metals											
Arsenic	2	2	2.38	2.38	3	3		2.69		0	0
Arsenic (Filtered)	3	3	0.677	0.677	1.97	1.97	1.5	1.85	0.71	0	0
Boron	2	2	33.5	33.5	140	140		86.75		0	0
Boron (Filtered)	3	3	26.2	26.2	107	107	57	38.9	43	0	0
Cadmium	2	0	<0.08	ND	<0.1	ND		0.045		1	0
Cadmium (Filtered)	3	0	<0.08	ND	<0.08	ND	0.04	0.04	0	0	0
Chromium (III+VI)	5	5	1	1	76.4	76.4	37	27.6	31	0	0
Copper	2	1	<0.85	17	17	17		8.7125		1	1
Copper (Filtered)	3	2	0.312	0.312	1.68	1.68	0.81	0.425	0.76	1	1
Iron	5	5	19	120	70400	70400	21448	13100	27872	4	4
Iron (Filtered)	3	1	<19	19.1	19.1	19.1	13	9.5	5.5	0	0
Lead	2	0	<0.1	ND	<1	ND		0.275		0	0
Lead (Filtered)	3	0	<0.1	ND	<0.2	ND	0.067	0.05	0.029	0	0
Mercury	2	1	<0.01	0.4	0.4	0.4		0.2025		1	1
Mercury (Filtered)	3	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Nickel	2	1	<0.44	3	3	3		1.61		0	0
Nickel (Filtered)	3	2	<0.44	0.451	1.39	1.39	0.69	0.451	0.62	0	0
Selenium	2	0	<0.81	ND	<1	ND		0.4525		0	0
Selenium (Filtered)	3	1	<0.5	4.51	4.51	4.51	1.7	0.405	2.4	0	0
Zinc	2	1	<2	3.57	3.57	3.57		2.285		0	0
Zinc (Filtered)	3	3	1.08	1.08	4.53	4.53	2.5	1.92	1.8	0	0
Chromium (hexavalent)	4	0	<30	ND	<30	ND	15	15	0	4	0
Organics											
TOC	5	2	<3	5.5	5.54	5.54	3.1	1.5	2.2	0	0
Inorganics											
Cyanide (Free)	4	0	<0.05	ND	<0.05	ND	0.025	0.025	0	4	0
Nitrogen (Total)	1	0	<200	ND	<200	ND		100		0	0
Cyanide Total	4	0	<0.05	ND	<0.05	ND	0.025	0.025	0	4	0
Ammoniacal Nitrogen as N	3	0	<0.2	ND	<0.2	ND	0.1	0.1	0	0	0
Total Hardness	2	2	1120	1120	6650	6650		3885		0	0
COD	1	1	119	119	119	119		119		0	0
pH (Lab)	5	5	7.25	7.25	7.81	7.81	7.6	7.6	0.2	0	0
TSS	1	1	1110	1110	1110	1110		1110		0	0
Other											
Actril (loxynil)	2	0	<0.00004	ND	<0.00004	ND		0.00002		0	0
Surrogate											
Toluene-D8	1	1	110	110	110	110		110		0	0
GRO Surrogate	1	1	85	85	85	85		85		0	0

Little Eaton Groundwater Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	output unit	EQL	G:AC, WTV, E N:WA, EQS- Fresh	Field_ID	TL02	TL03	TL04	TL06	BL02	BL02	BL08	BL08	BL08	BL10	BL10	BL10	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
Location_Code					TL02	TL03	TL04	TL06	BL02	BL02	BL08	BL08	BL08	BL10	BL10	BL10											
Sampled_Date_Time					22/08/2016	22/08/2016	22/08/2016	18/08/2016	12/12/2016	23/03/2017	12/12/2016	23/03/2017	06/07/2017	13/12/2016	22/03/2017	03/07/2017											
Dichloroacetic acid	µg/L				-	-	-	-	<0.04	-	<0.04	-	-	<0.04	-	-	3	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
o,p''-Methoxychlor	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Benazolin	µg/L				-	-	-	-	<0.04	-	<0.04	-	-	<0.04	-	-	3	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
2,4-DB	µg/L				-	-	-	-	<0.04	-	<0.04	-	-	<0.04	-	-	3	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
2,3,6-Trichlorobenzoic acid	µg/L				-	-	-	-	<0.08	-	<0.145	-	-	<0.07	-	-	3	0	<0.07	ND	<0.145	ND	0.049	0.04	0.02	0	0
Aromatics >EC8-EC10	µg/L				-	-	-	-	<10	-	<10	-	-	<10	-	-	3	0	<10	ND	<10	ND	5	5	0	0	0
Aromatics >EC7-EC8	µg/L				-	-	-	-	<10	-	<10	-	-	<10	-	-	3	0	<10	ND	<10	ND	5	5	0	0	0
DNOC - (4,6-dinitro-o-cresol)	µg/l				-	-	-	-	<3	-	<3	-	-	<3	-	-	3	0	<3	ND	<3	ND	1.5	1.5	0	0	0
TPH																											
>C5-C7	µg/L				-	-	<5	-	-	-	-	-	-	-	-	-	1	0	<5	ND	<5	ND		2.5		0	0
>C8-C44	µg/L				-	-	13	-	-	-	-	-	-	-	-	-	1	1	13	13	13	13		13		0	0
GRO >C5-C6	µg/L				-	-	<100	-	-	-	-	-	-	-	-	-	1	0	<100	ND	<100	ND		50		0	0
GRO >C5-C10	µg/L				-	-	<100	-	-	-	-	-	-	-	-	-	1	0	<100	ND	<100	ND		50		0	0
GRO >C5-C12	µg/L	50			-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	8	0	<50	ND	<50	ND	25	25	0	0	0
GRO >C6-C8	µg/L				-	-	<100	-	-	-	-	-	-	-	-	-	1	0	<100	ND	<100	ND		50		0	0
GRO >C7-C8	µg/L				-	-	<5	-	-	-	-	-	-	-	-	-	1	0	<5	ND	<5	ND		2.5		0	0
>C5-C6 Aliphatics	µg/L	10			-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	8	0	<10	ND	<10	ND	5	5	0	0	0
>C6-C8 Aliphatics	µg/L	10			-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	8	0	<10	ND	<10	ND	5	5	0	0	0
>C8-C10 Aliphatics	µg/L	10			-	-	<10	-	<10	<10	<10	<10	<10	<10	<10	<10	9	0	<10	ND	<10	ND	5	5	0	0	0
>C10-C12 Aliphatics	µg/L	10			-	-	<10	-	<10	<10	<10	<10	<10	<10	<10	<10	9	0	<10	ND	<10	ND	5	5	0	0	0
>C12-C16 Aliphatics	µg/L	10			-	-	<10	-	10	<10	<10	<10	<10	<10	<10	<10	9	1	<10	10	10	10	5.6	5	1.7	0	0
>C16-C21 Aliphatics	µg/L	10			-	-	-	-	13	<10	13	<10	<10	<10	<10	<10	8	2	<10	13	13	13	7	5	3.7	0	0
>C16-C35 Aliphatics	µg/L				-	-	<10	-	70	-	29	-	-	<20	-	-	4	2	<10	29	70	70	29	19.5	30	0	0
>C21-C35 Aliphatics	µg/L	10			-	-	-	-	57	<10	16	<10	<10	<10	<10	70	8	3	<10	16	70	70	21	5	27	0	0
>C35-C44 Aliphatics	µg/L				-	-	<10	-	-	-	-	-	-	-	-	-	1	0	<10	ND	<10	ND		5		0	0
>C12-C35 Aliphatics	µg/L	10			-	-	-	-	80	<10	29	<10	<10	<10	<10	70	8	3	<10	29	80	80	26	5	32	0	0
>C8 -C10 Aromatics	µg/L				-	-	<10	-	-	-	-	-	-	-	-	-	1	0	<10	ND	<10	ND		5		0	0
>EC5-EC7 Aromatics	µg/L	10	10		-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	8	0	<10	ND	<10	ND	5	5	0	0	0
>EC7-EC8 Aromatics	µg/L	10	74		-	-	-	-	-	<10	-	<10	<10	-	-	<10	5	0	<10	ND	<10	ND	5	5	0	0	0
>EC8-EC10 Aromatics	µg/L	10			-	-	-	-	-	<10	-	<10	<10	-	-	<10	5	0	<10	ND	<10	ND	5	5	0	0	0
>EC10-EC12 Aromatics	µg/L	10			-	-	<10	-	<10	<10	<10	<10	<10	<10	<10	<10	9	0	<10	ND	<10	ND	5	5	0	0	0
>EC12-EC16 Aromatics	µg/L	10			-	-	<10	-	<10	<10	<10	<10	<10	<10	<10	<10	9	0	<10	ND	<10	ND	5	5	0	0	0
>EC16-EC21 Aromatics	µg/L	10			-	-	<10	-	<10	<10	<10	<10	<10	<10	<10	<10	9	0	<10	ND	<10	ND	5	5	0	0	0
>EC21-EC35 Aromatics	µg/L	10			-	-	<10	-	<10	<10	<10	<10	<10	<10	<10	28	9	1	<10	28	28	28	7.6	5	7.7	0	0
>EC35-EC44 Aromatics	µg/L				-	-	<10	-	-	-	-	-	-	-	-	-	1	0	<10	ND	<10	ND		5		0	0
>EC12-EC35 Aromatics	µg/L	10			-	-	-	-	<10	<10	<10	<10	<10	<10	<10	28	8	1	<10	28	28	28	7.9	5	8.1	0	0
>C5-C35 Aliphatics & Aromatics	µg/L	10			-	-	-	-	80	-	41	-	-	10	-	107	5	3	<10	41	107	107	48	41	45	0	0
4-Bromofluorobenzene	µg/L				-	-	-	-	1,110,000,000	-	1,100,000,000	-	-	1,090,000,000	-	-	3	3	1090000000	1090000000	1110000000	1110000000	1100000000	1100000000	10000000	0	0
BTEX																											
Benzene	µg/L	1	10		<1	-	<5	-	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<5	ND	0.7	0.5	0.63	0	0
Toluene	µg/L	1	74		<1	-	<5	-	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<5	ND	0.7	0.5	0.63	0	0
Ethylbenzene	µg/L	1	20		<1	-	<5	-	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<5	ND	0.7	0.5	0.63	0	0
Xylene (m & p)	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Xylene Total	µg/L	11	30		-	-	<10	-	<11	<11	<11	<11	<11	<11	<11	<11	9	0	<10	ND	<11	ND	5.4	5.5	0.17	0	0
Xylene (o)	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Total BTEX	µg/L	28			-	-	-	-	<28	<28	<28	<28	<28	<28	<28	<28	8	0	<28	ND	<28	ND	14	14	0	0	0
Oxygenates																											
MTBE	µg/L	1	5100		-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Tert Amyl Methyl Ether	µg/L	1	510		-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chlorinated Hydrocarbons																											
Chloromethane	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Vinyl chloride	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chloroethane	µg/L	1			<5	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<5	ND	0.72	0.5	0.67	0	0
1,1-dichloroethene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dichloromethane	µg/L	3	20		-	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3	8	0	<3	ND	<3	ND	1.5	1.5	0	0	0
trans-1,2-dichloroethene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1-dichloroethane	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
cis-1,2-dichloroethene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chloroform	µg/L	1	2.5		<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,1-trichloroethane	µg/L	1	100		<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Carbon tetrachloride	µg/L	1	12		<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Trichloroethene	µg/L	1	10		<5	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<5	ND	0.72	0.5	0.67	0	0
1,1,2-trichloroethane	µg/L	1	400		<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Tetrachloroethene	µg/L	1	10		<5	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<5	ND	0.72	0.5	0.67	0	0
Sum of PCE and TCE	µg/L				-	-	-	-	<2	-	<2	-	-	<2	-	-	3	0	<2	ND	<2	ND	1	1	0	0	0
TCE+DCE+VC	µg/L				-	-	-	-	<5	-	<5	-	-	<5	-	-	3	0	<5	ND	<5	ND	2.5	2.5	0	0	0
PCE+TCE+DCE+VC	µg/L				-	-	-	-	<6	-	<6	-	-	<6	-	-	3	0	<6	ND	<6	ND	3	3	0	0	0
VOC																											
2,2-dichloropropane	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromochloromethane	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1-dichloropropene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichloroethane	µg/L	1	10		<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichloropropane	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dibromomethane	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromodichloromethane	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
cis-1,3-dichloropropene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
trans-1,3-dichloropropene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3-dichloropropane	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chlorodibromomethane	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,1,2-tetrachloroethane	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Styrene	µg/L	1	50		<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromoform	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Isopropylbenzene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,2,2-tetrachloroethane	µg/L	1	140		<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2,3-trichloropropane	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
n-propylbenzene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3,5-trimethylbenzene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
tert-butylbenzene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2,4-trimethylbenzene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
sec-butylbenzene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
p-isopropyltoluene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
n-butylbenzene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dibromo-3-chloropropane	µg/L	1			<5	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<5	ND	0.72	0.5	0.67	0	0
Hexachlorobutadiene	µg/L	1	0.6		<5	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<5	ND	0.72	0.5	0.67	9	0
1,2-Dichloroethene	µg/L				-	-	-	-	<2	-	<2	-	-	<2	-	-	3	0	<2	ND	<2	ND	1	1	0	0	0
Trihalomethanes	µg/L				-	-	-	-	<4	-	<4	-	-	<4	-	-	3	0	<4	ND	<4	ND	2	2	0	0	0
PAH																											
Naphthalene	µg/L	0.1	2		<5	<0.02	-	-	<0.1	<0.1	<1 - 0.182	<0.1	<1 - 0.1	<0.1	<0.1	<0.1	10	2	<0.02	ND	<5	0.182	0.35	0.05	0.77	1	0
Acenaphthylene	µg/L	0.011			-	<0.01	-	-	<1 - 0.0125	<0.011	<1 - 0.0217	<0.011	<0.011	<0.011	<0.011	<0.011	9	2	<0.01	ND	0.0217	0.0217	0.062	0.0055	0.11	0	0
Acenaphthene	µg/L	0.015			-	<0.01	-	-	<1 - 0.0225	<0.015	<1 - 0.097	<1 - 0.0264	<1 - 0.0304	<0.015	<0.015	<0.015	9	4	<0.01	ND	0.097	0.097	0.12	0.0075	0.14	0	0
Fluorene	µg/L	0.014			-	<0.01	-	-	<1 - 0.0224	<0.014	<1 - 0.0948	<1 - 0.0341	<1 - 0.0339	<0.014	<0.014	<0.014	9	4	<0.01	ND	0.0948	0.0948	0.13	0.007	0.14	0	0
Phenanthrene	µg/L	0.022			-	<0.01	-	-	<1 - 0.135	<0.022	<1 - 0.427	<1 - 0.14	<1 - 0.136	<0.022	<1 - 0.0221	<1 - 0.0233	9	6	<0.01	ND	0.427	0.427	0.22	0.26165	0.17	0	0
Anthracene	µg/L	0.015	0.1		-	<0.01	-	-	<1 - 0.0253	<0.015	<1 - 0.115	<1 - 0.0328	<1 - 0.0284	<0.015	<0.015	<0.015	9	4	<0.01	ND	0.115	0.115	0.13	0.0075	0.14	1	1
Fluoranthene	µg/L	0.017	0.0063		-	<0.01	-	-	<1 - 0.203	<0.017	<1 - 0.712	<1 - 0.177	<1 - 0.172	<0.017	<0.017	<1 - 0.0198	9	5	<0.01	ND	0.712	0.712	0.21	0.2599	0.22	9	5
Pyrene	µg/L	0.015			-	<0.01	-	-	<1 - 0.239	<1 - 0.0182	<1 - 0.613	<1 - 0.164	<1 - 0.175	<0.015	<0.015	<1 - 0.0224	9	6	<0.01	ND	0.613	0.613	0.24	0.2612	0.19	0	0
Benz(a)anthracene	µg/L	0.017			-	<0.01	-	-	<1 - 0.184	<0.017	<1 - 0.425	<1 - 0.0933	<0.017	<0.017	<1 - 0.0278	<0.017	9	4	<0.01	ND	0.425	0.425	0.16	0.0085	0.18	0	0
Chrysene	µg/L	0.013			-	<0.01	-	-	<1 - 0.214	<0.013	<1 - 0.451	<1 - 0.105	<1 - 0.0843	<0.013	<0.013	<0.013	9	4	<0.01	ND	0.451	0.451	0.16	0.0065	0.19	0	0
Benzo(a) pyrene	µg/L	0.009	0.00017		-	<0.01	-	-	<1 - 0.283	<0.009	<1 - 1.55	<1 - 0.142	<1 - 0.147	<0.009	<0.009	<1 - 0.0115	9	5	<0.009	ND	1.55	1.55	0.26	0.25575	0.33	9	5
Indeno(1,2,3-c,d)pyrene	µg/L	0.014	0.00017		-	<0.01	-	-	<1 - 0.241	<0.014	<1 - 0.951	<1 - 0.101	<1 - 0.0872	<0.014	<0.014	<0.014	9	4	<0.01	ND	0.951	0.951	0.19	0.007	0.25	9	4
Dibenz(a,h)anthracene	µg/L	0.016			-	<0.01	-	-	<1 - 0.0523	<0.016	<1 - 0.189	<1 - 0.0181	<1 - 0.0165	<0.016	<0.016	<0.016	9	4	<0.01	ND	0.189	0.189	0.13	0.008	0.15	0	0
Benzo(g,h,i)perylene	µg/L	0.016	0.0082		-	<0.01	-	-	<1 - 0.317	<0.016	<1 - 1.06	<1 - 0.128	<1 - 0.115	<0.016	<1 - 0.017	<0.016	9	5	<0.01	ND	1.06	1.06	0.23	0.2585	0.26	9	5
Benzo(b)fluoranthene	µg/L	0.023	0.017		-	<0.01	-	-	<1 - 0.486	<0.023	<1 - 2.46	<1 - 0.201	<1 - 0.227	<0.023	<0.023	<1 - 0.0234	9	5	<0.01	ND	2.46	2.46	0.33	0.2617	0.47	8	5
Benzo(k)fluoranthene	µg/L	0.027	0.017		-	<0.01	-	-	<1 - 0.223	<0.027	<1 - 1.2	<1 - 0.0881	<1 - 0.0916	<0.027	<0.027	<0.027	9	4	<0.01	ND	1.2	1.2	0.21	0.0135	0.28	8	4
Benzo(b)&(k)fluoranthene	µg/L				-	-	-	-	0.709	-	3.66	-	-	<0.05	-	-	3	2	<0.05	0.709	3.66	3.66	1.5	0.709	1.9	0	0
PAHs (sum of 4)	µg/L				-	-	-	-	1.267	-	5.671	-	-	<0.08	-	-	3	2	<0.08	1.267	5.671	5.671	2.3	1.267	3	0	0
PAH 16 Total	µg/L	0.344			-	<0.17	-	-	2.66	<0.344	10.5	1.45	1.44	<0.344	<0.344	<0.344	9	4	<0.17	1.44	10.5	10.5	1.9	0.172	3.4	0	0
benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene	µg/L				-	-	-	-	0.558	-	2.011	-	-	<0.03	-	-	3	2	<0.03	0.558	2.011	2.011	0.86	0.558	1	0	0
Coal Tar (Bap as surrogate marker)	µg/L				-	-	-	-	0.283	-	1.55	-	-	<0.009	-	-	3	2	<0.009	0.283	1.55	1.55	0.61	0.283	0.82	0	0
SVOC																											
2-methylnaphthalene	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
4-bromophenyl phenyl ether	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
4-chlorophenyl phenyl ether	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Azobenzene	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bis(2-chloroethoxy) methane	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bis(2-chloroethyl)ether	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Carbazole	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dibenzofuran	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Hexachlorocyclopentadiene	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Hexachloroethane	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Phenolics																											

Little Eaton Groundwater Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	output unit	EQL	G-AC, WTV, E N/WA, EQS- Fresh	Field_ID					BL02	BL02	BL08	BL08	BL08	BL10	BL10	BL10	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
Location_Code					TL02	TL03	TL04	TL06	BL02	BL02	BL08	BL08	BL08	BL10	BL10	BL10											
Sampled_Date_Time					22/08/2016	22/08/2016	22/08/2016	18/08/2016	12/12/2016	23/03/2017	12/12/2016	23/03/2017	06/07/2017	13/12/2016	22/03/2017	03/07/2017											
Trimethylphenols	µg/L				<100	<100	<100	<100	-	-	-	-	-	-	-	-	4	0	<100	ND	<100	ND	50	50	0	0	0
2-methylphenol	µg/L	0.5			-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
2-nitrophenol	µg/L	0.5			-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
2,4-dimethylphenol	µg/L	0.5			-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
4-chloro-3-methylphenol	µg/L	0.5	40		-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
4-methylphenol	µg/L	0.5			-	-	-	-	<0.5	<0.5	<1 - 1.97	<0.5	<0.5	<0.5	<0.5	<0.5	8	1	<0.5	ND	1.97	1.97	0.37	0.25	0.35	0	0
4-nitrophenol	µg/L	0.5			-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
Phenol	µg/L	0.5	7.7		<100	<100	<100	<100	<1	<1	<1	<1	<1	<1	<2 - 1.71	<1	12	1	<1	ND	<100	1.71	17	0.5	24	4	0
2-chloronaphthalene	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
2,4-dinitrophenol	µg/L	2.5			-	-	-	-	<2.5	<2.5	<2.5	<2.5	<12.5	<2.5	<2.5	<5	8	0	<2.5	ND	<12.5	ND	2	1.25	1.8	0	0
3-Methylphenol	µg/L	0.5			-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
4,6-Dinitro-2-methylphenol	µg/L	3			-	-	-	-	-	<3	-	<3	<9	-	<3	<6	5	0	<3	ND	<9	ND	2.4	1.5	1.3	0	0
4-chlorophenol	µg/L	0.5			-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
Phenols	µg/L				-	-	-	-	<16	-	<16	-	-	<16	-	-	3	0	<16	ND	<16	ND	8	8	0	0	0
2,3/3,5-Dimethylphenol + 4-Ethylphenol	µg/L				<100	<100	<100	<100	-	-	-	-	-	-	-	-	4	0	<100	ND	<100	ND	50	50	0	0	0
Cresols by HPLC (W)	µg/L	6			<100	<100	<100	<100	<6	<6	<6	<6	<6	<6	<6	<6	12	0	<6	ND	<100	ND	19	3	23	0	0
Total Monohydric Phenols (S) Corrected	µg/L	16			-	-	-	-	-	<16	-	<16	<16	-	-	<16	5	0	<16	ND	<16	ND	8	8	0	0	0
Xylenols	µg/L	8			-	-	-	-	<8	-	<8	-	<8	<8	-	<8	5	0	<8	ND	<8	ND	4	4	0	0	0
Herbicides																											
Bentazone	µg/L	0.04	500		-	-	-	-	<0.04	-	<0.04	-	<0.04	<0.04	-	-	4	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Bromoxynil	µg/L	0.04	100		-	-	-	-	<0.08	-	<0.08	-	<0.04	<0.04	-	-	4	0	<0.04	ND	<0.08	ND	0.03	0.03	0.012	0	0
Clopyralid	µg/L	0.04			-	-	-	-	<0.08	-	<0.2	-	<0.05	<0.04	-	-	4	0	<0.04	ND	<0.2	ND	0.046	0.0325	0.037	0	0
Hedonal	µg/L	0.04	0.3		-	-	-	-	-	-	-	-	<0.04	-	-	<0.04	2	0	<0.04	ND	<0.04	ND		0.02		0	0
Dicamba	µg/L	0.04			-	-	-	-	<0.08	-	<0.08	-	<0.05	<0.04	-	-	4	0	<0.04	ND	<0.08	ND	0.031	0.0325	0.01	0	0
2,4-Dichlorprop	µg/L	0.04			-	-	-	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	8	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
2-Methyl-4-chlorophenoxyacetic acid	µg/L	0.04	12		-	-	-	-	<0.08	-	<0.08	-	<0.04	<0.04	-	<0.04	5	0	<0.04	ND	<0.08	ND	0.028	0.02	0.011	0	0
2-Methyl-4-Chlorophenoxy Butanoic Acid	µg/L	0.04			-	-	-	-	<0.04	-	<0.04	-	<0.04	<0.04	-	-	4	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
2,4,5-Trichlorophenoxy Acetic Acid	µg/L	0.04			-	-	-	-	<0.04	-	<0.04	-	<0.04	<0.04	-	<0.04	5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Triclopyr	µg/L				-	-	-	-	<0.04	-	<0.04	-	-	<0.04	-	-	3	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	µg/L	0.04			-	-	-	-	-	-	-	-	<0.04	-	-	<0.04	2	0	<0.04	ND	<0.04	ND		0.02		0	0
Dinoseb	µg/L	4			-	-	-	-	<4	<4	<4	<4	<12	<4	<4	<8	8	0	<4	ND	<12	ND	2.8	2	1.5	0	0
Fluroxypyr	µg/L				-	-	-	-	<0.08	-	<0.08	-	-	<0.04	-	-	3	0	<0.04	ND	<0.08	ND	0.033	0.04	0.012	0	0
Mecoprop	µg/L	0.04	18		-	-	-	-	<0.04	-	<0.04	-	<0.04	<0.04	-	<0.04	5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Fenoprop	µg/L				-	-	-	-	<0.04	-	<0.04	-	-	<0.04	-	-	3	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Pesticides																											
Parathion	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Aldrin+Dieldrin+Endrin+Isodrin	µg/L		0.01		-	-	-	-	<0.03	-	<0.03	-	-	<0.03	-	-	3	0	<0.03	ND	<0.03	ND	0.015	0.015	0	3	0
Organochlorine Pesticides																											
Aldrin	µg/L	0.01	9.99000000000049E11		-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
a-BHC	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
b-BHC	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Dieldrin	µg/L	0.01	9.99000000000049E11		-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endosulfan I	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endosulfan II	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endosulfan sulphate	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endrin	µg/L	0.01	9.99000000000049E11		-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
g-BHC (Lindane)	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Heptachlor	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Heptachlor epoxide	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
o,p"-DDE	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
2,4-DDT	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
o,p-DDD	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
4,4-DDE	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
DDT	µg/L	0.01	0.01		-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Methoxychlor	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
DDD	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Aldrin + Dieldrin	µg/L				-	-	-	-	<0.02	-	<0.02	-	-	<0.02	-	-	3	0	<0.02	ND	<0.02	ND	0.01	0.01	0	0	0
DDT+DDE+DDD	µg/L				-	-	-	-	<0.02	-	<0.02	-	-	<0.02	-	-	3	0	<0.02	ND	<0.02	ND	0.01	0.01	0	0	0
Organophosphorous Pesticides																											
Azinophos methyl	µg/L	0.01	0.01		-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Diazinon	µg/L	0.01	0.01		-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Dichlorvos	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Ethion	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Fenitrothion	µg/L	0.01	0.01		-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Malathion	µg/L	0.01	0.01		-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Methyl parathion	µg/L	0.01			-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Mevinphos (Phosdrin)	µg/L	0.01	0.02		-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	8	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Amino Aliphatics																											
N-nitrosodi-n-propylamine	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Anilines																											
2-nitroaniline	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
3-nitroaniline	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
4-chloroaniline	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
4-nitroaniline	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Explosives																											
2,4-Dinitrotoluene	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
2,6-dinitrotoluene	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Nitrobenzene	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Halogenated Benzenes																											
1,3,5-Trichlorobenzene	µg/L	1	9.99000000000065E11		-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chlorobenzene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromobenzene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
2-chlorotoluene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
4-chlorotoluene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3-dichlorobenzene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,4-dichlorobenzene	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichlorobenzene	µg/L	1			<5	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<5	ND	0.72	0.5	0.67	0	0
1,2,4-trichlorobenzene	µg/L	1	9.99000000000065E11		<5	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<5	ND	0.72	0.5	0.67	0	0
1,2,3-trichlorobenzene	µg/L	1	9.99000000000065E11		<5	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<5	ND	0.72	0.5	0.67	0	0
Hexachlorobenzene	µg/L	1	0.05		-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	8	0
Halogenated Hydrocarbons																											
Dichlorodifluoromethane	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromomethane	µg/L	1			<5	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<5	ND	0.72	0.5	0.67	0	0
Trichlorofluoromethane	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dibromoethane	µg/L	1			<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	9	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dibromofluoromethane	µg/L				-	-	-	-	1,220,000,000	-	1,190,000,000	-	-	1,230,000,000	-	-	3	3	1190000000	1190000000	1230000000	1230000000	1213333333	1220000000	20816660	0	0
Halogenated Phenols																											
2,3,5,6-Tetrachlorophenol	µg/L	0.5			-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	8	0	<0.5	ND	<1	ND	0.28	0.25	0.088	0	0
2-chlorophenol	µg/L	0.5	50		-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
2,4-dichlorophenol	µg/L	0.5	4.2		-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
2,4,5-trichlorophenol	µg/L	0.5			-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
2,4,6-trichlorophenol	µg/L	0.5			-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	8	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
Pentachlorophenol	µg/L	0.04	0.4		-	-	-	-	<0.04	<1	<0.04	<1	<0.04	<0.04	<1	<1	8	0	<0.04	ND	<1	ND	0.26	0.26	0.26	4	0
Phthalates																											
Bis(2-ethylhexyl) phthalate	µg/L	2	1.3		-	-	-	-	<2	<2	3.38	<2	<2	<2	<2	<2	8	1	<2	3.38	3.38	3.38	1.3	1	0.84	8	1
Butyl benzyl phthalate	µg/L	1	7.5		-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Di-n-butyl phthalate	µg/L	1	8		-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Di-n-octyl phthalate	µg/L	5	20		-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	8	0	<5	ND	<5	ND	2.5	2.5	0	0	0
Diethylphthalate	µg/L	1	200		-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dimethyl phthalate	µg/L	1	800		-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Solvents																											
Carbon disulfide	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Isophorone	µg/L	1			-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Metals																											
Arsenic	µg/L		50		<1	<1	<1	<1	0.56		8.02	-	-	1.02	-	-	7	3	0.56	0.56	8.02	8.02	1.7	0.5	2.8	0	0
Arsenic (Filtered)	µg/L	0.5	50		-	-	-	-	-	0.692	-	9.46	5.87	-	0.624	1.36	5	5	0.624	0.624	9.46	9.46	3.6	1.36	3.9	0	0
Boron	µg/L		2000		140	60	100	50	215	-	64.1	-	-	83.6	-	-	7	7	50	50	215	215	102	83.6	58	0	0
Boron (Filtered)	µg/L	5	2000		-	-	-	-	-	259	-	87.4	92.5	-	68.2	79.2	5	5	68.2	68.2	259	259	117	87.4	80	0	0
Cadmium	µg/L		0.08		1.5	0.1	0.4	<0.1	5.24		<0.08	-	-	<0.08	-	-	7	4	<0.08	0.1	5.24	5.24	1.1	0.1	1.9	5	4
Cadmium (Filtered)	µg/L	0.08	0.08		-	-	-	-	-	0.475	-	<0.08	<0.08	-	<0.08	<0.08	5	1	<0.08	0.475	0.475	0.475	0.13	0.04	0.19	1	1
Calcium	mg/L				120	96.9	115	116	-	-	-	-	-	-	-	-	4	4	96.9	96.9	120	120	112	115.5	10	0	0
Chromium (III+VI)	µg/L	3			<1	<1	<1	<1	136	22.3	62.9	25.6	17.1	13	9.87	15.9	12	8	<1	9.87	136	136	25	14.45	39	0	0
Copper	µg/L		1		<1	<1	<1	<1	1.62	-	<0.85	-	-	<0.85	-	-	7	1	<0.85	1.62	1.62	1.62	0.64	0.5	0.43	1	1
Copper (Filtered)	µg/L	0.3	1		-	-	-	-	-	<0.85	-	<0.85	<0.3	-	<0.85	<0.3	5	0	<0.3	ND	<0.85	ND	0.32	0.425	0.15	0	0
Iron	µg/L	24	1000		160 - 70.460	130 - 131.000	160 - 161.000	6590 - 68.740	<19 - 440.000	38.700	1030 - 115.000	104.000	27.200	67.9 - 17.200	21.200	35.000	12	12	19	67.9	440000	440000	60989	38182.5	56722	12	12
Iron (Filtered)	µg/L	19	1000		-	-	-	-	-	258	-	471	3250	-	327	2010	5	5	258	258	3250	3250	1263	471	1325	2	2
Lead	µg/L		1.2		<1	<1	<1	<1	0.193	-	<0.1	-	-	<0.1	-	-	7	1	<0.1	0.193	<1	0.193	0.33	0.5	0.22	0	0
Lead (Filtered)	µg/L	0.1	1.2		-	-	-	-	-	<0.1	-	<0.1	<0.2	-	<0.1	<0.2	5	0	<0.1	ND	<0.2	ND	0.07	0.05	0.027	0	0
Magnesium	mg/L				16	18.1	23.5	14.8	-	-	-	-	-	-	-	-	4	4	14.8	14.8	23.5	23.5	18	17.05	3.8	0	0
Mercury	µg/L		0.07		<0.1	<0.1	<0.1	<0.1	<0.01	-	<0.01	-	-	<0.01	-	-	7	0	<0.01	ND	<0.1	ND	0.031	0.05	0.024	4	0

Little Eaton Groundwater Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	output unit	EQL	G-AC, WTV, E N'WA, EQS- Fresh	Field_ID	TL02	TL03	TL04	TL06	BL02	BL02	BL08	BL08	BL08	BL10	BL10	BL10	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
Location_Code					TL02	TL03	TL04	TL06	BL02	BL02	BL08	BL08	BL08	BL10	BL10	BL10											
Sampled_Date_Time					22/08/2016	22/08/2016	22/08/2016	18/08/2016	12/12/2016	23/03/2017	12/12/2016	23/03/2017	06/07/2017	13/12/2016	22/03/2017	03/07/2017											
Mercury (Filtered)	µg/L	0.01	0.07		-	-	-	-	-	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	5	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Nickel	µg/L		4		5	1	32	<1	37.9	-	4.69	-	-	3.2	-	-	7	6	<1	1	37.9	37.9	12	4.69	16	4	4
Nickel (Filtered)	µg/L	0.4	4		-	-	-	-	-	7.91	-	5.01	2.68	-	5.34	4.57	5	5	2.68	2.68	7.91	7.91	5.1	5.01	1.9	4	4
Selenium	µg/L				<1	<1	<1	<1	1.29	-	1.05	-	-	<0.81	-	-	7	2	<0.81	1.05	1.29	1.29	0.68	0.5	0.35	0	0
Selenium (Filtered)	µg/L	0.5			-	-	-	-	-	<0.81	-	1.12	<0.5	-	<0.81	<0.5	5	1	<0.5	1.12	1.12	1.12	0.49	0.405	0.36	0	0
Zinc	µg/L		10.9		122	63	<2	<2	9.89	-	<1.3	-	-	1.34	-	-	7	4	<1.3	1.34	122	122	28	1.34	47	2	2
Zinc (Filtered)	µg/L	1	10.9		-	-	-	-	-	4.4	-	<1.3	<1	-	1.7	<1	5	2	<1	1.7	4.4	4.4	1.6	0.65	1.7	0	0
Chromium (hexavalent)	µg/L	30	3.4		<10	<10	<10	<10	<30	<30	<30	<30	<30	<30	<30	<30	12	0	<10	ND	<30	ND	12	15	4.9	12	0
Organics																											
TOC	mg/L	3			2.2	1.7	1.8	3.3	6.99	7.03	15.6	11.1	9.8	10.6	6.62	6.01	12	12	1.7	1.7	15.6	15.6	6.9	6.805	4.3	0	0
Inorganics																											
BOD	mg/L				<2	<2	<2	<2	-	-	-	-	-	-	-	-	4	0	<2	ND	<2	ND	1	1	0	0	0
Cyanide (Free)	mg/L	0.05	0.001		<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	12	0	<0.02	ND	<0.05	ND	0.02	0.025	0.0074	12	0
Nitrooen (Total)	µg/L				-	-	-	-	1190	-	<200	-	-	<200	-	-	3	1	<200	1190	1190	1190	463	100	629	0	0
Cyanide Total	mg/L	0.05	0.001		<0.02	0.03	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	12	1	<0.02	0.03	<0.05	0.03	0.022	0.025	0.0072	12	1
Hardness as CaCO3	mg/L				366	316	384	351	-	-	-	-	-	-	-	-	4	4	316	316	384	384	354	358.5	29	0	0
Ammoniacal Nitrogen as N	mg/L	0.2	9.99000000000059E8		0.06	<0.01	0.06	0.04	-	1.43	-	0.245	0.307	-	<0.2	<0.2	9	6	<0.01	0.04	1.43	1.43	0.26	0.1	0.45	0	0
Total Hardness	mg/l	0.35			-	-	-	-	-	618	-	1060	-	-	402	-	3	3	402	402	1060	1060	693	618	335	0	0
COD	mg/L	7			41	42	45	38	-	-	-	-	-	-	-	76.1	5	5	38	38	76.1	76.1	48	42	16	0	0
pH (Lab)	pH Units	1			6.7	7.2	7	6.7	7.26	7.67	7.51	7.86	7.48	7.56	7.76	7.54	12	12	6.7	6.7	7.86	7.86	7.4	7.495	0.39	0	0
TSS	mg/L	2			-	-	-	-	-	-	-	-	-	-	-	704	1	1	704	704	704	704		704		0	0
Other																											
Actril (lowvil)	mg/L	4E-05	0.01		-	-	-	-	<0.00004	-	<0.00004	-	<0.00004	<0.00004	-	-	4	0	<0.00004	ND	<0.00004	ND	0.00002	0.00002	0	0	0
Surrogate																											
Toluene-D8	%				-	-	-	-	110	-	109	-	-	109	-	-	3	3	109	109	110	110	109	109	0.58	0	0
GRO Surrogate	%				-	-	-	-	89	-	100	-	-	90	-	-	3	3	89	89	100	100	93	90	6.1	0	0

Kingsway Junction Surface Water Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	output unit	EQL	GAC_WTV_EQS_UWA_EQS-Fresh	Field_ID	HK01	HK01	HK02	HK02	HK02	HK03	HK03	HK03	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
Location_Code					HK01	HK01	HK02	HK02	HK02	HK03	HK03	HK03											
Sampled_Date_Time					15/12/2016	20/03/2017	15/12/2016	20/03/2017	04/07/2017	14/12/2016	20/03/2017	04/07/2017											
Hardness	mg/L				636	-	489	-	-	359	-	-	3	3	359	359	636	636	495	489	139	0	0
Dichloroacetic acid	µg/L				-	-	-	-	-	<0.04	-	-	1	0	<0.04	ND	<0.04	ND		0.02		0	0
o,p''-Methoxychlor	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Benazolin	µg/L				-	-	-	-	-	<0.04	-	-	1	0	<0.04	ND	<0.04	ND		0.02		0	0
2,4-DB	µg/L				-	-	-	-	-	<0.04	-	-	1	0	<0.04	ND	<0.04	ND		0.02		0	0
2,3,6-Trichlorobenzoic acid	µg/L				-	-	-	-	-	<0.04	-	-	1	0	<0.04	ND	<0.04	ND		0.02		0	0
Aromatics >EC8-EC10	µg/L				<10	-	<10	-	-	<10	-	-	3	0	<10	ND	<10	ND	5	5	0	0	0
Aromatics >EC7-EC8	µg/L				<10	-	<10	-	-	<10	-	-	3	0	<10	ND	<10	ND	5	5	0	0	0
DNOC :- (4,6-dinitro-o-cresol)	µg/l				-	-	-	-	-	<3	-	-	1	0	<3	ND	<3	ND		1.5		0	0
TPH																							
GRO >C5-C12	µg/L	50			<50	<50	<50	<50	<50	<50	<50	<50	8	0	<50	ND	<50	ND	25	25	0	0	0
>C5-C6 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	8	0	<10	ND	<10	ND	5	5	0	0	0
>C6-C8 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	8	0	<10	ND	<10	ND	5	5	0	0	0
>C8-C10 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	8	0	<10	ND	<10	ND	5	5	0	0	0
>C10-C12 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	8	0	<10	ND	<10	ND	5	5	0	0	0
>C12-C16 Aliphatics	µg/L	10			-	<10	-	<10	<10	<10	<10	<10	6	0	<10	ND	<10	ND	5	5	0	0	0
>C16-C21 Aliphatics	µg/L	10			-	<10	-	<10	<10	<10	<10	12	6	1	<10	12	12	12	6.2	5	2.9	0	0
>C16-C35 Aliphatics	µg/L				-	-	-	-	-	<20	-	-	1	0	<20	ND	<20	ND		10		0	0
>C21-C35 Aliphatics	µg/L	10			-	<10	-	<10	<10	<10	71	152	6	2	<10	71	152	152	41	5	61	0	0
>C12-C35 Aliphatics	µg/L	10			-	<10	-	<10	<10	<10	71	164	6	2	<10	71	164	164	43	5	65	0	0
>EC5-EC7 Aromatics	µg/L	10	10		<10	<10	<10	<10	<10	<10	<10	<10	8	0	<10	ND	<10	ND	5	5	0	0	0
>EC7-EC8 Aromatics	µg/L	10	74		-	<10	-	<10	<10	-	<10	<10	5	0	<10	ND	<10	ND	5	5	0	0	0
>EC8-EC10 Aromatics	µg/L	10			-	<10	-	<10	<10	-	<10	<10	5	0	<10	ND	<10	ND	5	5	0	0	0
>EC10-EC12 Aromatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	8	0	<10	ND	<10	ND	5	5	0	0	0
>EC12-EC16 Aromatics	µg/L	10			-	<10	-	<10	<10	<10	<10	<10	6	0	<10	ND	<10	ND	5	5	0	0	0
>EC16-EC21 Aromatics	µg/L	10			-	<10	-	<10	<10	<10	<10	13	6	1	<10	13	13	13	6.3	5	3.3	0	0
>EC21-EC35 Aromatics	µg/L	10			-	<10	-	13	<10	<10	33	94	6	3	<10	13	94	94	26	9	35	0	0
>EC12-EC35 Aromatics	µg/L	10			-	<10	-	13	<10	<10	33	107	6	3	<10	13	107	107	28	9	40	0	0
>C5-C35 Aliphatics & Aromatics	µg/L	10			-	-	-	-	<10	<10	-	271	3	1	<10	271	271	271	94	5	154	0	0
4-Bromofluorobenzene	µg/L				1,110,000,000	-	1,120,000,000	-	-	1,070,000,000	-	-	3	3	1070000000	1.07E+09	1120000000	1.12E+09	1100000000	1110000000	2.6E+07	0	0
BTEX																							
Benzene	µg/L	1	10		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Toluene	µg/L	1	74		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Ethylbenzene	µg/L	1	20		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Xylene (m & p)	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Xylene Total	µg/L	11	30		<11	<11	<11	<11	<11	<11	<11	<11	8	0	<11	ND	<11	ND	5.5	5.5	0	0	0
Xylene (o)	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Total BTEX	µg/L	28			<28	<28	<28	<28	<28	<28	<28	<28	8	0	<28	ND	<28	ND	14	14	0	0	0
Oxygenates																							
MTBE	µg/L	1	5100		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Tert Amyl Methyl Ether	µg/L	1	510		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chlorinated Hydrocarbons																							
Chloromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Vinyl chloride	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chloroethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1-dichloroethene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dichloromethane	µg/L	3	20		<3	<3	<3	<3	<3	<3	<3	<3	8	0	<3	ND	<3	ND	1.5	1.5	0	0	0
trans-1,2-dichloroethene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1-dichloroethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
cis-1,2-dichloroethene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chloroform	µg/L	1	2.5		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,1-trichloroethane	µg/L	1	100		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Carbon tetrachloride	µg/L	1	12		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Trichloroethene	µg/L	1	10		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,2-trichloroethane	µg/L	1	400		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Tetrachloroethene	µg/L	1	10		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Sum of PCE and TCE	µg/L				<2	-	<2	-	-	<2	-	-	3	0	<2	ND	<2	ND	1	1	0	0	0
TCE+DCE+VC	µg/L				<5	-	<5	-	-	<5	-	-	3	0	<5	ND	<5	ND	2.5	2.5	0	0	0
PCE+TCE+DCE+VC	µg/L				<6	-	<6	-	-	<6	-	-	3	0	<6	ND	<6	ND	3	3	0	0	0
VOC																							
2,2-dichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromochloromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1-dichloropropene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichloroethane	µg/L	1	10		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dibromomethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromodichloromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
cis-1,3-dichloropropene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
trans-1,3-dichloropropene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3-dichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chlorodibromomethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,1,2-tetrachloroethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Styrene	µg/L	1	50		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromoform	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Isopropylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,2,2-tetrachloroethane	µg/L	1	140		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2,3-trichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
n-propylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3,5-trimethylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
tert-butylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2,4-trimethylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
sec-butylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
p-isopropyltoluene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
n-butylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dibromo-3-chloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Hexachlorobutadiene	µg/L	1	0.6		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	8	0
1,2-Dichloroethene	µg/L				<2	-	<2	-	-	<2	-	-	3	0	<2	ND	<2	ND	1	1	0	0	0
Trihalomethanes	µg/L				<4	-	<4	-	-	<4	-	-	3	0	<4	ND	<4	ND	2	2	0	0	0

Kingsway Junction Surface Water Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	output unit	EQL	GAC_WTV_E NVA_EQS-Fresh	Field_ID	HK01	HK01	HK02	HK02	HK02	HK03	HK03	HK03	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
				Location_Code	HK01	HK01	HK02	HK02	HK02	HK03	HK03	HK03											
				Sampled_Date_Time	15/12/2016	20/03/2017	15/12/2016	20/03/2017	04/07/2017	14/12/2016	20/03/2017	04/07/2017											
PAH																							
Naphthalene	µg/L	0.1	2		<0.1	<0.1	<0.1	<0.1	<0.1	<1 - 0.518	<0.1	<0.1	8	1	<0.1	ND	0.518	0.518	0.11	0.05	0.16	0	0
Acenaphthylene	µg/L	0.011			<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	8	0	<0.011	ND	<0.011	ND	0.0055	0.0055	0	0	0
Acenaphthene	µg/L	0.015			<0.015	<0.015	<0.015	<1 - 0.0301	<0.015	<0.015	<0.015	<0.015	8	1	<0.015	ND	0.0301	0.0301	0.04	0.0075	0.091	0	0
Fluorene	µg/L	0.014			<0.014	<0.014	<0.014	<1 - 0.0288	<0.014	<0.014	<0.014	<1 - 0.0145	8	2	<0.014	ND	0.0288	0.0288	0.07	0.007	0.12	0	0
Phenanthrene	µg/L	0.022			0.195	<1 - 0.0473	<0.022	<1 - 0.146	<0.022	<0.022	<1 - 0.0797	<1 - 0.171	8	5	<0.022	0.195	0.195	0.195	0.18	0.234325	0.15	0	0
Anthracene	µg/L	0.015	0.1		0.0403	<0.015	<0.015	<1 - 0.0439	<0.015	<0.015	<1 - 0.0188	<1 - 0.0365	8	4	<0.015	0.0403	0.0439	0.0439	0.11	0.0239	0.13	0	0
Fluoranthene	µg/L	0.017	0.0063		0.633	<1 - 0.126	<0.017	<1 - 0.561	<1 - 0.0326	<0.017	<1 - 0.284	<1 - 0.641	8	6	<0.017	0.633	0.641	0.641	0.34	0.3525	0.24	8	6
Pyrene	µg/L	0.015			0.795	<1 - 0.126	<0.015	<1 - 0.506	<1 - 0.0283	<0.015	<1 - 0.327	<1 - 0.604	8	6	<0.015	0.795	0.795	0.795	0.36	0.36325	0.27	0	0
Benz(a)anthracene	µg/L	0.017			0.301	<1 - 0.0758	<0.017	<1 - 0.301	<1 - 0.0208	<0.017	<1 - 0.171	<1 - 0.24	8	6	<0.017	0.301	0.301	0.301	0.25	0.29445	0.15	0	0
Chrysene	µg/L	0.013			0.36	<1 - 0.0567	<0.013	<1 - 0.234	<0.013	<0.013	<1 - 0.138	<1 - 0.322	8	5	<0.013	0.36	0.36	0.36	0.22	0.298675	0.18	0	0
Benzo(a) pyrene	µg/L	0.009	0.00017		0.471	<1 - 0.0764	<0.009	<1 - 0.336	<1 - 0.0162	<0.009	<1 - 0.165	<1 - 0.257	8	6	<0.009	0.471	0.471	0.471	0.27	0.31035	0.18	8	6
Indeno(1,2,3-c,d)pyrene	µg/L	0.014	0.00017		0.329	<1 - 0.0482	<0.014	<1 - 0.272	<0.014	<0.014	<1 - 0.146	<1 - 0.191	8	5	<0.014	0.329	0.329	0.329	0.21	0.29855	0.17	8	5
Dibenz(a,h)anthracene	µg/L	0.016			0.0629	<0.016	<0.016	<1 - 0.0517	<0.016	<0.016	<1 - 0.032	<1 - 0.0404	8	4	<0.016	0.0629	0.0629	0.0629	0.11	0.03545	0.13	0	0
Benzo(g,h,i)perylene	µg/L	0.016	0.0082		0.412	<1 - 0.0581	<0.016	<1 - 0.286	<0.016	<0.016	<1 - 0.167	<1 - 0.212	8	5	<0.016	0.412	0.412	0.412	0.22	0.306275	0.18	8	5
Benzo(b)fluoranthene	µg/L	0.023	0.017		0.769	<1 - 0.0971	<0.023	<1 - 0.415	<1 - 0.0241	<0.023	<1 - 0.241	<1 - 0.515	8	6	<0.023	0.769	0.769	0.769	0.34	0.334525	0.25	8	6
Benzo(k)fluoranthene	µg/L	0.027	0.017		0.295	<1 - 0.037	<0.027	<1 - 0.168	<0.027	<0.027	<1 - 0.0921	<1 - 0.17	8	5	<0.027	0.295	0.295	0.295	0.2	0.28175	0.15	8	5
Benzo(b)&(k)fluoranthene	µg/L				1.064	-	<0.05	-	-	<0.05	-	-	3	1	<0.05	1.064	1.064	1.064	0.37	0.025	0.6	0	0
PAHs (sum of 4)	µg/L				1.805	-	<0.08	-	-	<0.08	-	-	3	1	<0.08	1.805	1.805	1.805	0.63	0.04	1	0	0
PAH 16 Total	µg/L	0.344			4.66	0.749	<0.344	3.38	<0.344	0.518	1.86	3.41	8	6	<0.344	0.518	4.66	4.66	1.9	1.3045	1.7	0	0
benzo(g,h,i)perylene + indeno(1,2,3-cd)pyrene	µg/L				0.741	-	<0.03	-	-	<0.03	-	-	3	1	<0.03	0.741	0.741	0.741	0.26	0.015	0.42	0	0
Coal Tar (Bap as surrogate marker)	µg/L				0.471	-	<0.009	-	-	<0.009	-	-	3	1	<0.009	0.471	0.471	0.471	0.16	0.0045	0.27	0	0
SVOC																							
2-methylnaphthalene	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
4-bromophenyl phenyl ether	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
4-chlorophenyl phenyl ether	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Azobenzene	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Bis(2-chloroethoxy) methane	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Bis(2-chloroethyl)ether	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Carbazole	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Dibenzofuran	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Hexachlorocyclopentadiene	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Hexachloroethane	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Phenolics																							
2-methylphenol	µg/L	0.5			-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
2-nitrophenol	µg/L	0.5			-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
2,4-dimethylphenol	µg/L	0.5			-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
4-chloro-3-methylphenol	µg/L	0.5	40		-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
4-methylphenol	µg/L	0.5			-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
4-nitrophenol	µg/L	0.5			-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
Phenol	µg/L	0.5	7.7		<2	<1	<2	<1	<1	<2	<1	<1	8	0	<1	ND	<2	ND	0.69	0.5	0.26	0	0
2-chloronaphthalene	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
2,4-dinitrophenol	µg/L	2.5			-	<5	-	<5	<12.5	<2.5	<5	<12.5	6	0	<2.5	ND	<12.5	ND	3.5	2.5	2.2	0	0
3-Methylphenol	µg/L	0.5			-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
4,6-Dinitro-2-methylphenol	µg/L	3			-	<6	-	<6	<9	-	<6	<9	5	0	<6	ND	<9	ND	3.6	3	0.82	0	0
4-chlorophenol	µg/L	0.5			-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
Phenols	µg/L				<16	-	<16	-	-	<16	-	-	3	0	<16	ND	<16	ND	8	8	0	0	0
Cresols by HPLC (W)	µg/L	6			<6	<6	<6	<6	<6	<6	<6	<6	8	0	<6	ND	<6	ND	3	3	0	0	0
Total Monohydric Phenols (S) Corrected	µg/L	16			-	<16	-	<16	<16	-	<16	<16	5	0	<16	ND	<16	ND	8	8	0	0	0
Xylenols	µg/L	8			<8	-	<8	-	<8	<8	-	<8	5	0	<8	ND	<8	ND	4	4	0	0	0
Herbicides																							
Bentazone	µg/L	0.04	500		-	-	-	-	<0.04	<0.04	-	<0.04	3	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Bromoxynil	µg/L	0.04	100		-	-	-	-	<0.04	<0.04	-	<0.04	3	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Clopyralid	µg/L	0.04			-	-	-	-	<0.04	<0.04	-	<0.04	3	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Hedonal	µg/L	0.04	0.3		-	-	-	-	<0.04	-	-	<0.04	2	0	<0.04	ND	<0.04	ND		0.02		0	0
Dicamba	µg/L	0.04			-	-	-	-	<0.05	<0.06	-	<0.04	3	0	<0.04	ND	<0.06	ND	0.025	0.025	0.005	0	0
2,4-Dichlorprop	µg/L	0.04			-	<0.04	-	<0.04	<0.04	<0.04	<0.04	<0.04	6	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
2,4,5-TP (Silvex)	µg/L	0.04			-	-	-	-	<0.04	-	-	<0.04	2	0	<0.04	ND	<0.04	ND		0.02		0	0
2-Methyl-4-chlorophenoxyacetic acid	µg/L	0.04	12		-	-	-	-	<0.04	<0.04	-	<0.04	3	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
2-Methyl-4-Chlorophenoxy Butanoic Acid	µg/L	0.04			-	-	-	-	<0.04	<0.04	-	<0.04	3	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
2,4,5-Trichlorophenoxy Acetic Acid	µg/L	0.04			-	<0.04	-	-	<0.04	<0.04	-	<0.04	4	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Triclopyr	µg/L	0.04			-	-	-	-	<0.04	<0.04	-	<0.04	3	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	µg/L	0.04			-	-	-	-	<0.04	-	-	<0.04	2	0	<0.04	ND	<0.04	ND		0.02		0	0
Dinoseb	µg/L	4			-	<8	-	<8	<12	<4	<8	<12	6	0	<4	ND	<12	ND	4.3	4	1.5	0	0
Fluroxypyr	µg/L	0.04			-	-	-	-	<0.04	<0.04	-	<0.04	3	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Mecoprop	µg/L	0.04	18		-	-	-	-	<0.04	<0.04	-	<0.04	3	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Fenoprop	µg/L				-	-	-	-	-	<0.04	-	-	1	0	<0.04	ND	<0.04	ND		0.02		0	0
Pesticides																							
Parathion	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Aldrin+Dieldrin+Endrin+Isodrin	µg/L		0.01		-	-	-	-	-	<0.03	-	-	1	0	<0.03	ND	<0.03	ND		0.015		1	0
Organochlorine Pesticides																							
Aldrin	µg/L	0.01	9.99000000000049E11		-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
a-BHC	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
b-BHC	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Dieldrin	µg/L	0.01	9.99000000000049E11		-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endosulfan I	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endosulfan II	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endosulfan sulphate	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endrin	µg/L	0.01	9.99000000000049E11		-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
g-BHC (Lindane)	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Heptachlor	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Heptachlor epoxide	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
o,p''-DDE	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
2,4-DDT	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
o,p-DDD	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
4,4-DDE	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
DDT	µg/L	0.01	0.01		-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Methoxychlor	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
DDD	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Aldrin + Dieldrin	µg/L				-	-	-	-	-	<0.02	-	-	1	0	<0.02	ND	<0.02	ND		0.01		0	0
DDT+DDE+DDD	µg/L				-	-	-	-	-	<0.02	-	-	1	0	<0.02	ND	<0.02	ND		0.01		0	0

Kingsway Junction Surface Water Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	output unit	EQL	GAC_WTV_EWWA_EQS-Fresh	Field_ID	HK01	HK01	HK02	HK02	HK02	HK03	HK03	HK03	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
				Location_Code	HK01	HK01	HK02	HK02	HK02	HK03	HK03	HK03											
				Sampled_Date_Time	15/12/2016	20/03/2017	15/12/2016	20/03/2017	04/07/2017	14/12/2016	20/03/2017	04/07/2017											
Organophosphorous Pesticides																							
Azinophos methyl	µg/L	0.01	0.01		-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Diazinon	µg/L	0.01	0.01		-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Dichlorvos	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Ethion	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Fenitrothion	µg/L	0.01	0.01		-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Malathion	µg/L	0.01	0.01		-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Methyl parathion	µg/L	0.01			-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Mevinphos (Phosdrin)	µg/L	0.01	0.02		-	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	6	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Amino Aliphatics																							
N-nitrosodi-n-propylamine	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Anilines																							
2-nitroaniline	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
3-nitroaniline	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
4-chloroaniline	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
4-nitroaniline	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Explosives																							
2,4-Dinitrotoluene	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
2,6-dinitrotoluene	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Nitrobenzene	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Halogenated Benzenes																							
1,3,5-Trichlorobenzene	µg/L	1	9.99000000000065E11		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
2-chlorotoluene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
4-chlorotoluene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3-dichlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,4-dichlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2,4-trichlorobenzene	µg/L	1	9.99000000000065E11		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2,3-trichlorobenzene	µg/L	1	9.99000000000065E11		<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Hexachlorobenzene	µg/L	1	0.05		-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	6	0
Halogenated Hydrocarbons																							
Dichlorodifluoromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromomethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Trichlorofluoromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dibromoethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dibromofluoromethane	µg/L				1,260,000,000	-	1,240,000,000	-	-	1,160,000,000	-	-	3	3	1160000000	1.16E+09	1260000000	1.26E+09	1220000000	1240000000	5.3E+07	0	0
Halogenated Phenols																							
2,3,5,6-Tetrachlorophenol	µg/L	0.5			-	<0.5	-	<0.5	<1	<0.5	<0.5	<0.5	6	0	<0.5	ND	<1	ND	0.29	0.25	0.1	0	0
2-chlorophenol	µg/L	0.5	50		-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
2,4-dichlorophenol	µg/L	0.5	4.2		-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
2,4,5-trichlorophenol	µg/L	0.5			-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
2,4,6-trichlorophenol	µg/L	0.5			-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
Pentachlorophenol	µg/L	0.04	0.4		-	<1	-	<1	<0.04	<0.04	<1	<0.04	6	0	<0.04	ND	<1	ND	0.26	0.26	0.26	3	0
Phthalates																							
Bis(2-ethylhexyl) phthalate	µg/L	2	1.3		-	<2	-	<2	<2	<4	<2	<2	6	0	<2	ND	<4	ND	1.2	1	0.41	6	0
Butyl benzyl phthalate	µg/L	1	7.5		-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Di-n-butyl phthalate	µg/L	1	8		-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Di-n-octyl phthalate	µg/L	5	20		-	<5	-	<5	<5	<10	<5	<5	6	0	<5	ND	<10	ND	2.9	2.5	1	0	0
Diethylphthalate	µg/L	1	200		-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Dimethyl phthalate	µg/L	1	800		-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Solvents																							
Carbon disulfide	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	8	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Isophorone	µg/L	1			-	<1	-	<1	<1	<2	<1	<1	6	0	<1	ND	<2	ND	0.58	0.5	0.2	0	0
Metals																							
Arsenic	µg/L		50		-	-	-	-	-	1.97	-	-	1	1	1.97	1.97	1.97	1.97		1.97		0	0
Arsenic (Filtered)	µg/L	0.5	50		-	1.54	-	1.08	1.76	-	1.13	1.9	5	5	1.08	1.08	1.9	1.9	1.5	1.54	0.37	0	0
Boron	µg/L		2000		-	-	-	-	-	69.7	-	-	1	1	69.7	69.7	69.7	69.7		69.7		0	0
Boron (Filtered)	µg/L	5	2000		-	60.7	-	127	138	-	72.4	86.9	5	5	60.7	60.7	138	138	97	86.9	34	0	0
Cadmium	µg/L		0.08		-	-	-	-	-	<0.08	-	-	1	0	<0.08	ND	<0.08	ND		0.04		0	0
Cadmium (Filtered)	µg/L	0.08	0.08		-	<0.08	-	<0.08	<0.08	-	<0.08	<0.08	5	0	<0.08	ND	<0.08	ND	0.04	0.04	0	0	0
Chromium (III+VI)	µg/L	3			21.7	11	8.34	9.73	<3	<3	4.01	<3	8	5	<3	4.01	21.7	21.7	7.4	6.175	7	0	0
Copper	µg/L		1		-	-	-	-	-	3.5	-	-	1	1	3.5	3.5	3.5	3.5		3.5		1	1
Copper (Filtered)	µg/L	0.3	1		-	5.23	-	3.05	0.803	-	4.92	0.503	5	5	0.503	0.503	5.23	5.23	2.9	3.05	2.2	3	3
Iron	µg/L	24	1000		9180	3670	179	4690	377	99.8 - 147	1610	209	8	8	99.8	99.8	9180	9180	2505	993.5	3215	4	4
Iron (Filtered)	µg/L	19	1000		-	80.6	-	20.5	<19	-	<19	20.2	5	3	<19	20.2	80.6	80.6	28	20.2	30	0	0
Lead	µg/L		1.2		-	-	-	-	-	0.782	-	-	1	1	0.782	0.782	0.782	0.782		0.782		0	0
Lead (Filtered)	µg/L	0.1	1.2		-	0.451	-	<0.1	<0.2	-	0.115	<0.2	5	2	<0.1	0.115	0.451	0.451	0.16	0.1	0.16	0	0
Mercury	µg/L		0.07		<0.01	-	<0.01	-	-	<0.01	-	-	3	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Mercury (Filtered)	µg/L	0.01	0.07		-	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	5	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Nickel	µg/L		4		-	-	-	-	-	1.47	-	-	1	1	1.47	1.47	1.47	1.47		1.47		0	0
Nickel (Filtered)	µg/L	0.4	4		-	1.99	-	0.886	0.813	-	1.04	0.804	5	5	0.804	0.804	1.99	1.99	1.1	0.886	0.5	0	0
Selenium	µg/L				-	-	-	-	-	<0.81	-	-	1	0	<0.81	ND	<0.81	ND		0.405		0	0
Selenium (Filtered)	µg/L	0.5			-	<0.81	-	<0.81	<0.5	-	<0.81	<0.5	5	0	<0.5	ND	<0.81	ND	0.34	0.405	0.085	0	0
Zinc	µg/L		10.9		-	-	-	-	-	12.2	-	-	1	1	12.2	12.2	12.2	12.2		12.2		1	1
Zinc (Filtered)	µg/L	1	10.9		-	3.72	-	<1.3	1.13	-	9.86	3.46	5	4	1.13	1.13	9.86	9.86	3.8	3.46	3.7	0	0
Chromium (hexavalent)	µg/L	30	3.4		<30	<30	<30	<30	<30	<30	<30	<30	8	0	<30	ND	<30	ND	15	15	0	8	0
Organics																							
TOC	mg/L	3			10.9	16.1	7.15	9.78	5.16	6.58	5.98	3.98	8	8	3.98	3.98	16.1	16.1	8.2	6.865	3.9	0	0
Inorganics																							
BOD	mg/L	1			13.1	5.56	3.21	5.06	<1	<1	2	<1	8	5	<1	2	13.1	13.1	3.8	2.605	4.3	0	0
Cyanide (Free)	mg/L	0.05	0.001		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	8	0	<0.05	ND	<0.05	ND	0.025	0.025	0	8	0
Nitrogen (Total)	µg/L				296	-	<200	-	-	<200	-	-	3	1	<200	296	296	296	165	100	113	0	0
Cyanide Total	mg/L	0.05	0.001		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	8	0	<0.05	ND	<0.05	ND	0.025	0.025	0	8	0
Ammoniacal Nitrogen as N	mg/L	0.2	9.99000000000059E8		-	<0.2	-	<0.2	<0.2	-	<0.2	0.299	5	1	<0.2	0.299	0.299	0.299	0.14	0.1	0.089	0	0
Total Hardness	mg/l	0.35			-	204	-	362	446	-	320	467	5	5	204	204	467	467	360	362	106	0	0
COD	mg/L	7			281	120	15.8	117	21.4	18.6	17	11.9	8	8	11.9	11.9	281	281	75	20	95	0	0
pH (Lab)	pH_Units	1			7.88	8.19	8.13	8.22	8.33	8.05	8.12	8.09	8	8	7.88	7.88	8.33	8.33	8.1	8.125	0.13	0	0
TSS	mg/L	2			166	136	10.6	166	14.1	<9	32.3	8.5	8	7	8.5	8.5	166	166	67	23.2	75	0	0
Other																							
Actril (loxynil)	mg/L	4E-05	0.01		-	-	-	-	<0.00004	<0.00004	-	<0.00004	3	0	<0.00004	ND	<0.00004	ND	0.00002	0.00002	0	0	0
Surrogate																							
Toluene-D8	%				110	-	109	-	-	109	-	-	3	3	109	109	110	110	109	109	0.58	0	0
GRO Surrogate	%				86	-	87	-	-	89	-	-	3	3	86	86	89	89	87	87	1.5	0	0

Markeaton Junction Surface Water Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	output unit	EQL	GAC_WTV_E NWA_EQS-Fresh	Field_ID	HM 01	HM 02	HM 03	HM 04	HM 05	HM01	HM01	HM02	HM02	HM03	HM03	HM04	HM04	HM05	HM05	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
				Location_Code	HM01	HM02	HM03	HM04	HM05	HM01	HM01	HM02	HM02	HM03	HM03	HM04	HM04	HM05	HM05											
				Sampled_Date_Time	13/12/2016	13/12/2016	13/12/2016	13/12/2016	13/12/2016	22/03/2017	05/07/2017	23/03/2017	########	22/03/2017	03/07/2017	22/03/2017	03/07/2017	22/03/2017	########											
Hardness	mg/L				297	290	300	301	298	-	-	-	-	-	-	-	-	-	-	5	5	290	290	301	301	297	298	4.3	0	0
o,p'-Methoxychlor	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Aromatics >EC8-EC10	µg/L				<10	<10	<10	<10	<10	-	-	-	-	-	-	-	-	-	-	5	0	<10	ND	<10	ND	5	5	0	0	0
Aromatics >EC7-EC8	µg/L				<10	<10	<10	<10	<10	-	-	-	-	-	-	-	-	-	-	5	0	<10	ND	<10	ND	5	5	0	0	0
TPH																														
GRO >C5-C12	µg/L	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	15	0	<50	ND	<50	ND	25	25	0	0	0
>C5-C6 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	15	0	<10	ND	<10	ND	5	5	0	0	0
>C6-C8 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	15	0	<10	ND	<10	ND	5	5	0	0	0
>C8-C10 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	15	0	<10	ND	<10	ND	5	5	0	0	0
>C10-C12 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	15	0	<10	ND	<10	ND	5	5	0	0	0
>C12-C16 Aliphatics	µg/L	10			-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	0	<10	ND	<10	ND	5	5	0	0	0
>C16-C21 Aliphatics	µg/L	10			-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	0	<10	ND	<10	ND	5	5	0	0	0
>C21-C35 Aliphatics	µg/L	10			-	-	-	-	-	<10	<10	<10	<10	19	<10	<10	<10	<10	<10	10	1	<10	19	19	19	6.4	5	4.4	0	0
>C12-C35 Aliphatics	µg/L	10			-	-	-	-	-	<10	<10	<10	<10	19	<10	<10	<10	<10	<10	10	1	<10	19	19	19	6.4	5	4.4	0	0
>EC5-EC7 Aromatics	µg/L	10	10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	15	0	<10	ND	<10	ND	5	5	0	0	0
>EC7-EC8 Aromatics	µg/L	10	74		-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	0	<10	ND	<10	ND	5	5	0	0	0
>EC8-EC10 Aromatics	µg/L	10			-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	0	<10	ND	<10	ND	5	5	0	0	0
>EC10-EC12 Aromatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	15	0	<10	ND	<10	ND	5	5	0	0	0
>EC12-EC16 Aromatics	µg/L	10			-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	0	<10	ND	<10	ND	5	5	0	0	0
>EC16-EC21 Aromatics	µg/L	10			-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	0	<10	ND	<10	ND	5	5	0	0	0
>EC21-EC35 Aromatics	µg/L	10			-	-	-	-	-	<10	<10	17	<10	17	<10	<10	<10	<10	<10	10	2	<10	17	17	17	7.4	5	5.1	0	0
>EC12-EC35 Aromatics	µg/L	10			-	-	-	-	-	<10	<10	17	<10	17	<10	<10	<10	<10	<10	10	2	<10	17	17	17	7.4	5	5.1	0	0
>C5-C35 Aliphatics & Aromatics	µg/L	10			-	-	-	-	-	-	<10	-	<10	-	<10	-	<10	-	<10	5	0	<10	ND	<10	ND	5	5	0	0	0
4-Bromofluorobenzene	µg/L				##########	##########	##########	##########	##########	-	-	-	-	-	-	-	-	-	-	5	5	1080000000	1.08E+09	1100000000	1.1E+09	1088000000	1090000000	8366600	0	0
BTEX																														
Benzene	µg/L	1	10		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Toluene	µg/L	1	74		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Ethylbenzene	µg/L	1	20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Xylene (m & p)	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Xylene Total	µg/L	11	30		<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	15	0	<11	ND	<11	ND	5.5	5.5	0	0	0
Xylene (o)	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Total BTEX	µg/L	28			<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	15	0	<28	ND	<28	ND	14	14	0	0	0
Oxygenates																														
MTBE	µg/L	1	5100		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1 - 3	<1	15	1	<1	ND	3	3	0.58	0.5	0.32	0	0
Tert Amyl Methyl Ether	µg/L	1	510		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chlorinated Hydrocarbons																														
Chloromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Vinyl chloride	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chloroethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1-dichloroethene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dichloromethane	µg/L	3	20		<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	15	0	<3	ND	<3	ND	1.5	1.5	0	0	0
trans-1,2-dichloroethene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1-dichloroethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
cis-1,2-dichloroethene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chloroform	µg/L	1	2.5		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,1-trichloroethane	µg/L	1	100		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Carbon tetrachloride	µg/L	1	12		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Trichloroethene	µg/L	1	10		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,2-trichloroethane	µg/L	1	400		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Tetrachloroethene	µg/L	1	10		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Sum of PCE and TCE	µg/L				<2	<2	<2	<2	<2	-	-	-	-	-	-	-	-	-	-	5	0	<2	ND	<2	ND	1	1	0	0	0
TCE+DCE+VC	µg/L				<5	<5	<5	<5	<5	-	-	-	-	-	-	-	-	-	-	5	0	<5	ND	<5	ND	2.5	2.5	0	0	0
PCE+TCE+DCE+VC	µg/L				<6	<6	<6	<6	<6	-	-	-	-	-	-	-	-	-	-	5	0	<6	ND	<6	ND	3	3	0	0	0
VOC																														
2,2-dichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromochloromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1-dichloropropene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichloroethane	µg/L	1	10		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dibromomethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromodichloromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
cis-1,3-dichloropropene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
trans-1,3-dichloropropene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3-dichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chlorodibromomethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,1,2-tetrachloroethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Styrene	µg/L	1	50		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromoform	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Isopropylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,2,2-tetrachloroethane	µg/L	1	140		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2,3-trichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
n-propylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3,5-trimethylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
tert-butylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2,4-trimethylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
sec-butylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
p-isopropyltoluene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
n-butylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dibromo-3-chloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Hexachlorobutadiene	µg/L	1	0.6		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	15	0
1,2-Dichloroethene	µg/L				<2	<2	<2	<2	<2	-	-	-	-	-	-	-	-	-	-	5	0	<2	ND	<2	ND	1	1	0	0	0
Trihalomethanes	µg/L				<4	<4	<4	<4	<4	-	-	-	-	-	-	-	-	-	-	5	0	<4	ND	<4	ND	2	2	0	0	0
PAH																														
Naphthalene	µg/L	0.1	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	0	<0.1	ND	<0.1	ND	0.05	0.05	0	0	0
Acenaphthylene	µg/L	0.011			<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	15	0	<0.011	ND	<0.011	ND	0.0055	0.0055	0	0	0
Acenaphthene	µg/L	0.015			<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	15	0	<0.015	ND	<0.015	ND	0.0075	0.0075	0	0	0
Fluorene	µg/L	0.014			<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	15	0	<0.014	ND	<0.014	ND	0.007	0.007	0	0	0
Phenanthrene	µg/L	0.022			<0.022	<0.022	<0.022	0.0304	<0.022	<0.022	<0.022	<0.022	<0.022	<1 - 0.0271	<0.022	<1 - 0.03	<0.022	<1 - 0.0302	<0.022	15	4	<0.022	0.0304	0.0304	0.0304	0.063	0.011	0.1	0	0
Anthracene	µg/L	0.015	0.1		<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	15	0	<0.015	ND	<0.015	ND	0.0075	0.0075	0	0	0
Fluoranthene	µg/L	0.017	0.0063		<0.017	0.027	0.0328	0.0494	0.018	<1 - 0.0441	<1 - 0.0243	<1 - 0.039		<1 - 0.0781	<1 - 0.0447	<1 - 0.0892	<1 - 0.0712	<1 - 0.0664	<0.017	15	12	<0.017	0.018	0.0892	0.0892	0.16	0.26215	0.13	15	12
Pyrene	µg/L	0.015			<0.015	0.0221	0.0313	0.0495	0.017	<1 - 0.0459	<1 - 0.0188	<1 - 0.0327	<0.015	<1 - 0.0788	<1 - 0.0397	<1 - 0.0945	<1 - 0.069	<1 - 0.0632	<0.015	15	12	<0.015	0.017	0.0945	0.0945	0.16	0.2594	0.13	0	0
Benz(a)anthracene	µg/L	0.017			<0.017	0.0224	<0.017	0.0242	<0.017	<0.017	<0.017	<1 - 0.0224	<0.017	<1 - 0.0382	<1 - 0.0187	<1 - 0.0389	<1 - 0.0285	<1 - 0.0424	<0.017	15	8	<0.017	0.0224	0.0424	0.0424	0.11	0.0224	0.13	0	0
Chrysene	µg/L	0.013			<0.013	<0.013	<0.013	0.0182	<0.013	<1 - 0.0153	<0.013	<1 - 0.0169	<0.013	<1 - 0.04	<1 - 0.0141	<1 - 0.0428	<1 - 0.0242	<1 - 0.0297	<0.013	15	8	<0.013	0.0182	0.0428	0.0428	0.13	0.0182	0.13	0	0
Benzo(a) pyrene	µg/L	0.009	0.00017		<0.009	0.0127	<0.009	0.0197	<0.009	<1 - 0.0249	<0.009	<1 - 0.0129	<0.009	<1 - 0.0372	<1 - 0.0133	<1 - 0.0618	<1 - 0.0259	<1 - 0.0392	<0.009	15	9	<0.009	0.0127	0.0618	0.0618	0.13	0.0197	0.13	15	9
Indeno(1,2,3-c,d)pyrene	µg/L	0.014	0.00017		<0.014	<0.014	<0.014	0.0212	<0.014	<1 - 0.0222	<0.014	<1 - 0.0153	<0.014	<1 - 0.0481	<0.014	<1 - 0.0525	<1 - 0.0201	<1 - 0.029	<0.014	15	7	<0.014	0.0212	0.0525	0.0525	0.11	0.007	0.13	15	7
Dibenz(a,h)anthracene	µg/L	0.016			<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	15	0	<0.016	ND	<0.016	ND	0.008	0.008	0	0	0
Benzo(a,h,i)perylene	µg/L	0.016	0.0082		<0.016	0.0166	<0.016	0.0239	<0.016	<1 - 0.0232	<0.016	<1 - 0.0186	<0.016	<1 - 0.0451	<0.016	<1 - 0.0498	<1 - 0.0277	<1 - 0.0394	<0.016	15	8	<0.016	0.0166	0.0498	0.0498	0.11	0.0166	0.13	15	8
Benzo(b)fluoranthene	µg/L	0.023	0.017		<0.023	<0.023	<0.023	0.0395	<0.023	<1 - 0.0352	<0.023	<1 - 0.0325	<0.023	<1 - 0.0721	<1 - 0.0286	<1 - 0.0797	<1 - 0.0525	<1 - 0.0564	<0.023	15	8	<0.023	0.0395	0.0797	0.0797	0.14	0.0395	0.13	15	8
Benzo(k)fluoranthene	µg/L	0.027	0.017		<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<1 - 0.0284	<0.027	<0.027	<0.027	15	1	<0.027	ND	0.0284	0.0284	0.03	0.0135	0.065	15	1
Benzo(b)&(k)fluoranthene	µg/L				<0.05	<0.05	<0.05	0.0665	<0.05	-	-	-	-	-	-	-	-	-	-	5	1	<0.05	0.0665	0.0665	0.0665	0.033	0.025	0.019	0	0
PAHs (sum of 4)	µg/L				<0.08	0.0806	<0.08	0.1116	<0.08	-	-	-	-	-	-	-	-	-	-	5	2	<0.08	0.0806	0.1116	0.1116	0.062	0.04	0.033	0	0
PAH 16 Total	µg/L	0.344			<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	0.465	<0.344	0.568	<0.344	0.396	<0.344	15	3	<0.344	0.396	0.568	0.568	0.23	0.172	0.13	0	0
benzo(a,h,i)perylene + indeno(1,2,3-cd)pyrene	µg/L				<0.03	0.0306	<0.03	0.0451	<0.03	-	-	-	-	-	-	-	-	-	-	5	2	<0.03	0.0306	0.0451	0.0451	0.024	0.015	0.014	0	0
Coal Tar (Bap as surrogate marker)	µg/L				<0.009	0.0127	<0.009	0.0197	<0.009	-	-	-	-	-	-	-	-	-	-	5	2	<0.009	0.0127	0.0197	0.0197	0.0092	0.0045	0.0069	0	0
SVOC																														
2-methylnaphthalene	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
4-bromophenyl phenyl ether	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
4-chlorophenyl phenyl ether	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Azobenzene	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bis(2-chloroethoxy) methane	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bis(2-chloroethyl)ether	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Carbazole	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dibenzofuran	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Hexachlorocyclopentadiene	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Hexachloroethane	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Phenolics																														
2-methylphenol	µg/L	0.5			-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	10	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
2-nitrophenol	µg/L	0.5			-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	10	0	<0.

Markeaton Junction Surface Water Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	output unit	EQL	GAC_WTV_E NWA_EQS-Fresh	Field_ID	HM 01	HM 02	HM 03	HM 04	HM 05	HM01	HM01	HM02	HM02	HM03	HM03	HM04	HM04	HM05	HM05	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
				Location_Code	HM01	HM02	HM03	HM04	HM05	HM01	HM01	HM02	HM02	HM03	HM03	HM04	HM04	HM05	HM05											
				Sampled_Date_Time	13/12/2016	13/12/2016	13/12/2016	13/12/2016	13/12/2016	22/03/2017	05/07/2017	23/03/2017	########	22/03/2017	03/07/2017	22/03/2017	03/07/2017	22/03/2017	########											
Herbicides																														
Bentazone	µg/L	0.04	500		-	-	-	-	-	-	<0.04	-	<0.04	-	<0.04	-	<0.04	-	<0.04	5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Bromoxynil	µg/L	0.04	100		-	-	-	-	-	-	<0.04	-	<0.04	-	<0.04	-	<0.04	-	<0.04	5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Clopyralid	µg/L	0.04			-	-	-	-	-	-	<0.042	-	<0.05	-	<0.04	-	<0.045	-	<0.045	5	0	<0.04	ND	<0.05	ND	0.022	0.0225	0.0019	0	0
Hedonal	µg/L	0.04	0.3		-	-	-	-	-	-	<0.04	-	0.146	-	0.161	-	0.191	-	0.179	5	4	<0.04	0.146	0.191	0.191	0.14	0.161	0.069	0	0
Dicamba	µg/L	0.04			-	-	-	-	-	-	<0.04	-	<0.04	-	<0.043	-	<0.04	-	<0.04	5	0	<0.04	ND	<0.043	ND	0.02	0.02	0.00067	0	0
2,4-Dichlorprop	µg/L	0.04			-	-	-	-	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	10	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
2,4,5-TP (Silvex)	µg/L	0.04			-	-	-	-	-	-	<0.04	-	<0.04	-	<0.04	-	<0.04	-	<0.04	5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
2-Methyl-4-chlorophenoxyacetic acid	µg/L	0.04	12		-	-	-	-	-	-	0.047	-	0.143	-	0.182	-	0.19	-	0.212	5	5	0.047	0.047	0.212	0.212	0.15	0.182	0.065	0	0
2-Methyl-4-Chlorophenoxy Butanoic Acid	µg/L	0.04			-	-	-	-	-	-	<0.04	-	<0.04	-	<0.04	-	<0.04	-	<0.04	5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
2,4,5-Trichlorophenoxy Acetic Acid	µg/L	0.04			-	-	-	-	-	-	<0.04	-	<0.04	-	<0.04	-	<0.04	-	<0.04	5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Triclopyr	µg/L	0.04			-	-	-	-	-	-	<0.04	-	<0.04	-	<0.04	-	<0.04	-	<0.04	5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	µg/L	0.04			-	-	-	-	-	-	<0.04	-	<0.04	-	<0.04	-	<0.04	-	<0.04	5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Dinoseb	µg/L	4			-	-	-	-	-	<4	<12	<4	<12	<4	<8	<4	<8	<4	<8	10	0	<4	ND	<12	ND	3.4	3	1.6	0	0
Fluroxypyr	µg/L	0.04			-	-	-	-	-	-	<0.04	-	<0.04	-	<0.04	-	<0.04	-	<0.04	5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Mecoprop	µg/L	0.04	18		-	-	-	-	-	-	<0.04	-	<0.04	-	<0.04	-	<0.04	-	<0.04	5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
Pesticides																														
Parathion	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Organochlorine Pesticides																														
Aldrin	µg/L	0.01	9.99000000000049E11		-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
a-BHC	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
b-BHC	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Dieldrin	µg/L	0.01	9.99000000000049E11		-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endosulfan I	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endosulfan II	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endosulfan sulphate	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Endrin	µg/L	0.01	9.99000000000049E11		-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
g-BHC (Lindane)	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Heptachlor	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Heptachlor epoxide	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
o,p'-DDE	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
2,4-DDT	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
o,p-DDD	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
4,4-DDE	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
DDT	µg/L	0.01	0.01		-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Methoxychlor	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
DDD	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Organophosphorous Pesticides																														
Azinophos methyl	µg/L	0.01	0.01		-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Diazinon	µg/L	0.01	0.01		-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Dichlorvos	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Ethion	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Fenitrothion	µg/L	0.01	0.01		-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Malathion	µg/L	0.01	0.01		-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Methyl parathion	µg/L	0.01			-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Mevinphos (Phosdrin)	µg/L	0.01	0.02		-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Amino Aliphatics																														
N-nitrosodi-n-propylamine	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Anilines																														
2-nitroaniline	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
3-nitroaniline	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
4-chloroaniline	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
4-nitroaniline	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Explosives																														
2,4-Dinitrotoluene	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
2,6-dinitrotoluene	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Nitrobenzene	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Halogenated Benzenes																														
1,3,5-Trichlorobenzene	µg/L	1	9.99000000000065E11		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
2-chlorotoluene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
4-chlorotoluene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3-dichlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,4-dichlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2,4-trichlorobenzene	µg/L	1	9.99000000000065E11		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2,3-trichlorobenzene	µg/L	1	9.99000000000065E11		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Hexachlorobenzene	µg/L	1	0.05		-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	10	0	0
Halogenated Hydrocarbons																														
Dichlorodifluoromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromomethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Trichlorofluoromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dibromoethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<2	ND	0.5	0.5	0	0	0
Dibromofluoromethane	µg/L				##########	##########	##########	##########	##########	-	-	-	-	-	-	-	-	-	-	5	5	1210000000	1.21E+09	1260000000	1.26E+09	1232000000	1230000000	1.9E+07	0	0
Halogenated Phenols																														
2,3,5,6-Tetrachlorophenol	µg/L	0.5			-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<0.5	10	0	<0.5	ND	<1	ND	0.28	0.25	0.079	0	0
2-chlorophenol	µg/L	0.5	50		-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	10	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
2,4-dichlorophenol	µg/L	0.5	4.2		-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	10	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
2,4,5-trichlorophenol	µg/L	0.5			-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	10	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
2,4,6-trichlorophenol	µg/L	0.5			-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	10	0	<0.5	ND	<0.5	ND	0.25	0.25	0	0	0
Pentachlorophenol	µg/L	0.04	0.4		-	-	-	-	-	<1	<0.04	<1	<0.04	<1	<0.04	<1	<0.04	<1	<0.04	10	0	<0.04	ND	<1	ND	0.26	0.26	0.25	5	0
Phthalates																														
Bis(2-ethylhexyl) phthalate	µg/L	2	1.3		-	-	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	10	0	<2	ND	<2	ND	1	1	0	10	0
Butyl benzyl phthalate	µg/L	1	7.5		-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Di-n-butyl phthalate	µg/L	1	8		-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Di-n-octyl phthalate	µg/L	5	20		-	-	-	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	10	0	<5	ND	<5	ND	2.5	2.5	0	0	0
Diethylphthalate	µg/L	1	200		-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dimethyl phthalate	µg/L	1	800		-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Solvents																														
Carbon disulfide	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Isophorone	µg/L	1			-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	10	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Metals																														
Arsenic	µg/L		50		1.66	1.38	1.01	1.55	-	-	-	-	-	-	-	-	-	-	-	4	4	1.01	1.01	1.66	1.66	1.4	1.465	0.28	0	0
Arsenic (Filtered)	µg/L	0.5	50		-	-	-	-	-	1.31	1.62	1.18	1.44	1.05	1.85	1.55	1.76	1.2	1.87	10	10	1.05	1.05	1.87	1.87	1.5	1.495	0.29	0	0
Boron	µg/L		2000		56.7	53.7	50.7	55.6	-	-	-	-	-	-	-	-	-	-	-	4	4	50.7	50.7	56.7	56.7	54	54.65	2.6	0	0
Boron (Filtered)	µg/L	5	2000		-	-	-	-	-	45.8	56.8	43.6	70.1	44.1	48.7	48.3	49.1	46.8	48.8	10	10	43.6	43.6	70.1	70.1	51	48.5	9.2	0	0
Cadmium	µg/L		0.08		0.15	0.146	<0.08	0.14	-	-	-	-	-	-	-	-	-	-	-	4	3	<0.08	0.14	0.15	0.15	0.12	0.143	0.053	3	3
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	<0.08	10	0	<0.08	ND	<0.08	ND	0.04	0.04	0	0	0
Chromium (III+VI)	µg/L	3			3.66	<3	3.16	<3	6.16	7.29	<3	7.55	<3	7.39	<3	5.99	<3	7.17	<3	15	8	<3	3.16	7.55	7.55	3.9	3.16	2.6	0	0
Copper	µg/L		1		1.54	1.57	3.49	2.56	-	-	-	-	-	-	-	-	-	-	-	4	4	1.54	1.54	3.49	3.49	2.3	2.065	0.93	4	4
Copper (Filtered)	µg/L	0.3	1		-	-	-	-	-	2.84	0.31	3.33	<0.3	4.24	0.96	4.02	0.938	3.17	1.39	10	9	<0.3	0.31	4.24	4.24	2.1	2.115	1.5	6	6
Iron	µg/L	24	1000		253 - 450	212 - 331	<19 - 442	238 - 324	273	562	262	828	70.1	1270	169	694	275	1110	95.5	15	15	19	70.1	1270	1270	449	275	367	2	2
Iron (Filtered)	µg/L	19	1000		-	-	-	-	-	32.8	49.1	30.2	<19	32.9	35.7	43.3	36	27.2	26.5	10	9	<19	26.5	49.1	49.1	32	32.85	11	0	0
Lead	µg/L		1.2		1.12	1.02	0.148	1.63	-	-	-	-	-	-	-	-	-	-	-	4	4	0.148	0.148	1.63	1.63	0.98	1.07	0.62	1	1
Lead (Filtered)	µg/L	0.1	1.2		-	-	-	-	-	<0.1	0.254	<0.1	<0.2	0.294	0.51	<0.1	0.693	<0.1	0.42	10	5	<0.1	0.254	0.693	0.693	0.25	0.177	0.23	0	0
Mercury	µg/L		0.07		<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	5	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Mercury (Filtered)	µg/L	0.01	0.07		-	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	10	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Nickel	µg/L		4		1.59	1.42	1.26	1.6	-	-	-	-	-	-	-	-	-	-	-	4	4	1.26	1.26	1.6	1.6	1.5	1.505	0.16	0	0
Nickel (Filtered)	µg/L	0.4	4		-	-	-	-	-	2.01	1.15	2.11	0.949	2.3	1.3	2.07	1.14	1.64	1.19	10	10	0.949	0.949	2.3	2.3	1.6	1.47	0.5	0	0
Selenium	µg/L				1.28	1.41	<0.81	1.31	-	-	-	-	-	-	-	-	-	-	-	4	3	<0.81	1.28	1.41	1.41	1.1	1.295	0.47	0	0
Selenium (Filtered)	µg/L	0.5			-	-	-	-	-	1.23	0.889	0.948	<0.5	1.27	0.655	0.854	<0.5	<0.81	0.616	10	7	<0.5	0.616	1.27	1.27	0.74	0.7545	0.37	0	0
Zinc	µg/L		10.9		13.6	11.3	5.9	18.3	-	-	-	-	-	-	-	-	-	-	-	4	4	5.9	5.9	18.3	18.3	12	12.45	5.2	3	3
Zinc (Filtered)	µg/L	1	10.9		-	-	-	-	-	8.86	2.71	8.16	1.47	9.8	5.02	8.4	1.34	6.11	2.64	10	10	1.34	1.34	9.8	9.8	5.5	5.565	3.3	0	0
Chromium (hexavalent)	µg/L	30	3.4		<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	15	0	<30	ND	<30	ND	15	15	0	15	0
Organics																														
TOC	mg/L	3			6.24	4.98	5.45	5.23	5.2	10.5	4.8	10.2	5.32	13.3	4.81	13.9	4.88	12	4.77	15	15	4.77	4.77	13.9	13.9	7.4	5.32	3.5	0	0
Inorganics																														
BOD	mg/L	1			<1	<1	<1	<1	<1	3.43	<1	3.25	<1	5.08	<1	5.31	<1	7.03	<1	15	5	<1	3.25	7.03	7.03	1.9	0.5	2.3	0	0
Cyanide (Free)	mg/L	0.05	0.001		<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	<0.05	<0.05	15	0	<0.05	ND	<0.05	ND	0.025	0.025	0	15	0
Nitrogen (Total)	µg/L				<200	270	261	218	<200	-	-	-	-	-	-	-	-	-	-	5	3	<200	218	270	270	190	218	84	0	0
Cyanide Total	mg/L	0.05	0.001		<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	<0.05	<0.05	15	0	<0.05	ND	<0.05	ND	0.025	0.025	0	15	0
Ammoniacal Nitrogen as N	mg/L	0.2	9.99000000000059E8		-	-	-	-	-	<0.2	<0.2	0.239	<0.2	0.433

Little Eaton Junction Surface Water Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	output unit	EQL	GAC_WTV_E NWA_EQS-Fresh	Field_ID	HL01	HL01	HL01	HL02	HL02	HL02	HL03	HL03	HL03	HL04	HL04	HL04	HL05	HL05	HL05	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
				Location_Code	HL01	HL01	HL01	HL02	HL02	HL02	HL03	HL03	HL03	HL04	HL04	HL04	HL05	HL05	HL05											
				Sampled_Date_Time	12/12/2016	23/03/2017	06/07/2017	12/12/2016	23/03/2017	06/07/2017	12/12/2016	22/03/2017	03/07/2017	12/12/2016	22/03/2017	03/07/2017	12/12/2016	22/03/2017	03/07/2017											
Hardness	mg/L				201	-	-	212	-	-	276	-	-	286	-	-	314	-	-	5	5	201	201	314	314	258	276	49	0	0
Dichloroacetic acid	µg/L				<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
o,p'-Methoxychlor	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	15	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
Benazolin	µg/L				<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
2,4-DB	µg/L				<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
2,3,6-Trichlorobenzoic acid	µg/L				<0.04	-	-	<0.04	-	-	<0.08	-	-	<0.08	-	-	<0.08	-	-	5	0	<0.04	ND	<0.08	ND	0.032	0.04	0.011	0	0
Aromatics >EC8-EC10	µg/L				<10	-	-	<10	-	-	<10	-	-	<10	-	-	<10	-	-	5	0	<10	ND	<10	ND	5	5	0	0	0
Aromatics >EC7-EC8	µg/L				<10	-	-	<10	-	-	<10	-	-	<10	-	-	<10	-	-	5	0	<10	ND	<10	ND	5	5	0	0	0
DNOC :- (4,6-dinitro-o-cresol)	µg/l				<3	-	-	<3	-	-	<3	-	-	<3	-	-	<3	-	-	5	0	<3	ND	<3	ND	1.5	1.5	0	0	0
TPH																														
GRO >C5-C12	µg/L	50			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	15	0	<50	ND	<50	ND	25	25	0	0	0
>C5-C6 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	15	0	<10	ND	<10	ND	5	5	0	0	0
>C6-C8 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	15	0	<10	ND	<10	ND	5	5	0	0	0
>C8-C10 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	15	0	<10	ND	<10	ND	5	5	0	0	0
>C10-C12 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	15	0	<10	ND	<10	ND	5	5	0	0	0
>C12-C16 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	15	0	<10	ND	<20	ND	5.3	5	1.3	0	0
>C16-C21 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10	<10	15	0	<10	ND	<20	ND	5.3	5	1.3	0	0
>C16-C35 Aliphatics	µg/L				<20	-	-	<20	-	-	<20	-	-	<20	-	-	<20	-	-	5	0	<20	ND	<20	ND	10	10	0	0	0
>C21-C35 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10	<10	15	0	<10	ND	<20	ND	5.3	5	1.3	0	0
>C12-C35 Aliphatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10	<10	15	0	<10	ND	<20	ND	5.3	5	1.3	0	0
>EC5-EC7 Aromatics	µg/L	10	10		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	15	0	<10	ND	<10	ND	5	5	0	0	0
>EC7-EC8 Aromatics	µg/L	10	74		-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	10	0	<10	ND	<10	ND	5	5	0	0	0
>EC8-EC10 Aromatics	µg/L	10			-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	10	0	<10	ND	<10	ND	5	5	0	0	0
>EC10-EC12 Aromatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	15	0	<10	ND	<10	ND	5	5	0	0	0
>EC12-EC16 Aromatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10	<10	15	0	<10	ND	<20	ND	5.3	5	1.3	0	0
>EC16-EC21 Aromatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10	<10	15	0	<10	ND	<20	ND	5.3	5	1.3	0	0
>EC21-EC35 Aromatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10	<10	15	0	<10	ND	<20	ND	5.3	5	1.3	0	0
>EC12-EC35 Aromatics	µg/L	10			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<20	<10	<10	15	0	<10	ND	<20	ND	5.3	5	1.3	0	0
>C5-C35 Aliphatics & Aromatics	µg/L	10			<10	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	<10	-	<10	10	0	<10	ND	<10	ND	5	5	0	0	0
4-Bromofluorobenzene	µg/L				##########	-	-	##########	-	-	##########	-	-	##########	-	-	##########	-	-	5	5	1120000000	1.12E+09	1140000000	1.14E+09	1128000000	1130000000	8366600	0	0
BTEX																														
Benzene	µg/L	1	10		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Toluene	µg/L	1	74		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Ethylbenzene	µg/L	1	20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Xylene (m & p)	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Xylene Total	µg/L	11	30		<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	<11	15	0	<11	ND	<11	ND	5.5	5.5	0	0	0
Xylene (o)	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Total BTEX	µg/L	28			<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	<28	15	0	<28	ND	<28	ND	14	14	0	0	0
Oxyoenates																														
MTBE	µg/L	1	5100		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Tert Amyl Methyl Ether	µg/L	1	510		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chlorinated Hydrocarbons																														
Chloromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Vinyl chloride	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chloroethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1-dichloroethene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dichloromethane	µg/L	3	20		<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	15	0	<3	ND	<3	ND	1.5	1.5	0	0	0
trans-1,2-dichloroethene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1-dichloroethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
cis-1,2-dichloroethene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chloroform	µg/L	1	2.5		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,1-trichloroethane	µg/L	1	100		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Carbon tetrachloride	µg/L	1	12		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Trichloroethene	µg/L	1	10		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,2-trichloroethane	µg/L	1	400		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Tetrachloroethene	µg/L	1	10		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Sum of PCE and TCE	µg/L				<2	-	-	<2	-	-	<2	-	-	<2	-	-	<2	-	-	5	0	<2	ND	<2	ND	1	1	0	0	0
TCE+DCE+VC	µg/L				<5	-	-	<5	-	-	<5	-	-	<5	-	-	<5	-	-	5	0	<5	ND	<5	ND	2.5	2.5	0	0	0
PCE+TCE+DCE+VC	µg/L				<6	-	-	<6	-	-	<6	-	-	<6	-	-	<6	-	-	5	0	<6	ND	<6	ND	3	3	0	0	0
VOC																														
2,2-dichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromochloromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1-dichloropropene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichloroethane	µg/L	1	10		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Dibromomethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromodichloromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
cis-1,3-dichloropropene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
trans-1,3-dichloropropene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3-dichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Chlorodibromomethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,1,2-tetrachloroethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Styrene	µg/L	1	50		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Bromoform	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Isopropylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,1,2,2-tetrachloroethane	µg/L	1	140		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2,3-trichloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
n-propylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,3,5-trimethylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
tert-butylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2,4-trimethylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
sec-butylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
p-isopropyltoluene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
n-butylbenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
1,2-dibromo-3-chloropropane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	0	0
Hexachlorobutadiene	µg/L	1	0.6		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<1	ND	0.5	0.5	0	15	0
1,2-Dichloroethene	µg/L				<2	-	-	<2	-	-	<2	-	-	<2	-	-	<2	-	-	5	0	<2	ND	<2	ND	1	1	0	0	0
Trihalomethanes	µg/L				<4	-	-	<4	-	-	<4	-	-	<4	-	-	<4	-	-	5	0	<4	ND	<4	ND	2	2	0	0	0
PAH																														
Naphthalene	µg/L	0.1	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1 - 0.117	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	1	<0.1	ND	0.117	0.117	0.067	0.05	0.067	0	0
Acenaphthylene	µg/L	0.011			<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	15	0	<0.011	ND	<0.011	ND	0.0055	0.0055	0	0	0
Acenaphthene	µg/L	0.015			<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	15	0	<0.015	ND	<0.015	ND	0.0075	0.0075	0	0	0
Fluorene	µg/L	0.014			<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	15	0	<0.014	ND	<0.014	ND	0.007	0.007	0	0	0
Phenanthrene	µg/L	0.022			<0.022	<1 - 0.0223	<0.022	<0.022	<1 - 0.0207	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	15	2	<0.022	ND	0.0307	0.0307	0.0307	0.045	0.011	0.089	0	0
Anthracene	µg/L	0.015	0.1		<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	15	0	<0.015	ND	<0.015	ND	0.0075	0.0075	0	0	0
Fluoranthene	µg/L	0.017	0.0063		<0.017	<1 - 0.0578	<0.017	<2 - 0.0208	<1 - 0.0768	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<1 - 0.0449	15	4	<0.017	ND	0.0768	0.0768	0.096	0.0085	0.16	15	4
Pyrene	µg/L	0.015			<0.015	<1 - 0.0556	<0.015	<2 - 0.0184	<1 - 0.0737	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<1 - 0.0169	<0.015	<0.015	<1 - 0.0396	15	6	<0.015	ND	0.0737	0.0737	0.13	0.0075	0.16	0	0
Benz(a)anthracene	µg/L	0.017			<0.017	<1 - 0.0227	<0.017	<2 - 0.023	<1 - 0.0195	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<1 - 0.0172	15	4	<0.017	ND	0.023	0.023	0.092	0.0085	0.16	0	0
Chrysene	µg/L	0.013			<0.013	<1 - 0.0226	<0.013	<0.013	<1 - 0.0344	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<1 - 0.0155	15	3	<0.013	ND	0.0344	0.0344	0.058	0.0065	0.11	0	0
Benzo(a) pyrene	µg/L	0.009	0.00017		<0.009	<1 - 0.0211	<0.009	<0.009	<1 - 0.0343	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<1 - 0.0205	15	3	<0.009	ND	0.0343	0.0343	0.056	0.0045	0.11	15	3
Indeno(1,2,3-c,d)pyrene	µg/L	0.014	0.00017		<0.014	<1 - 0.0161	<0.014	<0.014	<1 - 0.0276	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	15	2	<0.014	ND	0.0276	0.0276	0.041	0.007	0.089	15	2
Dibenz(a,h)anthracene	µg/L	0.016			<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	15	0	<0.016	ND	<0.016	ND	0.008	0.008	0	0	0
Benzo(g,h,i)perylene	µg/L	0.016	0.0082		<0.016	<1 - 0.0246	<0.016	<0.016	<1 - 0.0357	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	15	2	<0.016	ND	0.0357	0.0357	0.042	0.008	0.09	15	2
Benzo(b)fluoranthene	µg/L	0.023	0.017		<0.023	<1 - 0.0318	<0.023	<0.023	<1 - 0.0441	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<0.023	<1 - 0.0314	15	3	<0.023	ND	0.0441	0.0441	0.063	0.0115	0.11	15	3
Benzo(k)fluoranthene	µg/L	0.027	0.017		<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	15	0	<0.027	ND	<0.027	ND	0.014	0.0135	0	15	0
Benzo(b)&(k)fluoranthene	µg/L				<0.05	-	-	<0.05	-	-	<0.05	-	-	<0.05	-	-	<0.05	-	-	5	0	<0.05	ND	<0.05	ND	0.025	0.025	0	0	0
PAHs (sum of 4)	µg/L				<0.08	-	-	<0.08	-	-	<0.08	-	-	<0.08	-	-	<0.08	-	-	5	0	<0.08	ND	<0.08	ND	0.04	0.04	0	0	0
PAH 16 Total	µg/L	0.344			<0.344	<0.344	<0.344	<0.344	0.377	<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	15	1	<0.344	0.377	0.377	0.377	0.19	0.172	0.053	0	0
benzo(a,h,i)perylene + indeno(1,2,3-cd)pyrene	µg/L				<0.03	-	-	<0.03	-	-	<0.03	-	-	<0.03	-	-	<0.03	-	-	5	0	<0.03	ND	<0.03	ND	0.015	0.015	0	0	0
Coal Tar (Bap as surrogate marker)	µg/L				<0.009	-	-	<0.009	-	-	<0.009	-	-	<0.009	-	-	<0.009	-	-	5	0	<0.009	ND	<0.009	ND	0.0045	0.0045	0	0	0
SVOC																														
2-methylnaphthalene	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<2	ND	0.57	0.5	0.18	0	0
4-bromophenyl phenyl ether	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<2	ND	0.57	0.5	0.18	0	0
4-chlorophenyl phenyl ether	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<2	ND	0.57	0.5	0.18	0	0
Azobenzene	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<2	ND	0.57	0.5	0.18	0	0
Bis(2-chloroethoxy) methane	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<2	ND	0.57	0.5	0.18	0	0
Bis(2-chloroethyl)ether	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<2	ND	0.57	0.5	0.18	0	0
Carbazole	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	15	0	<1	ND	<2	ND	0.57

Little Eaton Junction Surface Water Chemistry
Analytical Results
A38 Derby Junctions
Highways England

	output unit	EQL	GAC_WTV_E NWA_EQS-Fresh	Field_ID	HL01	HL01	HL01	HL02	HL02	HL02	HL03	HL03	HL03	HL04	HL04	HL04	HL05	HL05	HL05
				Location_Code	HL01	HL01	HL01	HL02	HL02	HL02	HL03	HL03	HL03	HL04	HL04	HL04	HL05	HL05	HL05
				Sampled_Date_Time	12/12/2016	23/03/2017	06/07/2017	12/12/2016	23/03/2017	06/07/2017	12/12/2016	22/03/2017	03/07/2017	12/12/2016	22/03/2017	03/07/2017	12/12/2016	22/03/2017	03/07/2017
Herbicides																			
Bentazone	µg/L	0.04	500		<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04
Bromoxynil	µg/L	0.04	100		<0.04	-	<0.04	<0.04	-	<0.04	<0.08	-	<0.04	<0.08	-	<0.04	<0.08	-	<0.04
Clopyralid	µg/L	0.04			<0.04	-	<0.04	<0.04	-	<0.04	<0.08	-	<0.04	<0.08	-	<0.04	<0.08	-	<0.04
Hedonal	µg/L	0.04	0.3		-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04
Dicamba	µg/L	0.04			<0.04	-	<0.04	<0.04	-	<0.04	<0.08	-	<0.04	<0.08	-	<0.09	<0.08	-	<0.04
2,4-Dichlorprop	µg/L	0.04			<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
2,4,5-TP (Silvex)	µg/L	0.04			-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04
2-Methyl-4-chlorophenoxyacetic acid	µg/L	0.04	12		<0.04	-	<0.04	<0.04	-	<0.04	<0.08	-	<0.04	<0.08	-	<0.04	<0.08	-	<0.04
2-Methyl-4-Chlorophenoxy Butanoic Acid	µg/L	0.04			<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04
2,4,5-Trichlorophenoxy Acetic Acid	µg/L	0.04			<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04
Triclopyr	µg/L	0.04			<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	µg/L	0.04			-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04
Dinoseb	µg/L	4			<4	<4	<16	<4	<4	<16	<4	<4	<8	<4	<4	<8	<4	<4	<8
Fluroxypyr	µg/L	0.04			<0.04	-	<0.04	<0.04	-	<0.04	<0.08	-	<0.04	<0.08	-	<0.04	<0.08	-	<0.04
Mecoprop	µg/L	0.04	18		<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04	<0.04	-	<0.04
Fenoprop	µg/L				<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	<0.04	-	-	-
Pesticides																			
Parathion	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aldrin+Dieldrin+Endrin+Isodrin	µg/L		0.01		<0.03	-	-	<0.03	-	-	<0.03	-	-	<0.03	-	-	<0.03	-	-
Organochlorine Pesticides																			
Aldrin	µg/L	0.01	9.99000000000049E11		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
a-BHC	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
b-BHC	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	µg/L	0.01	9.99000000000049E11		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan II	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan sulphate	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	µg/L	0.01	9.99000000000049E11		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
g-BHC (Lindane)	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor epoxide	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o,p''-DDE	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
2,4-DDT	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o,p-DDD	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,4-DDE	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DDT	µg/L	0.01	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Methoxychlor	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DDD	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aldrin + Dieldrin	µg/L				<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-
DDT+DDE+DDD	µg/L				<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-	<0.02	-	-
Organophosphorous Pesticides																			
Azinophos methyl	µg/L	0.01	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Diazinon	µg/L	0.01	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dichlorvos	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ethion	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fenitrothion	µg/L	0.01	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Malathion	µg/L	0.01	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Methyl parathion	µg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mevinphos (Phosdrin)	µg/L	0.01	0.02		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Amino Aliphatics																			
N-nitrosodi-n-propylamine	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Anilines																			
2-nitroaniline	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
3-nitroaniline	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-chloroaniline	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-nitroaniline	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Explosives																			
2,4-Dinitrotoluene	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2,6-dinitrotoluene	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrobenzene	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Halogenated Benzenes																			
1,3,5-Trichlorobenzene	µg/L	1	9.99000000000065E11		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2-chlorotoluene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
4-chlorotoluene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3-dichlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-dichlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dichlorobenzene	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-trichlorobenzene	µg/L	1	9.99000000000065E11		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,3-trichlorobenzene	µg/L	1	9.99000000000065E11		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobenzene	µg/L	1	0.05		<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Halogenated Hydrocarbons																			
Dichlorodifluoromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromomethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichlorofluoromethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-dibromoethane	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibromofluoromethane	µg/L				##########	-	-	##########	-	-	##########	-	-	##########	-	-	##########	-	-	-
Halogenated Phenols																			
2,3,5,6-Tetrachlorophenol	µg/L	0.5			<0.5	<0.5	<4.5	<0.5	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-chlorophenol	µg/L	0.5	50		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-dichlorophenol	µg/L	0.5	4.2		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,5-trichlorophenol	µg/L	0.5			<0.5	<0.5	<1 - 0.86	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4,6-trichlorophenol	µg/L	0.5			<0.5	<0.5	<1 - 0.78	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	µg/L	0.04	0.4		<0.04	<1	<0.04	<0.04	<1	<0.04	<0.04	<1	<0.04	<0.04	<1	<0.04	<0.04	<1	<0.04
Phthalates																			
Bis(2-ethylhexyl) phthalate	µg/L	2	1.3		<4	<2	<2	<4	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Butyl benzyl phthalate	µg/L	1	7.5		<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Di-n-butyl phthalate	µg/L	1	8		<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Di-n-octyl phthalate	µg/L	5	20		<10	<5	<5	<10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Diethylphthalate	µg/L	1	200		<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Dimethyl phthalate	µg/L	1	800		<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Solvents																			
Carbon disulfide	µg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Isophorone	µg/L	1			<2	<1	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Metals																			
Arsenic	µg/L		50		0.773	-	-	0.857	-	-	0.75	-	-	0.786	-	-	0.862	-	-
Arsenic (Filtered)	µg/L	0.5	50		-	<0.51	0.784	-	<0.51	0.75	-	0.821	0.767	-	0.849	0.611	-	0.755	<0.5
Boron	µg/L		2000		35.2	-	-	38.9	-	-	44.4	-	-	86.1	-	-	102	-	-
Boron (Filtered)	µg/L	5	2000		-	17.1	39.5	-	18.1	40.7	-	78.3	97	-	89.7	100	-	86.9	109
Cadmium	µg/L		0.08		0.214	-	-	0.204	-	-	<0.08	-	-	0.0968	-	-	0.0971	-	-
Cadmium (Filtered)	µg/L	0.08	0.08		-	0.132	0.132	-	0.122	0.168	-	0.136	<0.08	-	0.131	<0.08	-	0.116	0.0952
Chromium (III+VI)	µg/L	3			<3	7.51	<3	<3	7.34	<3	<3	8.04	<3	<3	26.2	3.41	<3	5.77	<3
Cooper	µg/L		1		1.35	-	-	1.32	-	-	1.78	-	-	1.8	-	-	2.07	-	-
Copper (Filtered)	µg/L	0.3	1		-	1.45	0.891	-	1.62	0.588	-	2.67	1.04	-	2.61	0.839	-	2.66	0.816
Iron	µg/L	24	1000		88.7 - 265	972	223	102 - 264	867	198	62.8 - 416	458	284	45.3 - 436	443	285	33.5 - 393	524	824
Iron (Filtered)	µg/L	19	1000		-	76.7	51.4	-	69.6	68.5	-	47.4	54.2	-	<19	49.9	-	57.2	<19
Lead	µg/L		1.2		2.11	-	-	2.06	-	-	0.159	-	-	<0.1	-	-	<0.1	-	-
Lead (Filtered)	µg/L	0.1	1.2		-	0.777	1.13	-	1.16	1.43	-	<0.1	<0.2	-	<0.1	<0.2	-	<0.1	<0.2
Mercury	µg/L		0.07		<0.01	-	-	<0.01	-	-	<0.01	-	-	<0.01	-	-	<0.01	-	-
Mercury (Filtered)	µg/L	0.01	0.07		-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	<0.01
Nickel	µg/L		4		2.4	-	-	2.19	-	-	2.43	-	-	2.64	-	-	2.36	-	-
Nickel (Filtered)	µg/L	0.4	4		-	2.06	1.93	-	2.3	1.81	-	3.03	1.4	-	2.47	1.32	-	3.16	1.11
Selenium	µg/L				1.31	-	-	1.52	-	-	0.917	-	-	1.02	-	-	0.904	-	-
Selenium (Filtered)	µg/L	0.5			-	<0.81	0.692	-	<0.81	1.23	-	1.14	1.28	-	1.45	1.15	-	1.24	1.65
Zinc	µg/L		10.9		40.7	-	-	62.3	-	-	29.7	-	-	15	-	-	11.3	-	-
Zinc (Filtered)	µg/L	1	10.9		-	17.9	22.4	-	19.5	25	-	8.69	5.73	-	9.88	7.72	-	13.5	6.25
Chromium (hexavalent)	µg/L	30	3.4		<30	<30	42.5	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
Organics																			
TOC	mg/L	3			4.94	5.49	3.18	5.11	5.71	3.18	5.8	7.42	<3	5.45	7.25	<3	5.64	7.19	<3
Inorganics																			
BOD	mg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	3.26	<1	<1	<1	<1	<1
Cyanide (Free)	mg/L	0.05	0.001		<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	<0.05	<0.05
Nitrogen (Total)	µg/L				<200	-	-	<200	-	-	<200	-	-	<200	-	-	<200	-	-
Cyanide Total	mg/L	0.05	0.001		<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	<0.05	<0.05
Ammoniacal Nitrogen as N	mg/L	0.2	9.99000000000059E8		-	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2
Total Hardness	mg/l	0.35			-	138	208	-	133	213	-	231	287	-	256	302	-	253	331
COD	mg/L	7			13.7	16.9	15.4	14.9	16.6	11	16	23.6	8.09	15	18.2	19.2	19	24.4	23.6
pH (Lab)	pH Units	1			8.01	7.88	8.24	8.05	7.92	8.22	8.08	7.97	8.15	8.03	8.19	8.17	8.17	7.97	8.23
TSS	mg/L	2			<9	10.9	<2	11.1	18.6	<2	3.05	6.95	<2	5.2	7.05	2.05	3.1	8.05	19.3
Other																			
Actril (loxynil)	mg/L	4E-05	0.01		<0.00004	-	<0.00004	<0.00004	-	<0.00004	<0.00004	-	<0.00004	<0.00004	-	<0.00004	<0.00004	-	<0.00004
Surrogate																			
Toluene-D8	%				111	-	-	112	-	-	110	-	-	111	-	-	111	-	-
GRO Surrogate	%				94	-	-	93	-	-	82	-	-	94	-	-	89	-	-

Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Concentration	Maximum Detect	Average Concentration	Median Concentration	Standard Deviation	Number of Guideline Exceedances	Number of Guideline Exceedances (Detects Only)
10	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
10	0	<0.04	ND	<0.08	ND	0.026	0.02	0.0097	0	0
10	0	<0.04	ND	<0.08	ND	0.026	0.02	0.0097	0	0
5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
10	0	<0.04	ND	<0.09	ND	0.029	0.02	0.011	0	0
15	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
10	0	<0.04	ND	<0.08	ND	0.026	0.02	0.0097	0	0
10	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
10	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
10	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
15	0	<4	ND	<16	ND	3.2	2	2.1	0	0
10	0	<0.04	ND	<0.08	ND	0.026	0.02	0.0097	0	0
10	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
5	0	<0.04	ND	<0.04	ND	0.02	0.02	0	0	0
15	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0	0
5	0	<0.03	ND	<0.03	ND	0.015	0.015	0	5	0
15	0	<0.01	ND	<0.01	ND	0.005	0.005	0	0

Appendix C Combined Detailed Quantitative Risk Assessment

RTM - Hydrogeological Risk Assessment

Project Number	60533462
Project Title	A38 Derby Kingsway Junction
Date	01-Mar-17

Simulation Details	Analysis of potential migration of Contaminants in Groundwater to Bramble Brook.

RTM - Hydrogeological Risk Assessment

LEVEL 3 (GROUNDWATER) ASSESSMENT - INPUTS & JUSTIFICATION

Project Number	60533462	
Project Title	A38 Derby Kingsway Junction	
Date	01-Mar-17	

Simulation Details	Analysis of potential migration of Contaminants in Groundwater to Bramble Brook.

Source	Contaminants in the groundwater onsite		
Parameter	**Units**	**Input Value(s)**	**Source / Justification**
Saturated aquifer thickness	m	2.5	Assuming average Made Ground groundwater level of 6.62m bgl together with average proven base of Made Ground (9.12m)
Width of plume in aquifer	m	360	Length of the landfill perpendicular to the groundwater flow
Plume thickness at source	m	8.92	Average thickness of Made Ground
Bulk density of aquifer materials	g/cm^3	1.79	No site data available majority of strata is Clay, bulk density based on Brady, N.C., 1984. The nature and properties of soils.
Effective porosity of aquifer	fraction	0.1	Effective Porosity for Clay from Domenico & Schwartz, 1989
Hydraulic gradient	fraction	0.14	Calculated from the Groundwater levels in BH14 and BH15 in Made Ground
Hydraulic conductivity of aquifer	m/d	0.1944	Hydraulic conductivity value for Clay (Fetter 1986), most conservative value used
Fraction of Organic Carbon	fraction	25	Mean value from site data of TOC from landfill boreholes from ESG chemical data
Distance to compliance point	m	150	Distance between the Landfill and Bramble Brook
Time since pollutant entered groundwater	days	9.90E+99	EA RTM recommended value
Longitudinal dispersivity	m	1.5	10% of pathway length
Transverse dispersivity	m	0.15	1% of pathway length

CONTAMINANT SPECIFIC INPUTS

Project Number	60533462
Project Title	A38 Derby Kingsway Junction
Date	01-Mar-17

Simulation Details	Analysis of potential migration of Contaminants in Groundwater to Bramble Brook.

Determinand	Henry's Law Constant	Source	Soil-Water Partition Coefficient	Source	Organic carbon partition coefficient	Source	Half-Life of Contaminant in Groundwater	Source	Initial Contaminant Concentration in Groundwater Plume	Source
	dimensionless		l/kg		l/kg		days		µg/l	
Arsenic	-	-	1.80E+03	CLEA UK	-	-	1.00E+09	No degradation	7.30E+01	Maximum concentration recorded during GI
Boron	-	-	3	ce	-	-	1.00E+09	No degradation	3.03E+03	Maximum concentration recorded during GI
Cadmium	-	-	2560	CLEA UK	-	-	1.00E+09	No degradation	1.40E+00	Maximum concentration recorded during GI
Chromium VI	-	-	4800	CLEA UK	-	-	1.00E+09	No degradation	8.51E+01	Maximum concentration recorded during GI
Copper	-	-	35	ce	-	-	1.00E+09	No degradation	6.00E+00	Maximum concentration recorded during GI
Cyanide	-	-	9.9	cc	-	-	1.00E+09	No degradation	1.52E+00	Maximum concentration recorded during GI
Lead	-	-	36000	CLEA UK	-	-	1.00E+09	No degradation	1.10E+01	Maximum concentration recorded during GI
Nickel	-	-	2000	CLEA UK	-	-	1.00E+09	No degradation	5.03E+01	Maximum concentration recorded during GI
Zinc	-	-	36	cc calc			1.00E+09	No degradation	1.74E+02	Maximum concentration recorded during GI
Ammonical Nitrogen	-	-	1	CONSIM - Mean Value for Ammonium			1.00E+09	No degradation (Assumed)	2.73E+04	Maximum concentration recorded during GI
>EC5-7 Aromatics	2.30E-01	CC	-	-	6.76E+01	LQ	5.00E+01	(2) URS/EA	17	Maximum concentration recorded during GI
Benzene	1.16E-01	SR7	-	-	6.76E+01	SR7	5.00E+01	(1) EA	1.70E+01	Maximum concentration recorded during GI
Bis(2-ethylhexyl)phthalate	5.33E-05	CC	-	-	8.74E+04	cb	1.00E+05	(4)A&H/URS	27.6	Maximum concentration recorded during GI
Ethylbenzene	1.39E-01	SR7	-	-	4.47E+02	SR7	5.00E+01	(1) EA	3.40E+01	Maximum concentration recorded during GI
Napthalene	6.62E-03	SR7	-	-	6.46E+02	LQ	2.00E+02	(1) EA; (3) URS/PAHs	8.14E+00	Maximum concentration recorded during GI
Anthracene	1.81E-04	LQ	-	-	5.62E+03	LQ	6.00E+03	(3) URS/PAHs	1.54E+01	Maximum concentration recorded during GI
Fluoranthene	6.29E-05	SR7	-	-	1.82E+04	LQ	10,000	(3) URS/PAHs	5.92E+01	Maximum concentration recorded during GI
Benzo(a)pyrene	1.76E-06	SR7	-	-	1.29E+05	LQ	50,000	(3) URS/PAHs	78.90	Maximum concentration recorded during GI
Indeno(1,2,3-c,d)pyrene	2.05E-06	SR7	-	-	8.71E+04	LQ	50,000	(3) URS/PAHs	43.50	Maximum concentration recorded during GI
Benzo(g,h,i)perylene	2.86E-06	LQ	-	-	4.17E+05	LQ	50,000	(3) URS/PAHs	45.80	Maximum concentration recorded during GI
Benzo(b) fluoranthene	2.05E-06	SR7	-	-	1.05E+05	LQ	50,000	(3) URS/PAHs	89.30	Maximum concentration recorded during GI
Benzo(k) fluoranthene	1.74E-06	SR7	-	-	1.48E+05	LQ	50,000	(3) URS/PAHs	35.40	Maximum concentration recorded during GI
Phenol	8.32E+01	SR7	-	-	8.32E+01	SR7	500	(3) URS/PAHs	35.40	Maximum concentration recorded during GI

Key to sources	
a	Buss et al (2004), A Review of Ammonium Attenuation in Soil and Groundwater
c	US EPA 2003 User's Guide for Evaluating Subsurface Vapour Intrusion into Buildings
cb	www.toxnet.nlm.nih.gov
CC	h calc, compensated to 10C using Clausius-Claeyron relationship
cc	2001, USEPA, Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Peer Review Draft.
calc	US EPA 2001, Factsheet: Correcting the Henry's Law Constant for Soil Temperature, June 2001
ce	Baes.C.F., Sharp R.D., Sjoreen A.L., Shor R.W., (1984) A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture,
	Oak Ridge National laboratory for the US DoE
k	Review of the Fate and Transport of Selected Contaminants in the Soil Environment, Draft R&D Technical Report P5-079/TR1
LQ	LQM/CIEH 2009, Trremperature corrected to 10oC
SR7	Science Report – SC050021/SR7

EPI The EPI (**Estimation Programs Interface**) Suite™ is a Windows-based suite of physical/chemical property and environmental fate estimation programs developed by the EPA\'s Office of Pollution Prevention Toxics and Syracuse Research Corporation (SRC).

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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The calculation of equations in this worksheet has been independently checked by Entec (UK) Ltd on behalf of the Environment Agency.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Arsenic			
Target Concentration (C_T)	5.00E-02	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Arsenic		from Level 1
Target Concentration	C_T	5.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	7.30E-02	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.80E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	1.80E+03	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction

Soil water partition coefficient	Kd	1.80E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed

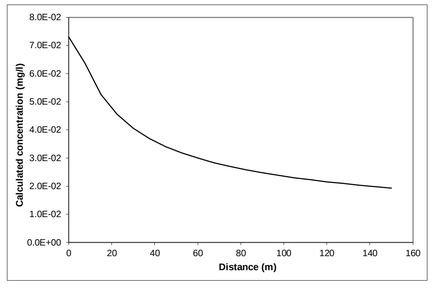
Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	3.22E+04	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Rate of contaminant flow due to retardation	u	8.45E-06	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.93E-02	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.77E+00**	

Remedial Targets

Remedial Target		**1.89E-01**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.93E-02**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	7.3E-02
7.5	6.38E-02
15.0	5.26E-02
22.5	4.55E-02
30.0	4.05E-02
37.5	3.69E-02
45.0	3.41E-02
52.5	3.18E-02
60.0	2.99E-02
67.5	2.84E-02
75.0	2.70E-02
82.5	2.58E-02
90.0	2.48E-02
97.5	2.39E-02
105.0	2.30E-02
112.5	2.23E-02
120.0	2.16E-02
127.5	2.10E-02
135.0	2.04E-02
142.5	1.98E-02
150.0	1.93E-02

Site being assessed:	Kingsway Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Lucy Full			
Date:	01-Mar-17		Version:	3.2
Contaminant	Boron			
Target Concentration (C_T)	2	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Environment Agency

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Boron		from Level 1
Target Concentration	C_T	2.00E+00	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	3.03E+00	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	5.47E+01	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Rate of contaminant flow due to retardation	u	4.98E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	8.13E-01	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.73E+00**	

Remedial Targets

Remedial Target		**7.45E+00**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**8.13E-01**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	3.00E+00	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{OC,n}$		l/kg
Sorption coefficient for ionised species	$K_{OC,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	3.00E+00	l/kg

Define dispersivity (click brown cell and use pull down list)

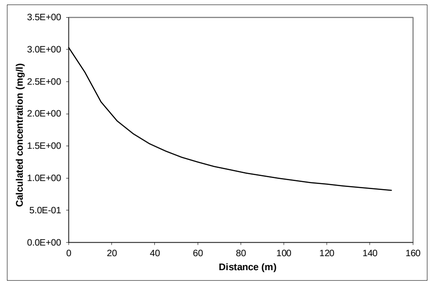
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	3.0E+00
7.5	2.65E+00
15.0	2.19E+00
22.5	1.89E+00
30.0	1.69E+00
37.5	1.54E+00
45.0	1.42E+00
52.5	1.33E+00
60.0	1.25E+00
67.5	1.18E+00
75.0	1.13E+00
82.5	1.08E+00
90.0	1.04E+00
97.5	9.98E-01
105.0	9.64E-01
112.5	9.33E-01
120.0	9.05E-01
127.5	8.79E-01
135.0	8.55E-01
142.5	8.33E-01
150.0	8.13E-01

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Kingsway Junction
Completed by:	Lucy Full
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Cadmium			
Target Concentration (C_T)	8.00E-05	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
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Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		Cadmium		from Level 1
Target Concentration	C_T	8.00E-05	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	4.00E-04	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.56E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — 2.56E+03 — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer — foc — fraction

Organic carbon partition coefficient — Koc — l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species — $K_{OC,n}$ — l/kg

Sorption coefficient for ionised species — $K_{OC,I}$ — l/kg

pH value — pH

acid dissociation constant — pKa

Fraction of organic carbon in aquifer — foc — fraction

Soil water partition coefficient	Kd	2.56E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

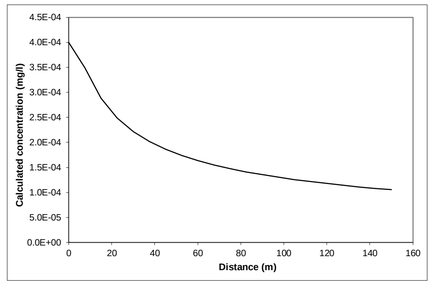
Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Calculated Parameters	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	4.58E+04	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Rate of contaminant flow due to retardation	u	5.94E-06	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.05E-04	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.79E+00**	

Remedial Targets

Remedial Target		**3.03E-04**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.05E-04**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	4.0E-04
7.5	3.50E-04
15.0	2.88E-04
22.5	2.49E-04
30.0	2.22E-04
37.5	2.02E-04
45.0	1.86E-04
52.5	1.74E-04
60.0	1.64E-04
67.5	1.55E-04
75.0	1.48E-04
82.5	1.41E-04
90.0	1.35E-04
97.5	1.30E-04
105.0	1.26E-04
112.5	1.22E-04
120.0	1.18E-04
127.5	1.14E-04
135.0	1.11E-04
142.5	1.08E-04
150.0	1.05E-04

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Kingsway Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Chromium VI			
Target Concentration (C_T)	3.40E-03	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
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It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Chromium VI		from Level 1
Target Concentration	C_T	3.40E-03	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	5.70E-01	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	4.80E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	4.80E+03	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	4.80E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed

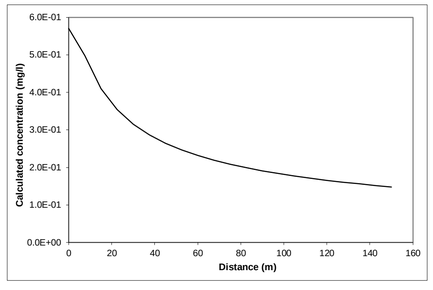
Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	8.59E+04	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Rate of contaminant flow due to retardation	u	3.17E-06	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.48E-01	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.85E+00**	

Remedial Targets

Remedial Target		**1.31E-02**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.48E-01**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	5.7E-01
7.5	4.98E-01
15.0	4.10E-01
22.5	3.54E-01
30.0	3.15E-01
37.5	2.87E-01
45.0	2.65E-01
52.5	2.47E-01
60.0	2.32E-01
67.5	2.19E-01
75.0	2.09E-01
82.5	1.99E-01
90.0	1.91E-01
97.5	1.84E-01
105.0	1.77E-01
112.5	1.71E-01
120.0	1.66E-01
127.5	1.61E-01
135.0	1.56E-01
142.5	1.52E-01
150.0	1.48E-01

Site being assessed:	Kingsway Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Lucy Full			
Date:	01-Mar-17		Version:	3.2
Contaminant	Copper			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		Copper		from Level 1
Target Concentration	C_T	1.00E-03	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	6.00E-03	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.50E+01	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	3.50E+01	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction

Soil water partition coefficient	Kd	3.50E+01	l/kg

Define dispersivity (click brown cell and use pull down list)

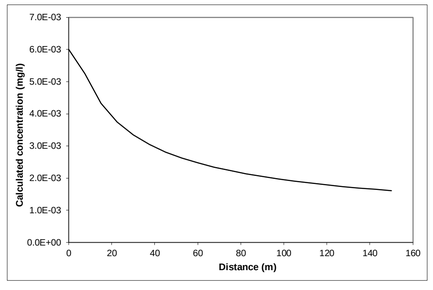
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	6.0E-03
7.5	5.25E-03
15.0	4.33E-03
22.5	3.74E-03
30.0	3.34E-03
37.5	3.04E-03
45.0	2.81E-03
52.5	2.63E-03
60.0	2.47E-03
67.5	2.34E-03
75.0	2.23E-03
82.5	2.14E-03
90.0	2.05E-03
97.5	1.98E-03
105.0	1.91E-03
112.5	1.85E-03
120.0	1.79E-03
127.5	1.74E-03
135.0	1.69E-03
142.5	1.65E-03
150.0	1.61E-03

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated Parameters	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	6.28E+02	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Rate of contaminant flow due to retardation	u	4.34E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.61E-03	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.73E+00**	

Site being assessed:	Kingsway Junction
Completed by:	Lucy Full
Date:	########
Version:	3.2

Remedial Targets

Remedial Target		**3.73E-03**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.61E-03**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Cyanide			
Target Concentration (C_T)	1.00E-06	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
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Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		Cyanide		from Level 1
Target Concentration	C_T	1.00E-06	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.52E-03	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	9.90E+00	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	9.90E+00	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	9.90E+00	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	ax	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	az	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	ay	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

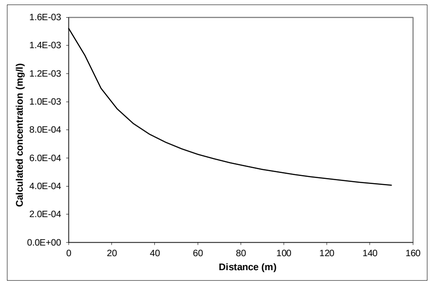
Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Calculated Parameters	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	1.78E+02	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Rate of contaminant flow due to retardation	u	1.53E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	4.08E-04	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.73E+00**	

Remedial Targets

Remedial Target		**3.73E-06**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**4.08E-04**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	**1.5E-03**
7.5	**1.33E-03**
15.0	**1.10E-03**
22.5	**9.48E-04**
30.0	**8.46E-04**
37.5	**7.71E-04**
45.0	**7.12E-04**
52.5	**6.65E-04**
60.0	**6.27E-04**
67.5	**5.94E-04**
75.0	**5.66E-04**
82.5	**5.41E-04**
90.0	**5.20E-04**
97.5	**5.01E-04**
105.0	**4.83E-04**
112.5	**4.68E-04**
120.0	**4.54E-04**
127.5	**4.41E-04**
135.0	**4.29E-04**
142.5	**4.18E-04**
150.0	**4.08E-04**

Site being assessed:	Kingsway Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Lead			
Target Concentration (C_T)	1.20E-03	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
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Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Lead		from Level 1
Target Concentration	C_T	1.20E-03	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.10E-02	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.60E+04	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	3.60E+04	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	3.60E+04	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed

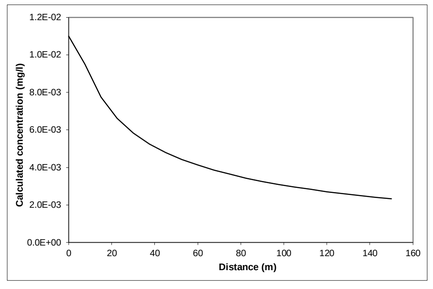
Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	6.44E+05	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Rate of contaminant flow due to retardation	u	4.22E-07	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	2.32E-03	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**4.74E+00**	

Remedial Targets

Remedial Target		**5.69E-03**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**2.32E-03**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.1E-02
7.5	9.51E-03
15.0	7.75E-03
22.5	6.62E-03
30.0	5.84E-03
37.5	5.25E-03
45.0	4.80E-03
52.5	4.43E-03
60.0	4.12E-03
67.5	3.86E-03
75.0	3.63E-03
82.5	3.43E-03
90.0	3.26E-03
97.5	3.10E-03
105.0	2.96E-03
112.5	2.83E-03
120.0	2.71E-03
127.5	2.60E-03
135.0	2.50E-03
142.5	2.41E-03
150.0	2.32E-03

Site being assessed:	Kingsway Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Lucy Full			
Date:	01-Mar-17		Version:	3.2
Contaminant	Nickel			
Target Concentration (C_T)	0.02	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Environment Agency

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		Nickel		from Level 1
Target Concentration	C_T	2.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	5.03E-02	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.00E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	2.00E+03	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	2.00E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

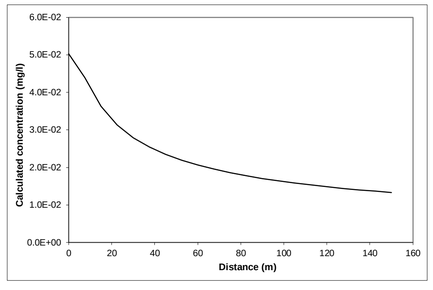
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	5.0E-02
7.5	4.40E-02
15.0	3.63E-02
22.5	3.13E-02
30.0	2.79E-02
37.5	2.54E-02
45.0	2.35E-02
52.5	2.19E-02
60.0	2.06E-02
67.5	1.95E-02
75.0	1.86E-02
82.5	1.78E-02
90.0	1.71E-02
97.5	1.64E-02
105.0	1.58E-02
112.5	1.53E-02
120.0	1.49E-02
127.5	1.44E-02
135.0	1.40E-02
142.5	1.37E-02
150.0	1.33E-02

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated Parameters	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	3.58E+04	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Rate of contaminant flow due to retardation	u	7.60E-06	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.33E-02	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.78E+00**	

Remedial Targets

Remedial Target		**7.56E-02**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.33E-02**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Kingsway Junction
Completed by:	Lucy Full
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Zinc			
Target Concentration (C_T)	1.09E-02	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
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It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		Zinc		from Level 1
Target Concentration	C_T	1.09E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	5.30E-02	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.60E+01	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	3.60E+01	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction

Soil water partition coefficient	Kd	3.60E+01	l/kg

Define dispersivity (click brown cell and use pull down list)

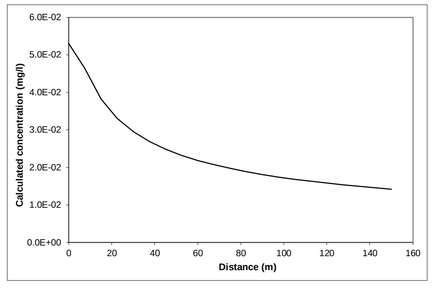
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	5.3E-02
7.5	4.64E-02
15.0	3.83E-02
22.5	3.31E-02
30.0	2.95E-02
37.5	2.69E-02
45.0	2.48E-02
52.5	2.32E-02
60.0	2.18E-02
67.5	2.07E-02
75.0	1.97E-02
82.5	1.89E-02
90.0	1.81E-02
97.5	1.75E-02
105.0	1.69E-02
112.5	1.63E-02
120.0	1.58E-02
127.5	1.54E-02
135.0	1.50E-02
142.5	1.46E-02
150.0	1.42E-02

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated Parameters	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	6.45E+02	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Rate of contaminant flow due to retardation	u	4.22E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.42E-02	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.73E+00**	

Remedial Targets

Remedial Target		**4.06E-02**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.42E-02**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Kingsway Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Ammoniacal Nitrogen			
Target Concentration (C_T)	3.00E-01	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		Ammoniacal Nitrogen		from Level 1
Target Concentration	C_T	3.00E-01	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.73E+01	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	1.00E+00	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{OC,n}$		l/kg
Sorption coefficient for ionised species	$K_{OC,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.00E+00	l/kg

Define dispersivity (click brown cell and use pull down list)

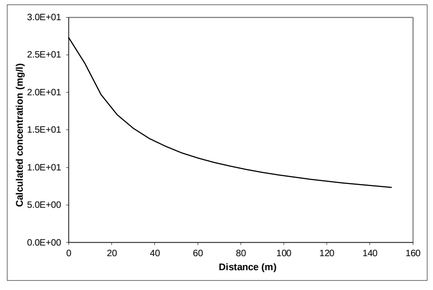
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report $ax = 0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	2.7E+01
7.5	2.39E+01
15.0	1.97E+01
22.5	1.70E+01
30.0	1.52E+01
37.5	1.38E+01
45.0	1.28E+01
52.5	1.20E+01
60.0	1.13E+01
67.5	1.07E+01
75.0	1.02E+01
82.5	9.72E+00
90.0	9.34E+00
97.5	8.99E+00
105.0	8.68E+00
112.5	8.40E+00
120.0	8.15E+00
127.5	7.92E+00
135.0	7.70E+00
142.5	7.51E+00
150.0	7.32E+00

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated Parameters	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	1.89E+01	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-02	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	7.32E+00	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.73E+00**	

Remedial Targets

Remedial Target		**1.12E+00**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**7.32E+00**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Kingsway Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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The calculation of equations in this worksheet has been independently checked by Entec (UK) Ltd on behalf of the Environment Agency.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Lucy Full			
Date:	01-Mar-17		Version:	3.2
Contaminant	>EC5 - 7 Aromatic			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
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The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		>EC5 - 7 Aromatic		from Level 1
Target Concentration	C_T	1.00E-03	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.70E+01	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+01	days	*See Justification Table*
Calculated decay rate	λ	1.39E-02	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.69E+01	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.50E-01	fraction
Organic carbon partition coefficient	Koc	6.76E+01	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{OC,n}$		l/kg
Sorption coefficient for ionised species	$K_{OC,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.69E+01	l/kg

Define dispersivity (click brown cell and use pull down list)

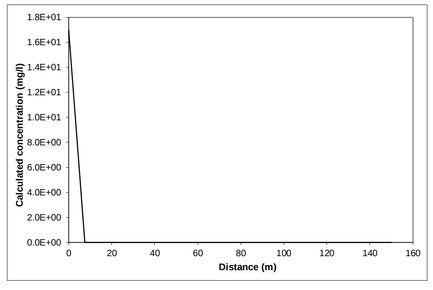
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.7E+01
7.5	9.38E-03
15.0	4.88E-06
22.5	2.66E-09
30.0	1.50E-12
37.5	8.62E-16
45.0	5.03E-19
52.5	2.96E-22
60.0	1.76E-25
67.5	1.05E-28
75.0	6.32E-32
82.5	3.82E-35
90.0	2.31E-38
97.5	1.41E-41
105.0	8.56E-45
112.5	5.23E-48
120.0	3.20E-51
127.5	1.96E-54
135.0	1.20E-57
142.5	7.40E-61
150.0	4.56E-64

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated Parameters	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	3.04E+02	fraction
Decay rate used	λ	1.39E-02	d^{-1}
Rate of contaminant flow due to retardation	u	8.97E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	4.56E-64	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.73E+64**	

Remedial Targets

Remedial Target		**3.73E+61**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**4.56E-64**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Kingsway Junction
Completed by:	Lucy Full
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Lucy Full			
Date:	01-Mar-17		Version:	3.2
Contaminant	Benzene			
Target Concentration (C_T)	10	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
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It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu) | **Variable** | **Value** | **Unit** | **Source**

Contaminant		Benzene		from Level 1
Target Concentration	C_T	1.00E+01	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.70E+01	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+01	days	*See Justification Table*
Calculated decay rate	λ	1.39E-02	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.69E+01	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.50E-01	fraction
Organic carbon partition coefficient	Koc	6.76E+01	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.69E+01	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed

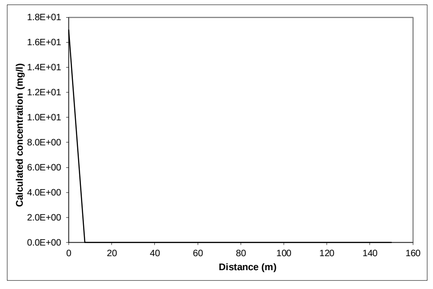
Calculated Parameters | **Variable**

Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	3.04E+02	fraction
Decay rate used	λ	1.39E-02	d^{-1}
Rate of contaminant flow due to retardation	u	8.97E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	4.56E-64	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.73E+64**	

Remedial Targets

Remedial Target		**3.73E+65**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**4.56E-64**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.7E+01
7.5	9.38E-03
15.0	4.88E-06
22.5	2.66E-09
30.0	1.50E-12
37.5	8.62E-16
45.0	5.03E-19
52.5	2.96E-22
60.0	1.76E-25
67.5	1.05E-28
75.0	6.32E-32
82.5	3.82E-35
90.0	2.31E-38
97.5	1.41E-41
105.0	8.56E-45
112.5	5.23E-48
120.0	3.20E-51
127.5	1.96E-54
135.0	1.20E-57
142.5	7.40E-61
150.0	4.56E-64

Site being assessed:	Kingsway Junction
Completed by:	Lucy Full
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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The calculation of equations in this worksheet has been independently checked by Entec (UK) Ltd on behalf of the Environment Agency.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Bis(2-ethylhexyl)phthalate			
Target Concentration (C_T)	1.30E-03	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		Bis(2-ethylhexyl)phthalate		from Level 1
Target Concentration	C_T	1.30E-03	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	3.03E+00	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+05	days	*See Justification Table*
Calculated decay rate	λ	6.93E-06	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.79E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.05E-02	fraction
Organic carbon partition coefficient	Koc	8.74E+04	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{OC,n}$		l/kg
Sorption coefficient for ionised species	$K_{OC,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.79E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

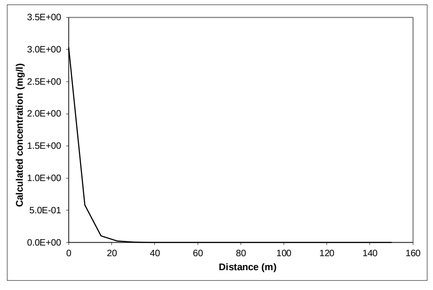
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	3.0E+00
7.5	5.81E-01
15.0	1.05E-01
22.5	1.99E-02
30.0	3.89E-03
37.5	7.77E-04
45.0	1.57E-04
52.5	3.22E-05
60.0	6.65E-06
67.5	1.38E-06
75.0	2.88E-07
82.5	6.04E-08
90.0	1.27E-08
97.5	2.68E-09
105.0	5.68E-10
112.5	1.21E-10
120.0	2.56E-11
127.5	5.45E-12
135.0	1.16E-12
142.5	2.48E-13
150.0	5.31E-14

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated Parameters	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	3.21E+04	fraction
Decay rate used	λ	6.93E-06	d^{-1}
Rate of contaminant flow due to retardation	u	8.49E-06	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	5.31E-14	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**5.71E+13**	

Remedial Targets

Remedial Target		**7.42E+10**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**5.31E-14**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Kingsway Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Lucy Full			
Date:	01-Mar-17		Version:	3.2
Contaminant	Ethylbenzene			
Target Concentration (C_T)	0.02	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		Ethylbenzene		from Level 1
Target Concentration	C_T	2.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	3.40E-02	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+01	days	*See Justification Table*
Calculated decay rate	λ	1.39E-02	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.12E+02	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.50E-01	fraction
Organic carbon partition coefficient	Koc	4.47E+02	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.12E+02	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

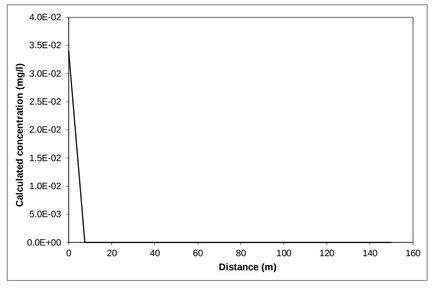
Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Calculated Parameters	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	2.00E+03	fraction
Decay rate used	λ	1.39E-02	d^{-1}
Rate of contaminant flow due to retardation	u	1.36E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.94E-170	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.75E+168**	

Remedial Targets

Remedial Target		**3.50E+166**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.94E-170**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	3.4E-02
7.5	1.23E-10
15.0	4.19E-19
22.5	1.50E-27
30.0	5.53E-36
37.5	2.08E-44
45.0	7.96E-53
52.5	3.07E-61
60.0	1.20E-69
67.5	4.69E-78
75.0	1.85E-86
82.5	7.31E-95
90.0	2.90E-103
97.5	1.15E-111
105.0	4.61E-120
112.5	1.84E-128
120.0	7.40E-137
127.5	2.97E-145
135.0	1.20E-153
142.5	4.82E-162
150.0	1.94E-170

Site being assessed:	Kingsway Junction
Completed by:	Lucy Full
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Lucy Full			
Date:	01-Mar-17		Version:	3.2
Contaminant	Napthalene			
Target Concentration (C_T)	0.002	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
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Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu) | **Variable** | **Value** | **Unit** | **Source**

Contaminant		Napthalene		from Level 1
Target Concentration	C_T	2.00E-03	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	8.14E-03	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	2.00E+02	days	*See Justification Table*
Calculated decay rate	λ	3.47E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.62E+02	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.50E-01	fraction
Organic carbon partition coefficient	Koc	6.46E+02	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.62E+02	l/kg

Define dispersivity (click brown cell and use pull down list)

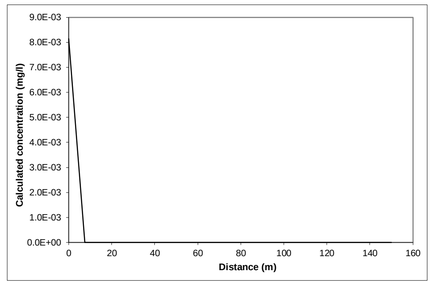
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	8.1E-03
7.5	7.18E-08
15.0	5.98E-13
22.5	5.21E-18
30.0	4.69E-23
37.5	4.31E-28
45.0	4.02E-33
52.5	3.79E-38
60.0	3.60E-43
67.5	3.44E-48
75.0	3.30E-53
82.5	3.19E-58
90.0	3.09E-63
97.5	3.00E-68
105.0	2.92E-73
112.5	2.85E-78
120.0	2.79E-83
127.5	2.73E-88
135.0	2.68E-93
142.5	2.64E-98
150.0	2.60E-103

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated Parameters | **Variable**

Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	2.89E+03	fraction
Decay rate used	λ	3.47E-03	d^{-1}
Rate of contaminant flow due to retardation	u	9.41E-05	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	2.60E-103	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.13E+100**	

Remedial Targets

Remedial Target		**6.27E+97**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**2.60E-103**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Kingsway Junction
Completed by:	Lucy Full
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Lucy Full			
Date:	01-Mar-17		Version:	3.2
Contaminant	Anthracene			
Target Concentration (C_T)	0.0001	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu) | **Variable** | **Value** | **Unit** | **Source**

Contaminant		Anthracene		from Level 1
Target Concentration	C_T	1.00E-04	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.54E-02	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	6.00E+03	days	*See Justification Table*
Calculated decay rate	λ	1.16E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.41E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.50E-01	fraction
Organic carbon partition coefficient	Koc	5.62E+03	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{OC,n}$		l/kg
Sorption coefficient for ionised species	$K_{OC,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.41E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed

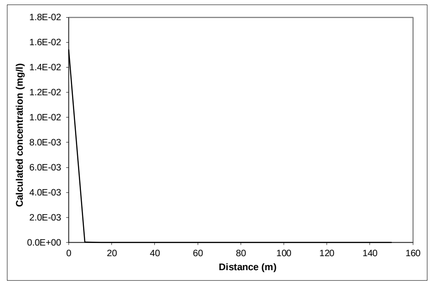
Calculate Parameters | **Variable**

Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	2.52E+04	fraction
Decay rate used	λ	1.16E-04	d^{-1}
Rate of contaminant flow due to retardation	u	1.08E-05	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	6.11E-56	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.52E+53**	

Remedial Targets

Remedial Target		**2.52E+49**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**6.11E-56**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Kingsway Junction
Completed by:	Lucy Full
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.5E-02
7.5	3.08E-05
15.0	5.79E-08
22.5	1.14E-10
30.0	2.33E-13
37.5	4.84E-16
45.0	1.02E-18
52.5	2.18E-21
60.0	4.68E-24
67.5	1.01E-26
75.0	2.20E-29
82.5	4.81E-32
90.0	1.06E-34
97.5	2.32E-37
105.0	5.12E-40
112.5	1.13E-42
120.0	2.50E-45
127.5	5.55E-48
135.0	1.23E-50
142.5	2.74E-53
150.0	6.11E-56

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Lucy Full			
Date:	01-Mar-17		Version:	3.2
Contaminant	Fluoranthene			
Target Concentration (C_T)	0.0000063	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
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Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Fluoranthene		from Level 1
Target Concentration	C_T	6.30E-06	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	5.92E-02	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+04	days	*See Justification Table*
Calculated decay rate	λ	6.93E-05	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	4.55E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.50E-01	fraction
Organic carbon partition coefficient	Koc	1.82E+04	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	4.55E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed

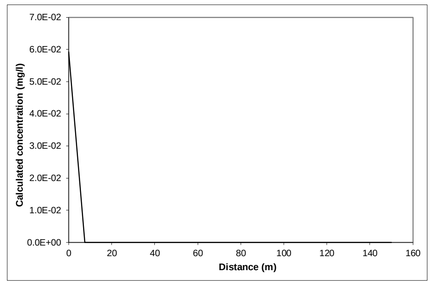
Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	8.14E+04	fraction
Decay rate used	λ	6.93E-05	d^{-1}
Rate of contaminant flow due to retardation	u	3.34E-06	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	5.42E-77	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.09E+75**	

Remedial Targets

Remedial Target		**6.89E+69**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**5.42E-77**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	5.9E-02
7.5	9.79E-06
15.0	1.53E-09
22.5	2.50E-13
30.0	4.21E-17
37.5	7.25E-21
45.0	1.27E-24
52.5	2.24E-28
60.0	3.99E-32
67.5	7.14E-36
75.0	1.29E-39
82.5	2.33E-43
90.0	4.23E-47
97.5	7.70E-51
105.0	1.41E-54
112.5	2.57E-58
120.0	4.72E-62
127.5	8.66E-66
135.0	1.59E-69
142.5	2.94E-73
150.0	5.42E-77

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Kingsway Junction
Completed by:	Lucy Full
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Lucy Full			
Date:	01-Mar-17		Version:	3.2
Contaminant	Benzo(a)pyrene			
Target Concentration (C_T)	0.00000017	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
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It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Benzo(a)pyrene		from Level 1
Target Concentration	C_T	1.70E-07	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	7.89E-02	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.23E+04	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.50E-01	fraction
Organic carbon partition coefficient	Koc	1.29E+05	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	3.23E+04	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed

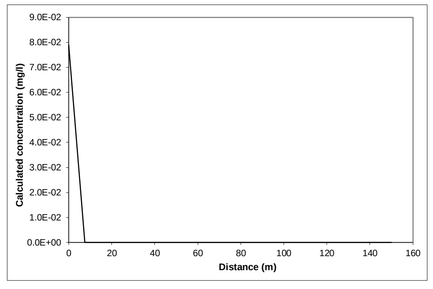
Calculate Parameters

	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	5.77E+05	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Rate of contaminant flow due to retardation	u	4.71E-07	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.82E-91	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**4.33E+89**	

Remedial Targets

Remedial Target		**7.36E+82**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.82E-91**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	7.9E-02
7.5	2.43E-06
15.0	7.06E-11
22.5	2.15E-15
30.0	6.76E-20
37.5	2.17E-24
45.0	7.05E-29
52.5	2.32E-33
60.0	7.70E-38
67.5	2.57E-42
75.0	8.62E-47
82.5	2.90E-51
90.0	9.82E-56
97.5	3.33E-60
105.0	1.13E-64
112.5	3.86E-69
120.0	1.32E-73
127.5	4.51E-78
135.0	1.55E-82
142.5	5.30E-87
150.0	1.82E-91

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Kingsway Junction
Completed by:	Lucy Full
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Lucy Full			
Date:	01-Mar-17		Version:	3.2
Contaminant	Indeno(1,2,3-cd)pyrene			
Target Concentration (C_T)	0.00000017	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
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Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Indeno(1,2,3-cd)pyrene		from Level 1
Target Concentration	C_T	1.70E-07	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	4.35E-02	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.18E+04	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.50E-01	fraction
Organic carbon partition coefficient	Koc	8.71E+04	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{OC,n}$		l/kg
Sorption coefficient for ionised species	$K_{OC,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	2.18E+04	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed

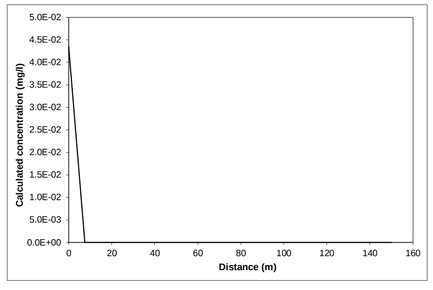
Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	3.90E+05	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Rate of contaminant flow due to retardation	u	6.98E-07	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.82E-75	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.40E+73**	

Remedial Targets

Remedial Target		**4.07E+66**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.82E-75**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	4.4E-02
7.5	8.71E-06
15.0	1.64E-09
22.5	3.25E-13
30.0	6.65E-17
37.5	1.39E-20
45.0	2.93E-24
52.5	6.27E-28
60.0	1.35E-31
67.5	2.93E-35
75.0	6.39E-39
82.5	1.40E-42
90.0	3.07E-46
97.5	6.78E-50
105.0	1.50E-53
112.5	3.32E-57
120.0	7.36E-61
127.5	1.64E-64
135.0	3.65E-68
142.5	8.13E-72
150.0	1.82E-75

Site being assessed:	Kingsway Junction
Completed by:	Lucy Full
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment

Site Name:	**Kingsway Junction**			
Site Address:	**A38, Derbyshire**			
Completed by:	**Lucy Full**			
Date:	**01-Mar-17**		**Version:**	**3.2**
Contaminant	**Benzo(g,h,i)perylene**			
Target Concentration (C_T)	**0.0000082**	**mg/l**	**Origin of C_T:**	**EQS**

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
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Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Benzo(g,h,i)perylene		from Level 1
Target Concentration	C_T	8.20E-06	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	4.58E-02	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.04E+05	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.50E-01	fraction
Organic carbon partition coefficient	Koc	4.17E+05	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.04E+05	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed

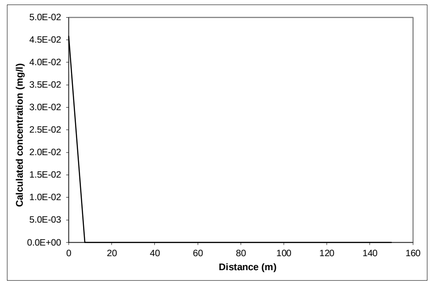
Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	1.87E+06	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Rate of contaminant flow due to retardation	u	1.46E-07	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.80E-164	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.54E+162**	

Remedial Targets

Remedial Target		**2.08E+157**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.80E-164**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	4.6E-02
7.5	3.24E-10
15.0	2.17E-18
22.5	1.52E-26
30.0	1.10E-34
37.5	8.08E-43
45.0	6.05E-51
52.5	4.58E-59
60.0	3.49E-67
67.5	2.68E-75
75.0	2.07E-83
82.5	1.60E-91
90.0	1.24E-99
97.5	9.70E-108
105.0	7.59E-116
112.5	5.94E-124
120.0	4.67E-132
127.5	3.67E-140
135.0	2.89E-148
142.5	2.28E-156
150.0	1.80E-164

Site being assessed:	Kingsway Junction
Completed by:	Lucy Full
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Lucy Full			
Date:	01-Mar-17		Version:	3.2
Contaminant	Benzo(b)fluoranthene			
Target Concentration (C_T)	0.000017	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
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The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Benzo(b)fluoranthene		from Level 1
Target Concentration	C_T	1.70E-05	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	8.93E-02	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.63E+04	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.50E-01	fraction
Organic carbon partition coefficient	Koc	1.05E+05	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	2.63E+04	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed

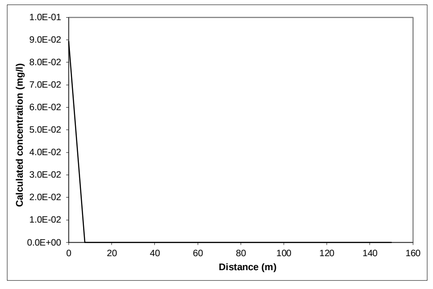
Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	4.70E+05	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Rate of contaminant flow due to retardation	u	5.79E-07	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.71E-82	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**5.23E+80**	

Remedial Targets

Remedial Target		**8.89E+75**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.71E-82**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	8.9E-02
7.5	7.68E-06
15.0	6.23E-10
22.5	5.30E-14
30.0	4.65E-18
37.5	4.16E-22
45.0	3.78E-26
52.5	3.47E-30
60.0	3.22E-34
67.5	3.00E-38
75.0	2.81E-42
82.5	2.64E-46
90.0	2.49E-50
97.5	2.36E-54
105.0	2.24E-58
112.5	2.13E-62
120.0	2.03E-66
127.5	1.94E-70
135.0	1.86E-74
142.5	1.78E-78
150.0	1.71E-82

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Kingsway Junction
Completed by:	Lucy Full
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Lucy Full			
Date:	01-Mar-17		Version:	3.2
Contaminant	Benzo(k)fluoranthene			
Target Concentration (C_T)	0.000017	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Benzo(k)fluoranthene		from Level 1
Target Concentration	C_T	1.70E-05	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	3.54E-02	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.70E+04	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.50E-01	fraction
Organic carbon partition coefficient	Koc	1.48E+05	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{OC,n}$		l/kg
Sorption coefficient for ionised species	$K_{OC,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	3.70E+04	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed

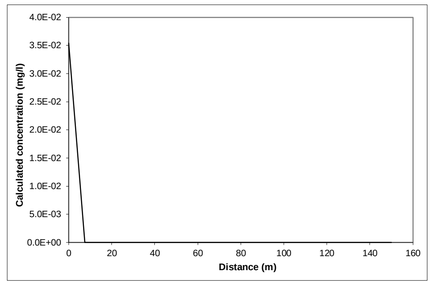
Calculated Parameters

	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	6.62E+05	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Rate of contaminant flow due to retardation	u	4.11E-07	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	2.68E-98	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.32E+96**	

Remedial Targets

Remedial Target		**2.25E+91**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**2.68E-98**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	3.5E-02
7.5	5.17E-07
15.0	7.12E-12
22.5	1.03E-16
30.0	1.53E-21
37.5	2.33E-26
45.0	3.59E-31
52.5	5.60E-36
60.0	8.80E-41
67.5	1.39E-45
75.0	2.21E-50
82.5	3.53E-55
90.0	5.66E-60
97.5	9.11E-65
105.0	1.47E-69
112.5	2.37E-74
120.0	3.84E-79
127.5	6.23E-84
135.0	1.01E-88
142.5	1.64E-93
150.0	2.68E-98

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Site being assessed:	Kingsway Junction
Completed by:	Lucy Full
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Kingsway Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Phenol			
Target Concentration (C_T)	7.70E-03	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		Phenol		from Level 1
Target Concentration	C_T	7.70E-03	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.60E-02	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+02	days	*See Justification Table*
Calculated decay rate	λ	1.39E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	3.60E+02	m	*See Justification Table*
Plume thickness at source	Sy	2.30E+00	m	*See Justification Table*
Saturated aquifer thickness	da	2.50E+00	m	*See Justification Table*
Bulk density of aquifer materials	ρ	1.79E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	1.40E-01	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	1.94E-01	m/d	*See Justification Table*
Distance to compliance point	x	1.50E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.71E+00	l/kg	*see options*
Longitudinal dispersivity	ax	1.50E+01	m	*see options*
Transverse dispersivity	az	1.50E+00	m	*see options*
Vertical dispersivity	ay	1.50E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	2.05E-02	fraction
Organic carbon partition coefficient	Koc	8.32E+01	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{OC,n}$		l/kg
Sorption coefficient for ionised species	$K_{OC,I}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.71E+00	l/kg

Define dispersivity (click brown cell and use pull down list)

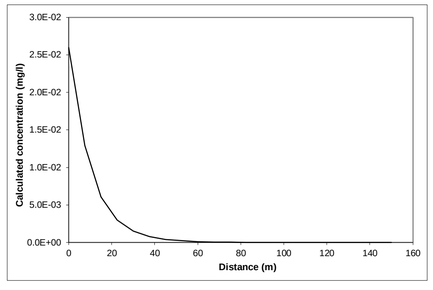
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.50E+01	5.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.50E+00	5.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.50E-01	5.42E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	2.6E-02
7.5	1.29E-02
15.0	6.06E-03
22.5	2.98E-03
30.0	1.51E-03
37.5	7.81E-04
45.0	4.10E-04
52.5	2.18E-04
60.0	1.16E-04
67.5	6.27E-05
75.0	3.39E-05
82.5	1.84E-05
90.0	1.01E-05
97.5	5.51E-06
105.0	3.02E-06
112.5	1.66E-06
120.0	9.15E-07
127.5	5.05E-07
135.0	2.79E-07
142.5	1.55E-07
150.0	8.57E-08

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated Parameters	Variable		
Groundwater flow velocity	v	2.72E-01	m/d
Retardation factor	Rf	3.15E+01	fraction
Decay rate used	λ	1.39E-03	d^{-1}
Rate of contaminant flow due to retardation	u	8.63E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	8.57E-08	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.03E+05**	

Remedial Targets

Remedial Target		**2.34E+03**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**150**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**8.57E-08**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Kingsway Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

RTM - Hydrogeological Risk Assessment

Project Number	60533462
Project Title	A38 Derby Markeaton Junction
Date	01-Mar-17

Simulation Details	Analysis of potential migration of Contaminants in Groundwater at Markeaton Junction to Markeaton Lake

LEVEL 2 (SOIL) ASSESSMENT - INPUTS & JUSTIFICATION

Project Number	60533462
Project Title	A38 Derby Markeaton Junction
Date	01-Mar-17

Simulation Details	Analysis of potential migration of Contaminants in Groundwater at Markeaton Junction to Markeaton Lake

Source 1			
Parameter	**Units**	**Input Value**	**Source / Justification**
Rainfall	mm/year	709.4	Annual Rainfall Watnall Station (closest to site) from www.metoffice.gov.uk
Infiltration Factor	%	0.5	Based on assumption of 50% hardstanding
Infiltration	mm/year	354.7	Based on assumption of 50% hardstanding
Infiltration	m/d	0.00097	Conversion from mm/year to m/d
Area of contaminant source	m^2	136440	Approximate area of investigation footprint at Markeaton Junction
Length of contaminant source	m	440	Approximate length of investigation area in the direction of groundwater flow
Saturated aquifer thickness	m	30	Assumed as base of aquifer (bedrock) is not proven
Hydraulic Conductivity of aquifer	m/d	0.0648	Average of variable head permeability tests at BM10
Hydraulic gradient of water table	fraction	0.063	Calculated for the site using the average groundwater level monitoring
Width of contaminant source	m	400	Assumed width of investigation area
Background concentration	mg/l	varying	Half of target concentration (EQS) assumed

LEVEL 3 (SOIL) ASSESSMENT - INPUTS & JUSTIFICATION

Project Number	60533462
Project Title	A38 Derby Markeaton Junction
Date	01-Mar-17

Simulation Details	Analysis of potential migration of Contaminants in Groundwater at Markeaton Junction to Markeaton Lake

Source	Soil Leachate at Markeaton Junction		
Parameter	**Units**	**Input Value**	**Source / Justification**
Bulk density of aquifer materials	g/cm3	2.30E+00	Ground investigation data
Effective porosity of aquifer	fraction	0.1	Effective Porosity for Clay from Domenico & Schwartz, 1989
Fraction of Organic Carbon	fraction	25	Mean value from site data of TOC from landfill boreholes from ESG chemical data
Distance to compliance point	m	100	Distance between the Landfill and Bramble Brook
Time since pollutant entered groundwa	days	9.9E+99	EA RTM recommended value
Longitudinal dispersivity	m	1.5	10% of pathway length
Transverse dispersivity	m	0.15	1% of pathway length

CONTAMINANT SPECIFIC INPUTS

Project Number	60533462
Project Title	A38 Derby Markeaton Jun
Date	01-Mar-17

Simulation Details	Analysis of potential migration of Contaminants in Groundwater at Markeaton Junction to Markeaton Lake

Determinand	Henry's Law Constant	Source	Soil-Water Partition Coefficient	Source	Organic carbon partition coefficient	Source	Half-Life of Contaminant in Groundwater	Source	Initial Contaminant Concentration in Groundwater Plume	Source
	dimensionless		l/kg		l/kg		days		µg/l	
Cadmium	-	-	2.56E+03	CLEA UK	-	-	1.00E+09	No degradation	2.3	Maximum concentration recorded during GI
Copper	-	-	3.50E+01	ce	-	-	1.00E+09	No degradation	29.1	Maximum concentration recorded during GI
Lead	-	-	3.60E+04	CLEA UK	-	-	1.00E+09	No degradation	1223	Maximum concentration recorded during GI
Zinc	-	-	3.60E+01	cc calc	-	-	1.00E+09	No degradation	137	Maximum concentration recorded during GI
Chromium VI	-	-	4.80E+03	CLEA UK	-	-	1.00E+09	No degradation	14.9	Maximum concentration recorded during GI
Cyanide			9.90E+00	cc	-	-	1.00E+09	No degradation	4	Maximum concentration recorded during GI
Napthalene	6.62E-03	SR7	-	-	6.46E+02	LQ	1.50E+03	(1) EA; (3) URS/PAHs	9.81	Maximum concentration recorded during GI
Fluoranthene	6.29E-05	SR7	-	-	1.82E+04	LQ	10,000	(3) URS/PAHs	0.228	Maximum concentration recorded during GI
Benzo(a)pyrene	1.76E-06	SR7	-	-	1.29E+05	LQ	50,000	(3) URS/PAHs	0.054	Maximum concentration recorded during GI
Indeno(1,2,3-c,d)pyrene	2.05E-06	SR7	-	-	8.71E+04	LQ	50,000	(3) URS/PAHs	0.044	Maximum concentration recorded during GI
Benzo(g,h,i)perylene	2.86E-06	LQ	-	-	4.17E+05	LQ	50,000	(3) URS/PAHs	0.25	Maximum concentration recorded during GI
Benzo(b) fluoranthene	2.05E-06	SR7	-	-	1.05E+05	LQ	50,000	(3) URS/PAHs	0.074	Maximum concentration recorded during GI
Benzo(k) fluoranthene	1.74E-06	SR7	-	-	1.48E+05	LQ	50,000	(3) URS/PAHs	0.027	Maximum concentration recorded during GI
Phenol	8.35E-06	SR7			8.32E+01	SR7	5.00E+02	(1) EA	31.9	Maximum concentration recorded during GI

Key to sources	
a	Buss et al (2004), A Review of Ammonium Attenuation in Soil and Groundwater
c	US EPA 2003 User's Guide for Evaluating Subsurface Vapour Intrusion into Buildings
cb	www.toxnet.nlm.nih.gov
CC	h calc, compensated to 10C using Clausius-Claeyron relationship
cc	2001, USEPA, Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Peer Review Draft.
calc	US EPA 2001, Factsheet: Correcting the Henry's Law Constant for Soil Temperature, June 2001
ce	Baes.C.F., Sharp R.D., Sjoreen A.L., Shor R.W., (1984) A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture,
	Oak Ridge National laboratory for the US DoE
k	Review of the Fate and Transport of Selected Contaminants in the Soil Environment, Draft R&D Technical Report P5-079/TR1
LQ	LQM/CIEH 2009, Tremperature corrected to 10oC
SR7	Science Report – SC050021/SR7

EPI The EPI (**Estimation Programs Interface**) Suite™ is a Windows-based suite of physical/chemical property and environmental fate estimation programs developed by the EPA\'s Office of Pollution Prevention Toxics and Syracuse Research Corporation (SRC).

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Markeaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	10-Apr-17		Version:	3.2
Contaminant	Cadmium			
Target Concentration (C_T)	0.00008	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**Cadmium**		from Level 1
Target concentration	**C_T**	**0.00008**	**mg/l**	from Level 1

This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	**Variable**	**Value**	**Unit**	**Source of parameter value**	
Standard entry					
Infiltration	Inf	9.70E-04	m/d	**See Justification Table**	
Area of contaminant source	A	1.36E+05	m^2	**See Justification Table**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	4.40E+02	m	**See Justification Table**	
Saturated aquifer thickness	da	3.00E+01	m	**See Justification Table**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	6.48E-02	m/d	**See Justification Table**	
Hydraulic gradient of water table	i	6.30E-02	fraction	**See Justification Table**	
Width of contaminant source perpendicular to groundwater flow	w	4.00E+02	m	**See Justification Table**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	4.00E-05	mg/l	**See Justification Table**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m		
Calculated mixing zone thickness	Mz	3.00E+01	m		

Calculated Parameters

Dilution Factor	**DF**	**1.14E+00**		
Level 2 Remedial Target		**9.15E-05**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentration.**
		or		
		#DIV/0!	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10-Apr-17
Version:	3.2

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Cadmium		from Level 1
Target Concentration	C_T	0.00008	mg/l	from Level 1
Dilution Factor	DF	1.14E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, l

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration		0	mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	
Calculated decay rate	λ	6.93E-10	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	4.00E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	
Effective porosity of aquifer	n	1.00E-01	fraction	
Hydraulic gradient	i	5.02E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.48E-02	m/d	from Level 2
Distance to compliance point	x	1.00E+02	m	
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.56E+03	l/kg	*see options*
Longitudinal dispersivity	ax	10.000	m	*see options*
Transverse dispersivity	az	1.000	m	*see options*
Vertical dispersivity	ay	0.100	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.25E-01	m/d
Retardation factor	Rf	5.89E+04	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	5.02E-01	fraction
Rate of contaminant flow due to retardation	u	5.53E-06	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	9.88E-01	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.01E+00**	**fraction**
Calculated soil leachate concentration	Co	#DIV/0!	mg/l

Enter method of defining partition co-efficient (using pull down list)

User specified value for partition coefficient

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — 2.56E+03 l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer — foc — fraction
Organic carbon partition coefficient — Koc — l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species — $K_{oc,n}$ — l/kg
Sorption coefficient for ionised species — $K_{oc,i}$ — l/kg
pH value — pH
Acid dissociation constant — pKa
Fraction of organic carbon in aquifer — foc — fraction

Soil water partition coefficient — Kd — 2.56E+03 — l/kg

Define dispersivity (click brown cell and use pull down list)

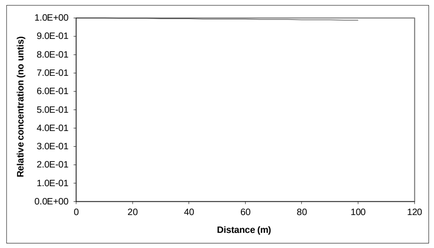
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.00E+01	4.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.00E+00	4.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.00E-01	4.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10/04/2017
Version:	3.2

Remedial Targets

Level 3 Remedial Target		**9.26E-05**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		#DIV/0!	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**100**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**9.88E-01**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Markeaton Junction
A38, Derbyshire

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Markeaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	10-Apr-17		Version:	3.2
Contaminant	Copper			
Target Concentration (C_T)	1.00E-03	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**Copper**		from Level 1
Target concentration	C_T	**0.001**	**mg/l**	from Level 1

This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	**Variable**	**Value**	**Unit**	**Source of parameter value**	
Standard entry					
Infiltration	Inf	9.70E-04	m/d	**See Justification Table**	
Area of contaminant source	A	1.36E+05	m^2	**See Justification Table**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	4.40E+02	m	**See Justification Table**	
Saturated aquifer thickness	da	3.00E+01	m	**See Justification Table**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	6.48E-02	m/d	**See Justification Table**	
Hydraulic gradient of water table	i	6.30E-02	fraction	**See Justification Table**	
Width of contaminant source perpendicular to groundwater flow	w	4.00E+02	m	**See Justification Table**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	5.00E-04	mg/l	**See Justification Table**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m		
Calculated mixing zone thickness	Mz	3.00E+01	m		

Calculated Parameters

Dilution Factor	**DF**	**1.14E+00**		
Level 2 Remedial Target		**1.14E-03**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentration.**
		or		
		#DIV/0!	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10-Apr-17
Version:	3.2

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Copper		from Level 1
Target Concentration	C_T	0.001	mg/l	from Level 1
Dilution Factor	DF	1.14E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, l

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	4.00E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	5.02E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.48E-02	m/d	from Level 2
Distance to compliance point	x	1.00E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.50E+01	l/kg	*see options*
Longitudinal dispersivity	ax	10.000	m	*see options*
Transverse dispersivity	az	1.000	m	*see options*
Vertical dispersivity	ay	0.100	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.25E-01	m/d
Retardation factor	Rf	8.06E+02	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	5.02E-01	fraction
Rate of contaminant flow due to retardation	u	4.04E-04	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	1.00E+00	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.00E+00**	**fraction**
Calculated soil leachate concentration	Co	#DIV/0!	mg/l

Remedial Targets

Level 3 Remedial Target		**1.14E-03**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		#DIV/0!	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**100**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**1.00E+00**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

User specified value for partition coefficient

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — 3.50E+01 l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer — foc — fraction
Organic carbon partition coefficient — Koc — l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species — $K_{oc,n}$ — l/kg
Sorption coefficient for ionised species — $K_{oc,i}$ — l/kg
pH value — pH
Acid dissociation constant — pKa
Fraction of organic carbon in aquifer — foc — fraction

Soil water partition coefficient — Kd — 3.50E+01 — l/kg

Define dispersivity (click brown cell and use pull down list)

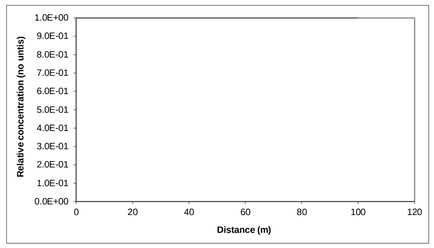
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.00E+01	4.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.00E+00	4.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.00E-01	4.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10/04/2017
Version:	3.2

Markeaton Junction
A38, Derbyshire

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Markeaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	10-Apr-17		Version:	3.2
Contaminant	Lead			
Target Concentration (C_T)	1.20E-03	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Markeaton Junction
A38, Derbyshire

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**Lead**		from Level 1
Target concentration	C_T	**0.0012**	**mg/l**	from Level 1

This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	Variable	Value	Unit	Source of parameter value	
Standard entry					
Infiltration	Inf	9.70E-04	m/d	**See Justification Table**	
Area of contaminant source	A	1.36E+05	m^2	**See Justification Table**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	4.40E+02	m	**See Justification Table**	
Saturated aquifer thickness	da	3.00E+01	m	**See Justification Table**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	6.48E-02	m/d	**See Justification Table**	
Hydraulic gradient of water table	i	6.30E-02	fraction	**See Justification Table**	
Width of contaminant source perpendicular to groundwater flow	w	4.00E+02	m	**See Justification Table**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	6.00E-04	mg/l	**See Justification Table**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m		
Calculated mixing zone thickness	Mz	3.00E+01	m		

Calculated Parameters

Dilution Factor	**DF**	**1.14E+00**		
Level 2 Remedial Target		**1.37E-03**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentration.**
		or		
		#DIV/0!	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10-Apr-17
Version:	3.2

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Lead		from Level 1
Target Concentration	C_T	0.0012	mg/l	from Level 1
Dilution Factor	DF	1.14E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, l

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	4.00E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	5.02E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.48E-02	m/d	from Level 2
Distance to compliance point	x	1.00E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.60E+04	l/kg	*see options*
Longitudinal dispersivity	ax	10.000	m	*see options*
Transverse dispersivity	az	1.000	m	*see options*
Vertical dispersivity	ay	0.100	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.25E-01	m/d
Retardation factor	Rf	8.28E+05	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	5.02E-01	fraction
Rate of contaminant flow due to retardation	u	3.93E-07	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	8.41E-01	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.19E+00**	**fraction**
Calculated soil leachate concentration	Co	#DIV/0!	mg/l

Remedial Targets

Level 3 Remedial Target		**1.63E-03**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		#DIV/0!	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**100**	**m**	assumes Level 1 Remedial Target calculated from soil-water
				partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**8.41E-01**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

User specified value for partition coefficient

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — 3.60E+04 l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer — foc — fraction
Organic carbon partition coefficient — Koc — l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species — $K_{oc,n}$ — l/kg
Sorption coefficient for ionised species — $K_{oc,i}$ — l/kg
pH value — pH
Acid dissociation constant — pKa
Fraction of organic carbon in aquifer — foc — fraction

Soil water partition coefficient — Kd — 3.60E+04 l/kg

Define dispersivity (click brown cell and use pull down list)

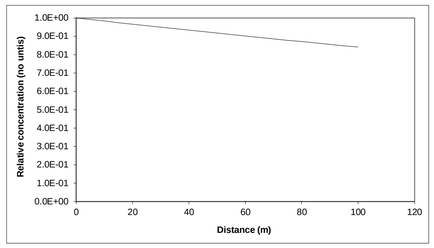
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.00E+01	4.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.00E+00	4.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.00E-01	4.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10/04/2017
Version:	3.2

Markeaton Junction
A38, Derbyshire

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Markeaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	10-Apr-17		Version:	3.2
Contaminant	Zinc			
Target Concentration (C_T)	1.09E-02	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Markeaton Junction
A38, Derbyshire

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**Zinc**		from Level 1
Target concentration	C_T	**0.0109**	**mg/l**	from Level 1

This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	Variable	Value	Unit	Source of parameter value	
Standard entry					
Infiltration	Inf	9.70E-04	m/d	**See Justification Table**	
Area of contaminant source	A	1.36E+05	m^2	**See Justification Table**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	4.40E+02	m	**See Justification Table**	
Saturated aquifer thickness	da	3.00E+01	m	**See Justification Table**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	6.48E-02	m/d	**See Justification Table**	
Hydraulic gradient of water table	i	6.30E-02	fraction	**See Justification Table**	
Width of contaminant source perpendicular to groundwater flow	w	4.00E+02	m	**See Justification Table**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	5.45E-03	mg/l	**See Justification Table**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m		
Calculated mixing zone thickness	Mz	3.00E+01	m		

Calculated Parameters

Dilution Factor	**DF**	**1.14E+00**		
Level 2 Remedial Target		**1.25E-02**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentration.**
		or		
		#DIV/0!	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10-Apr-17
Version:	3.2

Markeaton Junction
A38, Derbyshire

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters

	Variable	Value	Unit	Source
Contaminant		Zinc		from Level 1
Target Concentration	C_T	0.0109	mg/l	from Level 1
Dilution Factor	DF	1.14E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, l

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	4.00E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	5.02E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.48E-02	m/d	from Level 2
Distance to compliance point	x	1.00E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.60E+01	l/kg	*see options*
Longitudinal dispersivity	ax	10.000	m	*see options*
Transverse dispersivity	az	1.000	m	*see options*
Vertical dispersivity	ay	0.100	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters

	Variable		
Groundwater flow velocity	v	3.25E-01	m/d
Retardation factor	Rf	8.29E+02	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	5.02E-01	fraction
Rate of contaminant flow due to retardation	u	3.92E-04	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	1.00E+00	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.00E+00**	**fraction**
Calculated soil leachate concentration	Co	#DIV/0!	mg/l

Remedial Targets

Level 3 Remedial Target		**1.25E-02**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		#DIV/0!	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**100**	**m**	assumes Level 1 Remedial Target calculated from soil-water
				partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**1.00E+00**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

User specified value for partition coefficient

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — 3.60E+01 l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer — foc — fraction
Organic carbon partition coefficient — Koc — l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species — $K_{oc,n}$ — l/kg
Sorption coefficient for ionised species — $K_{oc,i}$ — l/kg
pH value — pH
Acid dissociation constant — pKa
Fraction of organic carbon in aquifer — foc — fraction

Soil water partition coefficient — Kd — 3.60E+01 — l/kg

Define dispersivity (click brown cell and use pull down list)

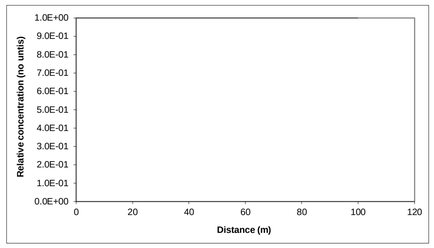
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.00E+01	4.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.00E+00	4.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.00E-01	4.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10/04/2017
Version:	3.2

Markeaton Junction
A38, Derbyshire

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Markeaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	10-Apr-17		Version:	3.2
Contaminant	Chromium VI			
Target Concentration (C_T)	3.40E-03	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Markeaton Junction
A38, Derbyshire

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**Chromium VI**		from Level 1
Target concentration	**C_T**	**0.0034**	**mg/l**	from Level 1

This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	**Variable**	**Value**	**Unit**	**Source of parameter value**	
Standard entry					
Infiltration	Inf	9.70E-04	m/d	**See Justification Table**	
Area of contaminant source	A	1.36E+05	m^2	**See Justification Table**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	4.40E+02	m	**See Justification Table**	
Saturated aquifer thickness	da	3.00E+01	m	**See Justification Table**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	6.48E-02	m/d	**See Justification Table**	
Hydraulic gradient of water table	i	6.30E-02	fraction	**See Justification Table**	
Width of contaminant source perpendicular to groundwater flow	w	4.00E+02	m	**See Justification Table**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	1.70E-03	mg/l	**See Justification Table**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m		
Calculated mixing zone thickness	Mz	3.00E+01	m		

Calculated Parameters

Dilution Factor	**DF**	**1.14E+00**		
Level 2 Remedial Target		**3.89E-03**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentration.**
		or		
		#DIV/0!	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10-Apr-17
Version:	3.2

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters

	Variable	Value	Unit	Source
Contaminant		Chromium VI		from Level 1
Target Concentration	C_T	0.0034	mg/l	from Level 1
Dilution Factor	DF	1.14E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, l

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	4.00E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	5.02E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.48E-02	m/d	from Level 2
Distance to compliance point	x	1.00E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	4.80E+03	l/kg	*see options*
Longitudinal dispersivity	ax	10.000	m	*see options*
Transverse dispersivity	az	1.000	m	*see options*
Vertical dispersivity	ay	0.100	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters

	Variable		
Groundwater flow velocity	v	3.25E-01	m/d
Retardation factor	Rf	1.10E+05	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	5.02E-01	fraction
Rate of contaminant flow due to retardation	u	2.95E-06	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	9.77E-01	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.02E+00**	**fraction**
Calculated soil leachate concentration	Co	#DIV/0!	mg/l

Remedial Targets

Level 3 Remedial Target		**3.98E-03**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		#DIV/0!	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**100**	**m**	assumes Level 1 Remedial Target calculated from soil-water
				partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**9.77E-01**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

User specified value for partition coefficient

Entry if specify partition coefficient (option)

Soil water partition coefficient	Kd	4.80E+03	l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	4.80E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

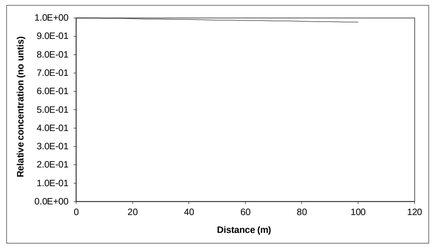
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.00E+01	4.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.00E+00	4.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.00E-01	4.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10/04/2017
Version:	3.2

Markeaton Junction
A38, Derbyshire

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Markeaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	10-Apr-17		Version:	3.2
Contaminant	Cyanide			
Target Concentration (C_T)	1.00E-06	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Markeaton Junction
A38, Derbyshire

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**Cyanide**		from Level 1
Target concentration	C_T	**0.000001**	**mg/l**	from Level 1

This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	**Variable**	**Value**	**Unit**	**Source of parameter value**	
Standard entry					
Infiltration	Inf	9.70E-04	m/d	**See Justification Table**	
Area of contaminant source	A	1.36E+05	m^2	**See Justification Table**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	4.40E+02	m	**See Justification Table**	
Saturated aquifer thickness	da	3.00E+01	m	**See Justification Table**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	6.48E-02	m/d	**See Justification Table**	
Hydraulic gradient of water table	i	6.30E-02	fraction	**See Justification Table**	
Width of contaminant source perpendicular to groundwater flow	w	4.00E+02	m	**See Justification Table**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	5.00E-07	mg/l	**See Justification Table**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m		
Calculated mixing zone thickness	Mz	3.00E+01	m		

Calculated Parameters

Dilution Factor	**DF**	**1.14E+00**		
Level 2 Remedial Target		**1.14E-06**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentration.**
		or		
		#DIV/0!	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10-Apr-17
Version:	3.2

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Cyanide		from Level 1
Target Concentration	C_T	0.000001	mg/l	from Level 1
Dilution Factor	DF	1.14E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, l

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	4.00E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	5.02E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.48E-02	m/d	from Level 2
Distance to compliance point	x	1.00E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	9.90E+00	l/kg	*see options*
Longitudinal dispersivity	ax	10.000	m	*see options*
Transverse dispersivity	az	1.000	m	*see options*
Vertical dispersivity	ay	0.100	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.25E-01	m/d
Retardation factor	Rf	2.29E+02	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	5.02E-01	fraction
Rate of contaminant flow due to retardation	u	1.42E-03	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	1.00E+00	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**1.00E+00**	**fraction**
Calculated soil leachate concentration	Co	#DIV/0!	mg/l

Remedial Targets

Level 3 Remedial Target		**1.14E-06**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		#DIV/0!	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**100**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**1.00E+00**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

User specified value for partition coefficient

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — 9.90E+00 l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer — foc — fraction
Organic carbon partition coefficient — Koc — l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species — $K_{oc,n}$ — l/kg
Sorption coefficient for ionised species — $K_{oc,i}$ — l/kg
pH value — pH
Acid dissociation constant — pKa
Fraction of organic carbon in aquifer — foc — fraction

Soil water partition coefficient — Kd — 9.90E+00 l/kg

Define dispersivity (click brown cell and use pull down list)

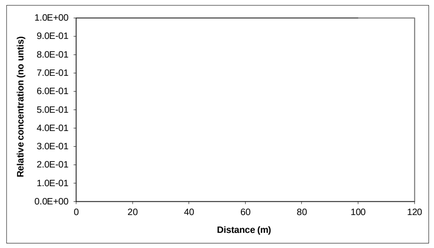
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.00E+01	4.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.00E+00	4.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.00E-01	4.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10/04/2017
Version:	3.2

Markeaton Junction
A38, Derbyshire

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Markeaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	10-Apr-17		Version:	3.2
Contaminant	Naphthalene			
Target Concentration (C_T)	2.00E-03	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Markeaton Junction
A38, Derbyshire

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**Naphthalene**		from Level 1
Target concentration	**C_T**	**0.002**	**mg/l**	from Level 1

This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	**Variable**	**Value**	**Unit**	**Source of parameter value**	
Standard entry					
Infiltration	Inf	9.70E-04	m/d	**See Justification Table**	
Area of contaminant source	A	1.36E+05	m^2	**See Justification Table**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	4.40E+02	m	**See Justification Table**	
Saturated aquifer thickness	da	3.00E+01	m	**See Justification Table**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	6.48E-02	m/d	**See Justification Table**	
Hydraulic gradient of water table	i	6.30E-02	fraction	**See Justification Table**	
Width of contaminant source perpendicular to groundwater flow	w	4.00E+02	m	**See Justification Table**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	1.00E-03	mg/l	**See Justification Table**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m		
Calculated mixing zone thickness	Mz	3.00E+01	m		

Calculated Parameters

Dilution Factor	**DF**	**1.14E+00**		
Level 2 Remedial Target		**2.29E-03**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentration.**
		or		
		#DIV/0!	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10-Apr-17
Version:	3.2

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Naphthalene		from Level 1
Target Concentration	C_T	0.002	mg/l	from Level 1
Dilution Factor	DF	1.14E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, l

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	1.50E+03	days	*See Justification Table*
Calculated decay rate	λ	4.62E-04	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	4.00E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	5.02E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.48E-02	m/d	from Level 2
Distance to compliance point	x	1.00E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.04E+00	l/kg	*see options*
Longitudinal dispersivity	ax	10.000	m	*see options*
Transverse dispersivity	az	1.000	m	*see options*
Vertical dispersivity	ay	0.100	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.25E-01	m/d
Retardation factor	Rf	7.08E+01	fraction
Decay rate used	λ	4.62E-04	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	5.02E-01	fraction
Rate of contaminant flow due to retardation	u	4.59E-03	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	2.01E-03	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**4.96E+02**	**fraction**
Calculated soil leachate concentration	Co	#DIV/0!	mg/l

Remedial Targets

Level 3 Remedial Target		**1.14E+00**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		#DIV/0!	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**100**	**m**	assumes Level 1 Remedial Target calculated from soil-water
				partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**2.01E-03**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient	Kd		l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	4.70E-03	fraction
Organic carbon partition coefficient	Koc	6.46E+02	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	3.04E+00	l/kg

Define dispersivity (click brown cell and use pull down list)

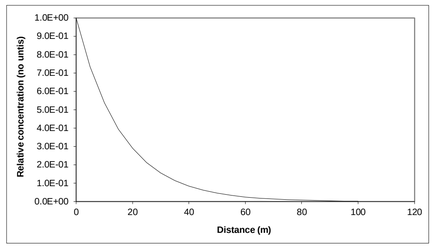
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.00E+01	4.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.00E+00	4.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.00E-01	4.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10/04/2017
Version:	3.2

Markeaton Junction
A38, Derbyshire

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Markeaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	10-Apr-17		Version:	3.2
Contaminant	Fluoranthene			
Target Concentration (C_T)	6.30E-06	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
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Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Markeaton Junction
A38, Derbyshire

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**Fluoranthene**		from Level 1
Target concentration	C_T	**0.0000063**	**mg/l**	from Level 1

This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	Variable	Value	Unit	Source of parameter value	
Standard entry					
Infiltration	Inf	9.70E-04	m/d	**See Justification Table**	
Area of contaminant source	A	1.36E+05	m^2	**See Justification Table**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	4.40E+02	m	**See Justification Table**	
Saturated aquifer thickness	da	3.00E+01	m	**See Justification Table**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	6.48E-02	m/d	**See Justification Table**	
Hydraulic gradient of water table	i	6.30E-02	fraction	**See Justification Table**	
Width of contaminant source perpendicular to groundwater flow	w	4.00E+02	m	**See Justification Table**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	3.15E-06	mg/l	**See Justification Table**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m		
Calculated mixing zone thickness	Mz	3.00E+01	m		

Calculated Parameters

Dilution Factor	**DF**	**1.14E+00**		
Level 2 Remedial Target		**7.20E-06**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentration.**
		or		
		#DIV/0!	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10-Apr-17
Version:	3.2

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Fluoranthene		from Level 1
Target Concentration	C_T	0.0000063	mg/l	from Level 1
Dilution Factor	DF	1.14E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, l

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+04	days	*See Justification Table*
Calculated decay rate	λ	6.93E-05	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	4.00E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	5.02E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.48E-02	m/d	from Level 2
Distance to compliance point	x	1.00E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	8.55E+01	l/kg	*see options*
Longitudinal dispersivity	ax	10.000	m	*see options*
Transverse dispersivity	az	1.000	m	*see options*
Vertical dispersivity	ay	0.100	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.25E-01	m/d
Retardation factor	Rf	1.97E+03	fraction
Decay rate used	λ	6.93E-05	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	5.02E-01	fraction
Rate of contaminant flow due to retardation	u	1.65E-04	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	1.04E-07	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**9.62E+06**	**fraction**
Calculated soil leachate concentration	Co	#DIV/0!	mg/l

Remedial Targets

Level 3 Remedial Target		**6.93E+01**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		#DIV/0!	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**100**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**1.04E-07**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient	Kd		l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	4.70E-03	fraction
Organic carbon partition coefficient	Koc	1.82E+04	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	8.55E+01	l/kg

Define dispersivity (click brown cell and use pull down list)

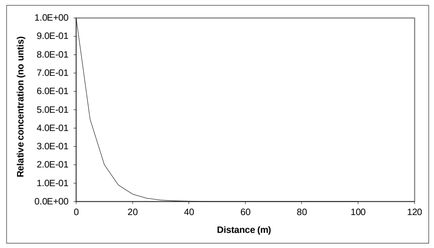
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.00E+01	4.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.00E+00	4.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.00E-01	4.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10/04/2017
Version:	3.2

Markeaton Junction
A38, Derbyshire

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Markeaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	10-Apr-17		Version:	3.2
Contaminant	Benzo(a)pyrene			
Target Concentration (C_T)	1.70E-07	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
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The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Markeaton Junction
A38, Derbyshire

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**Benzo(a)pyrene**		from Level 1
Target concentration	**C_T**	**0.00000017**	**mg/l**	from Level 1

This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	**Variable**	**Value**	**Unit**	**Source of parameter value**	
Standard entry					
Infiltration	Inf	9.70E-04	m/d	**See Justification Table**	
Area of contaminant source	A	1.36E+05	m^2	**See Justification Table**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	4.40E+02	m	**See Justification Table**	
Saturated aquifer thickness	da	3.00E+01	m	**See Justification Table**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	6.48E-02	m/d	**See Justification Table**	
Hydraulic gradient of water table	i	6.30E-02	fraction	**See Justification Table**	
Width of contaminant source perpendicular to groundwater flow	w	4.00E+02	m	**See Justification Table**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	8.50E-08	mg/l	**See Justification Table**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m		
Calculated mixing zone thickness	Mz	3.00E+01	m		

Calculated Parameters

Dilution Factor	**DF**	**1.14E+00**		
Level 2 Remedial Target		**1.94E-07**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentration.**
		or		
		#DIV/0!	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10-Apr-17
Version:	3.2

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Benzo(a)pyrene		from Level 1
Target Concentration	C_T	0.00000017	mg/l	from Level 1
Dilution Factor	DF	1.14E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, l

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	4.00E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	5.02E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.48E-02	m/d	from Level 2
Distance to compliance point	x	1.00E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	6.06E+02	l/kg	*see options*
Longitudinal dispersivity	ax	10.000	m	*see options*
Transverse dispersivity	az	1.000	m	*see options*
Vertical dispersivity	ay	0.100	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.25E-01	m/d
Retardation factor	Rf	1.39E+04	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	5.02E-01	fraction
Rate of contaminant flow due to retardation	u	2.33E-05	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	2.31E-09	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**4.32E+08**	**fraction**
Calculated soil leachate concentration	Co	#DIV/0!	mg/l

Remedial Targets

Level 3 Remedial Target		**8.40E+01**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		#DIV/0!	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**100**	**m**	assumes Level 1 Remedial Target calculated from soil-water
				partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**2.31E-09**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	4.70E-03	fraction
Organic carbon partition coefficient	Koc	1.29E+05	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	6.06E+02	l/kg

Define dispersivity (click brown cell and use pull down list)

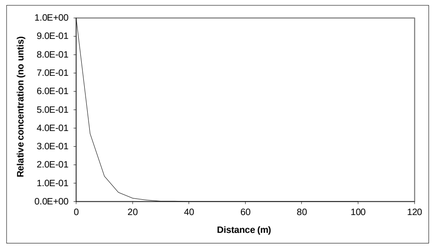
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.00E+01	4.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.00E+00	4.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.00E-01	4.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10/04/2017
Version:	3.2

Markeaton Junction
A38, Derbyshire

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Markeaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	10-Apr-17		Version:	3.2
Contaminant	Indeno(1,2,3-c,d)pyrene			
Target Concentration (C_T)	1.70E-07	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
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It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Markeaton Junction
A38, Derbyshire

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**Indeno(1,2,3-c,d)pyrene**		from Level 1
Target concentration	**C_T**	**0.00000017**	**mg/l**	from Level 1

This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	**Variable**	**Value**	**Unit**	**Source of parameter value**	
Standard entry					
Infiltration	Inf	9.70E-04	m/d	**See Justification Table**	
Area of contaminant source	A	1.36E+05	m^2	**See Justification Table**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	4.40E+02	m	**See Justification Table**	
Saturated aquifer thickness	da	3.00E+01	m	**See Justification Table**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	6.48E-02	m/d	**See Justification Table**	
Hydraulic gradient of water table	i	6.30E-02	fraction	**See Justification Table**	
Width of contaminant source perpendicular to groundwater flow	w	4.00E+02	m	**See Justification Table**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	8.50E-08	mg/l	**See Justification Table**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m		
Calculated mixing zone thickness	Mz	3.00E+01	m		

Calculated Parameters

Dilution Factor	**DF**	**1.14E+00**		
Level 2 Remedial Target		**1.94E-07**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentration.**
		or		
		#DIV/0!	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10-Apr-17
Version:	3.2

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Indeno(1,2,3-c,d)pyrene		from Level 1
Target Concentration	C_T	0.00000017	mg/l	from Level 1
Dilution Factor	DF	1.14E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, l

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	4.00E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	5.02E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.48E-02	m/d	from Level 2
Distance to compliance point	x	1.00E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	4.09E+02	l/kg	*see options*
Longitudinal dispersivity	ax	10.000	m	*see options*
Transverse dispersivity	az	1.000	m	*see options*
Vertical dispersivity	ay	0.100	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.25E-01	m/d
Retardation factor	Rf	9.42E+03	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	5.02E-01	fraction
Rate of contaminant flow due to retardation	u	3.46E-05	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	1.60E-07	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**6.23E+06**	**fraction**
Calculated soil leachate concentration	Co	#DIV/0!	mg/l

Remedial Targets

Level 3 Remedial Target		**1.21E+00**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		#DIV/0!	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**100**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**1.60E-07**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	4.70E-03	fraction
Organic carbon partition coefficient	Koc	8.71E+04	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	4.09E+02	l/kg

Define dispersivity (click brown cell and use pull down list)

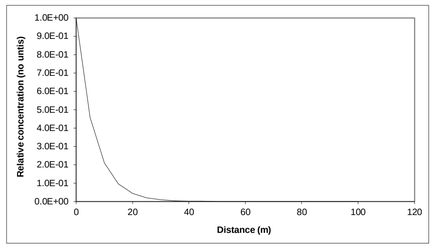
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.00E+01	4.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.00E+00	4.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.00E-01	4.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10/04/2017
Version:	3.2

Markeaton Junction
A38, Derbyshire

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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The calculation of equations in this worksheet has been independently checked by Entec (UK) Ltd on behalf of the Environment Agency.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Markeaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	10-Apr-17		Version:	3.2
Contaminant	Benzo(g,h,i)perylene			
Target Concentration (C_T)	8.20E-06	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Markeaton Junction
A38, Derbyshire

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**Benzo(g,h,i)perylene**		from Level 1
Target concentration	**C_T**	**0.0000082**	**mg/l**	from Level 1

This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	**Variable**	**Value**	**Unit**	**Source of parameter value**	
Standard entry					
Infiltration	Inf	9.70E-04	m/d	**See Justification Table**	
Area of contaminant source	A	1.36E+05	m^2	**See Justification Table**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	4.40E+02	m	**See Justification Table**	
Saturated aquifer thickness	da	3.00E+01	m	**See Justification Table**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	6.48E-02	m/d	**See Justification Table**	
Hydraulic gradient of water table	i	6.30E-02	fraction	**See Justification Table**	
Width of contaminant source perpendicular to groundwater flow	w	4.00E+02	m	**See Justification Table**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	4.10E-06	mg/l	**See Justification Table**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m		
Calculated mixing zone thickness	Mz	3.00E+01	m		

Calculated Parameters

Dilution Factor	**DF**	**1.14E+00**		
Level 2 Remedial Target		**9.38E-06**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentration.**
		or		
		#DIV/0!	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10-Apr-17
Version:	3.2

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Benzo(g,h,i)perylene		from Level 1
Target Concentration	C_T	0.0000082	mg/l	from Level 1
Dilution Factor	DF	1.14E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, l

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	4.00E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	5.02E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.48E-02	m/d	from Level 2
Distance to compliance point	x	1.00E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.96E+03	l/kg	*see options*
Longitudinal dispersivity	ax	10.000	m	*see options*
Transverse dispersivity	az	1.000	m	*see options*
Vertical dispersivity	ay	0.100	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.25E-01	m/d
Retardation factor	Rf	4.51E+04	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	5.02E-01	fraction
Rate of contaminant flow due to retardation	u	7.22E-06	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	1.03E-17	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**9.67E+16**	**fraction**
Calculated soil leachate concentration	Co	#DIV/0!	mg/l

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	4.70E-03	fraction
Organic carbon partition coefficient	Koc	4.17E+05	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.96E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

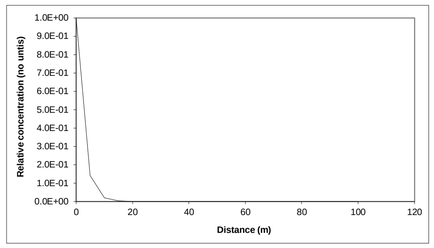
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.00E+01	4.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.00E+00	4.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.00E-01	4.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10/04/2017
Version:	3.2

Remedial Targets

Level 3 Remedial Target		**9.07E+11**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		#DIV/0!	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**100**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	**1.03E-17**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Markeaton Junction
A38, Derbyshire

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Markeaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	10-Apr-17		Version:	3.2
Contaminant	Benzo(b)fluoranthene			
Target Concentration (C_T)	1.70E-05	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
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It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Markeaton Junction
A38, Derbyshire

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**Benzo(b)fluoranthene**		from Level 1
Target concentration	**C_T**	**0.000017**	**mg/l**	from Level 1

This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	**Variable**	**Value**	**Unit**	**Source of parameter value**	
Standard entry					
Infiltration	Inf	9.70E-04	m/d	**See Justification Table**	
Area of contaminant source	A	1.36E+05	m^2	**See Justification Table**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	4.40E+02	m	**See Justification Table**	
Saturated aquifer thickness	da	3.00E+01	m	**See Justification Table**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	6.48E-02	m/d	**See Justification Table**	
Hydraulic gradient of water table	i	6.30E-02	fraction	**See Justification Table**	
Width of contaminant source perpendicular to groundwater flow	w	4.00E+02	m	**See Justification Table**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	8.50E-06	mg/l	**See Justification Table**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m		
Calculated mixing zone thickness	Mz	3.00E+01	m		

Calculated Parameters

Dilution Factor	**DF**	**1.14E+00**		
Level 2 Remedial Target		**1.94E-05**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentration.**
		or		
		#DIV/0!	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10-Apr-17
Version:	3.2

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Benzo(b)fluoranthene		from Level 1
Target Concentration	C_T	0.000017	mg/l	from Level 1
Dilution Factor	DF	1.14E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, l

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	4.00E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	5.02E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.48E-02	m/d	from Level 2
Distance to compliance point	x	1.00E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	4.94E+02	l/kg	*see options*
Longitudinal dispersivity	ax	10.000	m	*see options*
Transverse dispersivity	az	1.000	m	*see options*
Vertical dispersivity	ay	0.100	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.25E-01	m/d
Retardation factor	Rf	1.14E+04	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	5.02E-01	fraction
Rate of contaminant flow due to retardation	u	2.87E-05	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	2.38E-08	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**4.20E+07**	**fraction**
Calculated soil leachate concentration	Co	#DIV/0!	mg/l

Remedial Targets

Level 3 Remedial Target		**8.17E+02**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		#DIV/0!	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**100**	**m**	assumes Level 1 Remedial Target calculated from soil-water
				partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**2.38E-08**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient	Kd		l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	4.70E-03	fraction
Organic carbon partition coefficient	Koc	1.05E+05	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	4.94E+02	l/kg

Define dispersivity (click brown cell and use pull down list)

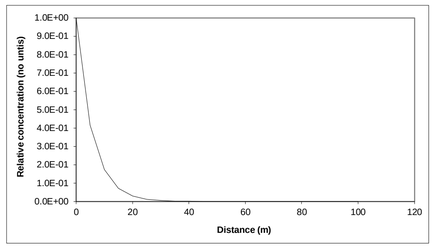
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.00E+01	4.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.00E+00	4.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.00E-01	4.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10/04/2017
Version:	3.2

Markeaton Junction
A38, Derbyshire

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Markeaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	10-Apr-17		Version:	3.2
Contaminant	Benzo(k)fluoranthene			
Target Concentration (C_T)	1.70E-05	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Markeaton Junction
A38, Derbyshire

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**Benzo(k)fluoranthene**		from Level 1
Target concentration	**C_T**	**0.000017**	**mg/l**	from Level 1

This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	**Variable**	**Value**	**Unit**	**Source of parameter value**	
Standard entry					
Infiltration	Inf	9.70E-04	m/d	**See Justification Table**	
Area of contaminant source	A	1.36E+05	m^2	**See Justification Table**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	4.40E+02	m	**See Justification Table**	
Saturated aquifer thickness	da	3.00E+01	m	**See Justification Table**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	6.48E-02	m/d	**See Justification Table**	
Hydraulic gradient of water table	i	6.30E-02	fraction	**See Justification Table**	
Width of contaminant source perpendicular to groundwater flow	w	4.00E+02	m	**See Justification Table**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	8.50E-06	mg/l	**See Justification Table**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m		
Calculated mixing zone thickness	Mz	3.00E+01	m		

Calculated Parameters

Dilution Factor	**DF**	**1.14E+00**		
Level 2 Remedial Target		**1.94E-05**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentration.**
		or		
		#DIV/0!	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10-Apr-17
Version:	3.2

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Benzo(k)fluoranthene		from Level 1
Target Concentration	C_T	0.000017	mg/l	from Level 1
Dilution Factor	DF	1.14E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, l

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	4.00E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	5.02E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.48E-02	m/d	from Level 2
Distance to compliance point	x	1.00E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	6.96E+02	l/kg	*see options*
Longitudinal dispersivity	ax	10.000	m	*see options*
Transverse dispersivity	az	1.000	m	*see options*
Vertical dispersivity	ay	0.100	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.25E-01	m/d
Retardation factor	Rf	1.60E+04	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	5.02E-01	fraction
Rate of contaminant flow due to retardation	u	2.03E-05	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	4.23E-10	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**2.37E+09**	**fraction**
Calculated soil leachate concentration	Co	#DIV/0!	mg/l

Remedial Targets

Level 3 Remedial Target		**4.60E+04**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		#DIV/0!	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**100**	**m**	assumes Level 1 Remedial Target calculated from soil-water
				partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**4.23E-10**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	4.70E-03	fraction
Organic carbon partition coefficient	Koc	1.48E+05	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	6.96E+02	l/kg

Define dispersivity (click brown cell and use pull down list)

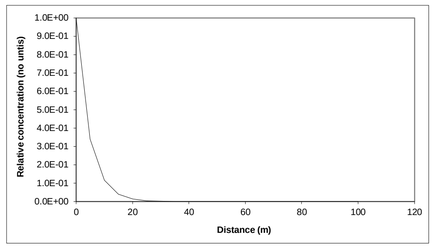
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.00E+01	4.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.00E+00	4.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.00E-01	4.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10/04/2017
Version:	3.2

Markeaton Junction
A38, Derbyshire

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Markeaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	10-Apr-17		Version:	3.2
Contaminant	Phenol			
Target Concentration (C_T)	7.70E-03	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

Markeaton Junction
A38, Derbyshire

Remedial Targets Worksheet , Release 3.2

Level 2 - Soil

Contaminant		**Phenol**		from Level 1
Target concentration	C_T	**0.0077**	**mg/l**	from Level 1

This sheet calculates the Level 2 remedial target for soils (mg/kg) or for pore water (mg/l).

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 2 remedial target to determine the need for further action. Equations presented in 'Hydrogeological risk assessment for land contamiantion' (Environment Agency 2006)

Input Parameters	Variable	Value	Unit	Source of parameter value	
Standard entry					
Infiltration	Inf	9.70E-04	m/d	**See Justification Table**	
Area of contaminant source	A	1.36E+05	m^2	**See Justification Table**	Not used in calculation
Entry for groundwater flow below site					
Length of contaminant source in direction of groundwater flow	L	4.40E+02	m	**See Justification Table**	
Saturated aquifer thickness	da	3.00E+01	m	**See Justification Table**	
Hydraulic Conductivity of aquifer in which dilution occurs	K	6.48E-02	m/d	**See Justification Table**	
Hydraulic gradient of water table	i	6.30E-02	fraction	**See Justification Table**	
Width of contaminant source perpendicular to groundwater flow	w	4.00E+02	m	**See Justification Table**	Not used in calculation
Background concentration of contaminant in groundwater beneath site	Cu	3.85E-03	mg/l	**See Justification Table**	
Define mixing zone depth by specifying or calculating depth (using pull down list)		**Calculate**			
Enter mixing zone thickness	Mz		m		
Calculated mixing zone thickness	Mz	3.00E+01	m		

Calculated Parameters

Dilution Factor	**DF**	**1.14E+00**		
Level 2 Remedial Target		**8.80E-03**	**mg/l**	**For comparison with measured pore water concentration. This assumes Level 1 Remedial Target is based on Target Concentration.**
		or		
		#DIV/0!	**mg/kg**	**For comparison with measured soil concentration. This assumes Level 1 Remedial Target calculated from soil-water**

Additional option

Calculation of impact on receptor

Concentration of contaminant in contaminated discharge (entering receptor)	Cc	0.00E+00	mg/l	
Calculated concentration within receptor (dilution only)		0.00E+00	mg/l	0

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10-Apr-17
Version:	3.2

Remedial Targets Worksheet , Release 3.2

Level 3 - Soil

See Note

Input Parameters	Variable	Value	Unit	Source
Contaminant		Phenol		from Level 1
Target Concentration	C_T	0.0077	mg/l	from Level 1
Dilution Factor	DF	1.14E+00		from Level 2

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value, l

	Variable	Value	Unit	Source of parameter value
Enter source concentration		Soil concentration as mg/kg		
Enter soil concentration			mg/kg	
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+02	days	*See Justification Table*
Calculated decay rate	λ	1.39E-03	$days^{-1}$	calculated
Width of plume in aquifer at source	Sz	4.00E+02	m	from Level 2
Plume thickness in aquifer at source	Sy	3.00E+01	m	from Level 2
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	5.02E-01	fraction	from Level 2 (adjusted)
Hydraulic conductivity of saturated aquifer	K	6.48E-02	m/d	from Level 2
Distance to compliance point	x	1.00E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z		m	
Distance (depth) to compliance point perpendicular to flow direction	y		m	
Time since pollutant entered groundwater	t	1.00E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.91E-01	l/kg	*see options*
Longitudinal dispersivity	ax	10.000	m	*see options*
Transverse dispersivity	az	1.000	m	*see options*
Vertical dispersivity	ay	0.100	m	*see options*

Parameter values should be checked against Level 1 and 2

Calculated Parameters	Variable		
Groundwater flow velocity	v	3.25E-01	m/d
Retardation factor	Rf	9.99E+00	fraction
Decay rate used	λ	1.39E-03	d^{-1}
Hydraulic gradient used in aquifer flow down-gradient	i	5.02E-01	fraction
Rate of contaminant flow due to retardation	u	3.26E-02	m/d
Ratio of Compliance Point to Source Concentration	C_{ED}/C_0	3.99E-02	fraction
Attenuation factor (C_0/C_{ED})	**AF**	**2.50E+01**	**fraction**
Calculated soil leachate concentration	Co	#DIV/0!	mg/l

Remedial Targets

Level 3 Remedial Target		**2.21E-01**	**mg/l**	For comparison with measured pore water concentration.
Ogata Banks		**or**		This assumes Level 1 Remedial Target is based on Target Concentration.
		#DIV/0!	**mg/kg**	For comparison with measured soil concentration. This
Distance to compliance point		**100**	**m**	assumes Level 1 Remedial Target calculated from soil-water partitioning equation.
Ratio of Compliance Point to Source Concentration	**C_{ED}/C_0**	**3.99E-02**	**fraction**	Ogata Banks

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99

Enter method of defining partition co-efficient (using pull down list)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient	Kd		l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	4.70E-03	fraction
Organic carbon partition coefficient	Koc	8.32E+01	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
Acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	3.91E-01	l/kg

Define dispersivity (click brown cell and use pull down list)

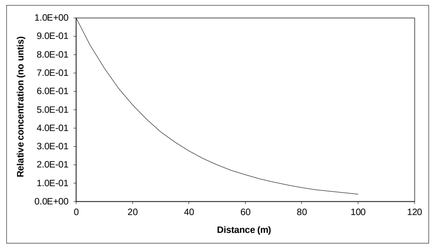
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.00E+01	4.42E+00	m
Transverse dispersivity	**az**	0.00E+00	1.00E+00	4.42E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.00E-01	4.42E-02	m

Note values of dispersivity must be > 0

Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Note
This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O_2, NO_3, SO_4 etc than an alternative solution should be used



Note: 'Relative concentration' is the ratio of calculated concentation at a given position compared to the source concentration. The calculations assume plume disperses from the top of the aquifer. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

This sheet calculates the Level 3 remedial target for soils(mg/kg) or for pore water (mg/l), based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.By setting a long travel time (e.g. 9E99) it will give the steady state solution, which should always be used when calculating remedial targets.

The measured soil concentration as mg/kg or pore water concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.9E+99.

Site being assessed:	Markeaton Junction
Completed by:	Victor Ojambati
Date:	10/04/2017
Version:	3.2

RTM - Hydrogeological Risk Assessment

Project Number	60533462
Project Title	A38 Derby Junctions (Little Eaton)
Date	01-Mar-17

Simulation Details	Analysis of potential migration of Contaminants in Groundwater to River Derwent.

RTM - Hydrogeological Risk Assessment

LEVEL 3 (GROUNDWATER) ASSESSMENT - INPUTS & JUSTIFICATION

Project Number	60533462	
Project Title	A38 Derby Junctions (Little	
Date	01-Mar-17	

Simulation Details	Analysis of potential migration of Contaminants in Groundwater to River Derwent.

Source	Contaminants in the groundwater onsite		
Parameter	**Units**	**Input Value(s)**	**Source / Justification**
Saturated aquifer thickness	m	30	Assumed as base of aquifer (bedrock) is not proven
Width of plume in aquifer	m	1000	Approximate length of investigation area perpendicular to groundwater flow
Plume thickness at source	m	25	Assumed 5m less than aquifer thickness
Bulk density of aquifer materials	g/cm^3	2.3	Average from Site Data
Effective porosity of aquifer	fraction	0.1	Effective Porosity for Clay from Domenico & Schwartz, 1989
Hydraulic gradient	fraction	0.00206	Calculated from the Groundwater levels in BHL03 and BL08C
Hydraulic conductivity of aquifer	m/d	0.0648	Average of variable head permeability tests at BM10
Fraction of Organic Carbon	fraction	0.0141	Mean value from site data of TOC from Little Eaton boreholes from ESG chemical data
Distance to compliance point	m	120	Distance from investigation area to the River Derwent
Time since pollutant entered groundwater	days	9.90E+99	EA RTM recommended value
Longitudinal dispersivity	m	1.2	10% of pathway length
Transverse dispersivity	m	0.12	1% of pathway length

CONTAMINANT SPECIFIC INPUTS

Project Number	60533462
Project Title	A38 Derby Junctions (Little
Date	01-Mar-17

Simulation Details	Analysis of potential migration of Contaminants in Groundwater to River Derwent.

Determinand	Henry's Law Constant	Source	Soil-Water Partition Coefficient	Source	Organic carbon partition coefficient	Source	Half-Life of Contaminant in Groundwater	Source	Initial Contaminant Concentration in Groundwater Plume	Source
	dimensionless		l/kg		l/kg		days		µg/l	
>EC5-7 Aromatics	2.30E-01	CC	-	-	6.76E+01	LQ	5.00E+01	(2) URS/EA	17	Maximum concentration recorded during GI
Bis(2-ethylhexyl)phthalate					8.74E+04	cb	1.00E+05	(4)A&H/URS	27.6	Maximum concentration recorded during GI
Benzene	1.16E-01	SR7	-	-	6.76E+01	SR7	5.00E+01	(1) EA	1.70E+01	Maximum concentration recorded during GI
Ethylbenzene	1.39E-01	SR7	-	-	4.47E+02	SR7	5.00E+01	(1) EA	3.40E+01	Maximum concentration recorded during GI
Arsenic			1.80E+03	CLEA UK	-	-	1.00E+09	No degradation	7.30E+01	Maximum concentration recorded during GI
Boron	-	-	3	ce	-	-	1.00E+09	No degradation	3.03E+03	Maximum concentration recorded during GI
Cadmium			2560	CLEA UK			1.00E+09	No degradation	1.40E+00	Maximum concentration recorded during GI
Chromium VI			4800	CLEA UK			1.00E+09	No degradation	8.51E+01	Maximum concentration recorded during GI
Cyanide			9.9	cc			1.00E+09	No degradation	1.52E+00	Maximum concentration recorded during GI
Lead			36000	CLEA UK			1.00E+09	No degradation	1.10E+01	Maximum concentration recorded during GI
Nickel	-	-	2000	CLEA UK	-	-	1.00E+09	No degradation	5.03E+01	Maximum concentration recorded during GI
Zinc			36	cc calc			1.00E+09	No degradation	1.74E+02	Maximum concentration recorded during GI
			1	CONSIM - Mean Value for Ammonium			1.00E+09	No degradation (Assumed)	2.73E+04	Maximum concentration recorded during GI
Napthalene	6.62E-03	SR7	-	-	6.46E+02	LQ	2.00E+02	(1) EA; (3) URS/PAHs	8.14E+00	Maximum concentration recorded during GI
Anthracene	1.81E-04	LQ	-	-	5.62E+03	LQ	6.00E+03	(3) URS/PAHs	1.54E+01	Maximum concentration recorded during GI
Fluoranthene	6.29E-05	SR7	-	-	1.82E+04	LQ	10,000	(3) URS/PAHs	5.92E+01	Maximum concentration recorded during GI
Benzo(a)pyrene	1.76E-06	SR7	-	-	1.29E+05	LQ	50,000	(3) URS/PAHs	78.90	Maximum concentration recorded during GI
Benzo(g,h,i)perylene	2.86E-06	LQ	-	-	4.17E+05	LQ	50,000	(3) URS/PAHs	45.80	Maximum concentration recorded during GI
Benzo(b) fluoranthene	2.05E-06	SR7	-	-	1.05E+05	LQ	50,000	(3) URS/PAHs	89.30	Maximum concentration recorded during GI
Benzo(k) fluoranthene	1.74E-06	SR7	-	-	1.48E+05	LQ	50,000	(3) URS/PAHs	35.40	Maximum concentration recorded during GI
Phenol			-	-	8.32E+01	SR7	500	(3) URS/PAHs	35.40	Maximum concentration recorded during GI

Key to sources	
a	Buss et al (2004), A Review of Ammonium Attenuation in Soil and Groundwater
c	US EPA 2003 User's Guide for Evaluating Subsurface Vapour Intrusion into Buildings
cb	www.toxnet.nlm.nih.gov
CC	h calc, compensated to 10C using Clausius-Claeyron relationship
cc	2001, USEPA, Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, Peer Review Draft.
calc	US EPA 2001, Factsheet: Correcting the Henry's Law Constant for Soil Temperature, June 2001
ce	Baes.C.F., Sharp R.D., Sjoreen A.L., Shor R.W., (1984) A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture,
	Oak Ridge National laboratory for the US DoE
k	Review of the Fate and Transport of Selected Contaminants in the Soil Environment, Draft R&D Technical Report P5-079/TR1
LQ	LQM/CIEH 2009, Tremperature corrected to 10oC
SR7	Science Report – SC050021/SR7

EPI The EPI (**Estimation Programs Interface**) Suite™ is a Windows-based suite of physical/chemical property and environmental fate estimation programs developed by the EPA\'s Office of Pollution Prevention Toxics and Syracuse Research Corporation (SRC).

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Little Eaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Cadmium			
Target Concentration (C_T)	5.00E-03	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Cadmium		from Level 1
Target Concentration	C_T	5.00E-03	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.51E-01	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.00E+03	m	*See Justification Table*
Plume thickness at source	Sy	2.50E+01	m	*See Justification Table*
Saturated aquifer thickness	da	3.00E+01	m	*See Justification Table*
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	2.06E-03	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	6.48E-02	m/d	*See Justification Table*
Distance to compliance point	x	1.20E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.56E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.20E+01	m	*see options*
Transverse dispersivity	az	1.20E+00	m	*see options*
Vertical dispersivity	ay	1.20E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — 2.56E+03 — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer — foc — fraction

Organic carbon partition coefficient — Koc — l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species — $K_{OC,n}$ — l/kg

Sorption coefficient for ionised species — $K_{OC,I}$ — l/kg

pH value — pH

acid dissociation constant — pKa

Fraction of organic carbon in aquifer — foc — fraction

Soil water partition coefficient	Kd	2.56E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

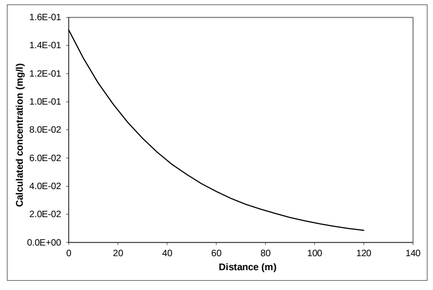
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.20E+01	4.86E+00	m
Transverse dispersivity	**az**	0.00E+00	1.20E+00	4.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.20E-01	4.86E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.5E-01
6.0	1.31E-01
12.0	1.14E-01
18.0	9.84E-02
24.0	8.53E-02
30.0	7.40E-02
36.0	6.41E-02
42.0	5.56E-02
48.0	4.82E-02
54.0	4.18E-02
60.0	3.62E-02
66.0	3.14E-02
72.0	2.72E-02
78.0	2.36E-02
84.0	2.05E-02
90.0	1.78E-02
96.0	1.54E-02
102.0	1.33E-02
108.0	1.16E-02
114.0	1.00E-02
120.0	8.70E-03

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.33E-03	m/d
Retardation factor	Rf	5.89E+04	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Rate of contaminant flow due to retardation	u	2.27E-08	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	8.70E-03	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.74E+01**	

Remedial Targets

Remedial Target		**8.68E-02**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**120**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**8.70E-03**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Little Eaton Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Little Eaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Chromium			
Target Concentration (C_T)	3.00E-03	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
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Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Environment Agency

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		Chromium		from Level 1
Target Concentration	C_T	3.00E-03	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.36E-01	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.00E+03	m	*See Justification Table*
Plume thickness at source	Sy	2.50E+01	m	*See Justification Table*
Saturated aquifer thickness	da	3.00E+01	m	*See Justification Table*
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	2.06E-03	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	6.48E-02	m/d	*See Justification Table*
Distance to compliance point	x	1.20E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	4.80E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.20E+01	m	*see options*
Transverse dispersivity	az	1.20E+00	m	*see options*
Vertical dispersivity	ay	1.20E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	4.80E+03	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	4.80E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

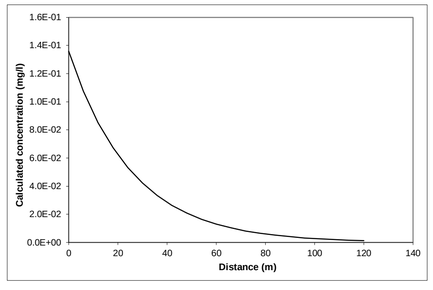
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.20E+01	4.86E+00	m
Transverse dispersivity	**az**	0.00E+00	1.20E+00	4.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.20E-01	4.86E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.4E-01
6.0	1.08E-01
12.0	8.51E-02
18.0	6.74E-02
24.0	5.33E-02
30.0	4.22E-02
36.0	3.34E-02
42.0	2.64E-02
48.0	2.09E-02
54.0	1.65E-02
60.0	1.31E-02
66.0	1.03E-02
72.0	8.18E-03
78.0	6.47E-03
84.0	5.12E-03
90.0	4.05E-03
96.0	3.21E-03
102.0	2.54E-03
108.0	2.01E-03
114.0	1.59E-03
120.0	1.26E-03

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated Parameters	Variable		
Groundwater flow velocity	v	1.33E-03	m/d
Retardation factor	Rf	1.10E+05	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Rate of contaminant flow due to retardation	u	1.21E-08	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.26E-03	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.08E+02**	

Remedial Targets

Remedial Target		**3.25E-01**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**120**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.26E-03**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Little Eaton Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Little Eaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Lead			
Target Concentration (C_T)	1.00E-02	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
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The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		Lead		from Level 1
Target Concentration	C_T	1.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	4.60E-02	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.00E+03	m	*See Justification Table*
Plume thickness at source	Sy	2.50E+01	m	*See Justification Table*
Saturated aquifer thickness	da	3.00E+01	m	*See Justification Table*
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	2.06E-03	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	6.48E-02	m/d	*See Justification Table*
Distance to compliance point	x	1.20E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.60E+04	l/kg	*see options*
Longitudinal dispersivity	ax	1.20E+01	m	*see options*
Transverse dispersivity	az	1.20E+00	m	*see options*
Vertical dispersivity	ay	1.20E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	3.60E+04	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	3.60E+04	l/kg

Define dispersivity (click brown cell and use pull down list)

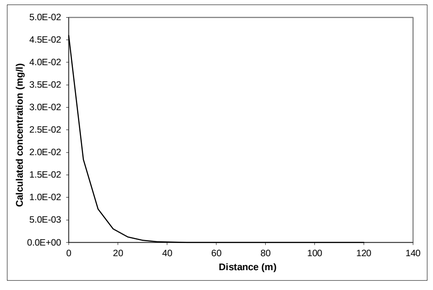
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.20E+01	4.86E+00	m
Transverse dispersivity	**az**	0.00E+00	1.20E+00	4.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.20E-01	4.86E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	4.6E-02
6.0	1.85E-02
12.0	7.41E-03
18.0	2.97E-03
24.0	1.19E-03
30.0	4.79E-04
36.0	1.92E-04
42.0	7.72E-05
48.0	3.10E-05
54.0	1.24E-05
60.0	4.99E-06
66.0	2.00E-06
72.0	8.04E-07
78.0	3.23E-07
84.0	1.29E-07
90.0	5.20E-08
96.0	2.09E-08
102.0	8.37E-09
108.0	3.36E-09
114.0	1.35E-09
120.0	5.41E-10

Site being assessed:	Little Eaton Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.33E-03	m/d
Retardation factor	Rf	8.28E+05	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Rate of contaminant flow due to retardation	u	1.61E-09	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	5.41E-10	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**8.50E+07**	

Remedial Targets

Remedial Target		**8.50E+05**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**120**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**5.41E-10**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Little Eaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Nickel			
Target Concentration (C_T)	2.00E-02	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		Nickel		from Level 1
Target Concentration	C_T	2.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	3.79E-02	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.00E+03	m	*See Justification Table*
Plume thickness at source	Sy	2.50E+01	m	*See Justification Table*
Saturated aquifer thickness	da	3.00E+01	m	*See Justification Table*
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	2.06E-03	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	6.48E-02	m/d	*See Justification Table*
Distance to compliance point	x	1.20E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.00E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.20E+01	m	*see options*
Transverse dispersivity	az	1.20E+00	m	*see options*
Vertical dispersivity	ay	1.20E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	2.00E+03	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	2.00E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

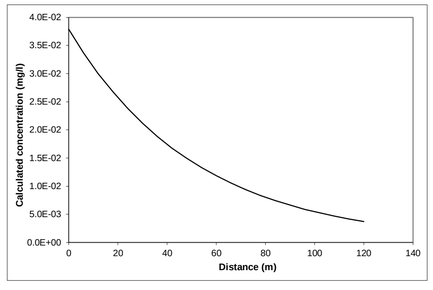
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.20E+01	4.86E+00	m
Transverse dispersivity	**az**	0.00E+00	1.20E+00	4.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.20E-01	4.86E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	3.8E-02
6.0	3.37E-02
12.0	3.00E-02
18.0	2.67E-02
24.0	2.38E-02
30.0	2.12E-02
36.0	1.89E-02
42.0	1.68E-02
48.0	1.49E-02
54.0	1.33E-02
60.0	1.18E-02
66.0	1.05E-02
72.0	9.39E-03
78.0	8.36E-03
84.0	7.44E-03
90.0	6.62E-03
96.0	5.90E-03
102.0	5.25E-03
108.0	4.67E-03
114.0	4.16E-03
120.0	3.70E-03

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated Parameters	Variable		
Groundwater flow velocity	v	1.33E-03	m/d
Retardation factor	Rf	4.60E+04	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Rate of contaminant flow due to retardation	u	2.90E-08	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	3.70E-03	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.02E+01**	

Remedial Targets

Remedial Target		**2.05E-01**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**120**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**3.70E-03**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Little Eaton Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Little Eaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Selenium			
Target Concentration (C_T)	1.00E-02	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
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Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)	Variable	Value	Unit	Source
Contaminant		Selenium		from Level 1
Target Concentration	C_T	1.00E-02	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.22E-01	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+09	days	*See Justification Table*
Calculated decay rate	λ	6.93E-10	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.00E+03	m	*See Justification Table*
Plume thickness at source	Sy	2.50E+01	m	*See Justification Table*
Saturated aquifer thickness	da	3.00E+01	m	*See Justification Table*
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	2.06E-03	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	6.48E-02	m/d	*See Justification Table*
Distance to compliance point	x	1.20E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.00E+02	l/kg	*see options*
Longitudinal dispersivity	ax	1.20E+01	m	*see options*
Transverse dispersivity	az	1.20E+00	m	*see options*
Vertical dispersivity	ay	1.20E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

User specified value for partition coefficient

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd	3.00E+02	l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc		fraction
Organic carbon partition coefficient	Koc		l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{OC,n}$		l/kg
Sorption coefficient for ionised species	$K_{OC,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	3.00E+02	l/kg

Define dispersivity (click brown cell and use pull down list)

Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.20E+01	4.86E+00	m
Transverse dispersivity	**az**	0.00E+00	1.20E+00	4.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.20E-01	4.86E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed

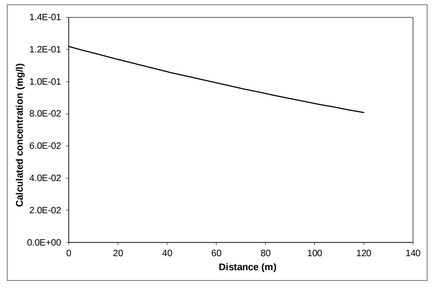
Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.33E-03	m/d
Retardation factor	Rf	6.90E+03	fraction
Decay rate used	λ	6.93E-10	d^{-1}
Rate of contaminant flow due to retardation	u	1.93E-07	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	8.07E-02	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.51E+00**	

Remedial Targets

Remedial Target		**1.51E-02**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**120**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**8.07E-02**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.2E-01
6.0	1.20E-01
12.0	1.17E-01
18.0	1.15E-01
24.0	1.12E-01
30.0	1.10E-01
36.0	1.08E-01
42.0	1.06E-01
48.0	1.03E-01
54.0	1.01E-01
60.0	9.92E-02
66.0	9.72E-02
72.0	9.52E-02
78.0	9.33E-02
84.0	9.14E-02
90.0	8.95E-02
96.0	8.77E-02
102.0	8.59E-02
108.0	8.41E-02
114.0	8.24E-02
120.0	8.07E-02

Site being assessed:	Little Eaton Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Little Eaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Benzo(a)pyrene			
Target Concentration (C_T)	1.00E-05	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
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The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu) | **Variable** | **Value** | **Unit** | **Source**

Contaminant		Benzo(a)pyrene		from Level 1
Target Concentration	C_T	1.00E-05	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — **Equations in HRA publication**

Approach for simulating vertical dispersion: **Simulate vertical dispersion in 1 direction**

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to pollutants in all phases (e.g. field derived value**

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.55E-03	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.00E+03	m	*See Justification Table*
Plume thickness at source	Sy	2.50E+01	m	*See Justification Table*
Saturated aquifer thickness	da	3.00E+01	m	*See Justification Table*
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	2.06E-03	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	6.48E-02	m/d	*See Justification Table*
Distance to compliance point	x	1.20E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.82E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.20E+01	m	*see options*
Transverse dispersivity	az	1.20E+00	m	*see options*
Vertical dispersivity	ay	1.20E-01	m	*see options*

Calculated Parameters | **Variable**

Groundwater flow velocity	v	1.33E-03	m/d
Retardation factor	Rf	4.18E+04	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Rate of contaminant flow due to retardation	u	3.19E-08	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	0.00E+00	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**breakthrough at compliance point**	

Remedial Targets

Remedial Target	**No impact**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks			
Distance to compliance point	**120**	**m**	
Concentration of contaminant at compliance point	**0.00E+00**	**mg/l**	Ogata Banks
after	**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer	foc	1.41E-02	fraction
Organic carbon partition coefficient	Koc	1.29E+05	l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species	$K_{OC,n}$		l/kg
Sorption coefficient for ionised species	$K_{OC,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.82E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

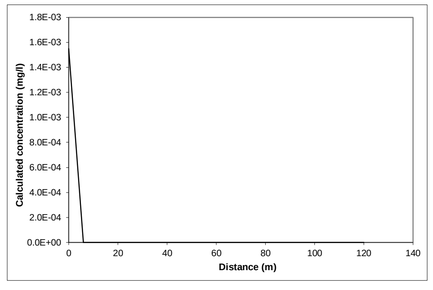
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.20E+01	4.86E+00	m
Transverse dispersivity	**az**	0.00E+00	1.20E+00	4.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.20E-01	4.86E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.6E-03
6.0	4.16E-19
12.0	1.12E-34
18.0	2.99E-50
24.0	8.03E-66
30.0	2.16E-81
36.0	5.78E-97
42.0	1.55E-112
48.0	4.16E-128
54.0	1.12E-143
60.0	3.00E-159
66.0	8.04E-175
72.0	2.16E-190
78.0	5.79E-206
84.0	1.55E-221
90.0	4.17E-237
96.0	1.12E-252
102.0	3.00E-268
108.0	8.06E-284
114.0	2.16E-299
120.0	0.00E+00

Site being assessed:	Little Eaton Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Little Eaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Benzo(b)fluoranthene			
Target Concentration (C_T)	1.00E-05	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu) | **Variable** | **Value** | **Unit** | **Source**

Contaminant		Benzo(b)fluoranthene		from Level 1
Target Concentration	C_T	1.00E-05	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.46E-03	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.00E+03	m	*See Justification Table*
Plume thickness at source	Sy	2.50E+01	m	*See Justification Table*
Saturated aquifer thickness	da	3.00E+01	m	*See Justification Table*
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	2.06E-03	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	6.48E-02	m/d	*See Justification Table*
Distance to compliance point	x	1.20E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.48E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.20E+01	m	*see options*
Transverse dispersivity	az	1.20E+00	m	*see options*
Vertical dispersivity	ay	1.20E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	1.41E-02	fraction
Organic carbon partition coefficient	Koc	1.05E+05	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{OC,n}$		l/kg
Sorption coefficient for ionised species	$K_{OC,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	1.48E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

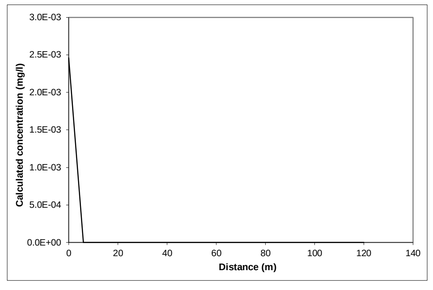
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.20E+01	4.86E+00	m
Transverse dispersivity	**az**	0.00E+00	1.20E+00	4.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.20E-01	4.86E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	2.5E-03
6.0	2.25E-17
12.0	2.07E-31
18.0	1.89E-45
24.0	1.74E-59
30.0	1.59E-73
36.0	1.46E-87
42.0	1.34E-101
48.0	1.22E-115
54.0	1.12E-129
60.0	1.03E-143
66.0	9.43E-158
72.0	8.64E-172
78.0	7.92E-186
84.0	7.26E-200
90.0	6.65E-214
96.0	6.10E-228
102.0	5.59E-242
108.0	5.12E-256
114.0	4.69E-270
120.0	4.30E-284

Calculated Parameters | **Variable**

Groundwater flow velocity	v	1.33E-03	m/d
Retardation factor	Rf	3.41E+04	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Rate of contaminant flow due to retardation	u	3.92E-08	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	4.30E-284	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**5.72E+280**	

Remedial Targets

Remedial Target		**5.72E+275**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**120**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**4.30E-284**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Little Eaton Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Little Eaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Benzo(g,h,i)perylene			
Target Concentration (C_T)	1.00E-05	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu) | **Variable** | **Value** | **Unit** | **Source**

Contaminant		Benzo(g,h,i)perylene		from Level 1
Target Concentration	C_T	1.00E-05	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — **Equations in HRA publication**

Approach for simulating vertical dispersion: **Simulate vertical dispersion in 1 direction**

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: **Apply degradation rate to pollutants in all phases (e.g. field derived value**

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.06E-03	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.00E+03	m	*See Justification Table*
Plume thickness at source	Sy	2.50E+01	m	*See Justification Table*
Saturated aquifer thickness	da	3.00E+01	m	*See Justification Table*
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	2.06E-03	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	6.48E-02	m/d	*See Justification Table*
Distance to compliance point	x	1.20E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	5.88E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.20E+01	m	*see options*
Transverse dispersivity	az	1.20E+00	m	*see options*
Vertical dispersivity	ay	1.20E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	1.41E-02	fraction
Organic carbon partition coefficient	Koc	4.17E+05	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{oc,n}$		l/kg
Sorption coefficient for ionised species	$K_{oc,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	5.88E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

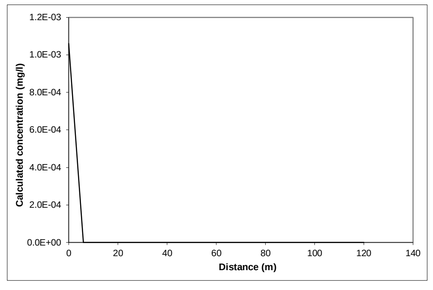
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.20E+01	4.86E+00	m
Transverse dispersivity	**az**	0.00E+00	1.20E+00	4.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.20E-01	4.86E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	**Concentration**
	mg/l
0	**1.1E-03**
6.0	**8.77E-32**
12.0	**7.26E-60**
18.0	**6.01E-88**
24.0	**4.97E-116**
30.0	**4.12E-144**
36.0	**3.41E-172**
42.0	**2.82E-200**
48.0	**2.33E-228**
54.0	**1.93E-256**
60.0	**1.60E-284**
66.0	**0.00E+00**
72.0	**0.00E+00**
78.0	**0.00E+00**
84.0	**0.00E+00**
90.0	**0.00E+00**
96.0	**0.00E+00**
102.0	**0.00E+00**
108.0	**0.00E+00**
114.0	**0.00E+00**
120.0	**0.00E+00**

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated Parameters | **Variable**

Groundwater flow velocity	v	1.33E-03	m/d
Retardation factor	Rf	1.35E+05	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Rate of contaminant flow due to retardation	u	9.87E-09	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	0.00E+00	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**breakthrough at compliance point**	

Remedial Targets

Remedial Target		**No impact**	**mg/l**	
Ogata Banks				
Distance to compliance point		**120**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**0.00E+00**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

For comparison with measured groundwater concentration.

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Little Eaton Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Little Eaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Benzo(k)fluoranthene			
Target Concentration (C_T)	1.00E-05	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
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Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu)

	Variable	Value	Unit	Source
Contaminant		Benzo(k)fluoranthene		from Level 1
Target Concentration	C_T	1.00E-05	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.20E-03	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.00E+03	m	*See Justification Table*
Plume thickness at source	Sy	2.50E+01	m	*See Justification Table*
Saturated aquifer thickness	da	3.00E+01	m	*See Justification Table*
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	2.06E-03	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	6.48E-02	m/d	*See Justification Table*
Distance to compliance point	x	1.20E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.09E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.20E+01	m	*see options*
Transverse dispersivity	az	1.20E+00	m	*see options*
Vertical dispersivity	ay	1.20E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	1.41E-02	fraction
Organic carbon partition coefficient	Koc	1.48E+05	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{OC,n}$		l/kg
Sorption coefficient for ionised species	$K_{OC,i}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	2.09E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

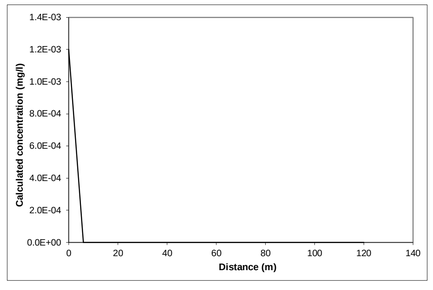
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.20E+01	4.86E+00	m
Transverse dispersivity	**az**	0.00E+00	1.20E+00	4.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.20E-01	4.86E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.2E-03
6.0	2.47E-20
12.0	5.09E-37
18.0	1.05E-53
24.0	2.16E-70
30.0	4.44E-87
36.0	9.14E-104
42.0	1.88E-120
48.0	3.88E-137
54.0	7.98E-154
60.0	1.64E-170
66.0	3.38E-187
72.0	6.97E-204
78.0	1.43E-220
84.0	2.95E-237
90.0	6.08E-254
96.0	1.25E-270
102.0	2.58E-287
108.0	5.31E-304
114.0	0.00E+00
120.0	0.00E+00

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared
with the Level 3 remedial target to determine the need for further action.
Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.33E-03	m/d
Retardation factor	Rf	4.80E+04	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Rate of contaminant flow due to retardation	u	2.78E-08	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	0.00E+00	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**breakthrough at compliance point**	

Remedial Targets

Remedial Target	No impact	mg/l	
Ogata Banks			
Distance to compliance point	**120**	**m**	
Concentration of contaminant at compliance point	**0.00E+00**	**mg/l**	Ogata Banks
after	**9.9E+99**	**days**	

For comparison with measured groundwater concentration.

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Little Eaton Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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The calculation of equations in this worksheet has been independently checked by Entec (UK) Ltd on behalf of the Environment Agency.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Little Eaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Dibenz(a,h)anthracene			
Target Concentration (C_T)	7.00E-05	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
Worksheet options are identified by brown background and employ a pull-down menus. Data entry are identified as blue background.
Data origin / justification should be noted in cells coloured yellow and fully documented in subsequent reports.
Data carried forward from an earlier worksheet are identified by a light green background
It is recommended that a copy of the original worksheet is saved (all data fields in the original copy are blank).

The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu) | **Variable** | **Value** | **Unit** | **Source**

Contaminant		Dibenz(a,h)anthracene		from Level 1
Target Concentration	C_T	7.00E-05	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.89E-04	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.00E+03	m	*See Justification Table*
Plume thickness at source	Sy	2.50E+01	m	*See Justification Table*
Saturated aquifer thickness	da	3.00E+01	m	*See Justification Table*
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	2.06E-03	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	6.48E-02	m/d	*See Justification Table*
Distance to compliance point	x	1.20E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.62E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.20E+01	m	*see options*
Transverse dispersivity	az	1.20E+00	m	*see options*
Vertical dispersivity	ay	1.20E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)			
Soil water partition coefficient	Kd		l/kg
Entry for non-polar organic chemicals (option)			
Fraction of organic carbon in aquifer	foc	1.41E-02	fraction
Organic carbon partition coefficient	Koc	1.86E+05	l/kg
Entry for ionic organic chemicals (option)			
Sorption coefficient for related species	$K_{OC,n}$		l/kg
Sorption coefficient for ionised species	$K_{OC,I}$		l/kg
pH value	pH		
acid dissociation constant	pKa		
Fraction of organic carbon in aquifer	foc		fraction
Soil water partition coefficient	Kd	2.62E+03	l/kg

Define dispersivity (click brown cell and use pull down list)

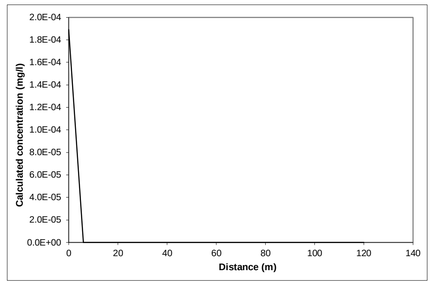
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.20E+01	4.86E+00	m
Transverse dispersivity	**az**	0.00E+00	1.20E+00	4.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.20E-01	4.86E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	1.9E-04
6.0	3.61E-23
12.0	6.89E-42
18.0	1.31E-60
24.0	2.51E-79
30.0	4.79E-98
36.0	9.14E-117
42.0	1.74E-135
48.0	3.33E-154
54.0	6.35E-173
60.0	1.21E-191
66.0	2.31E-210
72.0	4.42E-229
78.0	8.43E-248
84.0	1.61E-266
90.0	3.07E-285
96.0	5.86E-304
102.0	0.00E+00
108.0	0.00E+00
114.0	0.00E+00
120.0	0.00E+00

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated Parameters | **Variable**

Groundwater flow velocity	v	1.33E-03	m/d
Retardation factor	Rf	6.03E+04	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Rate of contaminant flow due to retardation	u	2.21E-08	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	0.00E+00	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**breakthrough at compliance point**	

Remedial Targets

Remedial Target		**No impact**	**mg/l**	
Ogata Banks				
Distance to compliance point		**120**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**0.00E+00**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

For comparison with measured groundwater concentration.

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Little Eaton Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

This worksheet has been produced in combination with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination (Environment Agency 2006).

Users of this worksheet should always refer to the User Manual to the Remedial Targets Methodology and to relevant guidance on UK legislation and policy, in order to understand how this procedure should be applied in an appropriate context.

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IMPORTANT: To enable MS Excel worksheet, click Tools, Add -Ins, Analysis Tool Pak and Analysis Tool Pak-VBA (to calculate error functions)

Details to be completed for each assessment				
Site Name:	Little Eaton Junction			
Site Address:	A38, Derbyshire			
Completed by:	Victor Ojambati			
Date:	11-Apr-17		Version:	3.2
Contaminant	Indeno(a)pyrene			
Target Concentration (C_T)	1.00E-04	mg/l	Origin of C_T:	EQS

This worksheet can be used to determine remedial targets for soils (Worksheets Level 1 Soil, Level 2 and Level 3 Soil) or to determine remedial targets for groundwater (Level 3 Groundwater). For Level 3, parameter values must be entered separately dependent on whether the assessment is for soil or groundwater. For soil, remedial targets are calculated as either mg/kg (for comparision with soil measurements) or mg/l (for comparison with leaching tests or pore water concentrations).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
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The spreadsheet also includes a porosity calculation worksheet, a soil impact calculation worksheet and a worksheet that performs some simple hydrogeological calculations.

R&D Publication 20 Remedial Targets Worksheet, Release 3.2

Level 3 - Groundwater

See Note

Input Parameters (using pull down menu) | **Variable** | **Value** | **Unit** | **Source**

Contaminant		Indeno(a)pyrene		from Level 1
Target Concentration	C_T	1.00E-04	mg/l	from Level 1

Select analytical solution (click on brown cell below, then on pull-down menu)

Ogata Banks — Equations in HRA publication

Approach for simulating vertical dispersion: Simulate vertical dispersion in 1 direction

Select nature of decay rate (click on brown cell below, then on pull-down menu)

Approach for simulating degradation of pollutants: Apply degradation rate to pollutants in all phases (e.g. field derived value

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	9.51E-04	mg/l	*Maximum concentration in GW*
Half life for degradation of contaminant in water	$t_{1/2}$	5.00E+04	days	*See Justification Table*
Calculated decay rate	λ	1.39E-05	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.00E+03	m	*See Justification Table*
Plume thickness at source	Sy	2.50E+01	m	*See Justification Table*
Saturated aquifer thickness	da	3.00E+01	m	*See Justification Table*
Bulk density of aquifer materials	ρ	2.30E+00	g/cm^3	*See Justification Table*
Effective porosity of aquifer	n	1.00E-01	fraction	*See Justification Table*
Hydraulic gradient	i	2.06E-03	fraction	*See Justification Table*
Hydraulic conductivity of aquifer	K	6.48E-02	m/d	*See Justification Table*
Distance to compliance point	x	1.20E+02	m	*See Justification Table*
Distance (lateral) to compliance point perpendicular to flow direction	z	0.00E+00	m	
Distance (depth) to compliance point perpendicular to flow direction	y	0.00E+00	m	
Time since pollutant entered groundwater	t	9.90E+99	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.23E+03	l/kg	*see options*
Longitudinal dispersivity	ax	1.20E+01	m	*see options*
Transverse dispersivity	az	1.20E+00	m	*see options*
Vertical dispersivity	ay	1.20E-01	m	*see options*

Select Method for deriving Partition Co-efficient (using pull down menu)

Calculate for non-polar organic chemicals

Entry if specify partition coefficient (option)

Soil water partition coefficient — Kd — l/kg

Entry for non-polar organic chemicals (option)

Fraction of organic carbon in aquifer — foc — 1.41E-02 — fraction

Organic carbon partition coefficient — Koc — 8.71E+04 — l/kg

Entry for ionic organic chemicals (option)

Sorption coefficient for related species — $K_{OC,n}$ — l/kg

Sorption coefficient for ionised species — $K_{OC,I}$ — l/kg

pH value — pH

acid dissociation constant — pKa

Fraction of organic carbon in aquifer — foc — fraction

Soil water partition coefficient — Kd — 1.23E+03 — l/kg

Define dispersivity (click brown cell and use pull down list)

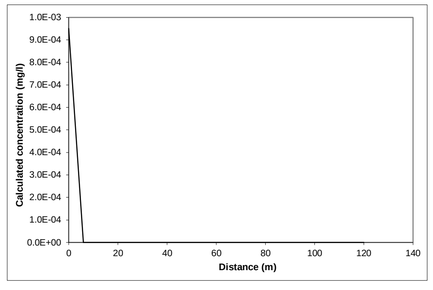
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value	Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	1.20E+01	4.86E+00	m
Transverse dispersivity	**az**	0.00E+00	1.20E+00	4.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	1.20E-01	4.86E-02	

Note values of dispersivity must be > 0

For calculated value, assumes ax = 0.1 *x, az = 0.01 * x, ay = 0.001 * x

Xu & Eckstein (1995) report ax = $0.83(\log_{10}X)^{2.414}$; az = ax/10, ay = ax/100 are assumed



Note graph assumes plume disperses vertically in one direction only. An alternative solution assuming the centre of the plume is located at the mid-depth of the aquifer is presented in the calculation sheets.

Calculated concentrations for distance-concentration graph

Ogata Banks
From calculation sheet

Distance	Concentration
	mg/l
0	9.5E-04
6.0	1.59E-16
12.0	2.67E-29
18.0	4.47E-42
24.0	7.49E-55
30.0	1.26E-67
36.0	2.10E-80
42.0	3.52E-93
48.0	5.91E-106
54.0	9.89E-119
60.0	1.66E-131
66.0	2.78E-144
72.0	4.65E-157
78.0	7.80E-170
84.0	1.31E-182
90.0	2.19E-195
96.0	3.67E-208
102.0	6.14E-221
108.0	1.03E-233
114.0	1.72E-246
120.0	2.89E-259

Note

This sheet calculates the Level 3 remedial target for groundwater, based on the distance to the receptor or compliance located down hydraulic gradient of the source Three solution methods are included, the preferred option is Ogata Banks.

By setting a long travel time it will give the steady state solution, which should be used to calculate remedial targets.

The measured groundwater concentration should be compared with the Level 3 remedial target to determine the need for further action.

Note if contaminant is not subject to first order degradation, then set half life as 9.0E+99.

This worksheet should be used if pollutant transport and degradation is best described by a first order reaction. If degradation is best desribed by an electron limited degradation such as oxidation by O2, NO3, SO4 etc than an alternative solution should be used

Calculated Parameters | **Variable**

Groundwater flow velocity	v	1.33E-03	m/d
Retardation factor	Rf	2.82E+04	fraction
Decay rate used	λ	1.39E-05	d^{-1}
Rate of contaminant flow due to retardation	u	4.73E-08	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	2.89E-259	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.29E+255**	

Remedial Targets

Remedial Target		**3.29E+251**	**mg/l**	For comparison with measured groundwater concentration.
Ogata Banks				
Distance to compliance point		**120**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**2.89E-259**	**mg/l**	Ogata Banks
after		**9.9E+99**	**days**	

Care should be used when calculating remedial targets using the time variant options as this may result in an overestimate of the remedial target.
The recommended value for time when calculating the remedial target is 9.9E+99.

Site being assessed:	Little Eaton Junction
Completed by:	Victor Ojambati
Date:	########
Version:	3.2