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GEO ENVIRONMENTAL REPORT ON SITE INVESTIGATIONS

JAGUAR LAND ROVER, HALEWOOD, EASTLANDS

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GBX Remediation

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EXECUTIVE SUMMARY

Client	Jaguar Land Rover
Site	Jaguar Land Rover, Halewood, Eastlands, Liverpool
Proposed Development	We understand that the proposed re-development includes the formation of an area of car parking with associated road infrastructure, drainage and lighting. We understand that the re-development will necessarily involve the relocation of 2 No. large bunds of soil that were formed as part of the previous development at the site.
Project Objectives	▪ Underlying soil and groundwater profiles. ▪ To investigate the possible presence of ground contamination associated with the historical uses of the site and any potential associated risks. ▪ Ground gas emissions. ▪ To investigate the ground conditions and provide recommendations on foundation and infrastructure design. ▪ To provide recommendations (if any) for additional works/remediation required.
Topography and Surface Cover	Approximately 30% of the site is surfaced by tarmac or concrete hardstanding. Approximately 40% of the site is surfaced by gravel/aggregates. The remaining 30% is surfaced by bunded soil stockpiles and rough vegetation.
Site History	At the time of the earliest Ordnance Survey maps dating from 1849 the site was indicated to have been undeveloped and occupied by farmland and woodland. Since the 1960s the site has been associated with the motor works to the west; the woodland was also cleared around this time. Whilst the use of the site as landfill was not recorded within the available OS data, we understand that at some point since the 1960s the site was used for this purpose with the associating waste rubble originating from the wider motor works site. By the 1990s a small section on the western site boundary of the southern site area was used as a laydown or storage area. The northern site area was developed for car parking circa 2000. The movement of soil materials to the north of the northern parking area is evident from 2013 until recently. The southern area was developed for trailer parking between 2016 and 2018. The formation of soil bunds to the east and south east of the southern trailer park is associated with the southern trailer park development.
Recorded Ground Conditions	Hardstanding - TP104 recorded 'black tarmac with medium angular to subangular gravel aggregate' from ground level to 0.10 mbgl which was underlain by subbase to 0.35 mbgl, described as 'grey slightly sandy fine to coarse angular to subangular gravel of quarried aggregate'. All other locations were located off the tarmacadam hardstanding areas and were covered in gravel hardstanding which was typically 0.30 m to 0.40 m thick and comprised of crushed aggregate described as 'grey slightly sandy fine to coarse angular to subangular gravel of quarried aggregate' or 'grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments'. Within 4 No. locations in the west of the northern car park area (SA103, TP106, TP112, and TP113) the gravel layer at the surface was only 0.10 m thick and described as 'brownish grey clayey sandy gravel of various lithology' or 'grey clayey sandy gravel of quarried aggregate with frequent extraneous fragments of blaes and brick', these strata were underlain by further granular made ground described as 'orange fine to coarse angular gravel of crushed brick and blaes' and 'multicoloured sandy gravelly cobbles of demolition rubble' to depths between 0.20 mbgl and 0.60 mbgl. Made ground deposits were encountered within all exploratory hole locations with thickness ranging between 1.30 m and at least 5.00 m, though generally between 2.50 m and 4.00 m thick. The majority of the made ground deposits were typically sandy gravelly clay soils with much extraneous material, predominantly demolition rubble with timber, ceramic, glass, burnt shale with more rare waste materials such as slag and ash. Locally made ground was more granular including crushed brick 'orange fine to coarse angular gravel of crushed brick and blaes with abundant whole bricks' or demolition materials

	without significant soil matrix 'multicoloured sandy gravelly cobbles and boulders of demolition rubble with rare timber. Natural glacial till was recorded to underly the made ground deposits (proven in 18 of 46 No. locations) from depths ranging between 2.30 mbgl (BH14) and 4.30 mbgl (BH02), proven to 5.00 mbgl. These soils were consistently described as 'firm becoming stiff (or stiff) brown and grey slightly silty slightly sandy slightly gravelly CLAY' or 'firm becoming stiff brown and grey slightly silty slightly sandy CLAY with rare gravel' or 'firm brown grey mottled silty gravelly CLAY'. Within 2 No. locations in the north of the site (TP08 and TP09) natural sandy soils described as 'dark grey slightly silty fine to medium SAND with frequent rootlets (presumed natural)' were encountered below the made ground at depths between 1.30 mbgl and 2.70 mbgl and proven to 3.20 mbgl. Rockhead was not encountered within any of the exploratory hole locations, extended to a depth of 5.00 mbgl.
Assessment of Risks to Human Health, Vegetation and the Water Environment	Comparing the heavy metal, TPH and PAH contaminant concentrations against appropriate guideline values, no concentrations were recorded above the guideline values. As such we do not consider a risk to human health from heavy metal, TPH or TPH concentrations recorded within the shallow made ground soils. Given the exceedances of asbestos within the made ground soils we consider that these soils pose a risk to human health and to site end users. We consider that the proposed development of a car park however will break the source-pathway-receptor linkage in respect to human health and therefore areas surfaced with hardstanding will not require additional asbestos remedial measures. Should the development proposals include any areas of soft landscaping, we consider an environmental capping layer with a basal high-visibility geotextile is required in order to break the source-pathway-receptor linkage. The shallow soils are considered to pose a low risk to the water environment. Construction personnel should be aware of the nature of the soils on the site and vigilance should be maintained for any soils at variance from those anticipated during construction works. Appropriate health and safety procedures should be adopted at the site in relation to these matters.
Assessment of Ground / Mine Gas, vapour and Radon	Given that the construction of building or indoor space is not proposed, we do not consider ground gas preclusion measures to be required as part of the future development. Following our research, we do not consider that the site is at risk from mine gas generation, radon gas or hydrocarbon vapours.
Assessment of the Built Environment	Recommended concrete (ACEC) Classification is AC-2 with a Design Sulphate Class for the site of DS-2.
Off-Site Disposal	As part of our assessment, we have screened the soil samples collected using the Haz-Waste Online Screening Tool. The results indicate the vast majority of the material tested to be classified as being non-hazardous with respect to off-site disposal. Exceptions to this include a soil sample from BH06 which is classified as hazardous owing to the carcinogenic concentration of lead and 3 No sample (BH19, TP08, TP11) which were classified as hazardous owing to the recorded elevated pH value which is indicated to be corrosive.
Foundation Construction	The in-situ and laboratory geotechnical testing indicates that both the made ground and natural soils would be suitable for reuse in the proposed car park development subject to appropriate soils management and compaction. A materials management plan and earthworks specification should be compiled prior to site works.

	It should be noted that the site investigations and geotechnical testing did not extend to the two remediated soil bunds located to the east and south east of the trailer park area. Should it be proposed to reuse this material, material assessment of this material should be considered. Once development proposals and site level designs are finalised, we recommend that the ground conditions are revised to ensure the pertinence of our recommendations.
Mining and Quarrying	No mining or quarrying activities were noted within a distance of the site that would have a significant impact to the development. As such we considered that there would be no constraints to the site from mineral instability or mine gasses.
Invasive Plant Species	The walkover survey did not record the presence of invasive plant species, though we would note that works were undertaken out with the growing season (i.e April to September). We would advise an updated survey be undertaken by an invasive species specialist during the growing season.

1.0 INTRODUCTION

1.1 Commission

1.1.1 LandWise Consulting Ltd were commissioned by GBX Remediation Ltd (the Remediation Specialist) on behalf of Jaguar Land Rover (the Client) to undertake Phase II Site Investigations in connection the proposed development of a site titled 'Jaguar Land Rover, Halewood, Eastlands'. (Drawing Nos. LW25/136/DRG/SI/01 and 02).

1.1.2 We understand that the proposed re-development includes the formation of an area of car parking with associated road infrastructure, drainage and lighting. We understand that the re-development will necessarily involve the relocation of 2 No. large bunds of soil that were formed as part of the previous development at the site.

1.2 Assessment Proposals

1.2.1 The objective of these assessments was to provide the following.

- Comment on the underlying soil and groundwater profile.
- Chemical contamination risk assessment, to include:
    - Human Health Risk Assessment
    - Water Environment Risk Assessment
    - Built Environment Risk Assessment
- Ground gas emission risk assessment.
- Geotechnical characteristics of the materials.
- Foundation bearing characteristics.
- Mining and quarrying constraints (if any).

1.3 Limitations

1.3.1 Our interpretations of the ground conditions are based on the information retrieved from trial pits and soil bores sunk within the site during the recent investigations. While we have carried out interpretation of the ground conditions between the exploratory locations, it should be recognised that soil and groundwater conditions can vary from point to point. As such, ground conditions at variance with those indicated by the exploratory pits/bores may exist in areas not investigated.

1.3.2 It should be recognised that this report is prepared in accordance with current recommended practice and existing legislation. It is written in the context of the proposed commercial car park development. Should there be any alternative end-use, it would be prudent to consult with LandWise Consulting Ltd further to ensure the continued pertinence of the recommendations advised.



Site: Jaguar Land Rover, Halewood, Eastlands **Ref:** LW25-136	Drawing No. LW25-136/DRG/SI/01	LandWise geo-environmental consultants				
Title: **Location Plan**	Scale Not to Scale	Drawn AT	Approved HOL	Revision 01	Date 23/02/2026	



Site: Jaguar, Land Rover, Halewood, Eastlands **Ref:** LW25-136	Drawing No. LW25-136/DRG/SI/02	LandWise geo-environmental consultants			
Title: **Site Layout Plan**	Scale. Not to Scale	Drawn AT	Approved HOL	Revision. 01	Date 23/02/2026

2.0 DESK STUDY RESEARCHES

2.1 General

2.1.1 LandWise Consulting Ltd were previously commissioned by GBX Remediation Ltd (the Remediation Specialist) on behalf of Jaguar Land Rover (the Client) to compile a Phase 1 Geo-Environmental Desk Study for the site. A summary of the findings of this desk study is presented below.

2.2 Current Site Conditions

2.2.1 As part of our researches a walkover survey of the site was conducted on the 6th January 2026. Approximately 30% of the site is surfaced by tarmac or concrete hardstanding. Approximately 40% of the site is surfaced by gravel/aggregates. The remaining 30% is surfaced by bunded soil stockpiles and rough vegetation. The site is generally noted to be flat lying, having been platformed to create level surfaces for car/trailer parking. There are however areas out with the car/trailer parking areas where soil bunds/stockpiles are present. These are described below;

- Northern stockpile – this is located within the northernmost site area. The topographic survey indicates this bund to rise approximately 2.50m above the northern car parking area.
- Central stockpile – this is located between the northern car parking area and southern trailer park area. This rises to approximately 1.0m above the northern car parking area and southern trailer park area in the west and approximately 2.0m above the northern car parking area and southern trailer park area in the east.
- Eastern Bund – this is located to the east of the trailer park and is indicated to rise to a level of 3.0m above the trailer park. The volume of material in this bund is estimated to be approximately 8,660m^3.
- South Eastern Bund – This is located to the south east of the trailer park. We do not hold topographic survey information for this bund but understand that the volume is estimated at approximately 3,000m^3.

2.2.2 During the site walkover standing water or waterlogged ground was noted sporadically in the southern site area (on depressions within the gravel hard standing) and in the east of the northern site area.

2.2.3 During our walkover survey it was noted that the site was no longer in use for car parking or trailer storage. The north of the site was being used to store materials associated with construction activities such as scaffolding, heras fencing, temporary barriers, empty IBCs and stockpiles of gravel and concrete.

2.3 Historical Site Usage

2.3.1 A review of the earliest Ordnance Survey maps, dating from 1849, indicate that the site was undeveloped and occupied by farmland and woodland at the time. Since the 1960s the site has been associated with the motor works to the west; the woodland was also cleared around this time. Whilst the use of the site as landfill was not recorded within the available OS data, we understand that at some point since the 1960s the site was used for this purpose with the associating waste rubble originating from the wider motor works site. By the 1990s a small

section on the western site boundary of the southern site area was used as a laydown or storage area. The northern site area was developed for car parking circa 2000. The movement of soils materials to the north of the northern parking area is evident from 2013 until recently. The southern area was developed for trailer parking between 2016 and 2018. The formation of soil bunds to the east and south east of the southern trailer park is associated with the southern trailer park development.

2.3.2 The surrounding area was largely agricultural, with sporadic residential developments, until the 1930s when significant residential developments began to appear to the northwest of the site. By the late 1940s there was significant development in the surrounding area associated with Speke to the south of the site. The most significant development in the surrounding area occurred in the early 1960s with the development of the motor works 120-1,300 m to the west of the site, with associated developments such as railway sidings to the north of the site. Since this time there has been additional residential and infrastructural development in the wider area. Most recently between 2006 and 2025 additional developments on the motor works site such as an HGV trailer yard and logistics building to the immediate south of the site.

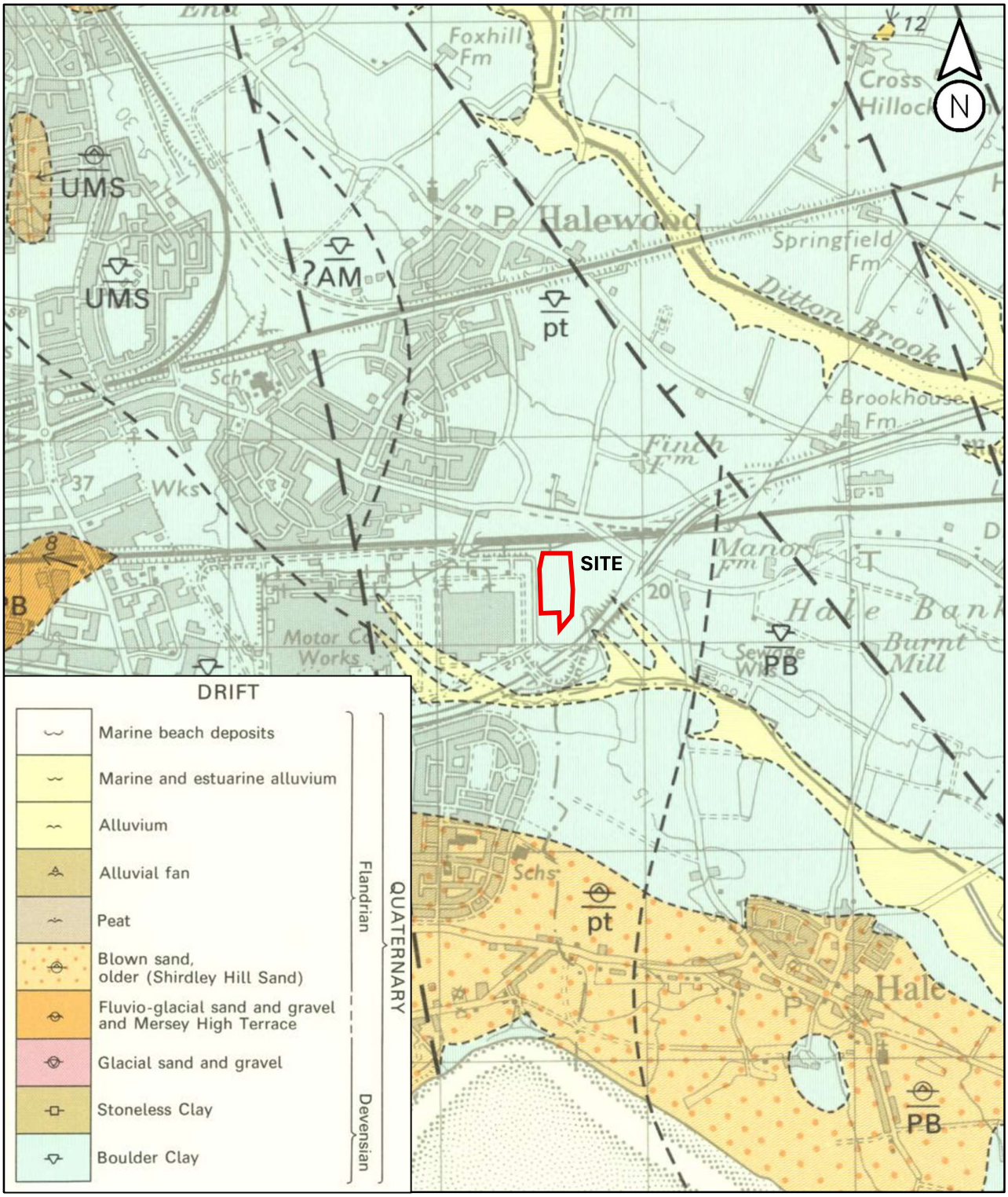
2.4 Conjectured Ground Conditions

2.4.1 The Silkstone Environmental (SEL) site investigation in 2016 recorded made ground across the development to depths in excess of 3.50mbgl. The majority of the made ground soils were described as sandy gravelly clay and sandy gravel with high cobble content of concrete and brick with gravels similarly comprising brick and concrete fragments. Other sub-ordinate extraneous material included glass, plastic, timber, rags, paper, slate, breeze blocks, metal pipes.

2.4.2 Although a consistent made ground stratigraphy is difficult to ascertain as the soils are indicated to be heterogeneous, it is noted that the granular content of the soils is indicated to decrease with depth with the common presence of sandy gravel layers within 1.0mbgl and predominantly sandy gravelly clays at greater depths.

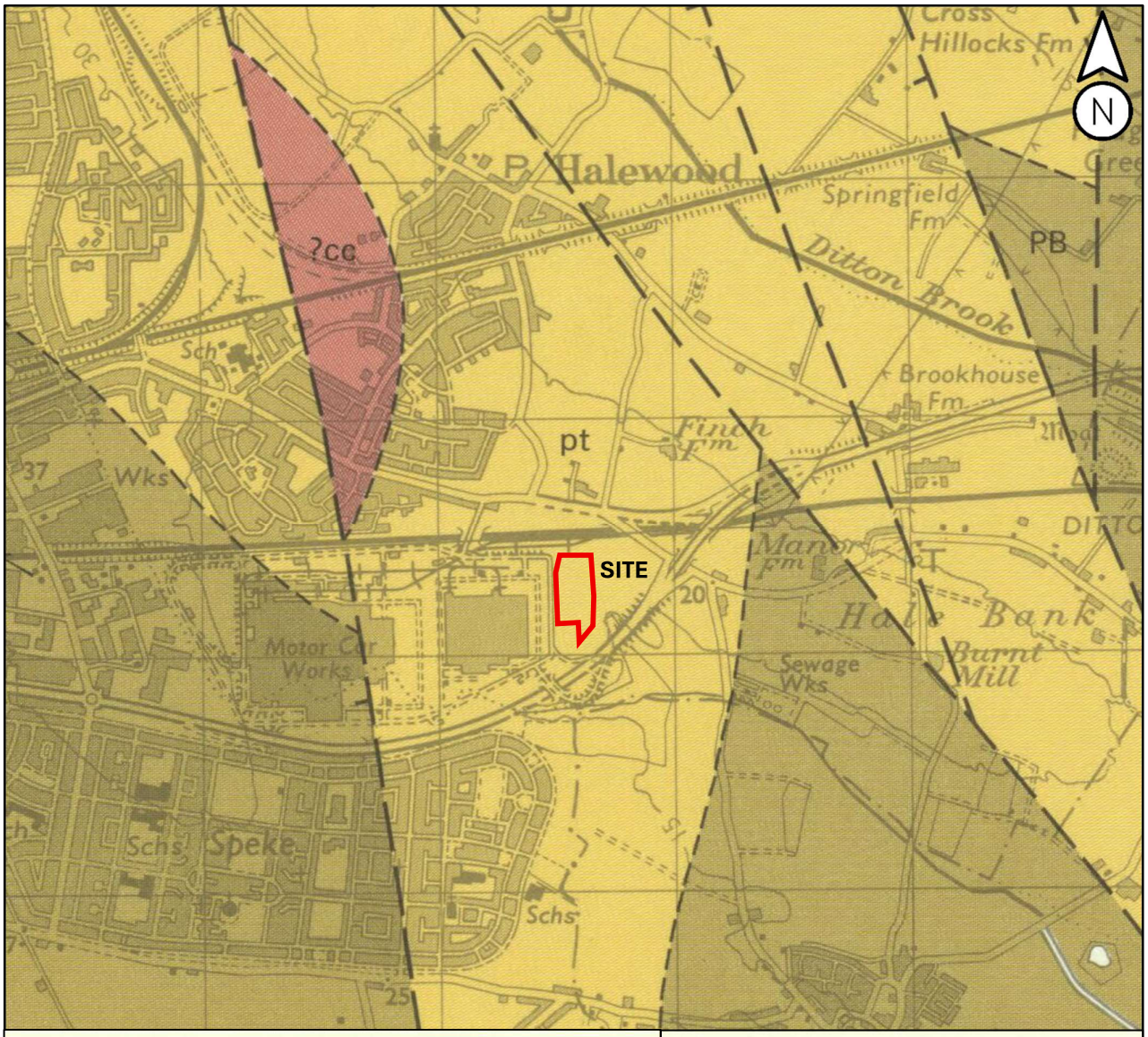
2.4.3 It is also worth noting that TP21 recorded gravelly sandy ash from surface to a depth of 1.40mbgl and sandy ashy gravel was recorded in TP17 which is inconsistent with the shallow made ground over the remainder of the site. Furthermore, it is also worth noting that a layer of cobbles and boulders was recorded in the deeper made ground in TP22, TP24 and TP32, all of which are located in the south eastern site area. Tar fragments were recorded in TP15 at depth of between 0.30mblg and 2.50mbgl.

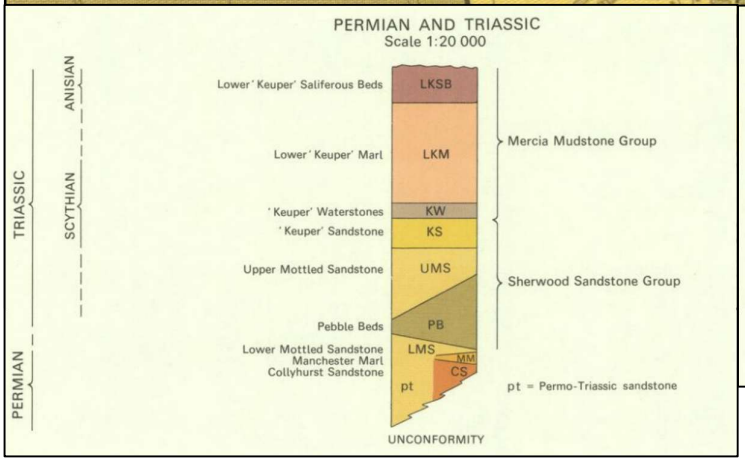
2.4.4 In the course of the SEL investigations natural soils were only encountered within trial pits TP01 and TP11, both located in the south west of the trailer park. Soft to stiff sandy gravelly clay were recorded in TP01 from a depth of 1.20mbgl to a depth of >3.40mbgl. Stiff sandy gravelly clay was recorded in TP11 from a depth of 3.00mbgl to a depth of >3.20mbgl.

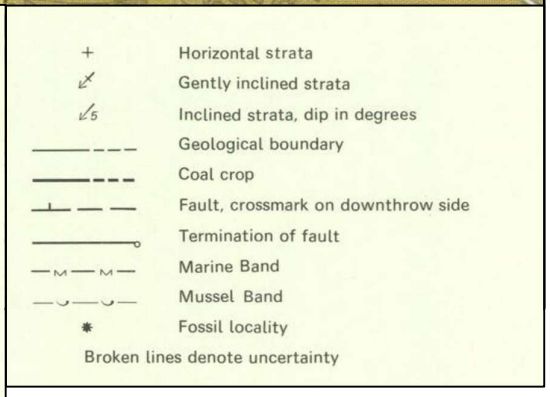


Extract from BGS © - Runcorn Sheet 97

Site: Jaguar Land Rover, Halewood, Eastlands **Ref: LW25-136**	Drawing No. LW25-136/DRG/SI/03	LandWise geo-environmental consultants			
Title: **Drift Lithology**	Scale. Not to Scale	Drawn AT	Approved HOL	Revision. 01	Date 23/02/26







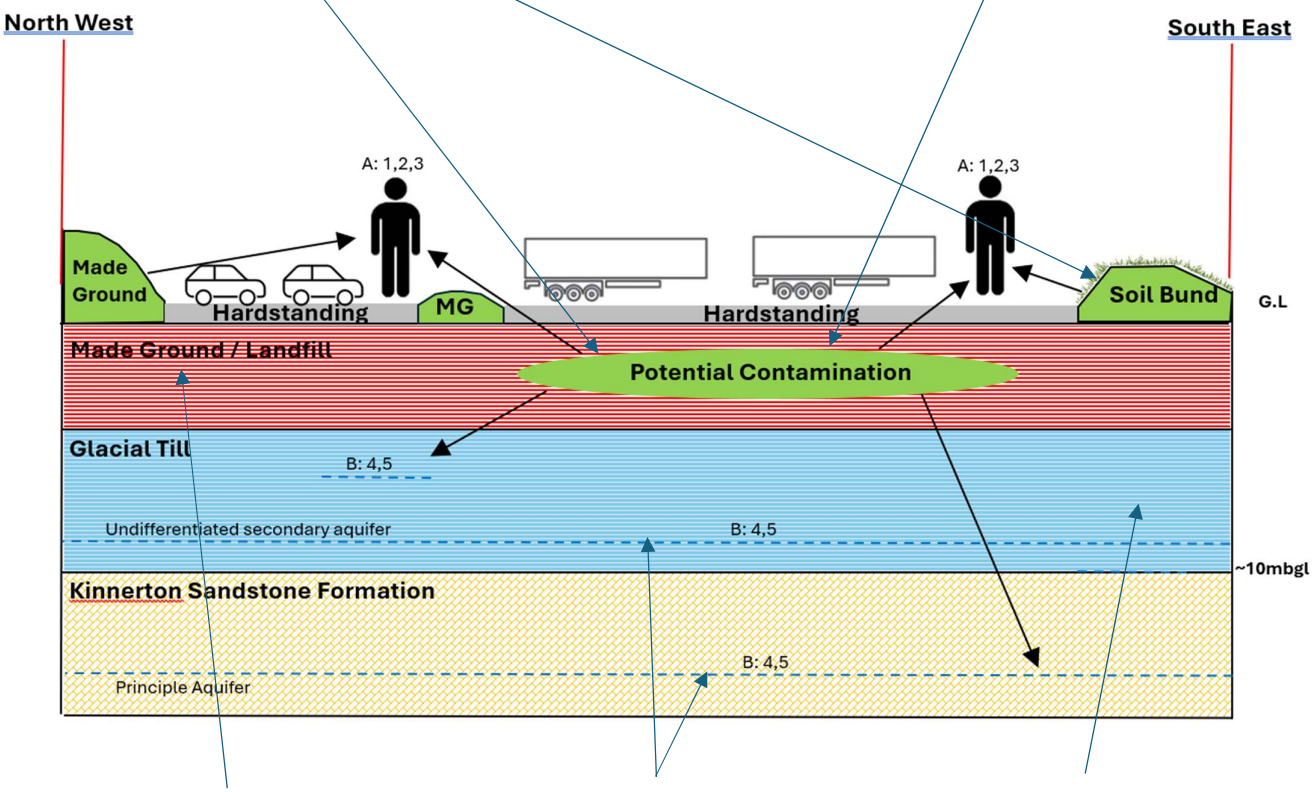
Extract from BGS © - Runcorn Sheet 97

Site: Jaguar Land Rover, Halewood, Eastlands **Ref: LW25-136**	Drawing No. LW25-136/DRG/SI/04	LandWise geo-environmental consultants			
Title: **Solid Lithology**	Scale. Not to Scale	Drawn AT	Approved HOL	Revision. 01	Date 23/02/26

A review of soil data from 2016 recorded no contaminant concentrations above the guideline values. Asbestos ACMs and asbestos fibres were however recorded in the made ground soils

Whilst we consider the risk from chemical contamination to be moderate, in respect to asbestos specifically, we consider a high likelihood of encountering further ACMs and asbestos impacted soils (fibres) during any further earthworks

A review of the 2016 water chemical data indicates potentially elevated concentrations of heavy metals, PAH and TPH. As such further assessment is required to assess the risk to the water environment.



The Silkstone Environmental site investigation in 2016 recorded made ground across the development to depths in excess of 3.50mbgl

The DEFRA Magic Map indicates the presence of an undifferentiated secondary aquifer within the superficial deposits and a principle bedrock aquifer the Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone Aquifers Water Body (ID: GB41201G101700) which was classified by the Environment Agency as having an overall 'poor' in 2019.

The Silkstone Environmental site investigation in 2016 recorded natural sandy gravelly CLAY from depths of between 1.50mblg and 3.00mbgl in 2 No. trial pits.

Source (Risk)

- Potentially Contaminated Soils

Pathway

1) Outdoor ingestion of dust
2) Skin contacts with outdoor soil
3) Outdoor inhalation of dust
4) Leaching of contaminants to the groundwater
5) Direct contaminant migration in groundwater

Receptor

A) Site users / construction or maintenance workers (Human Health)
B) The water environment

Site: Jaguar Land Rover, Halewood, Eastlands **Ref: LW25-136**	Drawing No. LW25-136/SI/05	LandWise geo-environmental consultants			
Title: **Preliminary Conceptual Site Model**	Scale. Not to Scale	Drawn HOL	Approved HOL	Revision. 01	Date 23/02/26

2.5 Chemical Contamination

2.5.1 SEL concluded that all contaminant concentrations recorded fell below the open space land use guideline values utilised in their 2016 assessment at the time. LandWise Consulting have undertaken a review of the historical chemical data comparing the recorded concentrations at the time to current S4UL guideline values appropriate for a commercial end use which indicates no contaminant concentrations to be recorded above the guideline values.

2.5.2 SEL recorded possible asbestos sheeting within the shallow made ground soils of TP24 to a depth of 0.70mbgl. Asbestos was recorded in 2 No samples within the subject site, described as chrysotile loose fibres in TP11 at a depth of 1.10mbgl and chrysotile loose fibres in TP21 at a depth of 0.30mbgl. Arcadis indicated that following the identification of asbestos impacted soils and Asbestos Containing Materials (ACMs) by SEL in March 2016, Santia Asbestos Management Ltd attended site in October 2016 to remove a small number of ACMs from site. A walkover survey in conjunction with partial soil excavation was undertaken by Santia Asbestos Management Ltd on the 10th October 2016. This identified further suspected ACMs, with analysis confirming the presence of asbestos.

2.5.3 Whilst we consider the risk from chemical contamination to be moderate, it would be considered prudent to undertake some additional up-to-date risk assessment in line with current guidance to confirm that the site does not pose a chemical contaminant risk. In respect to asbestos specifically, we consider a high likelihood of encountering further ACMs and asbestos impacted soils (fibres) during any further earthworks.

2.5.4 In respect to groundwater, SEL undertook a generic groundwater risk assessment comparing the results of 3 No water samples to generic assessment criteria at the time. Despite several heavy metal and PAH concentrations exceeding the guideline values utilised, SEL concluded these elevated concentrations not to be significant when compared to the average site concentration. LandWise Consulting similarly undertook a generic groundwater risk assessment comparing the recorded contaminant concentrations recorded within the 2016 groundwater samples to EQS guideline values with respect to the surface water risks assessment and to MRV guideline values with respect to the groundwater risk assessment. Based on the results of the preliminary review (GQRA) it is considered that the site conditions may potentially present a risk to both the Surface Water Environment and the Groundwater Water Environment. However, it is important to note that the preliminary assessment does not take into account the following:

- The requirement for modelling of these concentrations to determine the potential concentrations are the receptors, in this case the Ram's Brook and the underlying Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone Aquifer. Further assessment is required following retrieval, testing and modelling of further water samples.
- The proposed development, which includes for hardstanding and enclosed drainage, therefore reducing surface water infiltration across the site and subsequent reduction of potential contaminant loading to the shallow groundwater or surface water.
- The dilution potential of the Rams Brook or indeed the River Mersey.

2.5.5 Once all of the above is taken into account we anticipate the overall risk to the groundwater environment to be low to moderate however further assessment in this respect is required.

2.5.6 The Arcadis remediation method statement and materials management plan provide information on the source of the material within the soil bunds located to the east of the trailer park and the soil bund to the south east of the trailer park. The soil bund to the south east of the trailer park was formed using ACM contaminated material from the trailer park and that a clean capping of soils would be incorporated. The soil bund to the east of the trailer park, which already existed in 2017, which was also considered to contain ACM material was also capped using imported soil from the North Road car park development.

2.5.7 From review of the reports made available to us, we understand that the make up of the soil bund the south east of the trailer park is as follows; bund core comprising of concrete and brick rubble from the trailer park, overlain by potential ACM containing soils, overlain by an orange geotextile, overlain by 400mm clean topsoil. We understand that the make up of the soil bund the east of the trailer park, which was already present in 2017, comprises of potential ACM containing soils, overlain by an orange geotextile, overlain by 400mm clean topsoil.

2.6 Gas Emissions

2.6.1 Our research suggests that the site is within a 1-3% radon risk area and the ground conditions would suggest that there is a low to moderate ground gas generation potential (associated with historical rubble landfill associated with the wider motor works site and likely made ground deposits). With respect to hydrocarbon vapour generation, given the historical site usage hydrocarbon contaminants may be present within the made ground materials.

2.6.2 Notwithstanding the above, it is noted that the development proposals include for new car parking only with no proposals for enclosed or habitable spaces (i.e. new buildings). As such, it is considered that the potential for ground gas/vapour generation within the expected underlying ground conditions would have no material impact on site end users. Therefore, it is concluded that no further investigations will be required with respect to gas/vapour generation.

2.6.3 It should be noted that if during the course of development/maintenance of the car park manned excavations in excess of 1.20 m are required, it is our recommendation that these be treated as confined spaces and appropriate health and safety proposals put in place.

2.6.4 If the development proposals change to include for enclosed spaces (indoor air) LandWise should be contacted to ensure the pertinence of our recommendations.

2.7 Foundations and Pavements

2.7.1 Significant foundations are not envisioned as part of the development proposals. Our researches indicate that widespread made ground / landfill deposits of significant thickness exist across the site. Due to the heterogeneous nature of made ground deposits we would not consider these to represent a suitable bearing horizon for building foundations.

2.7.2 Should there be a requirement for foundations at part of the proposed development, further investigation would be required to ascertain the present depth to, and condition of, the natural soils to confirm a suitable foundation bearing horizon.

2.7.3 The SEL site investigations were undertaken prior to the development of the trailer park. We anticipate a stone capping of aggregate to be present below the northern car park and southern trailer park areas. It is anticipated that this material currently in-situ would provide a CBR value of >5%. As part of the redevelopment of these areas, it is anticipated that this material would be separated and reused and given the granular content would provide a CBR of >5% with limited compaction. The make up of the car park and trailer park capping/sub-base will be examined as part of future ground investigation proposals.

2.7.4 SEL did not undertake geotechnical analyses of the fill material across the site however analyses on the natural cohesive material recorded moisture contents of between 12% and 17%. Atterberg limit testing indicated the natural soils to have a low plasticity. The soils were recorded to have a maximum dry density of between 1.88Mg/m and 2.09Mg/m with an optimum moisture content of between 9% and 15%. Compaction testing indicated a CBR of between 23.8% and 42.4% using a 4.5kg rammer and 6.5% and 12.2% using a 2.5kg rammer.

2.8 Flood Risk

2.8.1 The BGS flood data indicates that there is limited potential for groundwater flooding to occur. The Environment Agency flood map shows localised areas of the site are at risk from surface water flooding including high risk areas (more than 3.3% annual chance) areas in the south and east of the HGV storage yard in the southern site area. No risk was indicated from river or sea flooding.

2.9 Mining and Quarrying

2.9.1 No mining or quarrying activities were noted within a distance of the site that would have a significant impact to the development. As such we considered that there would be no constraints to the site from mineral instability or mine gasses.

3.0 SITE INVESTIGATIONS

3.1 General

3.1.1 The scope and location of works was non-targeted and where access permitted. Site works undertaken were implemented generally in accordance with BS5930:2015 +A1:2020 and BS10175:2011 + A2:2017.

3.2 Investigation Rationale

3.2.1 The site investigation design was provided to LandWise Consulting by Beech Group. The design took cognisance of the preliminary conceptual site model, the works undertaken to date and the nature of the proposed development. The investigation was intended to provide appropriate coverage across the whole study area when including the historical investigation undertaken, facilitating the collection of sufficient chemical analyses and the installation of groundwater monitoring points.

3.2.2 The objectives of the LandWise Consulting investigation included the determination of:

a) The conjectured distribution and composition of made ground and natural soils and the geological context of the site
b) The groundwater regime.
c) Chemical contamination and risk to future development (source-pathway-receptor).
d) Risk assessment for the built environment (soft landscaping, buried concrete and water supply pipe infrastructure).
e) Preliminary waste classification of the shallow soils.
f) The geotechnical properties of the shallow soils.

3.2.3 The scope and method of investigation to fulfil objectives (a) to (f) is summarised in Table 07 overleaf.

3.2.4 The site investigations were intended to provide geotechnical and hydrogeological data along with contamination sampling of areas associated with the proposed development. Given the proposed end-use of the site (commercial car park), the principal purpose of the sampling and testing was to identify potential risks to the development, future site users and the water environment.

3.2.5 Representative samples of natural soils were obtained and tested for an appropriate suite of testing. The results of the analyses were utilised in a site-specific risk assessment in accordance with the current UK technical guidance for human health and EA guidance for the water environment.

Table 01 – Site Investigations Based on Objectives

Objective		Site Investigation
a)	Geological context of the site and underlying soils	(January 2025) 15 No. machine excavated trial pits (TP101 to TP115) 4 No. machine excavated soakaway testing pits (SA01 to SA04) 27 No. soil boreholes (BH01 to BH11, BH11A, BH11B, and BH12 to BH25).
b)	*Groundwater regime*	(January 2026 to February 2026) – Groundwater monitoring wells were installed within 10 No. borehole locations (BH01, BH02, BH03, BH08, BH09, BH12, BH17, BH19, BH23, BH25) 1 No. ground water monitoring visit undertaken. Results are included in Appendix 03.
c)	*Chemical contamination risk to future development*	(January 2026 to February 2026) – Representative samples of the shallow soils and groundwater were collected from the soil boreholes and sent for laboratory chemical testing. This included: 39 No. soil samples were tested for a comprehensive range of potential metal, hydrocarbon (TPH/PAH) and asbestos contaminants. 9 No. leachate samples were tested for a comprehensive range of potentially leachable metal contaminants. 4 No. water samples were retrieved. Chemical analysis results are included in Appendix 04.
d)	*Built environment risk assessment*	(January 2026) – 39 No samples tested for pH and SO_4 Soil chemical analysis results are included in Appendix 08.
e)	*Preliminary waste classification*	(January 2026) – 39 No chemical testing results were screened using the Haz-Waste online screening tool in order to classify the soils as 'Hazardous' or 'Non-Hazardous' waste. A copy of the report is included as Appendix 09.
f)	*Geotechnical characteristics*	(January 2025) – In-situ SPT tests were undertaken in all boreholes sunk on site. Geotechnical analyses were undertaken on selected soil samples including; -PSD with specification highway works gradings -Hand Shear Vanes -Multi-triaxial shear strength tests -Atterberg limits tests -Bulk density tests -Moisture content tests Geotechnical analysis results are included in Appendix 08.

3.2.6 All soil samples recovered for chemical analysis were contained in sealed plastic tubs, labelled, and stored on site in cool boxes to maintain natural temperature. Where hydrocarbon or organic contamination was suspected, samples were contained in amber glass jars to prevent chemical breakdown because of exposure to light and limit absorption of the contaminant to the sample container. The procedure is designed to maintain sample integrity and ensure that the chemical analysis is as representative of the site conditions as possible.

3.2.7 All soil samples were collected and dispatched to the laboratory for immediate testing. The scope of the chemical testing of soil samples recovered during the intrusive investigations are discussed in detail in section 6.0 of this report.

3.2.8 Samples for chemical analysis were submitted to Normec Dets Limited, a UKAS accredited laboratory.

3.2.9 Properties recorded during logging of the shallow soils included the general composition, strength, material, description, colour, density, state of weathering and any other notable features. These were generally described in accordance with the guidelines provided by the Code of Practice for Site Investigations BS:5930(2015).

3.2.10 The locations of the exploratory holes are indicated on Drawing No. LW25/136/DRG/SI/06, and records of the exploratory hole records are included as Appendices 07 to 09.

3.2.11 The analytic schedule was then based on the interpreted origin of the soils and their description, which is consistent with best practice under current contaminated land guidance BS:10175:2011 + A2(2017) *'Code of Practice for the Investigation of Contaminated Land'*. As such we have implemented the following practices:

- The drilling works have been undertaken by a suitably accredited sub-contractor. The geological succession at each exploratory hole location has been logged by an experienced field specialist and samples taken for laboratory analysis. A visual assessment was made of the geological profile and potential contamination if present. Soil samples have been taken at regular intervals, or change in lithology, or where evidence of potential contamination was observed.
- In selecting the appropriate samples for testing, we have taken cognisance of several factors, including the proposed site use. Sampling rationale has been determined in accordance with R&D Technical Report P5-066/TR Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination, indicated overleaf.
- The scope of the testing implemented considered the interpreted origin of the materials in association with their description. This is consistent with best practice under current contaminated land guidance. The chemical condition of these materials was assessed for a wide spectrum of potential contaminants, comprising a broad range of common organic and inorganic substances primarily of a toxic or phytotoxic nature, and appropriate to the past usage of the site.
- During sample collection, relevant information such as notes of field observations has been logged before transferring the samples to laboratory-prepared sample container of appropriate type. Care was also taken to minimise the aeration of samples during transfer to the jars/bottles.

3.2.12 Samples sent for chemical analysis were selected in order to provide site wide analysis and to provide representative coverage of the site. Samples were generally collected within the first meter of soil due to the limited potential for downward migration and the low risk to human health of any contaminants found at greater depths.



Site: Jaguar Land Rover, Halewood, Eastlands **Ref:** LW25-136	Drawing No. LW25-136/DRG/SI/04	LandWise geo-environmental consultants				
Title: Exploration Hole Location Plan	Scale. Not to Scale	Drawn HOL	Approved HOL	Revision. 01	Date 23/02/26	

3.2.13 At the generic assessment stage it should be assumed that all pathways, contained within the generic model applied, will be active. In reality, unless a contaminant is volatile (e.g. organic), exposure by direct contact is likely to be mitigated by the depth of the contaminant or available surface cover. Generally, direct contact with contaminants at greater than 600 mm depth, or under hardstanding is highly unlikely to occur, unless the ground is to be disturbed through removal of surfacing or earthworks.

Table 02 – Sampling Strategy

Rationale for Sampling at Different Depths	
Depth Range	**Rationale**
Ground Level – 1.0 m	To assess: • Human/ animal intake arising from ingestion and dermal contact. • Potential for wind entrainment leading to inhalation (of contaminated soils and dusts) or deposition onto neighbouring land. • Surface water run-off (e.g. due to flash flooding). • Uptake by shallow rooting plants (e.g. crops, ornamental and wild species). • Surface leaching to groundwater.
>1.0 m in made or natural ground	To assess: • Intake via ingestion/ inhalation/ dermal contact arising from 'abnormal' (or unpredicted) excavation (e.g. children digging dens) or for other purposes such as swimming pools, ponds, house extensions. • Uptake by deep rooting shrubs or trees. • Intake by or arising from the activities of burrowing animals. • Intake arising from construction/ maintenance of buildings and services, for example: a. Foundations (usually within 2.0 m of final formation level). b. Water supply pipes, telecommunications, gas and power (0.5 m to 1.0 m of final formation levels). c. Sewers (from 0.5 m to >1.0 m of final formation level). • To locate perched water of groundwater. • To confirm depth of made ground. • To locate possible lateral pathways for gas or vapour migration in made ground. • To establish the extent of any leaching of soluble constituents from superficial soils. • To detect 'deep' contamination (e.g. gas generating materials, leachable materials, dense solvents located above an impermeable stratum). • To obtain information on 'background' soil properties. • To locate 'natural' lateral migration pathways.

3.3 Analytical Procedures

3.3.1 Analytical procedures adopted during the chemical analyses, carried out on behalf of the consultant, conformed to recognised practices, allowing the award of UKAS accreditation (unless indicated otherwise).

4.0 RECORDED GROUND CONDITIONS

4.1 Ground Conditions

4.1.1 The ground conditions encountered during the site investigations were generally consistent with the anticipated sequence of strata indicated by the desk study information. The site was noted to be predominantly surfaced in gravel, tarmac and concrete hard standing. The areas out with hardstanding included soil stockpiles in the northern and central site area covered by rough vegetation. A soil bund is located to the east and south east of the trailer park which we understand has an environmental capping layer incorporated however it should be noted that the investigations did not extent to these bunds due to access constraints at the time. Furthermore, it was not advisable to penetrate the environmental capping layer owing to the known presence of asbestos impacted soils in within these bunds.

4.1.2 As was anticipated, thick made ground deposits were encountered, generally at least 3.00 m thick, although were noted to exceed 5.00 m thick in places. Many of the exploratory hole locations were terminated in the made ground deposits.

4.1.3 The ground investigations are briefly summarised in Table 03 below and the strata recorded in the borehole logs are summarised in Table 04 overleaf, with exploratory hole locations indicated on Drawing No. LW25/116/DRG/SI/06.

Table 03 – Summary of Ground Conditions

Strata Type	Depth Range (mbgl)	Visual Description
Hardstanding (42 No. out of 46 No. locations)	From 0.00 to 0.60	Described as 'black tarmac with medium angular to subangular gravel aggregate' and generally described as 'grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments'. Typically 0.30-0.40 m thick.
Made Ground (All Locations)	From 0.00 – >5.00	Made ground soils were generally variations of sandy gravelly clay soils with much extraneous material, predominantly demolition rubble. Locally these soils were sandy gravel or gravel and cobbles of demolition rubble.
Natural Cohesive Soils	From 2.30- >5.00	Typically described as 'firm becoming stiff (or stiff) brown and grey slightly silty slightly sandy slightly gravelly CLAY'.
Natural Granular Soils (TP08 and TP09)	From 1.30 - >3.20	Slightly gravelly clayey fine to coarse SAND.

4.2 Strata Encountered

Hard Standing

4.2.1 Approximately 30% of the site is surfaced by tarmac or concrete hardstanding. Approximately 40% of the site is surfaced by gravel/aggregates. The remaining 30% is surfaced by bunded soil stockpiles and rough vegetation. In order to minimise disruption to the site, many exploratory hole locations were relocated from areas of hardstanding to areas surfaced in gravel.

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Table 04 – Summary of Soils Recorded Within Boreholes

	Southern Site Area – Trailer Park													
Depth	BH01	BH02	BH03	BH04	BH05	BH06	BH07	BH08	BH09	BH21	BH22	BH23	BH24	BH25
0.10	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel
0.15														
0.20														
0.25														
0.30														
0.35														
0.40														
0.45														
0.50	MG – Stiff Sandy gravelly clay with brick, concrete and burnt shale. Rare wood	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale. Rare plastic	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale. Rare wood and plastic	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale	MG – Firm Sandy gravel with brick and burnt shale and occasional wood and plastic fragment and traces of ash and pockets of clay.	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale
0.60														
0.70														
0.80														
0.90														
1.00														
1.10														
1.20														
1.30														
1.40														
1.50														
1.60														
1.70														
1.80														
1.90														
2.00														
2.10														
2.20														
2.30														
2.40														
2.50														
2.60	MG – Stiff Sandy gravelly clay													
2.70														
2.80														
2.90														
3.00														
3.10														
3.20														
3.30														
3.40														
3.50														
3.60	Firm Sandy gravelly CLAY			Firm Silty sandy CLAY									Firm Sandy gravelly CLAY	
3.70														
3.80					Firm Silty gravelly CLAY					Firm Sandy gravelly CLAY				
3.90														
4.00														
4.10														
4.20														
4.30														
4.40		Firm Sandy gravelly CLAY												
4.50														
4.60														
4.70														
4.80														
4.90														
5.00														
5.10														
5.20														
5.30														
5.40														
5.50														

	Northern Site Area – Trailer Park										
Depth	BH10	BH11	BH12	BH13	BH14	BH15	BH16	BH17	BH18	BH19	BH20
0.10	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel	MG – Sandy clayey gravel
0.15											
0.20											
0.25											
0.30											
0.35											
0.40											
0.45											
0.50	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale. Rare plastic	MG – Soft to Firm Sandy gravelly clay with brick, concrete and burnt shale	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale. Rare plastic and wood.	MG – Stiff Sandy gravelly clay with brick, concrete and burnt shale. Rare wood.	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale	MG – Stiff Sandy gravelly clay with brick, concrete and burnt shale. Rare wood.	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale	MG – Firm Sandy gravelly clay with brick, concrete and burnt shale	MG – Stiff Sandy gravelly clay with brick, concrete and burnt shale
0.60											
0.70											
0.80											
0.90											
1.00											
1.10											
1.20											
1.30											
1.40											
1.50											
1.60											
1.70											
1.80											
1.90											
2.00											
2.10											
2.20											
2.30											
2.40					Stiff silty Gravelly CLAY						
2.50											
2.60											
2.70											
2.80											
2.90											
3.00											
3.10											
3.20											
3.30											
3.40											
3.50						Firm silty Gravelly CLAY					
3.60	Firm Sandy gravelly CLAY		Silty gravelly Sand with burnt shale and concrete								
3.70											
3.80											
3.90											
4.00											
4.10				Firm Sandy gravelly CLAY			Firm sandy Gravelly CLAY				
4.20											
4.30											
4.40											
4.50											
4.60											
4.70											
4.80											
4.90											
5.00									Firm sandy Gravelly CLAY	Firm silty sandy CLAY	Firm Sandy gravelly clay
5.10											
5.20											
5.30											
5.40											
5.50											

4.2.2 TP104 was located in an area covered by tarmacadam. In this location 'black tarmac with medium angular to subangular gravel aggregate' was recorded from ground level to 0.10 mbgl which was underlain by granular subbase to 0.35 mbgl, described as 'grey slightly sandy fine to coarse angular to subangular gravel of quarried aggregate'.

4.2.3 All locations apart from TP104, which was surfaced with tarmacadam, and TP111, TP114, and TP115, which were located away from the hardstanding areas, were located in areas of gravel hardstanding which was typically 0.30 m to 0.40 m thick and comprised of crushed aggregate described as 'grey slightly sandy fine to coarse angular to subangular gravel of quarried aggregate' or 'grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments'.

4.2.4 In 4 of 5 No. trial pit / soakaway locations, located in the HGV trailer storage yard in the south of the site, (SA101, SA102, TP101, TP102, and TP104) the gravel hardstanding was recorded to be underlain by a black plastic geotextile.

4.2.5 Within 4 No. locations in the west of the northern site area (SA103, TP106, TP112, and TP113) the gravel layer at the surface was only 0.10 m thick and described as 'brownish grey clayey sandy gravel of various lithology' or 'grey clayey sandy gravel of quarried aggregate with frequent extraneous fragments of blaes and brick', these strata were underlain by further granular made ground described as 'orange fine to coarse angular gravel of crushed brick and blaes' and 'multicoloured sandy gravelly cobbles of demolition rubble' to depths between 0.20 mbgl and 0.60 mbgl.

Made Ground

4.2.6 Made ground deposits were encountered within all exploratory hole locations with thickness ranging between 1.30 m and at least 5.00 m, though generally between 2.50 m and 4.00 m thick.

4.2.7 The majority of the made ground deposits were typically sandy gravelly clay soils with much extraneous material, predominantly demolition rubble with timber, ceramic, glass, burnt shale with more rare waste materials such as slag and ash. Locally made ground was more granular including crushed brick 'orange fine to coarse angular gravel of crushed brick and blaes with abundant whole bricks' or demolition materials without significant soil matrix 'multicoloured sandy gravelly cobbles and boulders of demolition rubble with rare timber.

4.2.8 The recorded thicknesses of made ground deposits is as indicated on Drawing No. LW25/136/DRG/SI/07

Glacial Till

4.2.9 The made ground deposits were recorded to be underlain by natural glacial till (proven in 18 of 46 No. locations) from depths ranging between 2.30 mbgl (BH14) and 4.30 mbgl (BH02), proven to 5.00 mbgl.

4.2.10 These soils were consistently described as ‘firm becoming stiff (or stiff) brown and grey slightly silty slightly sandy slightly gravelly CLAY’ or ‘firm becoming stiff brown and grey slightly silty slightly sandy CLAY with rare gravel’ or ‘firm brown grey mottled silty gravelly CLAY’.

Natural Granular Deposits

4.2.11 Within 2 No. locations in the north of the site (TP08 and TP09) natural sandy soils described as ‘dark grey slightly silty fine to medium SAND with frequent rootlets (presumed natural)’ were encountered below the made ground at depths between 1.30 mbgl and 2.70 mbgl and proven to 3.20 mbgl.

Rockhead

4.2.12 Rockhead was not encountered within any of the exploratory hole locations.



Site: Jaguar Land Rover, Halewood, Eastlands **Ref:** LW25-136	Drawing No. LW25-136/DRG/SI/07	LandWise geo-environmental consultants				
Title: Recorded Made Thickness	Scale. Not to Scale	Drawn HOL	Approved HOL	Revision. 01	Date 23/02/26	

4.3 Visual/Olfactory Evidence of Contamination

4.3.1 Hydrocarbon odours were recorded within 15 of 46 No. exploratory hole locations. These were described as 'moderate' in SA103, SA104, TP105-TP107, and TP111, and as 'slight' in TP101, TP108, TP110, TP112, TP113, BH03, BH06, BH12, and BH15.

4.3.2 Due to the potential for asbestos containing materials within the landfill soils, a watching brief was provided by the Beach Group. No ACMs were identified during the intrusive works.

4.4 Obstructions

4.4.1 BH11 was terminated on an obstruction at 1.80 mbgl, 2 No. additional positions were attempted, BH11A and BH11B, which were terminated on an obstruction at 1.90 mbgl and 1.95 mbgl, respectively. Nearby trial pit location TP107 recorded 'abundant cobbles and boulders of brick, stone block and concrete' within the made ground deposits from 0.80 mbgl to 1.50 mbgl which ties in with the refusal depths of the aforementioned boreholes.

4.4.2 TP111 was obstructed due to a large boulder sized concrete obstruction which whilst dislodged, was not able to be recovered from the pit. This boulder was recorded at 2.40 to 2.70 mbgl.

4.4.3 Occasional to abundant boulders of brick and concrete were recorded in 4 of 15 No. trial pit locations (TP107, TP108, TP110, and TP111) within the made ground deposits boreholes BH03, BH06, BH08, and BH23 were all terminated on obstructions within the made ground, presumed to be boulders of concrete or brick at depths between 2.50 mbgl and 4.00 mbgl, no additional positions were added at these locations.

4.5 Side-Wall Stability

4.5.1 Trial pits were generally stable, including pits excavated for the purpose of soakaway testing which were open for long periods of time. TP107 was recorded to be unstable below 1.70 mbgl in a made ground strata logged as 'sandy gravelly cobbles and boulders of demolition rubble with rare timber'.

4.6 Groundwater

4.6.1 During site works, groundwater ingress was recorded within 20 of 46 No. locations. Perched groundwater was recorded at 0.80 mbgl in TP03. A groundwater seepage was recorded in TP104, TP106, TP108, TP111 and TP112 at depths between 0.40 mbgl and 2.80 mbgl. Slow groundwater ingress was recorded within BH03. Rapid, but not rising, groundwater ingress was recorded in TP03, TP05 and TP07. Rising groundwater was recorded in TP02, BH02, BH06, and BH22. The most significant of these were TP02, where water rose rapidly from 1.20 to 0.80 mbgl, BH06, where water rose rapidly from 0.80 mbgl to 0.05 mbgl and BH22, where water rose from 2.00 mbgl to 1.00 mbgl. A summary of recorded water is provided below in Table 05 overleaf.

Table 05 – Summary of Recorded Water within Trial Pits and Boreholes

Trial Pit	Depth	Depth after 20 mins	Description	Soils at level of record
BH02	1.50	1.12	Water strike	Made Ground
BH03	2.00	2.00	Water strike	Made Ground
BH05	3.00	2.00	Water strike	Made Ground
BH06	1.00	0.05	Water strike	Made Ground
BH09	2.50	2.50	Water strike	Made Ground
BH10	2.50	2.50	Water strike	Made Ground
BH14	3.50	3.50	Water strike	Sandy gravelly CLAY
BH16	4.70	4.70	Water strike	Sandy gravelly CLAY
BH17	3.90	3.90	Water strike	Made Ground
BH22	2.00	1.00	Water strike	Made Ground
BH23	2.00	2.00	Water strike	Made Ground
TP102	1.20	0.80 (after 5 Mins)	Rapid Ingress	Made Ground
TP105	1.70	-	Rapid Ingress	Made Ground
TP107	2.40	-	Rapid Ingress	Made Ground
TP108	2.70	-	Seepage	Made Ground
TP111	0.70	-	Seepage	Made Ground
TP113	2.00	-	Moderate Ingress	Made Ground

4.6.2 To provide a more accurate assessment of groundwater behaviour, monitoring wells were installed within 10 No. boreholes (BH01 to BH03, BH08, BH09, BH12, BH17, BH19, BH23, and BH25). Groundwater monitoring has been undertaken on 1 No. occasion (results included in Appendix 03), with monitoring well locations indicated on Drawing No LW25/116/DRG/SI/06. The results of the groundwater depth monitoring are summarised in Table 06 below.

Table 6 – Summary of Groundwater Monitoring Data

Location	GW Depth (mbgl)	GW Level (mAOD)	Well Depth	Response Zone	Well Developed	Recovery	Sampled
BH01	2.32	19.31	4.85	Made Ground and Natural CLAY	Yes	5:00 mins	Yes
BH02	0.47	21.32	3.03	Made Ground	Yes	10:00 mins	Yes
BH03	0.66	20.94	2.78	Made Ground	Yes	5:00 mins	Yes
BH08	0.80	20.98	2.56	Made Ground	Yes	5:00 mins	Yes
BH09	1.19	20.47	3.82	Made Ground	Yes	No Recovery	N/A
BH12	2.70	19.18	4.70	Made Ground	Yes	No Recovery	N/A
BH17	2.36	20.23	3.90	Made Ground	Yes	No Recovery	N/A
BH19	DRY	DRY	3.67	Made Ground and Natural CLAY	N/A	N/A	N/A
BH23	0.72	20.71	2.47	Made Ground	Yes	No Recovery	N/A
BH25	Well could not be located – large area of standing water						

4.6.3 The information obtained during site works and from the well monitoring indicate that that water was encountered within the majority of the exploratory well installations. Although there is relative consistency of the water levels recorded (19.31mAOD – 21.32mAOD) within the wells, we consider that the water recorded is that of perched lenses rather than a pervasive groundwater body within the shallow soils. It is important to note that of the 9 No wells monitored that recovery of levels following purging was only in 4 No wells. We consider given the granular nature of the shallow made ground soils that the wells are filling with water sourced from surface water infiltration

and that the wells are essentially acting as sumps. We consider that the perched water recorded within the made ground soils is constrained to an extent by the underlying relatively impermeable cohesive natural clay. In conclusion, we do not consider a pervasive groundwater body exist within the shallow soils (made ground) underlying the site.

4.6.4 Notwithstanding the above it was noted that perched groundwater samples were able to be collected from 4 No monitoring well locations and therefore water can be expected within the shallow made ground soils and locally may be of significant volume likely driven by surface water infiltration.

4.6.5 Taking the above into account, given the inconsistent nature of the recorded groundwater, and the monitoring data information it was concluded that groundwater can be expected within the shallow soils but would not be considered as being pervasive.

5.0 CONTAMINATION RISK ASSESSMENT

5.1 Human Health and Groundwater Risk Assessment Screening Criteria

5.1.1 Consideration of analytical results against applicable, conservative risk-based screening criteria has been used to provide an assessment of risk using the chemical analysis results. A tiered risk-based approach comprises:

- Preliminary Risk Assessment (e.g., establishing potential pollutant linkages).
- Generic Quantitative Risk Assessment (GQRA) (e.g., the comparison of contaminant concentrations against Soil Guideline Values (SGV) or other Generic Assessment Criteria (GAC)); and
- Detailed Quantitative Risk Assessment (DQRA) (e.g., the comparison of contaminant concentrations against site specific assessment criteria).

5.1.2 A GQRA has been carried out as part of this assessment using the chemical analysis results made available to us. Soil chemical analysis data has been assessed in terms of risks to human health, vegetation and the built environment while leachate data and groundwater analysis has been assessed in terms of risks to the water environment. The GACs utilised are the Suitable 4 Use Levels (S4ULs) derived by LQM/CIEH, based on changes to the standard CLEA exposure parameters, as outlined in the DEFRA publication SP1010 (Category 4 Screening Levels (C4SLs) (March 2014). The S4ULs are derived in accordance with current UK legislation using the Environment Agencies CLEA software (v1.06) and led to the most current publication of CLEA (v1.071). Normally the CLEA software utilises the default exposure pathways and land use assumptions outlined in SR3 (Environment Agency 2009b). To implement the revised exposure and land use assumptions introduced by DEFRA publication SP1010, a number of modifications were made to the land use and receptor databases of the CLEA model. These changes are summarised in both DEFRA publication SP1010 (2014), and LQM/CIEH publication S4UL3203 (2015). These parameters are what was modified in CLEA v1.071.

5.1.3 The derived S4ULs are based on the concept of 'minimal tolerable risk' as described in SR2 (Environment Agency 2009a) which underpins all previous EA SGVs and other GACs. It should be noted that S4ULs do not incorporate any toxicological parameter changes to the CLEA base model, however recent toxicological data has been incorporated into the contaminant databases. Furthermore, S4UL GACs are equivalent to the previously published Environment agency SGVs, and previous iterations of LQM/CIEH GACs and as such are suitable for use in generic quantitative risk assessments under both planning and Part IIa regimes.

5.1.4 In this case we have utilised S4UL values appropriate for **commercial end use** and based on a soil organic matter (SOM) content of 2.5% (2.84% average SOM recorded in laboratory results).

5.2 Statistical Analysis of Data

5.2.1 Where appropriate, chemical data for soils can be considered statistically in general accordance with the guidelines given in the Chartered Institute of Environmental Health Publication *Guidance on comparing Soil Contamination Data with a Critical Concentration* (May 2008).

5.2.2 It should be noted that statistical analysis has not been undertaken as part of the risk assessment for this site.

5.3 Sample Depths

5.3.1 At the generic assessment stage, it should be assumed that all pathways contained within the generic model applied will be active. Unless a contaminant is volatile (e.g., organic), exposure by direct contact will likely be mitigated by the depth of the contaminant or available surface cover. Generally, direct contact with contaminants at greater than 600 mm depth or under hardstanding is highly unlikely to occur unless the ground is to be disturbed through removal of surfacing or earthworks.

5.4 Ground Gas Assessment

5.4.1 Notwithstanding the above, it is noted that the development proposals include for new car parking only with no proposals for enclosed or habitable spaces (i.e. new buildings). As such, it is considered that the potential for ground gas/vapour generation within the expected underlying ground conditions would have no material impact on site end users. Therefore, it is concluded that no further investigations will be required with respect to gas/vapour generation.

5.4.2 It should be noted that if during the course of development/maintenance of the car park manned excavations in excess of 1.20 m are required, it is our recommendation that these be treated as confined spaces and appropriate health and safety proposals put in place.

5.5 Building Materials Assessment

5.5.1 To determine the sustainability of water supply pipes, a preliminary assessment based on UKWIR guidance has been undertaken. Consideration has also been given to BRE Special Digest 1 Concrete in Aggressive Ground.

6.0 HUMAN HEALTH RISK ASSESSMENT

6.1 Contaminants in Soils

6.1.1 In keeping with the preliminary conceptual site model (Refer to Phase I Geo-Environmental Desk Study Report compiled by LandWise Consulting, February 2026, Second Edition), it was considered that owing to the site history there is a potential for chemical contaminants within the shallow soils, which could pose an adverse risk to human health. As such, it was considered prudent to undertake an assessment of the risk posed by chemical contaminants and asbestos within the shallow soils to human health.

6.1.2 As such, in the course of the intrusive site investigations, 39 No. samples of the shallow soils were collected from the soil boreholes and trial pits and sent for laboratory chemical testing. The testing included for a suite of heavy metals, TPH, PAH contaminants and asbestos. The testing was undertaken by Normec DETS, an accredited laboratory, with the chemical results included as Appendix 04. The number of samples collected was considered to be appropriate for the site (37m centres) (in line with BS5930 and BS10175). All 39 No. samples were collected from made ground deposits. It was noted that while the made ground deposits contained varying amounts of made ground material, predominantly demolition rubble, the matrix was typically a sandy gravelly clay.

6.1.3 The collected samples were analysed for a range of metal, hydrocarbon and asbestos contaminants. The laboratory test certificates are included in Appendix 04. An overview of the results is shown in Table 07 below.

6.1.4 The results were compared to guideline values appropriate to a commercial end use (with consideration to the proposed development of a car park), assuming 2.5% soil organic matter (2.84% average SOM recorded).

6.1.5 Within the shallow soils, our GQRA identified no exceedances of metal, TPH or PAH contaminants.

6.1.6 Asbestos was however identified in 9 of 39 No. samples (23% of samples tested). Quantification of the asbestos in these samples recorded results ranging from between <0.001% to 0.011% of the total sample mass.

Table 07 - Exceedance of Guideline Levels Commercial End-Use 2.5% SOM)*

Contaminant	Effect	Measured Concentrations in Excess of SGV[1] (mg/kg)		Measured Exceedance Concentrations (mg/kg)		SGV (mg/kg)	Source
		Made Ground	Natural	Made Ground	Natural		
Heavy Metal Contaminants							
Arsenic	Toxic	0 out of 39	N/A	-	N/A	640	LQM/CIEH S4ULs (2015)
Boron	Toxic	0 out of 39	N/A	-	N/A	240,00	LQM/CIEH S4ULs (2015)
Cadmium	Toxic	0 out of 39	N/A	-	N/A	190	LQM/CIEH S4ULs (2015)
Chromium III	Toxic	0 out of 39	N/A	-	N/A	8,600	LQM/CIEH S4ULs (2015)
Chromium VI	Toxic	0 out of 39	N/A	-	N/A	33	LQM/CIEH S4ULs (2015)
Copper	Toxic	0 out of 39	N/A	-	N/A	68,000	LQM/CIEH S4ULs (2015)
Lead	Toxic	0 out of 39	N/A	-	N/A	6,000	C4SL (DEFRA SP1010) (2014)
Mercury (Inorganic)	Toxic	0 out of 39	N/A	-	N/A	1,100	LQM/CIEH S4ULs (2015)
Nickel	Toxic	0 out of 39	N/A	-	N/A	980	LQM/CIEH S4ULs (2015)
Selenium	Toxic	0 out of 39	N/A	-	N/A	12,000	LQM/CIEH S4ULs (2015)
Zinc	Toxic	0 out of 39	N/A	-	N/A	730,000	LQM/CIEH S4ULs (2015)
Phenol	Toxic	0 out of 39	N/A	-	N/A	69	LQM/CIEH S4ULs (2015)
Aliphatic C5-C6	Toxic	0 out of 39	N/A	-	N/A	5,900	LQM/CIEH S4ULs (2015)
Aliphatic C6-C8	Toxic	0 out of 39	N/A	-	N/A	17,000	LQM/CIEH S4ULs (2015)
Aliphatic C8-C10	Toxic	0 out of 39	N/A	-	N/A	4,800	LQM/CIEH S4ULs (2015)
Aliphatic C10-C12	Toxic	0 out of 39	N/A	-	N/A	23,000	LQM/CIEH S4ULs (2015)
Aliphatic C12-C16	Toxic	0 out of 39	N/A	-	N/A	82,000	LQM/CIEH S4ULs (2015)
Aliphatic C16-C21	Toxic	0 out of 39	N/A	-	N/A	1,700,000	LQM/CIEH S4ULs (2015)

Aliphatic C16-C35	Toxic	0 out of 39	N/A	-	N/A	1,700,000	LQM/CIEH S4ULs (2015)
Aliphatic C21-C35	Toxic	0 out of 39	N/A	-	N/A	1,700,000	LQM/CIEH S4ULs (2015)
Aromatic C5-C7	Toxic	0 out of 39	N/A	-	N/A	46,000	LQM/CIEH S4ULs (2015)
Aromatic C7-C8	Toxic	0 out of 39	N/A	-	N/A	100,000	LQM/CIEH S4ULs (2015)
Aromatic C8-C10	Toxic	0 out of 39	N/A	-	N/A	8,100	LQM/CIEH S4ULs (2015)
Aromatic C10-C12	Toxic	0 out of 39	N/A	-	N/A	28,000	LQM/CIEH S4ULs (2015)
Aromatic C12-C16	Toxic	0 out of 39	N/A	-	N/A	37,000	LQM/CIEH S4ULs (2015)
Aromatic C16-C21	Toxic	0 out of 39	N/A	-	N/A	28,000	LQM/CIEH S4ULs (2015)
Aromatic C21-C35	Toxic	0 out of 39	N/A	-	N/A	28,000	LQM/CIEH S4ULs (2015)
Polycyclic Aromatic Hydrocarbon Contaminants							
Naphthalene	Toxic	0 out of 39	N/A	-	N/A	460	LQM/CIEH S4ULs (2015)
Acenaphthylene	Toxic	0 out of 39	N/A	-	N/A	97,000	LQM/CIEH S4ULs (2015)
Acenaphthene	Toxic	0 out of 39	N/A	-	N/A	97,000	LQM/CIEH S4ULs (2015)
Fluorene	Toxic	0 out of 39	N/A	-	N/A	68,000	LQM/CIEH S4ULs (2015)
Phenanthrene	Toxic	0 out of 39	N/A	-	N/A	22,000	LQM/CIEH S4ULs (2015)
Anthracene	Toxic	0 out of 39	N/A	-	N/A	540,000	LQM/CIEH S4ULs (2015)
Fluoranthene	Toxic	0 out of 39	N/A	-	N/A	23,000	LQM/CIEH S4ULs (2015)
Pyrene	Toxic	0 out of 39	N/A	-	N/A	54,000	LQM/CIEH S4ULs (2015)
Benzo(a)anthracene	Toxic	0 out of 39	N/A	-	N/A	170	LQM/CIEH S4ULs (2015)
Chrysene	Toxic	0 out of 39	N/A	-	N/A	350	LQM/CIEH S4ULs (2015)
Benzo(b)fluoranthene	Toxic	0 out of 39	N/A	-	N/A	44	LQM/CIEH S4ULs (2015)
Benzo(k)fluoranthene	Toxic	0 out of 39	N/A	-	N/A	1,200	LQM/CIEH S4ULs (2015)
Benzo(a)pyrene	Toxic	0 out of 39	N/A	-	N/A	35	LQM/CIEH S4ULs (2015)
Indeno(1,2,3-c,d)pyrene	Toxic	0 out of 39	N/A	-	N/A	510	LQM/CIEH S4ULs (2015)
Dibenz(a,h)anthracene	Toxic	0 out of 39	N/A	-	N/A	3.6	LQM/CIEH S4ULs (2015)
Benzo(g,h,i)perylene	Toxic	0 out of 39	N/A	-	N/A	4,000	LQM/CIEH S4ULs (2015)
Asbestos Contaminants							
Asbestos	Toxic	9 out of 39	N/A	0.005% (BH09 at 2.00 m) 0.011% (BH10 at 3.00 m) <0.001% (BH12 at 2.00 m) <0.001% (BH24 at 0.80 m) 0.002% (TP01 at 0.50 m) <0.001% (TP04 at 0.40 m) <0.001% (TP12 at 0.60 m) <0.001% (TP13 at 2.20 m) 0.002% (TP14 at 1.20 m)	N/A	Detection	HSE

* Based on SOM of 2.5%. Average SOM recorded as 2.84%

6.1.7 Comparing the heavy metal, TPH and PAH contaminant concentrations against appropriate guideline values, no concentrations were recorded above the guideline values. As such we do not consider a risk to human health from the heavy metal, TPH or TPH concentrations recorded within the shallow made ground soils.

6.1.8 Given the exceedances of asbestos within the made ground soils, we consider that these soils pose a human health risk to site end users. We consider that the proposed development of a car park however will break the source-pathway-receptor linkage in respect to human health risk and therefore areas surfaced with hardstanding will not require additional asbestos remedial measures. Should the development proposals include any areas of soft landscaping, we consider that in those areas an environmental capping layer with a basal high-visibility geotextile is required in order to break the source-pathway-receptor linkage.

7.0 CONTROLLED WATERS RISK ASSESSMENT

7.1 Water Environment Sensitivity Setting

7.1.1 The nearest identified watercourse indicated within the Envirocheck Report (Refer to Phase I Geo-Environmental Desk Study Report compied by LandWise Consulting, February 2026, Second Edition) is the Ram's Brook located 58 m southeast of the site, which flows to the south towards the River Mersey. This water course was not classified by the Environment Agency. The nearest surface water feature classified by the Environment Agency is the Mersey Estuary (ID: GB531206908100), approximately 1.9 km south of the site, which was classified as having a 'moderate ecological status' in 2022.

7.1.2 The 'DEFRA Magic Map' indicates the presence of a superficial aquifer which is designated as an undifferentiated secondary aquifer, i.e. of mixed permeability and therefore minor value.

7.1.3 The underlying bedrock aquifer was the Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone Aquifers Water Body (ID: GB41201G101700) which was classified by the Environment Agency as having an overall status of 'poor' in 2019. The Environment Agency classified the vulnerability of the groundwater to be 'low'.

7.1.4 We considered both the Ram's Brook surface water and the Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone aquifer to be potential sensitive receptors.

7.1.5 Given the inconsistent nature of the recorded groundwater strikes, and the monitoring data information it was concluded that groundwater can be expected within the shallow soils but would not be considered as being pervasive. In the event that a pervasive groundwater body were present we conjecture that hydraulic gradient would be to the south, in the direction of the Rams brook and Mersey Estuary beyond.

7.1.6 As the Rams Brook is 58m south east of the site boundary and the Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone aquifer is indicated to be beneath the site, it was considered that both of these be regarded as sensitive receptors. Therefore, a groundwater assessment has been undertaken as well as a surface water assessment.

7.2 Surface Water and Groundwater Assessments

7.2.1 The main objectives of the protection and remediation of groundwater under threat from land contamination are set out in the Environment Agency's Groundwater Protection: Principles and Practice (GP3) series of documents. When assessing risks to controlled waters the following need to be taken into consideration:

- Where pollutants have not yet entered groundwater, all necessary and reasonable measures must be taken to:
    - Prevent the input of hazardous substances into groundwater;
    - Limit the entry of other (non-hazardous) pollutants into groundwater so as to avoid pollution, and to avoid deterioration of the status of groundwater bodies or sustained, upward trends in pollutant concentration.

- Where hazardous substances or non-hazardous pollutants have already entered groundwater, the priority is to:
    - Minimise further entry of hazardous substances and non-hazardous pollutants into groundwater;
    - Take necessary and reasonable measures to limit the pollution of groundwater or impact on the status of the groundwater body from the future expansion of a contaminant 'plume', if necessary by actively reducing its extent.

7.2.2 Heavy metal leachate analysis, was carried out on 9 No. samples to determine the risks posed by the on-site conditions (if any) to the Controlled Waters. TPH and PAH leachate analyses was not undertaken on soils as we considered that should there be appreciable concentrations (leachate) of these contaminants within the soils that these would present within the water samples.

7.2.3 4 No. groundwater samples were obtained from BH01 to BH02, BH03 and BH08 and tested for a comprehensive suite of chemical analysis, including TPHs and PAHs.

7.2.4 The leachate and groundwater results have been compared to the appropriate guideline values (Tables 07 to XX). Where surface water is considered a primary risk, Environment Agency EQS values derived from The Water Framework Directive (Standards and Classification) Directions (England and Wales), 2015 (WFD), have been used. Where no EQS values were available we have resorted to the HO (4th Edition, 2017) guidelines and then laboratory limit of detection (LoD).

7.2.5 Where groundwater is considered a primary risk, Minimum Reporting Values (MRV) have been used as obtained from the Environmental Risk Assessment Framework, Environment Agency, April 2010. In the absence of an MRV we have reverted to UK Drinking Water Standards, then WHO (4th Edition, 2017) guidelines for drinking water quality and finally in the absence of these guidelines we have reverted to the laboratory limits of detection.

7.3 Surface Water Assessment

Leachate Analysis

7.3.1 The Ram's Brook is located 58m to the south east of the site and is considered a sensitive receptor. Therefore, the leachate results have been compared to the relevant assessment criteria as detailed above and as shown in Table 08 below.

TABLE 08 - Analysis of Leachate Samples Compared with Respective Standards

Potential Contaminant	EA EQS (µg/l)	WHO (2017)	Laboratory Limit of Detection (µg/l)	No of Samples Above Assessment Levels	Range of Concentrations which Exceeded Relevant Guidelines µg/l
Metals					
Arsenic	50	-	-	7 out of 9	BH03 3.00m 11.03ug/l BH09 2.00m 12.03ug/l BH12 2.00m 8.17ug/l BH14 0.50m 5.27ug/l TP01 0.50m 4.84ug/l TP11 0.20m 16.5ug/l TP12 0.60m 5.55ug/l
Cadmium	0.25	-	-	0 out of 9	
Chromium III	4.7	-	-	0 out of 9	
Copper	1	-	-	9 out of 9	BH03 3.00m 8.84ug/l BH04 0.50m 2.11ug/l BH09 2.00m 10.08ug/l BH12 2.00m 6.63ug/l BH14 0.50m 5.04ug/l TP01 0.50m 5.32ug/l TP11 0.20m 12.46ug/l TP12 0.60m 9.9ug/l TP13 2.20m 5.49ug/l
Lead	1.2	-	-	9 out of 9	BH03 3.00m 34.48ug/l BH04 0.50m 3.2ug/l BH09 2.00m 36.05ug/l BH12 2.00m 19.29ug/l BH14 0.50m 13ug/l TP01 0.50m 19.65ug/l TP11 0.20m 23.84ug/l TP12 0.60m 26.82ug/l TP13 2.20m 8.85ug/l
Mercury	0.07	-	-	0 out of 9	-
Nickel	4	-	-	5 out of 9	BH03 3.00m 7.17ug/l BH09 2.00m 8.63ug/l BH12 2.00m 5.29ug/l TP11 0.20m 11.3ug/l TP12 0.60m 4.79ug/l
Selenium	-	4	-	0 out of 9	-
Zinc	10.9	-	-	8 out of 9	BH03 3.00m 24.17ug/l BH09 2.00m 33.75ug/l BH12 2.00m 25.34ug/l BH14 0.50m 21.7ug/l TP01 0.50m 16.08ug/l TP11 0.20m 51ug/l TP12 0.60m 111.6ug/l TP13 2.20m 22.04ug/l
Phenols					
Phenols – Monohydric	7.7	-	-	0 out of 9	-

7.3.2 When screening against EQS values to assess the risk to a surface water receptor (i.e. Ram's Brook), the leachate results indicate widespread elevated exceedances of the contaminants of arsenic, copper, lead, nickel and zinc. It is therefore considered that these contaminants may be mobile and pose a risk to the surface water environment.

Groundwater Analysis

7.3.3 4 No. groundwater water samples were obtained from BH01 to BH02, BH03 and BH08. These samples have been screened against the relevant EQS thresholds for surface waters. The highest concentrations recorded in excess of guideline values is highlighted in bold text.

TABLE 09 - Analysis of Groundwater Samples Compared with Respective Standards

Potential Contaminant	EA EQS (µg/l)	WHO (2017)	Laboratory Limit of Detection (µg/l)**	No of Samples Above Assessment Levels	Range of Concentrations which Exceeded Relevant Guidelines mg/l
Metals					
Arsenic	50	-	-	0 out of 4	
Boron (water soluble)	2000	-	-	0 out of 4	
Cadmium	0.25	-	-	0 out of 4	
Chromium III	4.7	-	-	0 out of 4	
Copper	1	-	-	0 out of 4	
Lead	1.2	-	-	2 out of 4	**BH02 4.11ug/l** BH03 2.21ug/l
Mercury	0.07	-	-	2 out of 4	**BH02 24.29ug/l** BH03 4.65ug/l
Nickel	4	-	-	0 out of 4	
Selenium	-	4	-	0 out of 4	
Zinc	10.9	-	-	4 out of 4	**BH01 63.52 ug/l** BH02 11.64ug/l BH03 41.17ug/l BH08 53.53ug/l
Total Cyanide	1	-	-	4 out of 4	BH01 2.6 ug/l **BH02 13ug/l** BH03 11ug/l BH08 2.2ug/l
Total Petroleum Hydrocarbons (TPHs)					
Aliphatic C5-C6	-	-	0.1	0 out of 4	
Aliphatic C6-C8	-	-	0.1	0 out of 4	
Aliphatic C8-C10	-	-	0.1	0 out of 4	
Aliphatic C10-C12	-	-	1.0	1 out of 4	**BH01 11ug/l**
Aliphatic C12-C16	-	-	1.0	2 out of 4	**BH01 23ug/l** BH02 2.5ug/l
Aliphatic C16-C21	-	-	1.0	2 out of 4	**BH01 130ug/l** BH02 16ug/l
Aliphatic C21-C35	-	-	1.0	2 out of 4	**BH01 600ug/l** BH02 99ug/l
Total Aliphatic Hydrocarbons (C5-C35)	-	-	10.0	0 out of 4	
Aromatic C5-C7	-	-	0.1	0 out of 4	
Aromatic C7-C8	-	-	0.1	0 out of 4	
Aromatic C8-C10	-	-	0.1	0 out of 4	
Aromatic C10-C12	-	-	1.0	3 out of 4	BH02 13ug/l BH03 10ug/l **BH08 54ug/l**
Aromatic C12-C16	-	-	1.0	3 out of 4	BH02 13ug/l BH03 9.9ug/l **BH08 160ug/l**
Aromatic C16-C21	-	-	1.0	4 out of 4	BH01 41 ug/l BH02 15ug/l BH03 7ug/l **BH08 130ug/l**
Aromatic C21-C35	-	-	1.0	4 out of 4	**BH01 280 ug/l** BH02 43ug/l BH03 5.4ug/l BH08 140ug/l
Total Aromatic Hydrocarbons (C5-	N/A	-	10.0	0 out of 4	

C35)					
Total Petroleum Hydrocarbons (Aliphatics and Aromatics (C5-C35)	N/A	-	N/A	0 out of 4	
Polycyclic Aromatic Hydrocarbons (PAHs)-					
Naphthalene	2	-	-	4 out of 4	BH01 3.1 ug/l **BH02 170ug/l** BH03 3.5ug/l BH08 3.3ug/l
Acenaphthylene	-	-	0.01	4 out of 4	BH01 0.28 ug/l BH02 <10.00ug/l BH03 0.15ug/l BH08 0.14ug/l
Acenaphthene	-	-	0.01	4 out of 4	BH01 2.8 ug/l **BH02 120ug/l**
Fluorene	-	-	0.01	4 out of 4	BH01 2.0 ug/l **BH02 89ug/l** BH03 2.8ug/l BH08 2.6ug/l
Phenanthrene	-	-	0.01	4 out of 4	BH01 6.8 ug/l **BH02 450ug/l** BH03 3.7ug/l BH08 3.3ug/l
Anthracene	0.1	-	-	4 out of 4	BH01 1.6 ug/l **BH02 130ug/l** BH03 1.7ug/l BH08 1.1ug/l
Fluoranthene	0.0063	-	-	4 out of 4	BH01 8.1 ug/l **BH02 450ug/l** BH03 6.6ug/l BH08 5.6ug/l
Pyrene	-	-	0.01	4 out of 4	BH01 8.0 ug/l **BH02 410ug/l** BH03 5.6ug/l BH08 4.8ug/l
Benzo[a]anthracene	-	-	0.01	4 out of 4	BH01 4.3 ug/l **BH02 170ug/l** BH03 1.7ug/l BH08 0.90ug/l
Chrysene	-	-	0.01	4 out of 4	BH01 3.4 ug/l **BH02 130ug/l** BH03 0.96ug/l BH08 0.70ug/l
Benzo(b)fluoranthene	0.00017	-	-	4 out of 4	BH01 4.9 ug/l **BH02 220ug/l** BH03 1.1ug/l BH08 0.77ug/l
Benzo(k)fluoranthene	0.00017	-	-	4 out of 4	BH01 2.1 ug/l **BH02 110ug/l** BH03 0.52ug/l BH08 0.38ug/l
Benzo(a)pyrene	0.00017	-	-	4 out of 4	BH01 4.2 ug/l **BH02 160ug/l** BH03 0.99ug/l BH08 0.70ug/l
Indeno(1,2,3-c,d)Pyrene	0.00017	-	-	4 out of 4	BH01 2.5 ug/l **BH02 110ug/l** BH03 0.55ug/l BH08 0.39ug/l
Dibenzo(a,h)anthracene	-	-	0.01	4 out of 4	BH01 0.57 ug/l **BH02 25ug/l** BH03 0.11ug/l BH08 0.09ug/l
Benzo(g,h,i)perylene	0.00017	-	-	4 out of 4	BH01 2.6 ug/l **BH02 110ug/l** BH03 0.46ug/l BH08 0.34ug/l
Total PAHs	-	-	N/A	0 out of 4	
Phenols					
Phenols – Monohydric	7.7	-	-	0 out of 4	

7.3.4 Against current guideline values, the laboratory testing of the groundwater samples identified exceedances of the contaminants: lead, mercury, zinc, cyanide, 8 No. TPH fractions, and 16 No. PAH fractions. It is noted that arsenic, copper, nickel and zinc are not recorded at concentrations above the EQS thresholds in the groundwater samples, which indicates that although potentially leachable concentrations of these contaminants were identified within the soils on site, they are not leaching at elevated concentrations into the groundwater. EQS exceedances of lead and mercury were identified within 2 No. groundwater samples and leachable concentrations were also recorded within the leachate samples. Exceedances of zinc and cyanide were identified within 4 No. groundwater samples however, no such exceedances were recorded within leachate soil samples. EQS guideline values assume that zinc and lead are 100% bioavailable; further assessment of these contaminants will be made using the M-BAT tool and lead screening tool. It should be noted, for the purpose of our risk assessment we have assumed that non-detects/ concentrations below the LoD are considered to pose a low risk to the surface Controlled Waters.

Bioavailability Assessment

7.3.5 Most EQS's for metal in water are based on the amount of the contaminant that is bioavailable in the water. Consequently, to assess the risk posed by zinc to the surface water environment we have utilised the UKTAG River and Lake Assessment Method Specific Pollutants (Metals) Bioavailability Assessment Tool (M-BAT) by the Water Framework Directive – United Kingdom Technical Advisory Group (WFD- UKTAG), 2014. The tool predicts the bioavailable concentration of copper, nickel and zinc based on site conditions including pH, calcium and dissolved organic carbon (DOC).

7.3.6 The exceedances of copper, nickel and zinc identified in the groundwater samples were modelled using the M-BAT tool. The results compiled in Table 10 below.

TABLE 10 - Results of UKTAG Metal Bioavailability Tool (M-BAT)

Sample ID	Contaminant	Recorded Exceedance (µg/l)	Target Value – EQS (µg/l)	Max Bioavailable Concentration (µg/l)
BH01	Zinc	63.52 ug/l	10.9	29.85
BH02	Zinc	11.64ug/l	10.9	5.44
BH03	Zinc	41.17ug/l	10.9	18.64
BH08	Zinc	53.53ug/l	10.9	26.19

7.3.7 Following application of the M-BAT tool (Appendix 5), the results indicate that the bioavailable of zinc within BH01, BH03 and BH08 are recorded to be above the utilised EQS values by a approximate factor of two in the case of BH03 and an approximate factor of three in BH01 and BH08.

7.3.8 We have similarly utilised the lead screening tool to determine the bioavailable concentration of lead in the surface water, the results of which indicated that the concentrations of lead bioavailable to the water environment were recorded to be below the relevant EQS guideline values in BH02 but not in BH03 which marginally exceed the guideline value. As such we consider the lead contaminants recorded within the sample

collected from BH03 poses a risk to the surface water environment. Therefore, further modelling will be undertaken to further assess the risk.

Table 11 – Results of UKTAG Lead Screening Tool

Metal	Location of Recorded Exceedance	Concentration Recorded (µg/l)	Bioavailable Concentration (µg/l)	Target Value (EQS µg/l)	Bioavailable Concentration Above EQS?
Lead	BH02	4.11	1.28	1.2	Yes
Lead	BH03	2.21	0.57	1.2	No

Groundwater Modelling

7.3.9 Groundwater modelling of the potential risk of the identified contaminants to the surface environment was undertaken. We utilized RD P20 RTM (V3.2) published by the Environment Agency in our assessment and a copy of the model is included in Appendix 5.

7.3.10 The highest contaminant concentrations recorded are highlighted in Table 08 above and it is these concentrations that have been modelled. The model input parameters are presented in Table 12 and table 13 below;

TABLE 12 – P20 Modelling Parameter Justifications

Criteria	Value Utilised (Superficial Soils)	Justification
Width of plume in aquifer at source	165m	The width of plume is the distance between wells laterally or down gradient where samples did not record an elevated contaminant concentration. Where the plume is not constrained by the data collected, we consider using the width of the site to be an appropriately conservative approach
Plume thickness at source	BH01 – 0.768m BH02 – 0.953m BH03 – 0.934m BH08 – 0.920m	Plume thickness has been estimated at 10% saturated aquifer thickness, as most contaminant plumes typically only affect the top half meter of the aquifer, or beyond the top half meter, the contaminant will quickly mix to a lesser concentration.
Saturated aquifer thickness	BH01 – 7.68m BH02 – 9.53m BH03 – 9.34m BH08 – 9.20m	Utilises depth of water recorded in borehole with maximum exceedances of contamination. BH01 = GW level recorded between 2.32mbgl and rockhead level conjectured at 10.00mbgl = 7.68m water column BH02 = GW level recorded between 0.47mbgl and rockhead level conjectured at 10.00mbgl = 9.53m water column BH03 = GW level recorded between 0.66mbgl and rockhead level conjectured at 10.00mbgl = 9.34m water column BH08 = GW level recorded between 0.80mbgl and rockhead level conjectured at 10.00mbgl = 9.2m water column
Bulk density of aquifer materials	2.01 g/cm^3	Testing of the site soils (made) indicated to have a minimum bulk density of 2.01 g/cm^3). The average bulk density of the natural clay soils is indicated to be 2.126g/cm^3. We have utilised 2.01g/cm^3 as this is considered more conservative.
Effective porosity of aquifer	55 fraction	Freeze and Cherry (1979) indicated glacial till to have a porosity of between 0.40 and 0.70 so we have used the mean of 0.55.
Hydraulic gradient	0.057 – 0.0917	BH01 (19.31 mAOD - 16.00 mAOD (Rams Brook) / 58 = 0.057) BH02 (21.32 mAOD - 16.00 mAOD (Rams Brook) / 58 = 0.0917)

		BH03 (20.94 mAOD - 16.00 mAOD (Rams Brook) / 58 = 0.08517) BH08 (20.98 mAOD - 16.00 mAOD (Rams Brook) / 58 = 0.08586)
Hydraulic conductivity of aquifer	0.000864 m/day	The academic value for glacial till is 10^{-7} to 10^{-1}. The academic value for silty sand is 10^{-5} to 10^{-1} .We have used a value of 10^{-6} as this is considered conservative. From the site investigation undertaken it is known that the made ground deposits are underlain by cohesive glacial till soils. Source: Freeze and Cherry (1979).
Distance to compliance point	BH01 – 220m BH02 – 210m BH03 – 135m BH08 – 240m	The distance to the nearest surface water body, the 'Rams Brook', from the borehole location being modelled.

TABLE 13 – P20 Groundwater Modelling Justifications (Kd and Half Life)

	Substance	Kd (l/kg)	Reference	Half Life (days)	Reference
Metals	Zinc	30651	EPA 2005	Metal – assumed no decay	N/A
	Mercury	6309			
	Selenium	923.4			
	Cadmium	3981			
	Copper	8175			
	Lead	15849			
	Nickel	5629.5			
PAHs	Naphthalene	1700579		258	Howard et al. – document presents half-lives as a range, and so the most conservative value was utilised.
	Acenaphthylene	234897		120	
	Acenaphthene	2834714		204	
	Fluorene	1709756		120	
	Phenanthrene	142969599		401.5	
	Fluoranthene	10926014		879.65	
	Anthracene	4196816		919.8	
	Pyrene	13577369		3796	
	Benzo(a,h)anthracene	6165924		1361.45	
	Chrysene	5956863		2000	
	Benzo[b]fluoranthene	4049020		1219	
	Benzo[k]fluoranthene	2272222		4270.5	
	Benzo[a]pyrene	6659477		1058.5	
	Indeno(1,2,3-c,d)Pyrene	2919608		1460	
	Benzo[g,h,i]perylene	4216667		1314	
	Phenol	83.17		7	
TPHs	Aliphatic C5-C6	631		16	
	Aliphatic C6-C8	3162.3		28	
	Aliphatic C8-C10	31623		60	
	Aliphatic C10-C12	316228		102	
	Aliphatic C12-C16	316228		440	
	Aliphatic C16-C21	398107171		530	
	Aliphatic C21-C35	398107171		730	
	Aliphatic C5-C35	398107171		730	
	Aromatic C5-C7	79.4		16	
	Aromatic C7-C8	251.2		28	
	Aromatic C8-C10	1259		60	
	Aromatic C10-C12	3162.3		102	
	Aromatic C12-C16	6310		440	
	Aromatic C16-C21	15849		530	
	Aromatic C21-C35	125893		730	
	Aromatic C5-C35	125893		730	

EPA: Partition Coefficients for Metals in Surface Water, Soil and Waste, July 2005 (EPA/600/R-05/074)

7.3.11 The results of the modelling are shown in Table 16 and are included in Appendix 05.

TABLE 14 - Results of P20 Groundwater Modelling to the Ram's Brook

Contaminant	Maximum Recorded Exceedance (µg/l)	Target Value (µg/l)	Target Value Source	Final Concentration (µg/l)
Lead	BH02 4.11ug/l	1.20	EA EQS	$2.48X10^{-32}$
Mercury	BH02 24.29ug/l	0.07	EA EQS	$2.44X10^{-19}$
Zinc	BH01 63.52 ug/l	10.9	EA EQS	$5.50X10^{-58}$
Cyanide	BH02 13ug/l	1	EA EQS	1.03
Aliphatic C10-C12	BH01 11ug/l	1.0	LoD	$3.38X10^{-176}$
Aliphatic C12-C16	BH01 23ug/l	1.0	LoD	$7.13X10^{-84}$
Aliphatic C16-C21	BH01 130ug/l	1.0	LoD	$1.56X10^{-78}$
Aliphatic C21-C35	BH01 600ug/l	1.0	LoD	$2.34X10^{-66}$
Aromatic C10-C12	BH08 54ug/l	1.0	LoD	$4.95X10^{-149}$
Aromatic C12-C16	BH08 160ug/l	1.0	LoD	$2.87X10^{-73}$
Aromatic C16-C21	BH08 130ug/l	1.0	LoD	$6.69X10^{-64}$
Aromatic C21-C35	BH01 280 ug/l	1.0	LoD	$8.97X10^{-54}$
Naphthalene	BH02 170ug/l	2.0	EA EQS	$2.14X10^{-83}$
Acenaphthylene	BH01 0.28 ug/l	0.01	LoD	$6.07X10^{-164}$
Acenaphthene	BH02 120ug/l	0.01	LoD	$2.97X10^{-94}$
Fluorine	BH02 89ug/l	0.01	LoD	$9.55X10^{-123}$
Phenanthrene	BH02 450ug/l	0.01	LoD	$6.26X10^{-66}$
Anthracene	BH02 130ug/l	0.1	EA EQS	$4.15X10^{-43}$
Fluoranthene	BH02 450ug/l	0.0063	EA EQS	$1.35X10^{-43}$
Pyrene	BH02 410ug/l	0.01	LoD	$1.50X10^{-22}$
Benzo[a]anthracene	BH02 170ug/l	0.01	LoD	$6.74X10^{-35}$
Chrysene	BH02 130ug/l	0.01	LoD	$1.75X10^{-31}$
Benzo[b]fluoranthene	BH02 220ug/l	0.00017	EA EQS	$6.58X10^{-37}$
Benzo[k]fluoranthene	BH02 110ug/l	0.00017	EA EQS	$7.60X10^{-19}$
Benzo[a]pyrene	BH02 160ug/l	0.00017	EA EQS	$6.19X10^{-40}$
Indeno(1,2,3-c,d)Pyrene	BH02 110ug/l	0.00017	EA EQS	$8.36X10^{-34}$
Dibenz(a,h)anthracene	BH02 25ug/l	0.01	LoD	$3.56X10^{-30}$
Benzo(g,h,i)perylene	BH02 110ug/l	0.00017	EA EQS	$9.35X10^{-36}$

7.3.12 When modelling to the Rams Brook the final concentrations of contaminants are indicated to be below the appropriate guideline values. As such we do not consider the a risk to the nearest surface water receptor, the Rams Brook from the recorded site conditions.

7.4 Groundwater Assessment

7.4.1 Given the inconsistent nature of the recorded groundwater strikes, and the monitoring data information it was concluded that groundwater can be expected within the shallow soils but would not be considered as being pervasive. The Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone aquifer is indicated within the bedrock beneath the site.

7.4.2 As the Lower Mersey Basin and North Merseyside Permo-Triassic Sandstone aquifer is indicated to be beneath the site, it was considered these should be regarded as sensitive receptors. Therefore, a groundwater assessment has been undertaken in addition to the surface water assessment.

Leachate Analysis

7.4.3 The leachate results have been compared to the relevant assessment criteria pertaining to groundwater receptor as detailed above and as shown in Table 15 below.

TABLE 15 - Leachate Analysis for Groundwater Compared with Respective Standards

Potential Contaminant	MRV/Drinking Water Standards (µg/l)	WHO (4th Edition, First Addendum 2017) (µg/l)	Laboratory Limit of Detection (µg/l)	No of Samples Above Assessment Levels	Range of Concentrations which Exceeded Relevant Guidelines (µg/l)
Metals					
Arsenic	10	-	0.2	0 out of 9	
Cadmium	5	-	0.11	0 out of 9	
Chromium	50	-	0.5	0 out of 9	
Copper	2000	-	0.5	0 out of 9	
Mercury (inorganic low level))	1	-	0.05	0 out of 9	
Nickel	20	-	0.5	0 out of 9	
Lead	10	-	0.5	7 out of 9	BH03 3.00m 34.48ug/l BH09 2.00m 36.05ug/l BH12 2.00m 19.29ug/l BH14 0.50m 13ug/l TP01 0.50m 19.65ug/l TP11 0.20m 23.84ug/l TP12 0.60m 26.82ug/l
Selenium	10	-	0.5	0 out of 9	
Zinc	-	2000	2.5	0 out of 9	
Phenols					
Total Phenols	-	-	0.5	0 out of 9	

7.4.4 Against current guideline values, the leachate testing identified exceedances of lead in 7 out of 9 No samples. It is therefore considered that lead contaminants may be mobile and pose a risk to the surface water environment.

Groundwater Analysis

7.4.5 4 No. groundwater water samples were obtained from BH01 to BH02, BH03 and BH08. These samples have been screened against the relevant guideline thresholds for groundwater. The highest concentrations recorded in excess of guideline values is highlighted in bold text.

TABLE 16 - Analysis of Groundwater Samples Compared with Respective Standards

Potential Contaminant	MRV/Drinking Water Standards (µg/l)	WHO (4th Edition, First Addendum 2017) (µg/l)	Laboratory Limit of Detection (µg/l)	No of Samples Above Assessment Levels	Range of Concentrations which Exceeded Relevant Guidelines (µg/l)
Metals					
Arsenic	10	-	0.2	2 out of 4	**BH02 21.40ug/l** BH03 10.24ug/l
Cadmium	5	-	0.11	0 out of 4	-
Chromium	50	-	0.5	0 out of 4	-
Copper	2000	-	0.5	0 out of 4	-
Mercury (inorganic low level))	1	-	0.05	0 out of 4	-
Nickel	20	-	0.5	1 out of 4	**BH02 24.29ug/l**
Lead	10	-	0.5	0 out of 4	-
Selenium	10	-	0.5	0 out of 4	-
Zinc	-	2000	2.5	0 out of 4	-
Inorganics					
Cyanide	50	-	0.1	0 out of 4	
Sulphate	250 (mg/l)	-	1 (mg/l)	2 out of 4	**BH02 310ug/l**
Total Petroleum Hydrocarbons (TPHs)					
Aliphatic C5-C6	-	-	0.1	0 out of 4	
Aliphatic C6-C8	-	-	0.1	0 out of 4	
Aliphatic C8-C10	-	-	0.1	0 out of 4	
Aliphatic C10-C12	-	-	1.0	1 out of 4	BH01 11ug/l
Aliphatic C12-C16	-	-	1.0	2 out of 4	**BH01 23ug/l** BH02 2.5ug/l
Aliphatic C16-C21	-	-	1.0	2 out of 4	**BH01 130ug/l** BH02 16ug/l
Aliphatic C21-C35	-	-	1.0	2 out of 4	**BH01 600ug/l** BH02 99ug/l
Total Aliphatic C5-C35	N/A	N/A	10	0 out of 4	N/A
Aromatic C5-C7	-	-	0.1	0 out of 4	-
Aromatic C7-C8	-	-	0.1	0 out of 4	-
Aromatic C8-C10	-	-	0.1	0 out of 4	-
Aromatic C10-C12	-	-	1.0	3 out of 4	BH02 13ug/l BH03 10ug/l **BH08 54ug/l**
Aromatic C12-C16	-	-	1.0	3 out of 4	BH02 13ug/l BH03 9.9ug/l **BH08 160ug/l**
Aromatic C16-C21	-	-	1.0	4 out of 4	BH01 41 ug/l BH02 15ug/l BH03 7ug/l **BH08 130ug/l**
Aromatic C21-C35	-	-	1.0	4 out of 4	**BH01 280 ug/l** BH02 43ug/l BH03 5.4ug/l BH08 140ug/l
Total Aromatics C5-C25	-	-	10	0 out of 4	N/A
Total Aliphatics and Aromatic C5-C35	N/A	N/A	10	0 out of 4	N/A
Polycyclic Aromatic Hydrocarbons (PAHs)					
Naphthalene	-	-	0.05	4 out of 4	BH01 3.1 ug/l

					BH02 170ug/l BH03 3.5ug/l BH08 3.3ug/l
Acenaphthylene	-	-	0.01	4 out of 4	**BH01 0.28 ug/l** BH02 <10.00ug/l BH03 0.15ug/l BH08 0.14ug/l
Acenaphthene	-	-	0.01	2 out of 4	BH01 2.8 ug/l **BH02 120ug/l**
Fluorene	-	-	0.01	4 out of 4	BH01 2.0 ug/l **BH02 89ug/l** BH03 2.8ug/l BH08 2.6ug/l
Phenanthrene	-	-	0.01	4 out of 4	BH01 6.8 ug/l **BH02 450ug/l** BH03 3.7ug/l BH08 3.3ug/l
Anthracene	-	-	0.01	4 out of 4	BH01 1.6 ug/l **BH02 130ug/l** BH03 1.7ug/l BH08 1.1ug/l
Fluoranthene	0.1	-	0.01	4 out of 4	BH01 8.1 ug/l **BH02 450ug/**l BH03 6.6ug/l BH08 5.6ug/l
Pyrene	-	-	0.01	4 out of 4	BH01 8.0 ug/l **BH02 410ug/l** BH03 5.6ug/l BH08 4.8ug/l
Benzo(a)anthracene	-	-	0.01	4 out of 4	BH01 4.3 ug/l **BH02 170ug/l** BH03 1.7ug/l BH08 0.90ug/l
Chrysene	-	-	0.01	4 out of 4	BH01 3.4 ug/l **BH02 130ug/l** BH03 0.96ug/l BH08 0.70ug/l
Benzo(b)fluoranthene	0.1	-	0.01	4 out of 4	BH01 4.9 ug/l **BH02 220ug/l** BH03 1.1ug/l BH08 0.77ug/l
Benzo(k)fluoranthene	0.1	-	0.01	4 out of 4	BH01 2.1 ug/l **BH02 110ug/l** BH03 0.52ug/l BH08 0.38ug/l
Benzo(a)pyrene	0.01	-	0.01	4 out of 4	BH01 4.2 ug/l **BH02 160ug/l** BH03 0.99ug/l BH08 0.70ug/l
Indeno(123-cd)pyrene	0.1	-	0.01	4 out of 4	BH01 2.5 ug/l **BH02 110ug/l** BH03 0.55ug/l BH08 0.39ug/l
Dibenzo(a,h)anthracene	-	-	0.01	4 out of 4	BH01 0.57 ug/l **BH02 25ug/l** BH03 0.11ug/l BH08 0.09ug/l
Benzo(ghi)perylene	0.1	-	0.1	4 out of 4	BH01 2.6 ug/l **BH02 110ug/l** BH03 0.46ug/l BH08 0.34ug/l
Total PAH's	N/A	N/A	0.2	0 out of 4	N/A
Phenols					
Total Phenols	-	-	0.5	0 out of 4	-

* Based on an average water hardness of 343.14 mg/l.
** Most conservative laboratory Limit of Detection (LoD) value used as no reporting value was available in the EA EQS or WHO (2017) document.

7.4.6 Against current guideline values, the laboratory testing of the groundwater samples identified exceedances of the contaminants: arsenic, nickel and sulphate, 8 No. TPH fractions, and 16 No. PAH fractions. It is noted

that lead is not recorded at concentrations above the EQS thresholds in the groundwater samples, which indicates that although potentially leachable concentrations of these contaminants were identified within the soils on site, they are not leaching at elevated concentrations into the groundwater. It should be noted, for the purpose of our risk assessment we have assumed that non-detects/ concentrations below the LoD are considered to pose a low risk to the surface Controlled Waters.

Groundwater Modelling

7.4.7 Modelling of the potential risk of the identified contaminants to the bedrock aquifer was undertaken. We utilized RD P20 RTM (V3.2) published by the Environment Agency in our assessment and a copy of the model is included in Appendix 5.

7.4.8 As the site is located within a sewered urban area, and that there are significant infrastructural and commercial developments in the surrounding area, we considered that exploitation of the groundwater would not be feasible for the foreseeable future. A 250 m compliance point was chosen to give an indication of the impact to the wider groundwater environment, in the absence of an identified receptor.

7.4.9 The highest contaminant concentrations recorded are highlighted in Table 08 above and it is these concentrations that have been modelled. The model input parameters are presented in Table 17 and table 18 below;

TABLE 17 – P20 Modelling Parameter Justifications

Criteria	Value Utilised (Superficial Soils)	Value Utilised (bedrock)	Justification
Width of plume in aquifer at source	165m		The width of plume is the distance between wells laterally or down gradient where samples did not record an elevated contaminant concentration. Where the plume is not constrained by the data collected, we consider using the width of the site to be an appropriately conservative approach
Plume thickness at source	BH01 – 0.768m BH02 – 0.953m BH03 – 0.934m BH08 – 0.920m		Plume thickness has been estimated at 10% saturated aquifer thickness, as most contaminant plumes typically only affect the top half meter of the aquifer, or beyond the top half meter, the contaminant will quickly mix to a lesser concentration.
Saturated aquifer thickness	BH01 – 7.68m BH02 – 9.53m BH03 – 9.34m BH08 – 9.20m		Utilises depth of water recorded in borehole with maximum exceedances of contamination. BH01 = GW level recorded between 2.32mbgl and rockhead level conjectured at 10.00mbgl = 7.68m water column BH02 = GW level recorded between 0.47mbgl and rockhead level conjectured at 10.00mbgl = 9.53m water column BH03 = GW level recorded between 0.66mbgl and rockhead level conjectured at 10.00mbgl = 9.34m water column BH08 = GW level recorded between 0.80mbgl and rockhead level conjectured at 10.00mbgl = 9.2m water column
Bulk density of aquifer materials	2.01 g/cm^3	2.185 g/cm^3	Testing of the site soils (made) indicated to have a minimum bulk density of 2.01 g/cm^3). The average bulk density of the natural clay soils is indicated to be

			2.126g/cm^3. We have utilised 2.01g/cm^3 as this is considered more conservative. https://gpg.geosci.xyz/ - Sandstone bulk density Field derived values for sandstone were not collected, and as per the literature, values range from 1.61 g/m3 to 2.76 g/m3. As such, a mid-value of 2.185 m/g3 has been utilised in our assessment
Effective porosity of aquifer	55 fraction	20 fraction	Freeze and Cherry (1979) indicated glacial till to have a porosity of between 0.40 and 0.70 so we have used the mean of 0.55. Freeze and Cherry (1979) indicated sandstone to have a porosity of 0.20.
Hydraulic gradient	0.1		The hydraulic gradient in the north Merseyside Permo-Triassic sandstone aquifer is reported to be very low. We have utilised a value of 0.1
Hydraulic conductivity of aquifer	0.000864 m/day	0.0864 m/day	The academic value for glacial till is 10^{-7} to 10^{-1}. The academic value for silty sand is 10^{-5} to 10^{-1} .We have used a value of 10^{-6} as this is considered conservative. From the site investigation undertaken it is known that the made ground deposits are underlain by cohesive glacial till soils. The academic value for sandstone is 10^{-8} to 10^{-3}. We have utilised 10^{-4} which we consider to be conservative. Source: Freeze and Cherry (1979).
Distance to compliance point	BH01 – 220m BH02 – 210m BH03 – 135m BH08 – 240m	250m	250m as per EA guidance (urban environment)

TABLE 18 – P20 Groundwater Modelling Justifications (Kd and Half Life)

	Substance	Kd (l/kg)	Reference	Half Life (days)	Reference
Metals	Zinc	30651	EPA 2005	Metal – assumed no decay	N/A
	Mercury	6309			
	Selenium	923.4			
	Cadmium	3981			
	Copper	8175			
	Lead	15849			
	Nickel	5629.5			
PAHs	Naphthalene	1700579		258	Howard et al. – document presents half-lives as a range, and so the most conservative value was utilised.
	Acenaphthylene	234897		120	
	Acenaphthene	2834714		204	
	Fluorene	1709756		120	
	Phenanthrene	142969599		401.5	
	Fluoranthene	10926014		879.65	
	Anthracene	4196816		919.8	
	Pyrene	13577369		3796	
	Benzo(a,h)anthracene	6165924		1361.45	
	Chrysene	5956863		2000	
	Benzo[b]fluoranthene	4049020		1219	
	Benzo[k]fluoranthene	2272222		4270.5	
	Benzo[a]pyrene	6659477		1058.5	
	Indeno(1,2,3-c,d)Pyrene	2919608		1460	
	Benzo[g,h,i]perylene	4216667		1314	
	Phenol	83.17		7	
TPHs	Aliphatic C5-C6	631		16	
	Aliphatic C6-C8	3162.3		28	
	Aliphatic C8-C10	31623		60	
	Aliphatic C10-C12	316228		102	
	Aliphatic C12-C16	316228		440	
	Aliphatic C16-C21	398107171		530	
	Aliphatic C21-C35	398107171		730	

	Aliphatic C5-C35	398107171		730	
	Aromatic C5-C7	79.4		16	
	Aromatic C7-C8	251.2		28	
	Aromatic C8-C10	1259		60	
	Aromatic C10-C12	3162.3		102	
	Aromatic C12-C16	6310		440	
	Aromatic C16-C21	15849		530	
	Aromatic C21-C35	125893		730	
	Aromatic C5-C35	125893		730	

7.4.10 The results of the modelling are shown in Table 16 and are included in Appendix 05.

TABLE 19 - Results of P20 Groundwater Modelling to a 250 m Compliance Point.

Contaminant	Maximum Recorded Exceedance (µg/l)	Target Value (µg/l)	Target Value Source	Final Concentration (µg/l)
Arsenic	BH02 21.40ug/l	10	MRV/DWS	0.524
Nickel	BH02 24.29ug/l	20	MRV/DWS	0.209
Sulphate	BH02 310ug/l	250	MRV/DWS	18.8
Aliphatic C10-C12	BH02 310ug/l	1.0	LoD	$1.46X10^{-24}$
Aliphatic C12-C16	BH01 23ug/l	1.0	LoD	$7.44X10^{-11}$
Aliphatic C16-C21	BH01 130ug/l	1.0	LoD	$9.36X10^{-11}$
Aliphatic C21-C35	BH01 600ug/l	1.0	LoD	$1.86X10^{-7}$
Aromatic C10-C12	BH08 54ug/l	1.0	LoD	$2.46X10^{-25}$
Aromatic C12-C16	BH08 160ug/l	1.0	LoD	$7.80X10^{-11}$
Aromatic C16-C21	BH08 130ug/l	1.0	LoD	$8.91X10^{-11}$
Aromatic C21-C35	BH01 280 ug/l	1.0	LoD	$8.69X10^{-8}$
Naphthalene	BH02 170ug/l	0.1	LoD	$9.19X10^{-15}$
Acenaphthylene	BH01 0.28 ug/l	0.01	LoD	$1.40X10^{-25}$
Acenaphthene	BH02 120ug/l	0.01	LoD	$4.94X10^{-17}$
Fluorene	BH02 89ug/l	0.01	LoD	$5.51X10^{-23}$
Phenanthrene	BH02 450ug/l	0.01	LoD	$5.62X10^{-11}$
Anthracene	BH02 130ug/l	0.01	LoD	$2.14X10^{-5}$
Fluoranthene	BH02 450ug/l	0.1	DWS	$1.33X10^{-6}$
Pyrene	BH02 410ug/l	0.01	LoD	$4.40X10^{-2}$
Benzo[a]anthracene	BH02 170ug/l	0.01	LoD	$2.89X10^{-5}$
Chrysene	BH02 130ug/l	0.01	LoD	$3.86X10^{-4}$
Benzo[b]fluoranthene	BH02 220ug/l	0.1	MRV/DWS	$1.46X10^{-5}$
Benzo[k]fluoranthene	BH02 110ug/l	0.1	MRV/DWS	$2.00X10^{-2}$
Benzo[a]pyrene	BH02 160ug/l	0.01	MRV/DWS	$2.95X10^{-6}$
Indeno(1,2,3-c,d)Pyrene	BH02 110ug/l	0.1	MRV/DWS	$3.29X10^{-5}$
Dibenzo(a,h)anthracene	BH02 25ug/l	0.01	LoD	$4.85X10^{-5}$
Benzo(ghi)perylene	BH02 110ug/l	0.1	MRV/DWS	$1.39X10^{-5}$

7.4.11 Modelling to a 250 m compliance point identified an elevated concentration of pyrene at the compliance point and as such pyrene is considered to pose a potential risk to the bedrock aquifer .

7.4.12 It is important to note however that the modelling exercise does not take into account several key factors:

- The modelling undertaken utilised conservative inputs such as the porosity of sandstone, not taking into account that the recorded elevated contaminant concentrations recorded within the made ground soils which are underlain by cohesive clay deposits may be relatively impermeable to vertical migration.
- The proposed development, which includes for the site to be mostly surfaced with impermeable surfaces which will act to reduce the infiltration of water into the shallow soils and therefore significantly reduce the contaminant loading into the bedrock aquifer.
- The proposed development, which includes for the redesign of drainage to divert surface water to an enclosed drainage system which will similarly act to reduce the infiltration of water into the shallow soils and therefore significantly reduce the contaminant loading to the bedrock aquifer.

7.4.13 Taken the above into account we consider the overall risk to the bedrock aquifer to be low.

8.0 GROUND AND MINE GAS EMISSION RISK ASSESSMENT

8.1 General

8.1.1 Our research suggests that the site is within a 1-3% radon risk area and the ground conditions would suggest that there is a low to moderate ground gas generation potential (associated with historical rubble landfill associated with the wider motor works site and likely made ground deposits). With respect to hydrocarbon vapour generation, given the historical site usage hydrocarbon contaminants may be present within the made ground materials.

8.1.2 Notwithstanding the above, it is noted that the development proposals include for new car parking only with no proposals for enclosed or habitable spaces (i.e. new buildings). As such, it is considered that the potential for ground gas/vapour generation within the expected underlying ground conditions would have no material impact on site end users. Therefore, it is concluded that no further investigations or assessment will be required with respect to gas/vapour generation.

8.1.3 It should be noted that if during the course of development/maintenance of the car park manned excavations in excess of 1.20 m are required, it is our recommendation that these be treated as confined spaces and appropriate health and safety proposals are put in place.

9.0 BUILT ENVIRONMENT RISK ASSESSMENT

9.1 Sulphate Attack on Construction Materials

9.1.1 Laboratory testing (Appendix 04) was undertaken on selected soil samples, in order to determine the sulphate content and pH values, and hence the concrete class required for buried concrete. Note that as there is not a pervasive groundwater body within the soils, we have assumed a 'static water' situation. Notwithstanding this, based on our groundwater assessment, it was considered that pockets of groundwater could be encountered within the shallow soils.

9.1.2 Our assessment of risk to buried concrete has been undertaken in line with BRE Special Digest 1: 2005 'Concrete in Aggressive Ground'. Owing to the site history and the findings from our intrusive ground investigations we have assumed a 'Brownfield Location' within our risk assessment.

9.1.3 In line with the published guidance we have taken the mean value of the highest 20% of results of sulphate test results similarly we have taken the mean value of the lowest 20% of pH concentrations within our assessment. We've also compared the highest recorded sulphate result from the samples taken of the groundwater from the monitoring wells. The results are summarised on Table 20 below:

Table 20 – Sulphate and pH Summary

Determinant	*Concentration	SDI DS Class	SDI ACEC Class
pH*	8.58	DS-2	AC-2
Total Sulphate as SO_4 (%)	0.45		

* Mean result of lowest 20% of sample results.
** Mean result of highest 20% of sample results.

9.1.4 In accordance with BRE Special Digest 1: 2005 'Concrete in Aggressive Ground', recommendations for concrete is 'Aggressive Chemical Environment' for Concrete (ACEC) Classification AC-2 with a design sulphate class for the site of DS-2.

9.2 Waste Material Management

9.2.1 Should materials be removed and disposed off-site, the developer has a statutory responsibility under the Duty of Care Regulations of the Environmental Protection Act 1990 to ensure that contaminated soil and water is disposed of off-site to a suitably licensed waste management facility in a safe and approved manner.

9.2.2 To comply with the Duty of Care all wastes taken off site, in solid or liquid form, must be handled by a registered waste carrier and be accompanied by a consignment note which describes the waste.

9.2.3 Should development plans include the removal of materials; the proposed remedial strategy plan should include details of proposed frequency and assessment standards for the waste disposal strategy.

9.2.4 Should materials be removed and disposed off-site; the developer has a statutory responsibility under the Duty of Care Regulations of the Environmental Protection Act 1990 to ensure that contaminated soil and water is disposed of off-site to a suitably licensed waste management facility in a safe and approved manner.

9.2.5 As part of our assessment we have screened the soil samples collected using the Haz-Waste Online Screening Tool. The results indicate the vast majority of the material tested to be classified as being non-hazardous with respect to off-site disposal. Exceptions to this include a soil sample from BH06 which is classified as hazardous owing to the carcinogenic concentration of lead and 3 No sample (BH19, TP08, TP11) which were classified as hazardous owing to the recorded elevated pH value which is indicated to be corrosive. The Haz-Waste Online screening report is included as Appendix 06.

9.2.6 Should there be a requirement for offsite disposal of soils then we recommend that the results of the HazWaste Report should be provided to the waste acceptor/landfill for review.

10.0 REVISED CONCEPTUAL SITE MODEL

10.1 Contamination Sources

***Human Health*:** Comparing the results against S4UL guideline values appropriate to a commercial end-use we do not consider a risk to human health from chemical contamination. Asbestos contamination was however identified within the made ground soils and as such we consider a human health to both constructions workers and end users from asbestos.

***Water Environment*:** Following detailed assessment, we consider a low risk to the water environment from the site soils.

***Built Environment*:** Recommendations for concrete is 'Aggressive Chemical Environment' for Concrete (ACEC) Classification AC-2 with a design sulphate class for the site of DS-2.

10.2 Pollutant Linkage Assessment

10.2.1 Based on the ground and groundwater contamination conditions noted at the site, source-pathway-receptor pollutant linkages have been identified, as indicated on the Revised Conceptual Site Model (Drawing No LW25/136/DRG/SI/09).

10.3 Mitigation Measures

Human Health

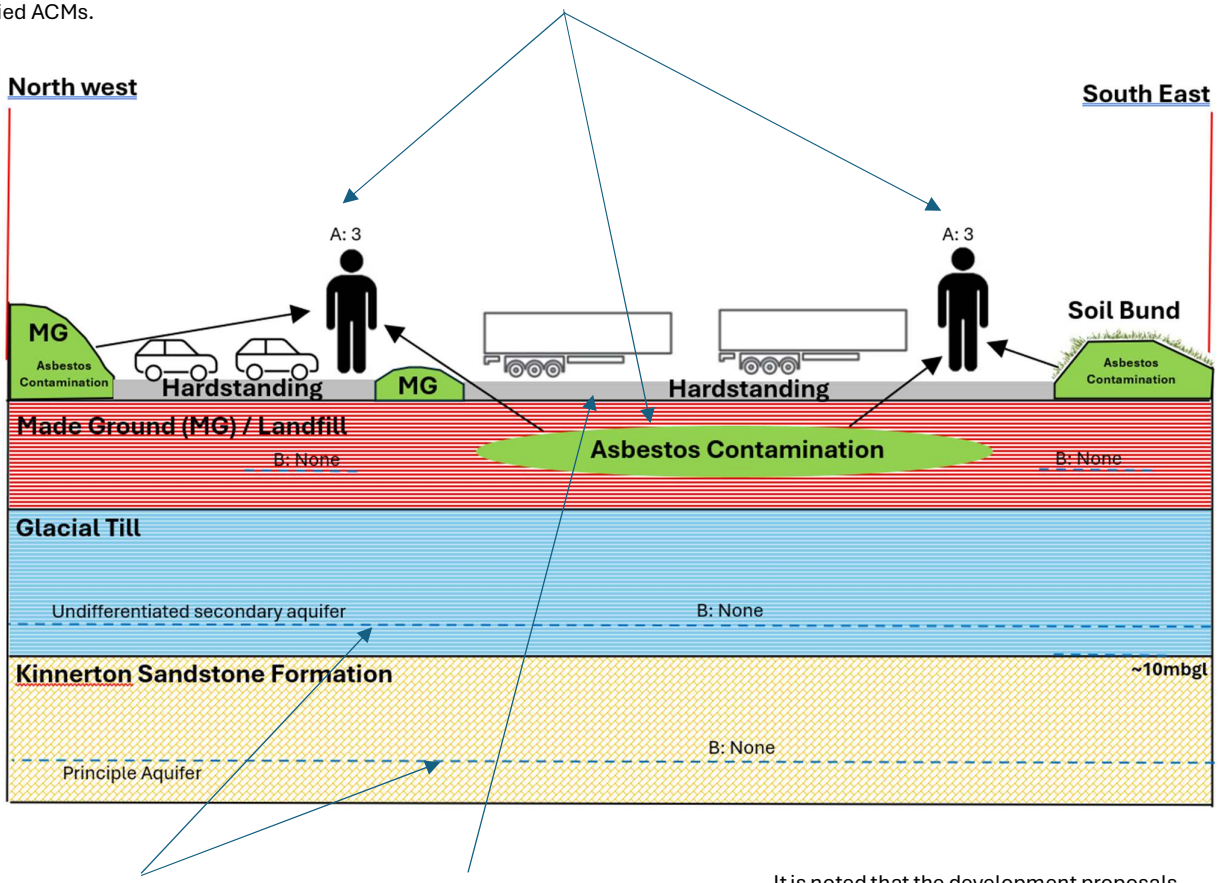
10.3.1 Given the detection of asbestos within the samples collected from the made ground deposit, it was considered that these soils pose a human health risk to site end users. We consider that the proposed development of a car park however will break the source-pathway-receptor linkage in respect to human health and therefore areas surfaced with hardstanding will not require additional asbestos remedial measures. Should the development proposals include any areas of soft landscaping, we consider an environmental capping layer with a basal high-visibility geotextile is required in order to break the source-pathway-receptor linkage.

10.3.2 Due to the presence of asbestos within the made ground soils we recommend that a watching brief is undertaken by a specialised licenced contactor during any earthworks undertaken as part of the development to remove visually identified ACMs.

Comparing the results against S4UL guideline values appropriate to a commercial end-use we do not consider a risk to human health from chemical contamination. Asbestos contamination was however identified within the made ground soils and as such we consider a human health to both constructions workers and end users from asbestos.

Due to the presence of asbestos within the made ground soils we recommend that a watching brief is undertaken by a specialised licenced contactor during any earthworks undertaken as part of the development to remove visually identified ACMs.

We consider that the proposed development of a car park however will break the source-pathway-receptor linkage in respect to human health and therefore areas surfaced with hardstanding will not require additional asbestos remedial measures. Should the development proposals include any areas of soft landscaping, we consider an environmental capping layer with a basal high-visibility geotextile is required in order to break the source-pathway-receptor linkage.



Following detailed assessment we consider a low risk to the water environment from site soils, and as such no remedial measures are required in this regard.

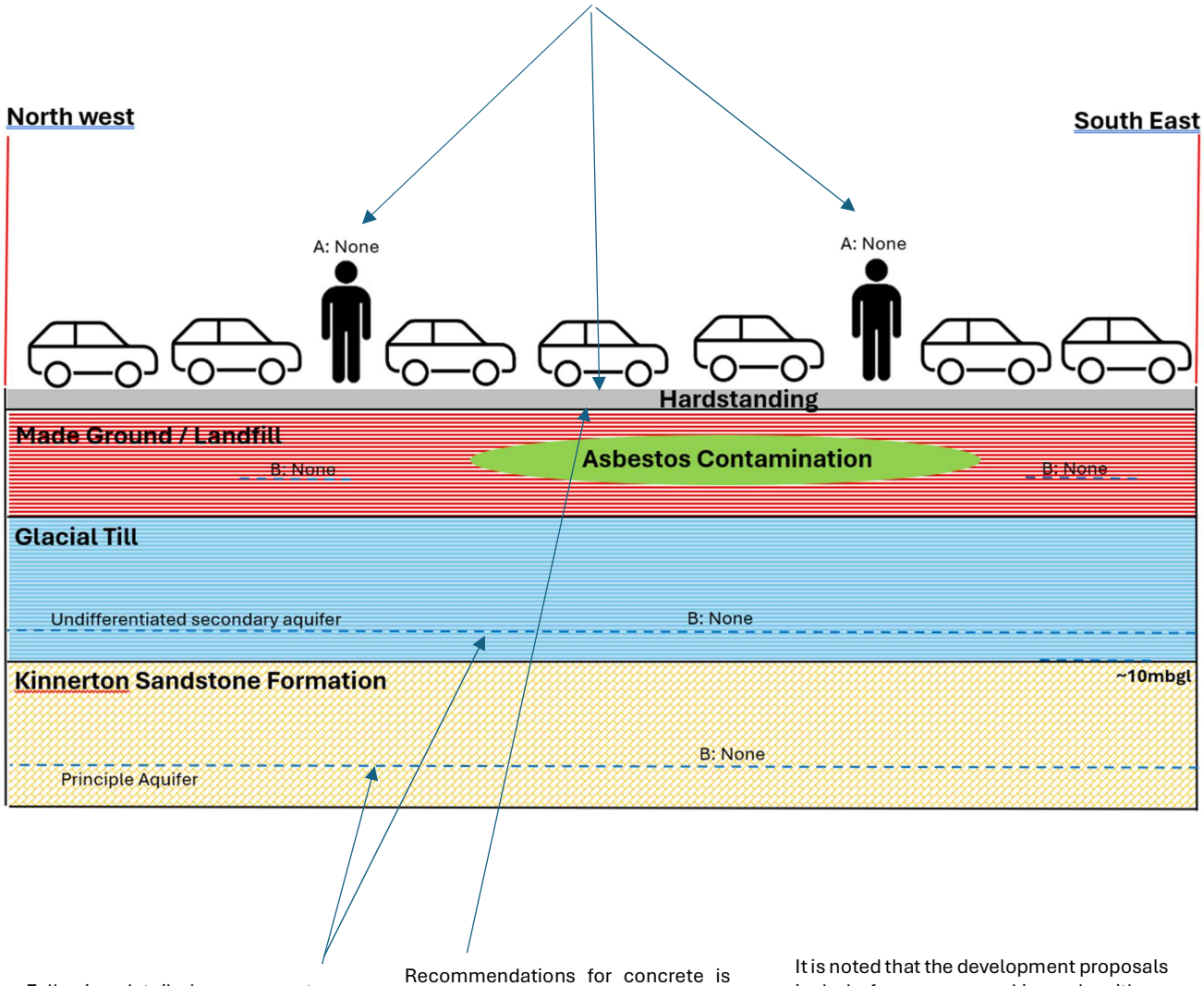
Recommendations for concrete is 'Aggressive Chemical Environment' for Concrete (ACEC) Classification AC-2 with a design sulphate class for the site of DS-2.

It is noted that the development proposals include for new car parking only with no proposals for enclosed or habitable spaces (i.e. new buildings). As such, it is considered that the potential for ground gas/vapour generation within the expected underlying ground conditions would have no material impact on site end users.

Source (Risk)	Pathway	Receptor
• Asbestos Contamination	1) Outdoor inhalation of dust	A) Site users / construction or maintenance workers (Human Health)

Site: Jaguar Land Rover, Halewood, Eastlands **Ref: LW25-136**	Drawing No. LW25-136/SI/09	LandWise geo-environmental consultants			
Title: Pre-Development Conceptual Site Model	Scale. Not to Scale	Drawn HOL	Approved HOL	Revision. 01	Date 02/03/26

We consider that the proposed development of a car park will break the source-pathway-receptor linkage in respect to asbestos risk to human health. Areas surfaced with hardstanding will not require additional asbestos remedial measures. Should the development proposals include any areas of soft landscaping, we consider an environmental capping layer with a basal high-visibility geotextile is required in order to break the source-pathway-receptor linkage.



Following detailed assessment we consider a low risk to the water environment from site soils, and as such no remedial measures are required in this regard.

Recommendations for concrete is 'Aggressive Chemical Environment' for Concrete (ACEC) Classification AC-2 with a design sulphate class for the site of DS-2.

It is noted that the development proposals include for new car parking only with no proposals for enclosed or habitable spaces (i.e. new buildings). As such, it is considered that the potential for ground gas/vapour generation within the expected underlying ground conditions would have no material impact on site end users.

Source (Risk)

- Asbestos Contamination

Pathway

NONE

Receptor

A) Site users / construction or maintenance workers (Human Health)

Site: Jaguar Land Rover, Halewood, Eastlands **Ref: LW25-136**	Drawing No. LW25-136/SI/10	LandWise geo-environmental consultants			
Title: Post-Development Conceptual Site Model	Scale. Not to Scale	Drawn HOL	Approved HOL	Revision. 01	Date 02/03/26

Water Environment

10.3.3 Following detailed assessment we consider a low risk to the water environment from site soils, and as such no remedial measures are required in this regard.

Ground Gas

10.3.4 Our research suggests that the site is within a 1-3% radon risk area and the ground conditions would suggest that there is a low to moderate ground gas generation potential (associated with historical rubble landfill associated with the wider motor works site and likely made ground deposits). With respect to hydrocarbon vapour generation, given the historical site usage hydrocarbon contaminants may be present within the made ground materials.

10.3.5 Notwithstanding the above, it is noted that the development proposals include for new car parking only with no proposals for enclosed or habitable spaces (i.e. new buildings). As such, it is considered that the potential for ground gas/vapour generation within the expected underlying ground conditions would have no material impact on site end users. Therefore, it is concluded that no further investigations or assessment will be required with respect to gas/vapour generation.

10.3.6 It should be noted that if during the course of development/maintenance of the car park manned excavations in excess of 1.20 m are required, it is our recommendation that these be treated as confined spaces and appropriate health and safety proposals put in place.

The Built Environment

10.3.7 Following our built environment risk assessment, the recommendation for concrete is 'Aggressive Chemical Environment' for Concrete (ACEC) Classification AC-2 with a design sulphate class for the site of DS-2.

Construction/Maintenance Workers

10.3.8 All site staff should remain vigilant to the possible risk of encountering isolated areas of unrecorded contaminated material, especially asbestos. Should such materials be encountered, further testing may be required to assess the risk to health and safety of the site workers and the environment.

10.3.9 Good site working practices should be followed, including:

- Use of appropriately qualified personnel for the task.
- Use of appropriate PPE.
- Provision of on-site washing facilities.
- Maintenance of a high standard of basic hygiene.

- Implementation of a non-smoking and eating policy within the working area, with designated clean areas set aside for these activities.

10.4 Contingent Liabilities

10.4.1 Assessments of the site include the determination of contingent liabilities in respect of current and future ownerships subsequent to remedial measures. These consider the impact of the environmental conditions on the study area and surrounding areas on site users, properties and also the liability of the site owners.

10.4.2 With regard to site users, considerations in relation to liability are inherent in the development of a suitable remedial strategy. In the site-specific circumstances presented by the identified conditions, the risk levels suggest minimal liability on ownership due to the environmental conditions, subsequent to development.

10.4.3 The potential for liability arising from site conditions impacting on the surrounding environment largely considers the potential for migration of pollutants beyond the site boundary normally associated with groundwater. However, the potential for contaminants to migrate beyond the site boundary was considered to be low. Therefore, the potential for liability arising from the site conditions is considered to be low following development of the site.

10.4.4 In the event that more definitive advice is required, we would recommend that the Client seeks specific advice on the liability's incumbent on ownership from their legal advisors.

11.0 GEOTECHNICAL ASSESSMENT

11.1 General

11.1.1 Geotechnical laboratory testing was undertaken on samples of the underlying soils. In addition, visual assessment of soils during the sinking of boreholes was supplemented by in-situ standard penetration tests (SPT's). Geotechnical test results are included in Appendix 7.

11.2 In-Situ Testing

SPT Tests

11.2.1 SPT testing was undertaken within the soil boreholes in order to provide comment on the density of the materials. The uncorrected n-values of the made ground deposits were variable and ranged from 3 to >50. The uncorrected n-values of the natural soils were less variable and ranged from 9 to >50. Given the large data set, we have provided an average of SPT n number at a given depth below;

Table 21 – Average SPT n Number at Depth (uncorrected)

Depth	Average SPT n Number			
	Made Ground	Consistency	Natural	Consistency
1.20	14	Firm	-	-
2.00	12	Firm	-	-
3.00	17	Stiff	13	Firm
4.00	18	Stiff	18	Stiff
4.40	11	Firm	22	Stiff
5.00	17	Stiff	16	Stiff

11.2.2 Given the variability of the values recorded however the above summary of average SPT values should not be used for design. The complete set of SPT are provided in Table 22 overleaf and should be reviewed using the following tables, indicating the corresponding typical indicative bearing capacity of different soils types and densities.

Table 23 - Typical indicative bearing capacity of different soils types and densities.

Cohesive Soils		
N-Values	Description	Indicative Bearing Capacity (kN/m^2)
0 – 4	Very Soft	<40
4 – 8	Soft	40 – 100
8 – 16	Firm	100 – 300
16 – 32	Stiff	300 – 500
>32	Very Stiff	>500
Granular Soils - Sand		
N-Values	Description	Indicative Bearing Capacity (kN/m^2)
0 – 4	Very Loose	<40
4 – 10	Loose	40-100
10 – 30	Medium Dense	100-300
30 – 50	Dense	300-500

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Table 02 – Summary of Recorded SPT N Numbers (Uncorrected)

Depth	Borehole	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0.10																										
0.20																										
0.30																										
0.40																										
0.50																										
0.50																										
0.60																										
0.70																										
0.80																										
0.90																										
1.00																										
1.10																										
1.20		17	10	8	12	9	5	20	16	10	17	>50	6.0	14	20	11	12	8	15	13	26	15	8	10	11	17
1.30																										
1.40																										
1.50																										
1.50																										
1.60																										
1.70																										
1.80																										
1.90																										
2.00		15	15	22	11	9	9	13	16	4	10		4	4	16	3	25	6	13	16	28	16	8	3	15	18
2.10																										
2.20																										
2.30																										
2.40																										
2.50																								>50		
2.60																										
2.70																										
2.80																										
2.90																										
3.00		16	11	>50	15	24	>50	14	27	18	13		9	14	9	9	12	12	16	16	9	15	7		14	12
3.10																										
3.20																										
3.30																										
3.40																										
3.50																										
3.60																										
3.70																										
3.80																										
3.90																										
4.00		14	12		17			12	>50	30	>50		11	16	18	11	10	5	17	12	14	16	17		16	14
4.10																										
4.20						>50																				
4.30																										
4.40										20								11			24		22			
4.50																										
4.60																										
4.70																										
4.80																										
4.90																										
5.00		15			16			12							22				17	16		18				16

>50	Very Dense	>500
Granular Soils – Gravel		
N-Values	**Description**	**Indicative Bearing Capacity (kN/m²)**
0 – 4	Very Loose	<80
4 – 10	Loose	80-200
10 – 30	Medium Dense	200-600
30 – 50	Dense	600-800
>50	Very Dense	>800

CBR Probes

11.2.3 20 No CBR probes were undertaken on the sandy clayey gravel recorded across the site to depth of between 0.30mbgl and 0.50mbgl underlain by the sandy gravelly clay. The result of the CBR probes are included in Appendix 7 and are summarised in Table 24 overleaf.

11.2.4 It should be noted that many of the CBR probes commenced from below the existing hardstanding cover in order to provide information on the sub-base.

11.2.5 All CBR values were recorded to be above 15% from depths of between 0.03mbgl and 0.23mbgl to depth of between 0.79mbgl and 0.99mbgl. The only three exceptions to this are a value of 12.7% recorded in CBR03 at a depth of between 0.29mbgl and 0.39mbgl, a value of 11.5% recorded in CBR10 at a depth of between 0.61mbgl and 0.72mbgl and a value of 13.4% recorded in in CBR19 at a depth of between 0.04mbgl and 0.14mbgl.

11.3 Laboratory Testing – Made Ground

Moisture Content

11.3.1 3 No samples of the made ground soils were collected from soil boreholes and sent for laboratory moisture content testing. The results from moisture content testing of the made ground soils are as indicated on Table 05 below. The findings are in keeping with visual descriptions.

Table 25 - Summary of Moisture Content Results (Made Ground)

Location	Depth (m bgl)	Moisture Content (%)	Soil Description
BH02	2.00	19.3	*Sandy clayey gravel of crushed aggregate and brick fragments*
BH04	2.00	17.1	*Sandy gravelly clay. Gravel comprising of brick, concrete and burnet shale.*
BH06	1.80	30.0	*Sandy gravel and cobbles of brick and burnt shale. Occasional wood and plastic and ash and clay pockets.*

Bulk Density

11.3.2 2 No samples of the made ground soils were collected from soil boreholes and sent for laboratory testing to determine the bulk density of the made ground soils.

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Table 04 – Summary of Recorded CBR Values

Depth (m)	CBR01	CBR02	CBR03	CBR04	CBR05	CBR06	CBR07	CBR08	CBR09	CBR10	CBR11	CBR12	CBR13	CBR14	CBR15	CBR16	CBR17	CBR18	CBR19	CBR20
0.01																				
0.02																				
0.03																				
0.04																				
0.05																				
0.06																				
0.07																				
0.08		38.6					40.7	29.6	51.5					61.6	61.6	35.9	42.9	29.6	13.4	59.3
0.09																				
0.10																				
0.11																				
0.12					69.8															
0.13																				
0.14		69.8								69.8										
0.15							59.3	33.5	196.7					145.1	145.1		80.3	85.9	45.4	35.9
0.16																33.5				
0.17																				
0.18														196.7	196.7					
0.19																				
0.20																				
0.21																				
0.22	96.7	76.5	21.8		74	46.8	51.5	28.8	159.1	107.1	69.8	59.3	55.1	121.0	128.2	45.4	69.8	35.9	57.5	327.6
0.23				145.1																
0.24																				
0.25																				
0.26																				
0.27																				
0.28	114.7		64.9			107.1							76.5		114.7		38.6			
0.29		55.1																		
0.30																				
0.31										302.0										
0.32																				
0.33					242.5	107.1	59.3				196.7	59.3		57.1	58.8	35.9	18.6	35.9	45.4	57.1
0.34										183.8			103.7							
0.35	114.7		12.7																	
0.36						84.6		35.9			86.9									
0.37										33.5		51.5								
0.38													103.7							
0.39																				
0.40					167.2															
0.41						45.4	45.4	49.8	33.5											
0.42																				
0.43																				
0.44		55.1	21.8								58.2	69.8		57.1	58.8		59.3	21.8		
0.45										128.2						33.5				
0.46	76.5				69.8	26.5														
0.47																				
0.48																				
0.49																				
0.50																				
0.51		69.8																		
0.52			34.5				24.7	51.5			22.2	59.3		55.1			33.5	58.2	155.4	50.8
0.53																				
0.54					145.1				80.3	33.5			60.6		45.4	42.4				
0.55						38.6														
0.56																				
0.57	74.7																			
0.58																				
0.59																				
0.60					145.1															
0.61						107.1	51.5	28.8	114.7	107.1	69.8	222.8	76.5	121.0	114.7	45.4	69.8	94.6	302	55.1
0.62																				
0.63																				
0.64																				
0.65																				
0.66		37.2			196.7	64.1	55.1	35.9	238.5	11.5	21.8	59.3	64.1	86.90	86.9	69.8	41.8	59.3	128.2	84.6
0.67	51.5																			
0.68																				
0.69																			196.7	
0.70																				
0.71			57.5		176		61.6	41.8	86.9	16.1	18.6	69.8	69.8	80.3	89.3	55.1	38.6	103.7	121	107.1
0.72						64.1														
0.73																				
0.74	59.3	60.2																		
0.75																				
0.76																				
0.77																				
0.78			69.8																	
0.79																				
0.80	69.8																			
0.81																				
0.82																				
0.83																				
0.84			55.1																	
0.85					55.1		21.8	41.8	69.8	18.6	21.8	183.8	84.6	94.6	89.3	69.8	69.8	94.6		76.5
0.86	84.6	84.6				45.4														
0.87																				
0.88			69.8				69.8	49.8	69.8			59.3	84.6	114.7	114.7	69.8	69.8	189.3		
0.89																				
0.90	55.1	76.5																		
0.91																				
0.92			84.6						238.5			84.6								
0.93																				
0.94																				
0.95																				
0.96																				
0.97																				
0.98																				
0.99																				

Table 26 – Bulk Density (Made Ground)

Location	Depth (m bgl)	Water Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Soil Description (Appendix 1 & 2)
BH16	1.80	18.9	*2.11*	*1.77*	*Firm sandy gravelly clay. Gravel comprises brick, concrete and shale. Rare wood.*
BH22	1.60	17.3	*2.01*	*1.71*	*Firm sandy gravelly clay. Gravel comprises brick, concrete and shale.*

11.3.3 The bulk density of the made ground soils was recorded to be between 2.01Mg/m^3 and 2.11Mg/m^3 which falls in the middle of the range expected for a consolidated clay.

Particle Size Distribution

11.3.4 14 No. samples of the made ground soils were collected and sent for particle size distribution (PSD) testing. The results from PSD testing support the visual observations made on site. The PSD testing was undertaken on the two predominant made ground soils types, the surface sandy clayey gravel of crushed aggregate (highlighted in blue) and the underlying sandy gravelly clay (highlighted in grey).

Table 27 - Summary of Particle Size Distribution Testing (Made Ground)

Sample	Depth	CLAY Content (%)	*SILT Content (%)	SAND Content (%)	GRAVEL Content (%)	COBBLE Content (%)	Soil Description (Appendix 1 & 2)	SHW Gradings
BH01	0.00-0.50	/	10	13	77	0	Sandy clayey gravel of crushed aggregate	1A, 6E & 6R, 6F2, 6F3, 6I, 6M, 6N, 6P
BH01	1.00-1.90	42	30	16	12	0	Sandy Gravelly Clay	2A & 2B, 7A, 7E, 7E, 7F, 7I
BH02	2.00-3.00	/	51	23	26	0	Sandy Gravelly Clay	2C, 7A, 7E, 7I
BH03	1.20-2.00	24	20	29	20	7	Sandy Gravelly Clay	2C, 7A, 7F
BH04	2.00-2.90	37	30	23	10	0	Sandy Gravelly Clay	2A & 2B, 7A, 7E, 7F, 7I
BH06	1.80	/	12	25	63	0	Sandy gravel and cobbles	1A, 6E & 6R, 6F1, 6I, 6N, 6P
BH07	0.00-0.50	2	11	13	74	0	Sandy clayey gravel of crushed aggregate	1A, 6E & 6R, 6I, 6N, 6P
BH08	0.00-0.50	/	2	2	35	61	Sandy clayey gravel of crushed aggregate	1B
BH10	1.00-1.50	20	13	29	38	0	Sandy Gravelly Clay	2C, 7A, 7D, 7F
BH11	0.00-0.50	/	10	21	69	0	Sandy clayey gravel of crushed aggregate	1A, 6E & 6R, 6F1, 6F2, 6F3, 6I, 6M, 6N, 6P
BH12	0.00-0.80	42	28	24	6	0	Sandy clayey gravel and Sandy Gravelly Clay	2A & 2B, 7A, 7E, 7F, 7I
BH18	0.00-0.50	/	10	11	73	6	Sandy clayey gravel of crushed aggregate	1A, 6E & 6R, 6F1, 6F2, 6F3, 6I, 6M, 6N, 6P,
BH23	0.50-1.00	22	20	32	26	0	Sandy Gravelly Clay	2C, 7A, 7F

BH24	0.00-0.50	/	18	19	46	17	Sandy clayey gravel of crushed aggregate	2C, 7A, 7F

*Where a sedimentation test was not carried out, this figure represents total fines i.e. particles of diameter less than 63 microns

** Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.

11.3.5 The PSD results were used to determine the gradings as per the Specification of Highway Works, Series 600. The results indicate that much of the surface/shallow sandy clayey gravel of crushed aggregate is classed as 6F2, 6N or 7A for example which would indicate this material suitable for reuse below the proposed car park subject to appropriate compaction. Similarly, the underlying sandy gravelly clay is all classed as either 7A or 6F1 for example. As such the underlying sandy gravelly clay is also suitable for reuse below the car park area, subject to appropriate compaction.

Hand Shear Vane Testing

11.3.6 In addition, 9 No. hand shear vane tests were conducted on selected samples of the made ground. The results recorded variable undrained shear strengths of between 25 kPa and 80kpa, indicative of soft to stiff soils. It should be noted however that given the granular content of the made ground soils that the undrained shear strength results may not be accurate.

Table 28 – Summary of Hand Vane Testing

Borehole	Depth	Undrained Shear Strength (kPa)	Soil Description (Appendix 1 & 2)
BH01	2.80	50	Sandy silty clay
BH05	1.90	53	Sandy gravelly clay
BH07	1.90	57	Sandy gravelly clay
BH09	2.00	65	Sandy gravelly clay
BH13	1.10	42	Sandy gravelly clay
BH17	1.90	68	Sandy gravelly clay
BH19	1.80	25	Sandy gravelly clay
BH24	1.50	80	Sandy gravelly clay

11.4 Laboratory Testing – Natural Cohesive Deposits

Moisture Content Testing

11.4.1 3 No samples of the natural Glacial Till soils were collected from soil boreholes and sent for laboratory moisture content testing. The results from moisture content testing are as indicated on Table 09 below. The findings are in keeping with visual descriptions.

Table 29 - Summary of Moisture Content Results (Glacial Till)

Location	Depth (m bgl)	Moisture Content (%)	Soil Description (Appendix 1 & 2)
BH07	4.20	19.3	*Firm silty sandy gravelly CLAY*
BH14	2.40	17.5	*Stiff silty gravelly CLAY*
BH21	3.40	23.6	*Firm silty sandy gravelly CLAY*

Particle Size Distribution

11.4.2 1 No. sample of the natural soils were collected and sent for particle size distribution (PSD) testing. The results from PSD testing support the visual observations made on site.

Table 30 - Summary of Particle Size Distribution Testing (Natural Soils)

Sample	Depth	CLAY Content (%)	*SILT Content (%)	SAND Content (%)	GRAVEL Content (%)	COBBLE Content (%)	Soil Description (Appendix 1 & 2)	SHW Gradings
BH18	3.00-3.90	/	75	19	6	0	**Silty Sandy Gravelly CLAY**	2A & 2B, 7A, 7E, 7I

11.4.3 The PSD results were used to determine the gradings as per the Specification of Highway Works, Series 600. The results indicate that the material can be classed as 7A for example. As such this material suitable for reuse below the car park area, subject to appropriate compaction.

Atterberg Limits Testing

11.4.4 Atterberg limit testing was carried out on 3 No. samples of the Glacial Till deposits. The test results describe the cohesive soils tested as being 'clay with low plasticity'. Results from the Atterberg limit testing are summarised in Table 31 below.

Table 31 – Summary of Atterberg Testing (Glacial Till)

Sample	Liquid Limit (%)	Plasticity Index (%)	Remarks
BH07	30	18	Clay with Low Plasticity
BH14	34	19	Clay with Low Plasticity
BH21	28	15	Clay with Low Plasticity

Laboratory triaxial strength testing

11.4.5 The results from triaxial strength testing strength testing indicated shear strengths between 32 kPa and 106 kPa, with cohesion between 13.5 kPa and 89.1 kPa and friction angles between 4.2° and 6.7°. The results are indicative of soft to firm clay soils.

Table 32 – *Laboratory triaxial strength testing* (Glacial Till)

Sample	BH01	BH07	BH14	BH15	BH19
Depth (mbgl)	4.80	4.40	2.60	4.60	3.30
Soil Description	Silty sandy gravelly CLAY	Silty sandy gravelly CLAY	Silty gravelly CLAY	Silty gravelly CLAY	Silty sandy CLAY
Cell Pressure (kPa)	50	50	50	50	50
Undrained Shear Stress (kPa)	66	64	32	106	68
Cohesion (kPa)	58	52.7	13.5	89.1	58.6
Friction Angle (°)	4.2	6.1	4.5	6.7	5.1

Laboratory Hand Vane Testing

11.4.6 In addition, 1 No. hand shear vane tests was conducted on a sample of glacial till in BH01 at a depth of 3.90mbgl. The results recorded undrained shear strengths of 40 kPa, indicated generally soft soils. It should be noted however that given the granular content of the made ground soils that the undrained shear strength results may not be accurate.

Table 33 – Summary of Hand Vane Testing

Borehole	Depth	Undrained Shear Strength (kPa)	Soil Description (Appendix 1 & 2)
BH01	3.90	40	Silty sandy gravelly CLAY

11.5 Infiltration Testing

11.5.1 As part of our investigations, we undertook 4 No soakaway tests within the made ground soils. The results are summarised in Table 34 below and included as Appendix 03. Following BRE365 3 No tests failed.

TABLE 34 - Summary of Infiltration (Falling Head) Testing

Location	Depth of Pit (mbgl)	Infiltration Time (mins)	Calculated Infiltration Rate
SA01	2.20	180	-
SA02	2.20	180	-
SA03	1.94	180	-
SA04	2.10	75	1.18×10^{-4} m/s

11.5.2 The results from the soakaway testing indicates that the shallow soils in SA04 at depths between 1.72 m and 2.0 m bgl would provide an infiltration rate between 1.8×10^{-4} m/s. Following BRE365 the tests undertaken in SA01, SA02 and SA03 failed as insufficient infiltration was recorded to undertake a successful test.

11.6 Conclusions

11.6.1 The in-situ and laboratory geotechnical testing indicates that both the made ground and natural soils would be suitable for reuse in the proposed car park development subject to appropriate soils management and compaction. A materials management plan and earthworks specification should be compiled prior to site works.

11.6.2 It should be noted that the site investigations and geotechnical testing did not extend to the two remediated soil bunds located to the east and south east of the trailer park area. Should it be proposed to reuse this material, material assessment of this material should be considered.

11.2.2 Once development proposals and site level designs are finalised, we recommend that the ground conditions are revised to ensure the pertinence of our recommendations.

12.0 CONCLUSIONS AND RECOMMENDATIONS

12.1 General

12.1.1 LandWise Consulting Ltd were commissioned by GBX Remediation Ltd (the Remediation Specialist) on behalf of Jaguar Land Rover (the Client) to undertake Phase II Site Investigations in connection the proposed development of a site titled 'Jaguar Land Rover, Halewood, Eastlands'. (Drawing Nos. LW25/136/DRG/SI/01 and 02).

12.1.2 We understand that the proposed re-development includes the formation of an area of car parking with associated road infrastructure, drainage and lighting. We understand that the re-development will necessarily involve the relocation of 2 No. large bunds of soil that were formed as part of the previous development at the site.

12.2 Recorded Ground Conditions

12.2.1 Approximately 30% of the site is surfaced by tarmac or concrete hardstanding. Approximately 40% of the site is surfaced by gravel/aggregates. The remaining 30% is surfaced by bunded soil stockpiles and rough vegetation.

12.2.2 TP104 recorded 'black tarmac with medium angular to subangular gravel aggregate' from ground level to 0.10 mbgl which was underlain by subbase to 0.35 mbgl, described as 'grey slightly sandy fine to coarse angular to subangular gravel of quarried aggregate'. All other locations were located off the tarmacadam hardstanding areas and were covered in gravel hardstanding which was typically 0.30 m to 0.40 m thick and comprised of crushed aggregate described as 'grey slightly sandy fine to coarse angular to subangular gravel of quarried aggregate' or 'grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments'. Within 4 No. locations in the west of the northern car park area (SA103, TP106, TP112, and TP113) the gravel layer at the surface was only 0.10 m thick and described as 'brownish grey clayey sandy gravel of various lithology' or 'grey clayey sandy gravel of quarried aggregate with frequent extraneous fragments of blaes and brick', these strata were underlain by further granular made ground described as 'orange fine to coarse angular gravel of crushed brick and blaes' and 'multicoloured sandy gravelly cobbles of demolition rubble' to depths between 0.20 mbgl and 0.60 mbgl.

12.2.3 Made ground deposits were encountered within all exploratory hole locations with thickness ranging between 1.30 m and at least 5.00 m, though generally between 2.50 m and 4.00 m thick. The majority of the made ground deposits were typically sandy gravelly clay soils with much extraneous material, predominantly demolition rubble with timber, ceramic, glass, burnt shale with more rare waste materials such as slag and ash. Locally made ground was more granular including crushed brick 'orange fine to coarse angular gravel of crushed brick and blaes with abundant whole bricks' or demolition materials without significant soil matrix 'multicoloured sandy gravelly cobbles and boulders of demolition rubble with rare timber.

12.2.4 Natural glacial till was recorded to underly the made ground deposits (proven in 18 of 46 No. locations) from depths ranging between 2.30 mbgl (BH14) and 4.30 mbgl (BH02), proven to 5.00 mbgl.

12.2.5 These soils were consistently described as 'firm becoming stiff (or stiff) brown and grey slightly silty slightly sandy slightly gravelly CLAY' or 'firm becoming stiff brown and grey slightly silty slightly sandy CLAY with rare gravel' or 'firm brown grey mottled silty gravelly CLAY'.

12.2.6 Within 2 No. locations in the north of the site (TP08 and TP09) natural sandy soils described as 'dark grey slightly silty fine to medium SAND with frequent rootlets (presumed natural)' were encountered below the made ground at depths between 1.30 mbgl and 2.70 mbgl and proven to 3.20 mbgl.

12.2.7 Rockhead was not encountered within any of the exploratory hole locations, extended to a depth of 5.00 mbgl.

12.3 Chemical Contamination and Gas Emissions

12.3.1 Comparing the heavy metal, TPH and PAH contaminant concentrations against appropriate guideline values, no concentrations were recorded above the guideline values. As such we do not consider a risk to human health from heavy metal, TPH or TPH concentration recorded within he shallow made ground soils.

12.3.2 Given the exceedances of asbestos within the made ground soils we consider that these soils pose a risk to human health to site end users. We consider that the proposed development of a car park will break the source-pathway-receptor linkage in respect to human health and therefore areas surfaced with hardstanding will not require additional asbestos remedial measures. Should the development proposals include any areas of soft landscaping, we consider an environmental capping layer with a basal high-visibility geotextile is required in order to break the source-pathway-receptor linkage.

12.3.3 The shallow soils are considered to pose a low risk to the water environment.

12.3.4 Given that the construction of building or indoor space is not proposed, we do not consider ground gas preclusion measures to be required as part of the future development.

12.3.5 Following our research, we do not consider that the site is at risk from mine gas generation, radon gas or hydrocarbon vapours.

12.3.6 Construction personnel should be aware of the nature of the soils on the site and vigilance should be maintained for any soils at variance from those anticipated during construction works. Appropriate health and safety procedures should be adopted at the site in relation to these matters.

12.4 Built Environment

12.4.1 Based on our findings, we recommend a concrete ACEC Classification AC-2 with a design sulphate class for the site of DS-2.

12.5 Invasive Plant Species

12.5.1 As part of our walkover survey, we have not recorded the presence of invasive plant species during our walkover survey, though we would note that works were undertaken out with the growing season (i.e April to September). We would advise an updated survey be undertaken during the growing season.

12.6 Waste Classification

12.6.1 As part of our assessment we have screened the soil samples collected using the Haz-waste Online Screening Tool. The results indicate the majority of the material to be classified as being non-hazardous with respect to off-site disposal. Exceptions to this include a soil sample from BH06 which is classified as hazardous owing to the carcinogenic concentration of lead and 3 No sample (BH19, TP08, TP11) which were classified as hazardous owing to the recorded elevated pH value which is indicated to be corrosive.

12.7 Geotechnical Analyses

12.7.1 The in-situ and laboratory geotechnical testing indicates that both the made ground and natural soils would be suitable for reuse in the proposed car park development subject to appropriate soils management and compaction. A materials management plan and earthworks specification should be compiled prior to site works.

12.7.2 It should be noted that the site investigations and geotechnical testing did not extend to the two remediated soil bunds located to the east and south east of the trailer park area. Should it be proposed to reuse this material, material assessment of this material should be considered.

12.7.3 Once development proposals and site level designs are finalised we recommend that the ground conditions are revised to ensure the pertinence of our recommendations.

12.7.4 It is our recommendation that any future foundation excavations should be inspected by an experienced Foundation Engineer to ensure the above expected ground conditions are encountered and being utilised as a foundation bearing horizon.

12.8 Mining

12.8.1 No mining or quarrying activities were noted within likely impact distance of the site during our researches. As such we considered that there would be no constraints to the site from mineral instability or mine gasses

12.9 Consultations with Public Authorities

12.9.1 It should be noted that various local authority departments will become involved in the review of the site conditions, including the issues of contaminated land. While measures proposed are consistent with conventional practice, we would advise that before design works are advanced to any considerable stage appropriate approvals are received from the relevant Council departments. We would be pleased to liaise with the Council's representatives in this regard.

We trust that this will meet with your current requirements. However, should you require any further information, please do not hesitate to contact us.

Arran Todd
Geo-Environmental Engineer

Hugh O'Leary
Director

Appendix 01

Record of Trial Pit Logs

LandWise
geo-environmental consultants

Key to exploratory hole symbols and abbreviations

SAMPLE TYPES

ACM - Asbestos sample
AMAL - Amalgamated sample
B - Bulk disturbed sample
BLK - Block sample
C - Core sample
CBR - CBR test sample
D - Disturbed sample
ES - Environmental sample
EW - Environmental water sample
G - Gas sample
J - Jar sample
L - Liner sample
TW - Pushed thin wall sample
U - Undisturbed sample
UT - Undisturbed thin wall sample
W - Water sample

IN-SITU TESTS

HV - Hand shear vane
HV(r) - Hand shear vane residual
PID - Photo ionisation detector
PP - Hand penetrometer
SPT - Standard penetration test
SPT(C) - SPT using cone

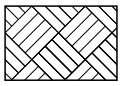
GROUNDWATER

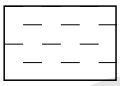
Groundwater strike
Groundwater rest level

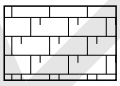
ROTARY CORE DETAILS

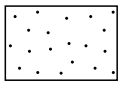
TCR - Total core recovery (%)
SCR - Solid core recovery (%)
RQD - Rock quality designation (%)
FI - Fracture index
NI - Non-intact core
AZCL - Assumed zone of core loss

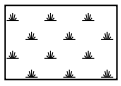
LEGEND

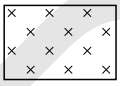

Topsoil

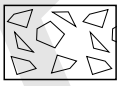

Clay

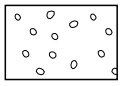

Chalk

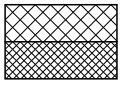

Sand backfill


Peat

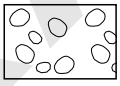

Silt

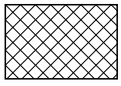

Breccia

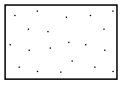

Gravel backfill

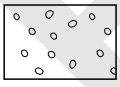

Made ground [cohesive]

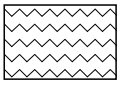

Sand

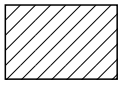

Conglomerate

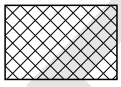

Arisings

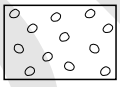

Concrete

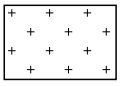

Gravel

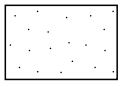

Metamorphic

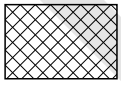

Bentonite

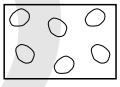

Wood


Cobbles


Igneous

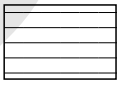

Concrete


Brick

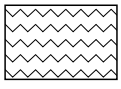

Boulders

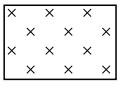

Grout


Bituminous material

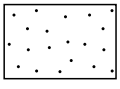

Mudstone


Plain pipe

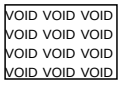

Gypsum


Siltstone

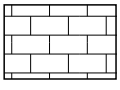

Coal


Sandstone


Slotted pipe



Void


Limestone

DRAFT

Trial Pit

SA101

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-20	2026-01-20

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.35) 0.35		MADE GROUND: Grey slightly sandy fine to coarse angular to subangular gravel of quarried aggregate. Sand is fine to coarse.
						(1.85)		MADE GROUND: Brown sandy very gravelly clay with frequent extraneous brick and fragments of brick and rare extraneous fragments of metal and plastic. *Black plastic geotextile (0.35m)*
						2.20		*End of Trial Pit at 2.20m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

DRAFT

Remarks

Method, Plant, Stability, Dimensions
0.00 - 2.10m TP JCB 3CX
Stable
L = 2.00m
W = 0.70m

Logger
A Todd

Checked By: HOL

Trial Pit

SA102

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-19	2026-01-19

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.40)		MADE GROUND: Grey slightly sandy fine to coarse angular to subangular gravel of quarried aggregate. Sand is fine to coarse.
						0.40		
						(0.40)		MADE GROUND: Brown sandy gravelly clay with frequent bricks and fragments of brick. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology. *Black plastic geotextile (0.40m)*
						0.80		
						(1.40)		MADE GROUND: Dark grey sandy very gravelly clay with frequent extraneous bricks and fragments of brick and rare pockets of remnant topsoil.
						2.20		*End of Trial Pit at 2.20m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

DRAFT

Remarks

Method, Plant, Stability, Dimensions
0.00 - 2.20m TP JCB 3CX
Stable
L = 2.00m
W = 0.70m

Logger
A Todd

Checked By: HOL

Trial Pit

SA103

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-19	2026-01-19

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.10) 0.10		MADE GROUND: Brownish grey clayey sandy gravel. Sand is coarse. Gravel is fine to medium angular to subrounded of various lithology.
						(0.10) 0.20		MADE GROUND: Orange fine to coarse angular gravel of crushed brick and blaes.
						(0.20) 0.40		MADE GROUND: Dark brown mottled dark grey sandy very gravelly clay with frequent extraneous brick and blaes fragments rare extraneous glass, ash, rope, ceramic and timber. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
						(0.50) 0.90		MADE GROUND: Black mottled brown sandy very gravelly clay with occasional extraneous plastic, metal and rubber.
						(1.05) 1.95		MADE GROUND: Brown very gravelly clay with occasional extraneous brick and metal. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
								End of Trial Pit at 1.95m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Remarks
Moderate hydrocarbon odour 0.40-0.90 m

Method, Plant, Stability, Dimensions
0.00 - 1.95m TP JCB 3CX
Stable
L = 1.70m
W = 0.70m

Logger
A Todd

Checked By: HOL

DRAFT

Trial Pit

SA104

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-19	2026-01-19

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.30)		MADE GROUND: Reddish brown slightly sandy fine to coarse angular to subrounded gravel of various lithology. Sand is fine to coarse.
						0.30 (0.10) 0.40		MADE GROUND: Grey slightly sandy fine to coarse angular to subangular gravel of quarried aggregate. Sand is fine to coarse.
						(0.40)		MADE GROUND: Brown clayey gravelly fine to coarse sand with occasional brick and concrete cobbles. Gravel was fine to coarse angular to subangular of various lithology.
						0.80 (1.30)		MADE GROUND: Dark grey clayey gravelly fine to coarse sand with frequent timber and metal cable and occasional brick and concrete cobbles and concrete boulders. Gravel was fine to coarse angular to subangular of various lithology.
						2.10		*End of Trial Pit at 2.10m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

DRAFT

Remarks
Moderate hydrocarbon odour 0.80-2.10 m

Method, Plant, Stability, Dimensions
0.00 - 2.10m TP JCB 3CX
Stable
L = 1.80m
W = 0.70m

Logger
A Todd

Checked By: HOL

Trial Pit

TP101

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-20	2026-01-20

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
		0.20	ES 1			(0.30) 0.30		MADE GROUND: Grey clayey sandy gravel with rare extraneous fragments of blaes. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of various lithology predominantly quarried aggregate.
		0.50	ES 2			(0.50) 0.80		MADE GROUND: Brown sandy very gravely friable clay with frequent extraneous bricks and fragments of brick and blaes and rare extraneous metal, glass and timber. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology. *Black plastic geotextile (0.30m)*
		0.90	ES 3			(0.30) 1.10		MADE GROUND: Black sandy slightly gravelly clay. Sand is fine to coarse. Gravel is fine to medium subrounded of various lithology.
		2.00	ES 4			(0.70) 1.80		MADE GROUND: Brown sandy very gravely friable clay with frequent extraneous cobble sized concrete fragments and occasional extraneous metal. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
						(1.50) 3.30		MADE GROUND: Brown sandy gravelly clay with frequent extraneous blaes and rare extraneous bricks metal and rubber. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
								End of Trial Pit at 3.30m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Remarks
Slight hydrocarbon odour 0.80-1.10 m

Method, Plant, Stability, Dimensions
0.00 - 3.30m TP JCB 3CX
Stable
L = 2.50m
W = 1.00m

Logger
A Todd

Checked By: HOL

DRAFT

Trial Pit

TP102

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-20	2026-01-20

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.25)		MADE GROUND: Grey clayey sandy gravel with rare extraneous fragments of blaes. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of various lithology predominantly quarried aggregate.
		0.30	ES 5			0.25		
						(0.25)		MADE GROUND: Brown very sandy gravelly clay with localised pockets of soft to firm light brown slightly gravelly clay and frequent blaes. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of various lithology.
						0.50		*Black plastic geotextile (0.25m)*
	▼	0.80	ES 6			(0.70)		MADE GROUND: Multi coloured slightly clayey very gravelly cobbles of demolition rubble including bricks concrete ceramic and timber with rare ceramic and metal. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology including demolition rubble.
	▽					1.20		*End of Trial Pit at 1.20m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

DRAFT

Remarks
Rapid groundwater ingress 1.20 m, rose to 0.80 m in 5 min thereafter no change. Terminated due to water ingress.

Method, Plant, Stability, Dimensions
0.00 - 1.20m TP JCB 3CX
Stable
L = 2.00m
W = 1.00m

Logger
A Todd

Checked By: HOL

Trial Pit

TP103

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-20	2026-01-20

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
		0.20	ES 7			(0.30) 0.30		MADE GROUND: Grey slightly sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of quarried aggregate.
		0.50	ES 8			(0.30) 0.60		MADE GROUND: Brown sandy gravelly clay with frequent blaes. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of various lithology.
	▽	0.70	ES 9			(0.20) 0.80		MADE GROUND: Black sandy slightly gravelly clay. Sand is fine to coarse. Gravel is fine to medium subrounded of various lithology.
		1.50	ES 10			(1.90)		MADE GROUND: Brown sandy very gravelly clay with frequent extraneous material including bricks, brick fragments, blaes, corrugated steel sheet, timber, metal wire, old pipes, hardened bitumen and occasional pockets of soft very gravelly dark grey clay. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
	▽					2.70		*End of Trial Pit at 2.70m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

DRAFT

Remarks

Method, Plant, Stability, Dimensions
0.00 - 3.00m TP JCB 3CX
Stable
L = 2.50m
W = 1.00m

Logger
A Todd

Checked By: HOL

Trial Pit

TP104

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-21	2026-01-21

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
		0.10	ES 12			(0.10) 0.10		MADE GROUND: Black tarmac with medium angular to subangular gravel aggregate.
						(0.25)		MADE GROUND: Grey slightly sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of quarried aggregate.
	▽	0.40	ES 11			0.35		MADE GROUND: Brown sandy very gravelly clay with frequent extraneous bricks, fragments of brick and blaes and rare extraneous fragments of ceramic, glass, plastic, metal and wood. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
						(0.45)		*Black plastic geotextile (0.35m)*
						0.80		MADE GROUND: Dark brown slightly sandy gravelly clay occasional extraneous fragments of blaes. Localised pockets of black sandy clay with frequent tree wood. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
						(0.80)		
		1.70	ES 13			1.60		MADE GROUND: Grey sandy slightly gravelly clay with rare remnant vegetation. Sand is fine to medium. Gravel is fine to medium subangular to subrounded of various lithology. (Presumed reworked)
						(1.60)		
						3.20		*End of Trial Pit at 3.20m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Remarks

Method, Plant, Stability, Dimensions
0.00 - 3.20m TP JCB 3CX
Stable
L = 2.50m
W = 1.00m

Logger
A Todd

Checked By: HOL

DRAFT

Trial Pit

TP105

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-21	2026-01-21

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
		0.20	ES 14			(0.30) 0.30		MADE GROUND: Grey very clayey sandy gravel with occasional cobbles. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of quarried aggregate.
		0.50	ES 15			(0.70) 1.00		MADE GROUND: Brown sandy very gravelly clay with frequent extraneous bricks, fragments of brick and blaes and rare extraneous fragments of ceramic, glass, plastic, metal and wood. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology. *Black plastic geotextile (0.30m)*
		1.20	ES 16			(0.70) 1.70		MADE GROUND: Black slightly clayey very sandy gravel with frequent extraneous bricks and timber and occasional blaes and concrete cobbles. Sand is predominantly coarse. Gravel is fine to coarse angular to subrounded of various lithology. *Frequent metal wire (1.65m)*
	▽	1.90	ES 17			(0.60) 2.30		MADE GROUND: Grey very clayey sandy gravel with frequent bricks. (Recovered wet)
								End of Trial Pit at 2.30m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Remarks
Moderate hydrocarbon 1.70-2.30 m. Rapid groundwater ingress below 1.70 m. Terminated due to water ingress.

Method, Plant, Stability, Dimensions
0.00 - 2.30m TP JCB 3CX
Stable
L = 2.00m
W = 1.00m

Logger
A Todd

Checked By: HOL

DRAFT

Trial Pit

TP106

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-19	2026-01-19

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.10) 0.10		MADE GROUND: Brownish grey sandy gravel. Sand is coarse. Gravel is fine to medium angular to subrounded of various lithology.
						(0.10) 0.20		MADE GROUND: Grey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of quarried aggregate.
		0.30	ES 18			(0.20) 0.40		MADE GROUND: Orange fine to coarse angular gravel of crushed brick and blaes.
		0.80	ES 19			(1.20)		MADE GROUND: Brown very gravelly clay with frequent extraneous cobbles of demolition rubble and fragments of plastic occasional metal wire and rare timber, glass, and tins (20 cm, cylinder) with remnant product (creosote or similar). Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
		1.40	ES 20			1.60		MADE GROUND: Brown very gravelly clay with occasional extraneous cobbles of demolition rubble, timber and fragments of plastic, metal wire and rare glass. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
						(1.20)		
	▽	2.90	ES 21			2.80 (0.40)		MADE GROUND: Grey sandy very gravelly clay with frequent cobbles. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of various lithology. Cobbles were angular to subangular of various lithology
						3.20		*End of Trial Pit at 3.20m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Remarks
Moderate hydrocarbon odour 0.40-1.60 m. Strong hyrocarbon odour 1.60-3.20 m.

Method, Plant, Stability, Dimensions
0.00 - 3.20m TP JCB 3CX
Stable
L = 2.50m
W = 1.00m

Logger
A Todd

Checked By: HOL

DRAFT

Trial Pit

TP107

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-21	2026-01-21

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
		0.10	ES 22			(0.15) 0.15		MADE GROUND: Brownish grey clayey sandy gravel. Sand is coarse. Gravel is fine to medium angular to subrounded of various lithology.
		0.20	ES 23			(0.20) 0.35		MADE GROUND: Orange fine to coarse angular gravel of crushed brick and blaes.
		0.40	ES 24			(0.45) 0.80		MADE GROUND: Dark brown mottled dark grey sandy very gravelly clay with frequent extraneous brick and blaes fragments rare extraneous glass, ash, rope, ceramic and timber. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
		0.90	ES 25			(0.70) 1.50		MADE GROUND: Dark grey and brown clayey very gravelly sand with abundant cobbles and boulders of brick, stone block and concrete and rare metal wire. Stiff dark brown mottled dark grey sandy very gravelly clay with frequent extraneous brick and blaes fragments rare extraneous glass, ash, rope, ceramic and timber. Sand was fine to coarse. Gravel was fine to coarse angular to subrounded of various lithology.
	▽	2.40	ES 26			(1.20) 2.70		MADE GROUND: Multicoulored sandy gravelly cobbles and boulders of demolition rubble with rare timber. Sand is coarse. Gravel is fine to coarse predominantly angular to subangular of demolition rubble. Cobbles are angular cubic of brick, stonework and concrete. Boulders are subangular of concrete.
								End of Trial Pit at 2.70m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

DRAFT

Remarks
Moderate hydrocarbon odour recorded 2.40-2.70 m. Rapid groundwater ingress below 2.40 m. Unstable below 1.50 m.

Method, Plant, Stability, Dimensions — **Logger**

0.00 - 1.50m TP JCB 3CX — A Todd
Stable
L = 2.50m *W = 1.00m*

1.50 - 2.70m TP JCB 3CX — A Todd
Unstable
L = 2.50m *W = 1.00m*

Checked By: HOL

Trial Pit

TP108

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-21	2026-01-22

Client	Consultant	Contractor
GBX Remediation	LandWise Conulting	Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.10	ES 27			(0.15) 0.15		MADE GROUND: Greyish brown clayey sandy gravel with rare extraneous blaes and ceramic. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of various lithology.
						(0.25) 0.40		MADE GROUND: Orange fine to coarse angular gravel of crushed brick and blaes.
						(0.40) 0.80		MADE GROUND: Multicoulored sandy gravelly subangular boulders of concrete with occasional extraneous plastic. Sand is coarse. Gravel is fine to coarse angular of concrete and brick.
		1.00	ES 28			(0.50) 1.30		MADE GROUND: Dark brown slightly clayey very gravelly fine to coarse sand with frequent extraneous fragments of brick and blaes and rare extraneous fragments of metal, timber and hardened bitumen. Gravel is fine to coarse angular to subangular of various lithology.
		1.50	ES 29			(1.40) 2.70		MADE GROUND: Dark brown very sandy very gravelly clay with frequent extraneous brick and blaes occasional extraneous brick and metal and rare extraneous plastic cobbles of tarmac and concrete and boulders of concrete. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
	▽	3.00	ES 30			(0.50) 3.20		Dark grey silty fine to medium SAND with frequent rootlets and partially decayed vegetation. (Presumed natural)
								End of Trial Pit at 3.20m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Remarks

Slight hydrocarbon odour 0.80-1.30 m. Moderate hydrocarbon odour 1.30-2.70 m. Groundwater seepage at 2.70 m. Excavated to 0.40 m, then backfilled on 21/01/26. Excavation progressed further with breaker 22/01/26.

Method, Plant, Stability, Dimensions

0.00 - 3.20m TP JCB 3CX
Stable
L = 2.50m
W = 1.00m

Logger
A Todd

Checked By: HOL

DRAFT

Trial Pit

TP109

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-22	2026-01-22

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.20) 0.20		MADE GROUND: Reddish grey sandy fine to coarse angular to subrounded gravel of various lithology with occasional cobbles. Sand is coarse. Cobbles are angular to subangular of various lithology.
		0.30	ES 31			(0.30) 0.50		MADE GROUND: Brown very sandy very gravelly clay with frequent extraneous brick, blaes and ceramic rare extraneous metal, glass, and hardened bitumen. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
		0.80	ES 32			(0.80) 1.30		MADE GROUND: Dark grey sandy very gravelly clay with rare extraneous metal, slag and ash. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
		1.50	ES 33			(1.40) 2.70		Dark grey slightly silty fine to medium SAND with frequent rootlets. (Presumed natural)
								End of Trial Pit at 2.70m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

DRAFT

Remarks
Slight organic odour 1.30-2.70 m.

Method, Plant, Stability, Dimensions
0.00 - 2.70m TP JCB 3CX
Stable
L = 2.00m
W = 1.00m

Logger
A Todd

Checked By: HOL

Trial Pit

TP110

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-21	2026-01-21

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
		0.10	ES 34			(0.20)		MADE GROUND: Brownish grey sandy fine to coarse angular to subangular gravel various lithology with frequent extraneous ceramic occasional extraneous brick fragments and rare extraneous metal and timber. Sand is coarse.
						0.20		
		0.50	ES 35			(0.40)		MADE GROUND: Reddish brown slightly clayey very sandy fine to coarse angular to subangular gravel various lithology with frequent extraneous bricks and brick fragments and occasional concrete and tarmac cobbles. Sand is fine to coarse.
						0.60		
						(0.40)		MADE GROUND: Subangular cubic boulders of concrete and stone blockwork.
		1.10	ES 36			1.00		MADE GROUND: Dark brown and grey very sandy very gravelly clay with frequent bricks and concrete boulders occasional extraneous metal and timer and rare plastic, hardened bitumen and rubber. Sand is fine to coarse.
		1.60	ES 37			(1.30)		
						2.30		*End of Trial Pit at 2.30m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Remarks
Slight hydrocarbon odour 1.00-2.30 m. Terminated due to difficult digging.

Method, Plant, Stability, Dimensions
0.00 - 2.30m TP JCB 3CX
Stable
L = 2.50m
W = 1.00m

Logger
A Todd

Checked By: HOL

DRAFT

Trial Pit

TP111

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-21	2026-01-21

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
		0.20	ES 38			(0.50)		MADE GROUND: Brownish grey clayey sandy fine to coarse angular to subangular gravel of various lithology with frequent rootlets occasional extraneous blaes and ceramic.
						0.50		
						(0.20)		MADE GROUND: Orange fine to coarse angular gravel of crushed brick and blaes.
	▽					0.70		
		0.80	ES 39			(0.20)		MADE GROUND: Brown sandy gravelly clay with frequent extraneous blaes and brick fragments. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
						0.90		
		1.00	ES 40			(0.30)		MADE GROUND: Black sandy gravelly clay with rare extraneous fragments of glass. Gravel is fine to coarse angular to subrounded of various lithology.
						1.20		MADE GROUND: Mottled brown and dark grey sandy very gravelly clay with frequent bricks and fragments of brick and rare metal, timber, concrete cobbles and boulders, and ash.
		1.50	ES 41					
						(1.50)		
								Large boulder sized concrete obstruction, could not be removed from pit. (2.40 - 2.70m)
						2.70		*End of Trial Pit at 2.70m*

DRAFT

Remarks
Moderate hydrocarbon odour 1.20-2.70. Groundwater seepage at 0.70 m.

Method, Plant, Stability, Dimensions
0.00 - 2.70m TP JCB 3CX
Stable
L = 2.50m
W = 1.00m

Logger
A Todd

Checked By: HOL

Trial Pit

TP112

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-21	2026-01-21

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.10) 0.10		MADE GROUND: Grey clayey sandy fine to coarse angular to subangular gravel of quarried aggregate with frequent extraneous fragments of blaes and brick. Sand is fine to coarse.
						(0.15) 0.25		MADE GROUND: Orange fine to coarse angular gravel of crushed brick and blaes with abundant whole bricks.
		0.30	ES 42			(0.25) 0.50		MADE GROUND: Dark brown clayey gravelly fine to coarse sand with frequent extraneous fragments of blaes and brick and rare plastic, glass and wood. Gravel is fine to coarse.
	▽	0.60	ES 43			(0.40) 0.90		MADE GROUND: Brown sandy gravelly clay with rare extraneous timber, metal and plastic. Localised pockets of dark grey sandy gravelly clay with remnant vegetation. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of various lithology.
		1.20	ES 44			(2.30)		MADE GROUND: Brownish grey sandy very gravelly clay with frequent extraneous fragments of brick and blaes and rare extraneous metal, plastic, timber, remnant vegetation, ceramic and glass. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
						3.20		*End of Trial Pit at 3.20m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Remarks
Slight organic odour 0.90-3.20 m.

Method, Plant, Stability, Dimensions
0.00 - 3.00m TP JCB 3CX
Stable
L = 2.50m
W = 1.00m

Logger
A Todd

Checked By: HOL

DRAFT

Trial Pit

TP113

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-22	2026-01-22

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.10) 0.10		MADE GROUND: Brownish grey sandy fine to coarse angular to subangular gravel various lithology with frequent extraneous ceramic. Sand is coarse.
						(0.40) 0.50		MADE GROUND: Multi coloured sandy gravelly angular to subangular cobbles of demolition rubble with occasional ceramic. Sand is coarse. Gravel is fine to coarse of demolition rubble.
		0.60	ES 45			(0.30) 0.80		MADE GROUND: Dark brown very sandy very gravelly clay with frequent extraneous brick and occasional extraneous ceramic, plastic and glass.
		1.10	ES 46			(0.70) 1.50		MADE GROUND: Dark grey very sandy very gravelly dark grey clay with frequent extraneous fragments of brick and rare extraneous fragments of tarmac, concrete, ash and slag. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
		2.20	ES 47			(1.20) 2.70		MADE GROUND: Dark grey very sandy very gravelly dark grey clay with frequent extraneous fragments of brick and rare extraneous fragments of tarmac, concrete, ash and slag. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
						(0.30) 3.00		Stiff brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium angular to subrounded of various lithology.
								End of Trial Pit at 3.00m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

Remarks
Slight hydrocarbon odour 2.00-3.00 m. Moderate groundwater ingress at 2.00 m.

Method, Plant, Stability, Dimensions

Logger

Checked By: HOL

DRAFT

Trial Pit

TP114

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-22	2026-01-22

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(1.00)		MADE GROUND: Dark brown clayey very gravelly sand with frequent extraneous brick, wood, metal, concrete, and plastic. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
		1.20	ES 48			1.00 (0.80)		MADE GROUND: Dark brown heterogenous clayey very gravelly sand with abundant extraneous brick wood metal concrete and plastic. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
		1.85	ES 49			1.80 (0.10) 1.90 (0.10) 2.00		MADE GROUND: Dark grey sandy fine to coarse subangular platy gravel of single lithology. Sand is medium to coarse.
						(0.20) 2.20		MADE GROUND: Orange fine to coarse angular gravel of crushed brick and blaes.
		2.30	ES 50			(0.30) 2.50		MADE GROUND: Brown sandy gravelly clay with occasional extraneous brick and blaes and rare metal. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
								MADE GROUND: Dark grey slightly sandy slightly gravelly clay with frequent extraneous blaes and partially decayed vegetation. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded of various lithology.
								End of Trial Pit at 2.50m

DRAFT

Remarks
Excavated into side of stockpile; top of pit ~1.80 m above surrounding ground level.

Method, Plant, Stability, Dimensions
0.00 - 2.50m TP JCB 3CX
Stable
L = 2.00m
W = 1.00m

Logger
A Todd

Checked By: HOL

Trial Pit

TP115

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP				1:25

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover, Halewood	LW25-136	2026-01-22	2026-01-22

Client
GBX Remediation

Consultant
LandWise Conulting

Contractor
Thomas Plant

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(2.50)		MADE GROUND: Dark brown clayey gravelly fine to medium sand with frequent roots and occasional extraneous material including brick, plastic, ceramic and timber. Gravel was fine to coarse angular to subrounded of various lithology. (Stockpiled topsoil)
		1.00	ES 51					
						2.50		
		2.60	ES 52			(0.20)		MADE GROUND: Grey sandy fine to coarse angular to subangular gravel. Sand was coarse.
						2.70		
		2.80	ES 53			(0.40)		MADE GROUND: Brown very sandy very gravelly clay with frequent brick occasional wood and rare slag, ash, tarmac and glass.
						3.10		*End of Trial Pit at 3.10m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

DRAFT

Remarks
Excavated into side of stockpile; top of pit ~2.70 m above surrounding ground level.

Method, Plant, Stability, Dimensions
0.00 - 3.10m TP JCB 3CX
Stable
L = 2.00m
W = 1.00m

Logger
A Todd

Checked By: HOL

Appendix 02

Record of Soil Borehole Logs

Window Sampler

BH01

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345525.85	384157.16	21.63	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.00-0.50	B					MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
		0.20	ES			(0.45)		
					21.18	0.45		MADE GROUND: Stiff locally firm brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale. Rare wood noted.
		0.50	ES					
		0.50-1.00	B					
		0.80	ES					
		1.00-1.45	D					
		1.00-2.00	U					
		1.20	SPT	N=17 (2,3/5,4,3,5)				
						(2.05)		
		2.00	SPT	N=15 (2,3/3,4,4,4)				
		2.00	ES					
		2.00-2.45	D					
		2.00-3.00	U					
					19.13	2.50		MADE GROUND: Stiff grey slightly sandy silty clay (presumed reworked).
		3.00	SPT	N=16 (2,3/3,4,4,5)		(1.00)		
		3.00-3.45	D					
		3.00-4.00	U					
					18.13	3.50		Firm brown and grey slightly silty slightly sandy slightly gravelly CLAY. Gravel is composed of subangular to subrounded fine to medium of various lithologies.
		4.00	SPT	N=14 (3,3/3,3,4,4)				
		4.00-4.45	D					
		4.00-5.00	U					
						(1.50)		
		5.00	SPT	N=15 (3,4/3,4,4,4)	16.63	5.00		*End of Borehole at 5.00m*
		5.00-5.45	D					

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	T Caddick
1.20 - 5.00m	WLS	Window Sample	T Caddick

Checked By: GD **Approved By:** GD

Created using Pebble Geo

GD Drilling Ltd

Window Sampler

BH01

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345525.85	384157.16	21.63	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=17 (2,3/5,4,3,5)
2.00 (S)	0.00	0.00	DART577	74	N=15 (2,3/3,4,4,4)
3.00 (S)	0.00	0.00	DART577	74	N=16 (2,3/3,4,4,5)
4.00 (S)	0.00	0.00	DART577	74	N=14 (3,3/3,3,4,4)
5.00 (S)	0.00	0.00	DART577	74	N=15 (3,4/3,4,4,4)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	B		
	ES		
	ES		
	B		
	ES		
	D		
	U		
	ES		
	D		
	U		
	D		
	U		
	D		
	U		
	D		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	T Caddick
1.20 - 5.00m	WLS	Window Sample	T Caddick

Checked By: GD **Approved By:** GD

Window Sampler

BH02

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345575.03	384180.36	21.79	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.20-0.00	ES 1			(0.30)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
					21.49	0.30		
		0.50-0.00	ES 2					MADE GROUND: Firm brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale. Rare plastic noted.
		0.50-1.00	B 1					
		1.00-0.00	ES 3					
		1.20	SPT	N=10 (2,3/3,4,1,2)				
		1.20-1.65	D 1					
		1.20-2.20	U 1	Blows: 55				
		1.80-0.00	B 2					
		2.00	SPT	N=15 (3,5/4,4,4,3)				
		2.00-0.00	ES 4					
		2.00-2.45	D 2					
		2.00-3.00	U 2	Blows: 67		(4.00)		
		3.00	SPT	N=11 (1,2/2,3,4,2)				
		3.00-0.00	ES 5					
		3.00-3.45	D 3					
		3.00-4.00	B 3					
		4.00	SPT	N=12 (2,2/3,2,3,4)				
		4.00-4.45	D 4					
					17.49	4.30		Firm grey slightly silty slightly sandy slightly gravelly CLAY. Gravel is composed of subangular to subrounded fine to medium of various lithologies.
						(0.70)		
					16.79	5.00		*End of Borehole at 5.00m*

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. Water strike at 1.50m and rising to 1.12m after 20mins. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions			Logger
0.00 - 1.20m	IP	Hand Tools	Gerry Devlin
1.20 - 5.00m	WS	Window Sample	Gerry Devlin

Checked By: GD **Approved By:** GD

Created using Pebble Geo

GD Drilling Ltd

Window Sampler

BH02

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345575.03	384180.36	21.79	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
1.50	0.00	0.00	2026-01-20T00:00	Med flow

Water Strike - Details

Struck (m)	Rose To (m)	Time (mins)	Remarks
1.50	1.50	5	Med
1.50	1.40	10	Med
1.50	1.30	15	Med
1.50	1.12	20	Med

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=10 (2,3/3,4,1,2)
2.00 (S)	0.00	0.00	DART577	74	N=15 (3,5/4,4,4,3)
3.00 (S)	0.00	0.00	DART577	74	N=11 (1,2/2,3,4,2)
4.00 (S)	0.00	0.00	DART577	74	N=12 (2,2/3,2,3,4)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
GD1181-BH02-ES-1	ES		
GD1181-BH02-ES-2	ES		
GD1181-BH02-ES-3	ES		
GD1181-BH02-ES-4	ES		
GD1181-BH02-ES-5	ES		
GD1181-BH02-B-1	B		
GD1181-BH02-B-2	B		
GD1181-BH02-D-1	D		
GD1181-BH02-D-2	D		
GD1181-BH02-D-3	D		
GD1181-BH02-D-4	D		
GD1181-BH02-B-3	B		
GD1181-BH02-U-1	U		
GD1181-BH02-U-2	U		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. Water strike at 1.50m and rising to 1.12m after 20mins. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Gerry Devlin
1.20 - 5.00m	WS	Window Sample	Gerry Devlin

Checked By: GD **Approved By:** GD

Window Sampler

BH03

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345622.54	384180.57	21.60	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.10	ES 1			(0.30)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
					21.30	0.30		
		0.50 0.50-1.00	ES 2 B 1					MADE GROUND: Firm brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale. Rare wood and plastic noted.
		1.00	ES 3					
		1.20 1.20-2.00	SPT U 1	N=8 (4,6/2,2,2,2) Blows: 56				
						(2.85)		
	▼	2.00 2.00	SPT ES 4	N=22 (2,3/4,6,4,8)				
		2.80	B 2					*From 2.80m: Slight hydrocarbon odour noted. (2.80 - 3.15m)*
		3.00 3.00	SPT ES 5	N=50 for 0mm (12,13)				
					18.45	3.15		*No further progress, possible boulder obstruction.*
								End of Borehole at 3.15m

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 3.15m and terminated on possible boulder obstruction. Water strike at 2.00m and remaining at this level after 20mins. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Joel McMillan
1.20 - 3.15m	WS	Window Sample	Joel McMillan

Checked By: GD **Approved By:** GD

Window Sampler

BH03

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345622.54	384180.57	21.60	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
2.00	0.00	0.00	2026-01-20T00:00	flow

Water Strike - Details

Struck (m)	Rose To (m)	Time (mins)	Remarks
2.00	2.00	20	

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART560	71	N=8 (4,6/2,2,2,2)
2.00 (S)	0.00	0.00	DART560	71	N=22 (2,3/4,6,4,8)
3.00 (S)	0.00	0.00	DART560	71	N=50 for 0mm (12,13)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
GD1181-WS03-B-1	B		
GD1181-WS03-B-2	B		
GD1181-WS03-ES-1	ES		
GD1181-WS03-ES-2	ES		
GD1181-WS03-ES-3	ES		
GD1181-WS03-ES-4	ES		
GD1181-WS03-ES-5	ES		
GD1181-WS03-U-1	U		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 3.15m and terminated on possible boulder obstruction. Water strike at 2.00m and remaining at this level after 20mins. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Joel McMillan
1.20 - 3.15m	WS	Window Sample	Joel McMillan

Checked By: GD **Approved By:** GD

Window Sampler

BH04

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345532.76	384226.16	21.60	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.20	ES			(0.40)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
					21.20	0.40		
		0.50	ES					MADE GROUND: Firm brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale.
		1.00	ES					
		1.20 1.20 1.20	SPT U 2 D 1.65	N=12 (3,3/3,3,3,3)				
		2.00 2.00 2.00 2.00 2.00	SPT ES U 3 D 2.45 D 3.45	N=11 (2,2/3,3,2,3)		(3.10)		
		3.00 3.00 3.00 3.00	SPT ES U 4 D 3.45	N=15 (3,3/3,4,4,4)				
					18.10	3.50		Firm becoming stiff brown and grey slightly silty slightly sandy CLAY with rare gravel.
		4.00 4.00 4.00	SPT U 5 D 4.45	N=17 (3,3/4,4,4,5)				
						(2.00)		
		5.00 5.00	SPT D 5.45	N=16 (3,4/4,4,4,4)				
					16.10	5.50		*End of Borehole at 5.50m*

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	T Caddick
1.20 - 5.50m	WLS	Window Sample	T Caddick

Checked By: GD **Approved By:** GD

Created using Pebble Geo

GD Drilling Ltd

Window Sampler

BH04

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345532.76	384226.16	21.60	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=12 (3,3/3,3,3,3)
2.00 (S)	0.00	0.00	DART577	74	N=11 (2,2/3,3,2,3)
3.00 (S)	0.00	0.00	DART577	74	N=15 (3,3/3,4,4,4)
4.00 (S)	0.00	0.00	DART577	74	N=17 (3,3/4,4,4,5)
5.00 (S)	0.00	0.00	DART577	74	N=16 (3,4/4,4,4,4)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	ES		
	ES		
	ES		
	ES		
	ES		
	U		
	U		
	U		
	U		
	D		
	D		
	D		
	D		
	D		
	D		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	T Caddick
1.20 - 5.50m	WLS	Window Sample	T Caddick

Checked By: GD **Approved By:** GD

Window Sampler

BH05

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345570.57	384219.41	21.80	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.20-0.00	ES 1			(0.40)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate. Sand is fine to coarse.
					21.40	0.40		
		0.50-0.00 0.50-1.00	ES 2 B 1					MADE GROUND: Firm brown locally grey slightly sandy gravelly locally very gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale. Lenses of gravelly sand from 3.00m
		1.00-0.00	ES 3					
		1.20 1.20-1.65 1.20-2.20	SPT D 1 U 1	N=9 (2,2/2,1,2,4) Blows: 55				
	▼	2.00 2.00-2.45 2.00-3.00 2.00-3.00	SPT D 2 ES 4 U 2	N=9 (2,2/2,3,2,2) Blows: 68		(3.30)		
	▽	3.00 3.00-3.45 3.00-3.80	SPT D 3 U 3	N=24 (7,8/7,7,6,4) Blows: 66				
					18.10	3.70		Firm to stiff brown grey slightly silty slightly gravelly CLAY. Gravel is composed of subangular to subrounded fine to coarse of various lithologies.
						(0.50)		
		4.20 4.20-4.45	SPT D 4	N=50 for 100mm (4,5/15,35 for 25mm)	17.60	4.20		*No further progress, possible boulder obstruction.*
								End of Borehole at 4.20m

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 4.20m and terminated on Engineer's instruction. Water strike at 3.00m and rising to 2.00m after 20mins. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Gerry Devlin
1.20 - 4.45m	WS	Window Sample	Gerry Devlin

Checked By: GD **Approved By:** GD

Created using Pebble Geo

GD Drilling Ltd

Window Sampler

BH05

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345570.57	384219.41	21.80	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
3.00	0.00	0.00	2026-01-20T00:00	Slow flow

Water Strike - Details

Struck (m)	Rose To (m)	Time (mins)	Remarks
3.00	2.80	5	Slow
3.00	2.50	10	Slow
3.00	2.30	15	Slow
3.00	2.00	20	Slow

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=9 (2,2/2,1,2,4)
2.00 (S)	0.00	0.00	DART577	74	N=9 (2,2/2,3,2,2)
3.00 (S)	0.00	0.00	DART577	74	N=24 (7,8/7,7,6,4)
4.20 (S)	4.00	0.00	DART577	74	N=50 for 100mm (4,5/15,35 for 25mm)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
GD1181-BH05-D-1	D		
GD1181-BH05-D-2	D		
GD1181-BH05-D-3	D		
GD1181-BH05-D-4	D		
GD1181-BH05-B-1	B		
GD1181-BH05-ES-1	ES		
GD1181-BH05-ES-2	ES		
GD1181-BH05-ES-3	ES		
GD1181-BH05-ES-4	ES		
GD1181-BH05-U-1	U		
GD1181-BH05-U-2	U		
GD1181-BH05-U-3	U		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 4.20m and terminated on Engineer's instruction. Water strike at 3.00m and rising to 2.00m after 20mins. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Gerry Devlin
1.20 - 4.45m	WS	Window Sample	Gerry Devlin

Checked By: GD **Approved By:** GD

Window Sampler

BH06

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345623.45	384230.86	21.53	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.20-0.00	ES 1			(0.40)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate. Sand is fine to coarse.
					21.13	0.40		
		0.50-0.00 0.50-1.00	ES 2 B 1					MADE GROUND: Blackish grey very sandy subangular fine to coarse gravel and cobbles of various lithologies including brick and burnt shale. Occasional wood and plastic. Slight hydrocarbon odour. Traces of ash and pockets of clay noted. Very loose from 1.20m.
		1.00-1.50	ES 3					
		1.20 1.20-1.65	SPT D 1	N=5 (1,2/1,2,1,1)				
						(2.60)		
		1.80-0.00	B 2					
		2.00 2.00-2.45	SPT D 2	N=9 (1,2/4,1,1,3)				
		2.80-0.00	B 3					
		3.00	SPT	N=50 for 0mm (25 for 0mm/)	18.53	3.00		*No further progress, possible boulder obstruction.*
								End of Borehole at 3.00m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 3.00m and terminated on Engineer's instruction. Water strike at 1.00m and rising to 0.05m after 20mins. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Gerry Devlin
1.20 - 3.00m	WS	Window Sample	Gerry Devlin

Checked By: GD **Approved By:** GD

Created using Pebble Geo

GD Drilling Ltd

Window Sampler

BH06

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345623.45	384230.86	21.53	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
1.00	0.00	0.00	2026-01-21T00:00	Fast flow

Water Strike - Details

Struck (m)	Rose To (m)	Time (mins)	Remarks
1.00	0.80	5	Fast
1.00	0.07	10	Fast
1.00	0.60	15	Fast
1.00	0.05	20	Fast

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=5 (1,2/1,2,1,1)
2.00 (S)	0.00	0.00	DART577	74	N=9 (1,2/4,1,1,3)
3.00 (S)	0.00	0.00	DART577	74	N=50 for 0mm (25 for 0mm/)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
GD1181-BH06-ES-1	ES		
GD1181-BH06-ES-2	ES		
GD1181-BH06-ES-3	ES		
GD1181-BH06-B-1	B		
GD1181-BH06-D-1	D		
GD1181-BH06-D-2	D		
GD1181-BH06-B-2	B		
GD1181-BH06-B-3	B		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 3.00m and terminated on Engineer's instruction. Water strike at 1.00m and rising to 0.05m after 20mins. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Gerry Devlin
1.20 - 3.00m	WS	Window Sample	Gerry Devlin

Checked By: GD **Approved By:** GD

Borehole Log

BH07

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
	345521.49	384269.77	21.85	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.00-0.50	B			(0.30)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
		0.20	ES		21.55	0.30		
		0.50	ES					MADE GROUND: Firm brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale.
		0.50-1.00	B					
		0.80	ES					
		1.00-1.45	D					
		1.00-2.00	U					
		1.20	SPT	N=20 (3,6/5,6,5,4)				
		2.00	SPT	N=13 (2,2/3,3,4,3)		(3.40)		
		2.00	ES					
		2.00-2.45	D					
		2.00-3.00	U					
		3.00	SPT	N=14 (3,3/3,3,4,4)				
		3.00	ES					
		3.00-3.45	D					
		3.00-4.00	U					
		4.00	SPT	N=12 (2,2/3,3,3,3)	18.15	3.70		Firm brown and grey slightly silty slightly sandy slightly gravelly CLAY. Gravel is composed of subangular to subrounded fine to medium of various lithologies.
		4.00-4.45	D					
		4.00-5.00	U			(1.30)		
		5.00	SPT	N=12 (2,3/3,3,3,3)	16.85	5.00		*End of Borehole at 5.00m*
		5.00	D					

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions
0.00 - 5.00m WLS Window Sample

Logger
T Caddick

Checked By: GD **Approved By:** GD

Created using Pebble Geo

Borehole Log

BH07

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
	345521.49	384269.77	21.85	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=20 (3,6/5,6,5,4)
2.00 (S)	0.00	0.00	DART577	74	N=13 (2,2/3,3,4,3)
3.00 (S)	0.00	0.00	DART577	74	N=14 (3,3/3,3,4,4)
4.00 (S)	0.00	0.00	DART577	74	N=12 (2,2/3,3,3,3)
5.00 (S)			DART577	74	N=12 (2,3/3,3,3,3)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	B		
	ES		
	ES		
	B		
	ES		
	D		
	U		
	ES		
	D		
	U		
	ES		
	D		
	U		
	D		
	U		
	D		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

0.00 - 5.00m WLS Window Sample

Logger

T Caddick

Checked By: GD **Approved By:** GD

Window Sampler

BH08

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345573.32	384272.31	21.78	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.00-0.50	B					MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
		0.20	ES			(0.40)		
					21.38	0.40		MADE GROUND: Firm brown locally grey slightly sandy gravelly locally very gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale. Lenses of gravelly sand from 2.00m.
		0.50	ES					
		0.50-1.00	B					
		0.80	ES					
		1.00-1.45	D					
		1.00-2.00	U					
		1.20	SPT	N=16 (2,2/3,3,5,5)				
		2.00	SPT	N=16 (3,3/4,4,4,4)				
		2.00	ES					
		2.00-2.45	D			(3.60)		
		2.00-3.00	U					
		3.00	SPT	N=27 (5,7/9,5,6,7)				
		3.00	D					
		4.00	SPT	N=50 for 0mm (25 for 0mm/)	17.78	4.00		*No further progress, possible boulder obstruction.*
								Between 3.00m and 4.00m: Driller records no recovery. (3.00 - 4.00m)
								End of Borehole at 4.00m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 4.00m and terminated on possible boulder obstruction. No groundwater encountered. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions
0.00 - 4.00m WLS Window Sample

Logger
T Caddick

Checked By: GD **Approved By:** GD

Created using Pebble Geo

GD Drilling Ltd

Window Sampler

BH08

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345573.32	384272.31	21.78	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=16 (2,2/3,3,5,5)
2.00 (S)	0.00	0.00	DART577	74	N=16 (3,3/4,4,4,4)
3.00 (S)	0.00	0.00	DART577	74	N=27 (5,7/9,5,6,7)
4.00 (S)			DART577	74	N=50 for 0mm (25 for 0mm/)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	B		
	ES		
	ES		
	B		
	ES		
	D		
	U		
	ES		
	D		
	U		
	D		

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 4.00m and terminated on possible boulder obstruction. No groundwater encountered. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions
0.00 - 4.00m WLS Window Sample

Logger
T Caddick

Checked By: GD **Approved By:** GD

Window Sampler

BH09

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345622.81	384279.38	21.66	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.20-0.00	ES 1			(0.40)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate. Sand is fine to coarse.
					21.26	0.40		
		0.50-0.00	ES 2					MADE GROUND: Firm locally soft brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including brick, concrete and burnt shale. Occasional lenses of gravelly sand from 2.50m.
		0.50-1.00	B 1					
		1.00-0.00	ES 3					
		1.20	SPT	N=10 (2,3/2,3,2,3)				
		1.20-1.65	D 1					
		1.20-2.20	U 1	Blows: 83				
		2.00	SPT	N=4 (1,1/1,1,1,1)				
		2.00-0.00	ES 4					
		2.00-2.45	D 8			(3.60)		
		2.00-3.00	U 2	Blows: 55				
		3.00	SPT	N=18 (2,3/5,2,5,6)				
		3.00-0.00	ES 5					*Between 3.00m and 4.00m: Driller records no recovery, possibly pushing cobbles. (3.00 - 4.00m)*
		3.00	U 3	Blows: 71				
		3.00-3.45	D 3					
		4.00	SPT	N=30 (2,2/2,7,10,11)	17.66	4.00		
		4.00-4.45	D 13					Firm to stiff brown slightly silty slightly sandy gravelly CLAY. Gravel is composed of subangular to subrounded fine to medium of various lithologies.
		4.45	SPT	N=20 (5,6/4,5,6,5)		(1.00)		
		4.45-4.90	D 14					
					16.66	5.00		*End of Borehole at 5.00m*

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. Water strike at 2.50m and remaining at this level after 20mins. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Gerry Devlin
1.20 - 5.00m	WS	Window Sample	Gerry Devlin

Checked By: GD **Approved By:** GD

Created using Pebble Geo

GD Drilling Ltd

Window Sampler

BH09

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345622.81	384279.38	21.66	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
2.50	0.00	0.00	2026-01-21T00:00	Med flow

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=10 (2,3/2,3,2,3)
2.00 (S)	0.00	0.00	DART577	74	N=4 (1,1/1,1,1,1)
3.00 (S)	0.00	0.00	DART577	74	N=18 (2,3/5,2,5,6)
4.00 (S)	0.00	0.00	DART577	74	N=30 (2,2/2,7,10,11)
4.45 (S)	0.00	0.00	DART577	74	N=20 (5,6/4,5,6,5)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
GD1181-BH09-D-1	D		
GD1181-BH09-ES-1	ES		
GD1181-BH09-ES-2	ES		
GD1181-BH09-ES-3	ES		
GD1181-BH09-ES-4	ES		
GD1181-BH09-ES-5	ES		
GD1181-BH09-D-8	D		
GD1181-BH09-B-1	B		
GD1181-BH09-D-3	D		
GD1181-BH09-D-13	D		
GD1181-BH09-D-14	D		
GD1181-BH09-U-1	U		
GD1181-BH09-U-2	U		
GD1181-BH09-U-3	U		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. Water strike at 2.50m and remaining at this level after 20mins. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Gerry Devlin
1.20 - 5.00m	WS	Window Sample	Gerry Devlin

Checked By: GD **Approved By:** GD

Window Sampler

BH10

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345517.71	384324.08	22.52	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.20	ES			(0.42)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
					22.10	0.42		
		0.50	B					MADE GROUND: Firm brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale.
		0.50	ES					
		0.50-1.00	B					
		0.80	ES					
		1.00-1.45	D					
		1.00-2.00	U					
		1.20	SPT	N=17 (2,3/4,4,4,5)				
		2.00	SPT	N=10 (2,2/2,2,3,3)		(3.08)		
		2.00	ES					
		2.00-2.45	D					
		2.00-3.00	U					
		3.00	SPT	N=13 (2,7/4,3,3,3)				
		3.00	ES					
		3.00-4.00	U					
					19.02	3.50		Firm brown and grey slightly silty slightly sandy slightly gravelly CLAY. Gravel is composed of subangular to subrounded fine to medium of various lithologies.
						(0.50)		
		4.00	SPT	N=50 for 0mm (25 for 0mm/)	18.52	4.00		*End of Borehole at 4.00m*

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on possible boulder obstruction. Water strike at 2.50m and remaining at this level after 20mins. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions
0.00 - 4.00m WLS Window Sample

Logger
T Caddick

Checked By: GD **Approved By:** GD

Created using Pebble Geo

GD Drilling Ltd

Window Sampler

BH10

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345517.71	384324.08	22.52	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
2.50				

Water Strike - Details

Struck (m)	Rose To (m)	Time (mins)	Remarks
2.50	2.50	20	

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART560	71	N=17 (2,3/4,4,4,5)
2.00 (S)	0.00	0.00	DART560	71	N=10 (2,2/2,2,3,3)
3.00 (S)	0.00	0.00	DART560	71	N=13 (2,7/4,3,3,3)
4.00 ()			DART577	74	N=50 for 0mm (25 for 0mm/)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	B		
	ES		
	ES		
	B		
	ES		
	D		
	U		
	ES		
	D		
	U		
	ES		
	U		

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on possible boulder obstruction. Water strike at 2.50m and remaining at this level after 20mins. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions
0.00 - 4.00m WLS Window Sample

Logger
T Caddick

Checked By: GD **Approved By:** GD

Window Sampler

BH11

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345581.11	384323.94	22.31	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
		0.00-0.50	B					MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
		0.20	ES			(0.40)		
					21.91	0.40		MADE GROUND: Firm brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale. Rare plastic noted.
		0.50	ES					
		0.50-1.00	B					
		1.00	D			(1.40)		
		1.20	SPT	N=50 for 265mm (5,7/11,12,15,12 for 40mm)				
					20.51	1.80		*No further progress, possible boulder obstruction.*
								End of Borehole at 1.80m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed to 1.80m and terminated on possible boulder obstruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions
0.00 - 1.00m IP Hand Tools

Logger
T Caddick

Checked By: GD **Approved By:** GD

Created using Pebble Geo

Window Sampler

BH11

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345581.11	384323.94	22.31	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART560	71	N=50 for 265mm (5,7/11,12,15,12 for 40mm)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	B		
	ES		
	ES		
	B		
	D		

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed to 1.80m and terminated on possible boulder obstruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions
0.00 - 1.00m IP Hand Tools

Logger
T Caddick

Checked By: GD **Approved By:** GD

Window Sampler

BH12

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345625.54	384344.92	21.88	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Legend	Description
		0.10	ES 1			(0.30)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
		0.20	B 1		21.58	0.30		
		0.50	ES 2					MADE GROUND: Soft becoming firm brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale.
		0.80	B 2					
		1.00	ES 3					
		1.20	SPT	N=6 (2,2/1,2,2,1)				*Between 1.20m and 2.00m: Slight hydrocarbon odour noted. (1.20 - 2.00m)*
		1.80	B 3					
		2.00	SPT	N=4 (2,1/1,1,1,1)		(3.30)		
		2.00	ES 4					
		2.80	B 4					
		3.00	SPT	N=9 (2,2/2,2,2,3)				
		3.00	ES 5					
					18.28	3.60		
		3.80	B 5					MADE GROUND: Greyish brown slightly clayey silty very gravelly fine to coarse sand. Gravel is subangular to subrounded fine to coarse of various lithologies including burnt shale and concrete.
		4.00	SPT	N=11 (2,3/3,2,3,3)				
		4.00	ES 6					
		4.00-5.00	U 1	Blows: 99		(1.40)		
					16.88	5.00		*End of Borehole at 5.00m*

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Joel McMillan
1.20 - 5.00m	WS	Window Sample	Joel McMillan

Checked By: GD **Approved By:** GD

Window Sampler

BH12

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345625.54	384344.92	21.88	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART560	71	N=6 (2,2/1,2,2,1)
2.00 (S)			DART577	74	N=4 (2,1/1,1,1,1)
3.00 (S)			DART577	74	N=9 (2,2/2,2,2,3)
4.00 (S)			DART577	74	N=11 (2,3/3,2,3,3)
()			DART577	74	N=0 (0,0/0,0,0,0)
()			DART577	74	N=0 (0,0/0,0,0,0)
()			DART577	74	N=0 (0,0/0,0,0,0)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
GD1181-WS12-ES-1	ES		
GD1181-WS12-ES-2	ES		
GD1181-WS12-ES-3	ES		
GD1181-WS12-ES-4	ES		
GD1181-WS12-ES-5	ES		
GD1181-WS12-B-2	B		
GD1181-WS12-B-1	B		
GD1181-WS12-ES-6	ES		
GD1181-WS12-B-3	B		
GD1181-WS12-B-4	B		
GD1181-WS12-B-5	B		
GD1181-WS12-U-1	U		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions			Logger
0.00 - 1.20m	IP	Hand Tools	Joel McMillan
1.20 - 5.00m	WS	Window Sample	Joel McMillan

Checked By: GD **Approved By:** GD

Window Sampler

BH13

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345515.58	384383.36	22.61	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.20	ES			(0.47)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
		0.50	B		22.14	0.47		
		0.50	ES					MADE GROUND: Firm brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale. Rare wood and plastic noted.
		0.50-1.00	B					
		0.80	ES					
		1.00-1.45	D					
		1.00-2.00	U					
		1.20	SPT	N=14 (2,2/3,3,4,4)				
		2.00	SPT	N=4 (2,1/1,1,1,1)				
		2.00	ES					
		2.00-2.45	D					
		2.00-3.00	U			(3.53)		
	▼							
		3.00	SPT	N=14 (2,3/3,3,4,4)				
		3.00	ES					
		3.00-3.45	D					
		3.00-4.00	U					
		4.00	SPT	N=16 (2,3/4,4,4,4)	18.61	4.00		Firm becoming stiff brown and grey slightly silty slightly sandy slightly gravelly CLAY. Gravel is composed of subangular to subrounded fine to medium of various lithologies.
		4.00-4.45	D					
		4.00-5.00	U			(1.00)		
					17.61	5.00		*End of Borehole at 5.00m*

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. Water strike at 2.50m and remaining at this level after 20mins. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions
0.00 - 5.00m WLS Window Sample

Logger
T Caddick

Checked By: GD **Approved By:** GD

Created using Pebble Geo

Window Sampler

BH13

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345515.58	384383.36	22.61	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
2.50				

Water Strike - Details

Struck (m)	Rose To (m)	Time (mins)	Remarks
2.50	2.50	20	

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
2.00 (S)	0.00	0.00	DART560	71	N=4 (2,1/1,1,1,1)
1.20 (S)	0.00	0.00	DART560	71	N=14 (2,2/3,3,4,4)
2.00 (S)	0.00	0.00	DART560	71	N=12 (2,2/3,3,3,3)
3.00 (S)	0.00	0.00	DART560	71	N=14 (2,3/3,3,4,4)
4.00 (S)	0.00	0.00	DART560	71	N=16 (2,3/4,4,4,4)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	B		
	ES		
	ES		
	B		
	ES		
	D		
	U		
	ES		
	D		
	U		
	ES		
	D		
	U		
	D		
	U		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. Water strike at 2.50m and remaining at this level after 20mins. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

0.00 - 5.00m WLS Window Sample

Logger

T Caddick

Checked By: GD **Approved By:** GD

Window Sampler

BH14

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345569.49	384371.60	22.60	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.20	ES		22.30	(0.30) 0.30		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
		0.50	B					MADE GROUND: Stiff brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale. Rare wood noted.
		0.50	ES					
		0.50-1.00	B					
		0.80	ES					
		1.00-1.45	D					
		1.00-2.00	U					
		1.20	SPT	N=20 (8,6/5,5,5,5)		(2.00)		
		2.00	SPT	N=16 (2,2/3,4,4,5)				
		2.00	ES					
		2.00-2.45	D					
		2.00-3.00	U		20.30	2.30		Stiff brown grey slightly silty slightly gravelly CLAY. Gravel is composed of subangular to subrounded fine to coarse of various lithologies.
		3.00	SPT	N=9 (2,2/2,2,2,3)				
		3.00-3.45	D					
		3.00-4.00	U					
	▼					(2.70)		
		4.00	SPT	N=18 (3,3/4,4,5,5)				
		4.00-4.45	D					
		4.00-5.00	U					
		5.00	SPT	N=22 (4,5/5,5,6,6)	17.60	5.00		*End of Borehole at 5.00m*
		5.00	D					

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. Water strike at 3.50m and remaining at this level after 20mins. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions
0.00 - 5.00m WLS Window Sample

Logger
T Caddick

Checked By: GD **Approved By:** GD

Created using Pebble Geo

Window Sampler

BH14

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345569.49	384371.60	22.60	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
3.50				

Water Strike - Details

Struck (m)	Rose To (m)	Time (mins)	Remarks
3.50	3.50	20	

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
3.00 (S)	0.00	0.00	DART560	71	N=9 (2,2/2,2,2,3)
1.20 (S)	0.00	0.00	DART560	71	N=20 (8,6/5,5,5,5)
2.00 (S)	0.00	0.00	DART560	71	N=16 (2,2/3,4,4,5)
3.00 (S)	0.00	0.00	DART560	71	N=20 (3,4/5,5,5,5)
4.00 (S)	0.00	0.00	DART560	71	N=18 (3,3/4,4,5,5)
5.00 (S)	0.00	0.00	DART560	71	N=22 (4,5/5,5,6,6)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	B		
	ES		
	ES		
	B		
	ES		
	D		
	U		
	ES		
	D		
	U		
	D		
	U		
	D		
	U		
	D		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. Water strike at 3.50m and remaining at this level after 20mins. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

0.00 - 5.00m WLS Window Sample

Logger

T Caddick

Checked By: GD **Approved By:** GD

Window Sampler

BH15

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345623.89	384377.77	22.13	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.10	ES 1			(0.30)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
		0.20	B 1		21.83	0.30		
		0.50	ES 2					MADE GROUND: Firm locally soft brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including brick, concrete and burnt shale.
		0.50	B 2					
		1.00	ES 3					
		1.00	B 3					
		1.20	SPT	N=11 (2,2/2,2,3,4)				
		1.80	B 4			(3.10)		
		2.00	SPT	N=3 (3,1/0,1,1,1)				
		2.00	ES 4					*Between 2.00m and 3.40m: Slight hydrocarbon odour noted. (2.00 - 3.40m)*
		2.80	B 5					
		3.00	SPT	N=9 (3,2/2,2,2,3)				
		3.00	ES 5					
		3.80	B 6		18.73	3.40		Firm brown grey mottled silty gravelly CLAY. Gravel is composed of subangular to rounded fine to coarse of various lithologies.
		4.00	SPT	N=11 (2,3/3,2,3,3)				
		4.00	ES 6					
		4.00-5.00	U 1	Blows: 37		(1.60)		
					17.13	5.00		*End of Borehole at 5.00m*

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Joel McMillan
1.20 - 5.00m	WS	Window Sample	Joel McMillan

Checked By: GD **Approved By:** GD

Created using Pebble Geo

Window Sampler

BH15

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345623.89	384377.77	22.13	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
4.00 (S)	0.00	0.00	DART560	71	N=11 (2,3/3,2,3,3)
1.20 (S)	0.00	0.00	DART560	71	N=11 (2,2/2,2,3,4)
2.00 (S)	0.00	0.00	DART560	71	N=3 (3,1/0,1,1,1)
3.00 (S)	0.00	0.00	DART560	71	N=9 (3,2/2,2,2,3)
4.00 (S)	0.00	0.00	DART560	71	N=12 (2,3/3,3,3,3)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
GD1181-WS15-ES-1	ES		
GD1181-WS15-ES-2	ES		
GD1181-WS15-ES-3	ES		
GD1181-WS15-ES-4	ES		
GD1181-WS15-ES-5	ES		
GD1181-WS15-ES-6	ES		
GD1181-WS15-B-1	B		
GD1181-WS15-B-2	B		
GD1181-WS15-B-3	B		
GD1181-WS15-B-4	B		
GD1181-WS15-B-5	B		
GD1181-WS15-B-6	B		
GD1181-WS15-U-1	U		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Joel McMillan
1.20 - 5.00m	WS	Window Sample	Joel McMillan

Checked By: GD **Approved By:** GD

Window Sampler

BH16

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345661.44	384379.78	22.04	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.10	ES 1			(0.30)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
		0.20	B 1		21.74	0.30		
		0.50	ES 2					MADE GROUND: Firm locally stiff brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale. Rare wood noted.
		0.80	B 2					
		1.00	ES 3					
		1.20	SPT	N=12 (8,9/3,3,2,4)				
		1.80	B 3					
		2.00	SPT	N=25 (12,12/9,7,5,4)				
		2.00	ES 4			(3.60)		
		2.80	B 4					
		3.00	SPT	N=12 (3,3/4,4,2,2)				
		3.00	ES 5					
		4.00	SPT	N=10 (4,3/2,2,3,3)	18.14	3.90		Firm brown and grey slightly silty slightly sandy slightly gravelly CLAY. Gravel is composed of subangular to subrounded fine to medium of various lithologies.
		4.00	ES 6					
		4.00-4.40	U 1	Blows: 65		(1.10)		
	▼				17.04	5.00		*End of Borehole at 5.00m*

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. Water strike at 4.70m and remaining at this level after 20mins. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Joel McMillan
1.20 - 5.00m	WS	Window Sample	Joel McMillan

Checked By: GD **Approved By:** GD

Created using Pebble Geo

Window Sampler

BH16

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345661.44	384379.78	22.04	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
4.70	0.00	0.00	2026-01-19T00:00	flow

Water Strike - Details

Struck (m)	Rose To (m)	Time (mins)	Remarks
4.70	4.70	20	

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART560	71	N=12 (8,9/3,3,2,4)
2.00 (S)	0.00	0.00	DART560	71	N=25 (12,12/9,7,5,4)
3.00 (S)	0.00	0.00	DART560	71	N=12 (3,3/4,4,2,2)
4.00 (S)	0.00	0.00	DART560	71	N=10 (4,3/2,2,3,3)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
GD1181-WS16-ES-1	ES		
GD1181-WS16-ES-3	ES		
GD1181-WS16-ES-2	ES		
GD1181-WS16-ES-4	ES		
GD1181-WS16-ES-5	ES		
GD1181-WS16-ES-6	ES		
GD1181-WS16-B-1	B		
GD1181-WS16-B-2	B		
GD1181-WS16-B-3	B		
GD1181-WS16-B-4	B		
GD1181-WS16-U-1	U		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. Water strike at 4.70m and remaining at this level after 20mins. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Joel McMillan
1.20 - 5.00m	WS	Window Sample	Joel McMillan

Checked By: GD **Approved By:** GD

Window Sampler

BH17

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345526.14	384413.45	22.59	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.20	B 1		22.29	(0.30) 0.30		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
		0.80	B 2					MADE GROUND: Firm locally soft brown slightly sandy gravelly locally very gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale. Occasional lenses of gravelly fine to coarse sand between 3.00m and 4.00m.
		1.20 1.20-2.00	SPT U 1	N=8 (2,3/2,2,2,2) Blows: 37				
		2.00 2.00-3.00	SPT B 3	N=6 (4,4/3,1,1,1)		(4.60)		
		3.00 3.00-4.00	SPT B 4	N=12 (2,3/3,3,3,3)				
	▼	4.00	SPT	N=5 (1,1/1,2,1,1)				
		4.45	SPT	N=11 (2,2/3,2,3,3)	17.69	4.90		*End of Borehole at 4.90m*

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 4.90m and terminated on Engineer's instruction. Water strike at 3.90m and remaining at this level. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Joel McMillan
1.20 - 4.90m	WS	Window Sample	Joel McMillan

Checked By: GD **Approved By:** GD

Created using Pebble Geo

GD Drilling Ltd

Window Sampler

BH17

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345526.14	384413.45	22.59	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
3.90	0.00	0.00	2026-01-20T00:00	flow

Water Strike - Details

Struck (m)	Rose To (m)	Time (mins)	Remarks
3.90	3.90	20	

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART560	71	N=8 (2,3/2,2,2,2)
2.00 (S)	0.00	0.00	DART560	71	N=6 (4,4/3,1,1,1)
3.00 (S)	0.00	0.00	DART560	71	N=12 (2,3/3,3,3,3)
4.00 (S)	0.00	0.00	DART560	71	N=5 (1,1/1,2,1,1)
4.45 (S)	0.00	0.00	DART560	71	N=11 (2,2/3,2,3,3)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
GD1181-WS17-B-1	B		
GD1181-WS17-B-2	B		
GD1181-WS17-B-3	B		
GD1181-WS17-B-4	B		
GD1181-WS17-U-1	U		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 4.90m and terminated on Engineer's instruction. Water strike at 3.90m and remaining at this level. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Joel McMillan
1.20 - 4.90m	WS	Window Sample	Joel McMillan

Checked By: GD **Approved By:** GD

Window Sampler

BH18

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345578.20	384418.09	22.33	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.00-0.50	B					MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate. Sand is fine to coarse.
		0.20	ES			(0.40)		
					21.93	0.40		MADE GROUND: Firm brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale.
		0.50	ES					
		0.50-1.00	B					
		0.80	ES					
		1.00-2.00	U					
		1.00-145.00	D					
		1.20	SPT	N=15 (2,3/3,4,4,4)				
						(2.10)		
		2.00	SPT	N=13 (2,3/3,4,3,3)				
		2.00	ES					
		2.00-2.45	D					
		2.00-3.00	U					
					19.83	2.50		Firm brown and grey slightly silty slightly sandy slightly gravelly CLAY. Gravel is composed of subangular to subrounded fine to medium of various lithologies.
		3.00	SPT	N=16 (2,3/4,4,4,4)				
		3.00-3.45	D					
		3.00-4.00	U					
						(2.50)		
		4.00	SPT	N=17 (3,3/4,4,4,5)				
		4.00-4.45	D					
		4.00-5.00	U					
		5.00	SPT	N=17 (2,4/4,4,4,5)	17.33	5.00		*End of Borehole at 5.00m*
		5.00-5.45	D					

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	T Caddick
1.20 - 5.00m	WLS	Window Sample	T Caddick

Checked By: GD **Approved By:** GD

Created using Pebble Geo

Window Sampler

BH18

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345578.20	384418.09	22.33	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=15 (2,3/3,4,4,4)
2.00 (S)	0.00	0.00	DART577	74	N=13 (2,3/3,4,3,3)
3.00 (S)	0.00	0.00	DART577	74	N=16 (2,3/4,4,4,4)
4.00 (S)	0.00	0.00	DART577	74	N=17 (3,3/4,4,4,5)
5.00 (S)	0.00	0.00	DART577	74	N=17 (2,4/4,4,4,5)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	B		
	ES		
	ES		
	B		
	ES		
	D		
	U		
	ES		
	D		
	U		
	D		
	U		
	D		
	U		
	D		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	T Caddick
1.20 - 5.00m	WLS	Window Sample	T Caddick

Checked By: GD **Approved By:** GD

Window Sampler

BH19

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345614.72	384419.43	22.28	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.00-0.50	B					MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate. Sand is fine to coarse.
		0.20	ES			(0.43)		
					21.85	0.43		MADE GROUND: Firm brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale.
		0.50	ES					
		0.50-1.00	B					
		0.80	ES					
		1.00-1.45	D					
		1.00-2.00	U					
		1.20	SPT	N=13 (4,5/4,3,3,3)				
						(2.07)		
		2.00	SPT	N=16 (2,3/4,4,4,4)				
		2.00	ES					
		2.00-2.45	D					
		2.00-3.00	U					
					19.78	2.50		Firm becoming stiff brown and grey slightly silty slightly sandy CLAY with rare gravel.
		3.00	SPT	N=16 (2,3/3,4,4,5)				
		3.00-3.45	D					
		3.00-4.00	U					
						(2.50)		
		4.00	SPT	N=12 (3,3/3,3,3,3)				
		4.00-4.45	D					
		4.00-5.00	U					
		5.00	SPT	N=16 (3,4/3,4,4,5)	17.28	5.00		*End of Borehole at 5.00m*
		5.00-5.45	D					

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	T Caddick
1.20 - 5.00m	WLS	Window Sample	T Caddick

Checked By: GD **Approved By:** GD

Created using Pebble Geo

Window Sampler

BH19

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345614.72	384419.43	22.28	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-20	2026-01-20

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=13 (4,5/4,3,3,3)
2.00 (S)	0.00	0.00	DART577	74	N=16 (2,3/4,4,4,4)
3.00 (S)	0.00	0.00	DART577	74	N=16 (2,3/3,4,4,5)
4.00 (S)	0.00	0.00	DART577	74	N=12 (3,3/3,3,3,3)
5.00 (S)	0.00	0.00	DART577	74	N=16 (3,4/3,4,4,5)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	B		
	ES		
	ES		
	B		
	ES		
	D		
	U		
	ES		
	D		
	U		
	D		
	U		
	D		
	U		
	D		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	T Caddick
1.20 - 5.00m	WLS	Window Sample	T Caddick

Checked By: GD **Approved By:** GD

Borehole Log

BH20

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
	345661.06	384419.19	22.03	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-22	2026-01-22

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.20	ES			(0.35)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
					21.68	0.35		
		0.50 0.50-1.00	ES B					MADE GROUND: Stiff locally firm brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale.
		1.00	ES					
		1.20 1.20-1.65	SPT D	N=26 (10,12/7,9,5,5)				
		1.80	B					
		2.00 2.00-2.45 2.00-3.00	SPT D U	N=28 (11,11/10,7,5,6) Blows: 86		(3.45)		
		3.00 3.00 3.00-3.45 3.00-4.00	SPT ES D U	N=9 (2,3/2,2,2,3) Blows: 40				
					18.23	3.80		Firm becoming stiff brown and grey slightly silty slightly sandy slightly gravelly CLAY. Gravel is composed of subangular to subrounded fine to medium of various lithologies.
		4.00 4.00-4.45	SPT D	N=14 (2,2/3,3,3,5)				
		4.45 4.45-4.90	SPT D	N=24 (4,5/6,7,6,5)		(1.20)		
					17.03	5.00		*End of Borehole at 5.00m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions
0.00 - 5.00m WLS Window Sample

Logger
Gerry Devlin

Checked By: GD **Approved By:** GD

Created using Pebble Geo

Borehole Log

BH20

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
	345661.06	384419.19	22.03	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-22	2026-01-22

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=26 (10,12/7,9,5,5)
2.00 (S)	0.00	0.00	DART577	74	N=28 (11,11/10,7,5,6)
3.00 (S)	0.00	0.00	DART577	74	N=9 (2,3/2,2,2,3)
4.00 (S)	0.00	0.00	DART577	74	N=14 (2,2/3,3,3,5)
4.45 (S)	0.00	0.00	DART577	74	N=24 (4,5/6,7,6,5)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	ES		
	ES		
	B		
	ES		
	D		
	B		
	D		
	U		
	D		
	ES		
	U		
	D		
	D		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

0.00 - 5.00m WLS Window Sample

Logger

Gerry Devlin

Checked By: GD **Approved By:** GD

Borehole Log

BH21

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
	345639.72	384294.44	21.49	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.00-0.50	B					MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
		0.20	ES			(0.45)		
					21.04	0.45		MADE GROUND: Firm becoming stiff brown locally grey slightly sandy gravelly locally very gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale.
		0.50	ES					
		0.50-1.00	B					
		0.80	ES					
		1.00-1.45	D					
		1.00-2.00	U					
		1.20	SPT	N=15 (3,3/3,4,4,4)				
						(2.15)		
		2.00	SPT	N=16 (2,3/4,4,4,4)				
		2.00	ES					
		2.00-2.45	D					
		2.00-3.00	U					
					18.89	2.60		Firm becoming stiff brown and grey slightly silty slightly sandy slightly gravelly CLAY. Gravel is composed of subangular to subrounded fine to medium of various lithologies.
		3.00	SPT	N=15 (3,3/3,4,4,4)				
		3.00-3.45	D					
		3.00-4.00	U					
						(2.40)		
		4.00	SPT	N=16 (4,4/4,4,4,4)				
		4.00-4.45	D					
		4.00-5.00	U					
		5.00	SPT	N=18 (2,4/4,4,5,5)	16.49	5.00		*End of Borehole at 5.00m*
		5.00	D					

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions
0.00 - 5.00m WLS Window Sample

Logger
T Caddick

Checked By: GD **Approved By:** GD

Created using Pebble Geo

Borehole Log

BH21

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
	345639.72	384294.44	21.49	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=15 (3,3/3,4,4,4)
2.00 (S)	0.00	0.00	DART577	74	N=16 (2,3/4,4,4,4)
3.00 (S)	0.00	0.00	DART577	74	N=15 (3,3/3,4,4,4)
4.00 (S)	0.00	0.00	DART577	74	N=16 (4,4/4,4,4,4)
5.00 (S)	0.00	0.00	DART577	74	N=18 (2,4/4,4,5,5)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	B		
	ES		
	ES		
	B		
	ES		
	D		
	U		
	D		
	ES		
	U		
	D		
	U		
	D		
	U		
	D		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

0.00 - 5.00m WLS Window Sample

Logger

T Caddick

Checked By: GD **Approved By:** GD

Created using Pebble Geo

Window Sampler

BH22

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345639.81	384258.22	21.45	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.20-0.00	ES 1			(0.35)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate. Sand is fine to coarse.
					21.10	0.35		
		0.50-0.00 0.50-1.00	ES 2 B 1					MADE GROUND: Firm locally soft brown slightly sandy gravelly locally very gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale. Occasional lenses of gravelly fine to coarse sand between 3.00m and 4.00m.
	▼	1.00-1.50	ES 3					
		1.20 1.20-1.65 1.20-2.20	SPT D 1 U 1	N=8 (6,4/3,2,2,2,1) Blows: 48				
	▽	2.00 2.00-2.45 2.00-52.00	SPT D 2 U 2	N=8 (1,2/2,2,2,2) Blows: 55		(3.65)		
		2.50-3.50	ES 4					
		3.00 3.00-3.45 3.00-4.00	SPT D 3 B 2	N=7 (1,0/1,1,1,4)				
		4.00 4.00-4.45	SPT D 4	N=17 (3,4/4,4,4,5)	17.45	4.00		Stiff brown slightly silty slightly sandy gravelly CLAY. Gravel is composed of subangular to subrounded fine to medium of various lithologies.
		4.45 4.45-4.90	SPT D 5	N=22 (3,4/5,6,5,6)		(1.00)		
					16.45	5.00		*End of Borehole at 5.00m*

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. Water strike at 2.00m and rising to 1.00m after 20mins. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Gerry Devlin
1.20 - 5.00m	WS	Window Sample	Gerry Devlin

Checked By: GD **Approved By:** GD

Created using Pebble Geo

Window Sampler

BH22

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345639.81	384258.22	21.45	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
2.00	0.00	0.00	2026-01-21T00:00	Fast flow

Water Strike - Details

Struck (m)	Rose To (m)	Time (mins)	Remarks
2.00	1.80	5	Fast
2.00	1.60	10	Fast
2.00	1.40	15	Fast
2.00	1.00	20	Fast

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=8 (6,4/3,2,2,1)
2.00 (S)	0.00	0.00	DART577	74	N=8 (1,2/2,2,2,2)
3.00 (S)	0.00	0.00	DART577	74	N=7 (1,0/1,1,1,4)
4.00 (S)	0.00	0.00	DART577	74	N=17 (3,4/4,4,4,5)
4.45 (S)	0.00	0.00	DART577	74	N=22 (3,4/5,6,5,6)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
GD1181-BH22-D-1	D		
GD1181-BH22-ES-1	ES		
GD1181-BH22-ES-2	ES		
GD1181-BH22-ES-3	ES		
GD1181-BH22-ES-4	ES		
GD1181-BH22-D-2	D		
GD1181-BH22-D-3	D		
GD1181-BH22-B-1	B		
GD1181-BH22-D-4	D		
GD1181-BH22-D-5	D		
GD1181-BH22-B-2	B		
GD1181-BH22-U-1	U		
GD1181-BH22-U-2	U		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. Water strike at 2.00m and rising to 1.00m after 20mins. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Gerry Devlin
1.20 - 5.00m	WS	Window Sample	Gerry Devlin

Checked By: GD **Approved By:** GD

Window Sampler

BH23

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345638.80	384210.90	21.43	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.20-0.00	ES 1			(0.40)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate. Sand is fine to coarse.
		0.50-0.00 0.50-1.00	ES 2 B 1		21.03	0.40		MADE GROUND: Firm brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale. Rare wood and plastic noted.
		1.00-1.50	ES 3					
		1.20 1.20-1.65 1.20-2.00	SPT D 6 B 2	N=10 (2,3/3,3,2,2)		(2.10)		
	▽	2.00 2.00-2.45 2.00-2.50	SPT D 7 B 3	N=3 (1,0/1,0,1,1)				
		2.50 2.50	SPT D 3	N=50 for 0mm (25 for 0mm/)	18.93	2.50		*No further progress, possible boulder obstruction.* *End of Borehole at 2.50m*

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on possible boulder obstruction. Water strike at 2.00m and remaining at this level after 20mins. Borehole backfilled with a wellpoint on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Gerry Devlin
1.20 - 2.50m	WS	Window Sample	Gerry Devlin

Checked By: GD **Approved By:** GD

Window Sampler

BH23

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345638.80	384210.90	21.43	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

Water Strike - General

Struck (m)	Seal Depth (m)	Casing Depth (m)	Date and Time	Remarks
2.00	0.00	0.00	2026-01-21T00:00	Med flow

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=10 (2,3/3,3,2,2)
2.00 (S)	0.00	0.00	DART577	74	N=3 (1,0/1,0,1,1)
2.50 (S)	0.00	0.00	DART577	74	N=50 for 0mm (25 for 0mm/)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
GD1181-BH23-ES-1	ES		
GD1181-BH23-ES-2	ES		
GD1181-BH23-ES-3	ES		
GD1181-BH23-B-1	B		
GD1181-BH23-B-2	B		
GD1181-BH23-D-6	D		
GD1181-BH23-D-7	D		
GD1181-BH23-D-3	D		
GD1181-BH23-B-3	B		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on possible boulder obstruction. Water strike at 2.00m and remaining at this level after 20mins. Borehole backfilled with a wellpoint on completion.

Method, Plant, Stability, Dimensions

			Logger
0.00 - 1.20m	IP	Hand Tools	Gerry Devlin
1.20 - 2.50m	WS	Window Sample	Gerry Devlin

Checked By: GD **Approved By:** GD

Window Sampler

BH24

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345639.39	384154.53	21.33	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-22	2026-01-22

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.00-0.50	B					MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
		0.20	ES			(0.50)		
		0.50	ES		20.83	0.50		MADE GROUND: Firm brown locally grey slightly sandy gravelly locally very gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale. Lenses of gravelly sand from 2.00m
		0.50-1.00	B					
		0.80	ES					
		1.00-1.45	D					
		1.00-2.00	U					
		1.20	SPT	N=11 (2,2/3,2,3,3)				
						(2.00)		
		2.00	SPT	N=15 (3,4/4,4,3,4)				
		2.00	ES					
		2.00-2.45	D					
		2.00-3.00	U					
					18.83	2.50		Firm becoming stiff brown and grey slightly silty slightly sandy slightly gravelly CLAY. Gravel is composed of subangular to subrounded fine to medium of various lithologies.
		3.00	SPT	N=14 (3,3/3,4,3,4)				
		3.00-3.45	D					
		3.00-4.00	U					
						(1.50)		
		4.00	SPT	N=16 (3,4/3,4,4,5)	17.33	4.00		*No further progress, possible boulder obstruction.*
		4.00-4.45	D					*End of Borehole at 4.00m*

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 4.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions
0.00 - 4.00m WLS Window Sample

Logger
T Caddick

Checked By: GD **Approved By:** GD

Created using Pebble Geo

GD Drilling Ltd

Window Sampler

BH24

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345639.39	384154.53	21.33	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-22	2026-01-22

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=11 (2,2/3,2,3,3)
2.00 (S)	0.00	0.00	DART577	74	N=15 (3,4/4,4,3,4)
3.00 (S)	0.00	0.00	DART577	74	N=14 (3,3/3,4,3,4)
4.00 (S)	0.00	0.00	DART577	74	N=16 (3,4/3,4,4,5)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	B		
	ES		
	ES		
	B		
	ES		
	D		
	U		
	ES		
	D		
	U		
	D		
	U		
	D		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 4.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions

0.00 - 4.00m WLS Window Sample

Logger

T Caddick

Checked By: GD **Approved By:** GD

Window Sampler

BH25

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345551.04	384249.93	21.56	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
		0.00-0.50	B					MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
		0.20	ES			(0.40)		
					21.16	0.40		MADE GROUND: Stiff locally firm brown locally grey slightly sandy gravelly locally very gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale.
		0.50	ES					
		0.50-1.00	B					
		0.80	EW					
		1.00-1.45	D					
		1.00-2.00	U					
		1.20	SPT	N=17 (2,3/3,5,4,5)				
						(3.10)		
		2.00	SPT	N=18 (3,4/4,4,5,5)				
		2.00	ES					
		2.00-2.45	D					
		2.00-3.00	U					
		3.00	SPT	N=12 (2,2/3,3,3,3)				
		3.00	ES					
		3.00-3.45	D					
		3.00-4.00	U					
					18.06	3.50		Firm becoming stiff brown and grey slightly silty slightly sandy slightly gravelly CLAY. Gravel is composed of subangular to subrounded fine to medium of various lithologies.
		4.00	SPT	N=14 (2,3/3,3,4,4)				
		4.00-4.45	D					
		4.00-5.00	U					
						(1.50)		
		5.00	SPT	N=16 (3,3/4,4,4,4)	16.56	5.00		*End of Borehole at 5.00m*
		5.00	D					

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions
0.00 - 5.00m WLS Window Sample

Logger
T Caddick

Checked By: GD **Approved By:** GD

Created using Pebble Geo

Window Sampler

BH25

SUPPLEMENTARY INFO

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345551.04	384249.93	21.56	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-21	2026-01-21

Client	Consultant	Contractor
Landwise Consulting	Hugh O'Leary	GD Drilling Ltd

SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	0.00	0.00	DART577	74	N=17 (2,3/3,5,4,5)
2.00 (S)	0.00	0.00	DART577	74	N=18 (3,4/4,4,5,5)
3.00 (S)	0.00	0.00	DART577	74	N=12 (2,2/3,3,3,3)
4.00 (S)	0.00	0.00	DART577	74	N=14 (2,3/3,3,4,4)
5.00 (S)	0.00	0.00	DART577	74	N=16 (3,3/4,4,4,4)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	B		
	ES		
	ES		
	B		
	EW		
	D		
	U		
	ES		
	D		
	U		
	ES		
	D		
	U		
	D		
	U		
	D		

Remarks

Inspection pit dug to a depth of 1.20m. Borehole progressed with windowless sampling techniques to a depth of 5.00m and terminated on Engineer's instruction. No groundwater encountered. Borehole fitted with a wellpoint on completion.

Method, Plant, Stability, Dimensions

0.00 - 5.00m WLS Window Sample

Logger

T Caddick

Checked By: GD **Approved By:** GD

Window Sampler

BH11A

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345585.79	384325.70	22.34	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
						(0.45)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
					21.89	0.45		MADE GROUND: Firm brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale. Rare plastic noted.
						(1.45)		
					20.44	1.90		*No further progress, possible boulder obstruction.*
								End of Borehole at 1.90m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed to 1.90m and terminated on possible boulder obstruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions
0.00 - 1.90m WLS Window Sample

Logger
T Caddick

Checked By: GD **Approved By:** GD

Created using Pebble Geo

Window Sampler

BH11B

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
WS	345584.81	384319.57	22.31	1:35

Project Name	Project No.	Start Date	End Date
Jaguar Land Rover , Liverpool	GD 1181	2026-01-19	2026-01-19

Client
Landwise Consulting

Consultant
Hugh O'Leary

Contractor
GD Drilling Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Type/ Ref	Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Description
						(0.40)		MADE GROUND: Grey (compact) slightly sandy slightly clayey angular fine to coarse gravel of crushed aggregate and brick fragments. Sand is fine to coarse.
					21.91	0.40		MADE GROUND: Firm brown locally grey slightly sandy gravelly clay (reworked). Gravel is subangular and subrounded fine to coarse of various lithologies including frequent brick, concrete and burnt shale. Rare plastic noted.
						(1.55)		
					20.36	1.95		*No further progress, possible boulder obstruction.*
								End of Borehole at 1.95m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0

Remarks
Inspection pit dug to a depth of 1.20m. Borehole progressed to 1.950m and terminated on possible boulder obstruction. No groundwater encountered. Borehole backfilled with arisings on completion.

Method, Plant, Stability, Dimensions
0.00 - 1.95m WLS Window Sample

Logger
T Caddick

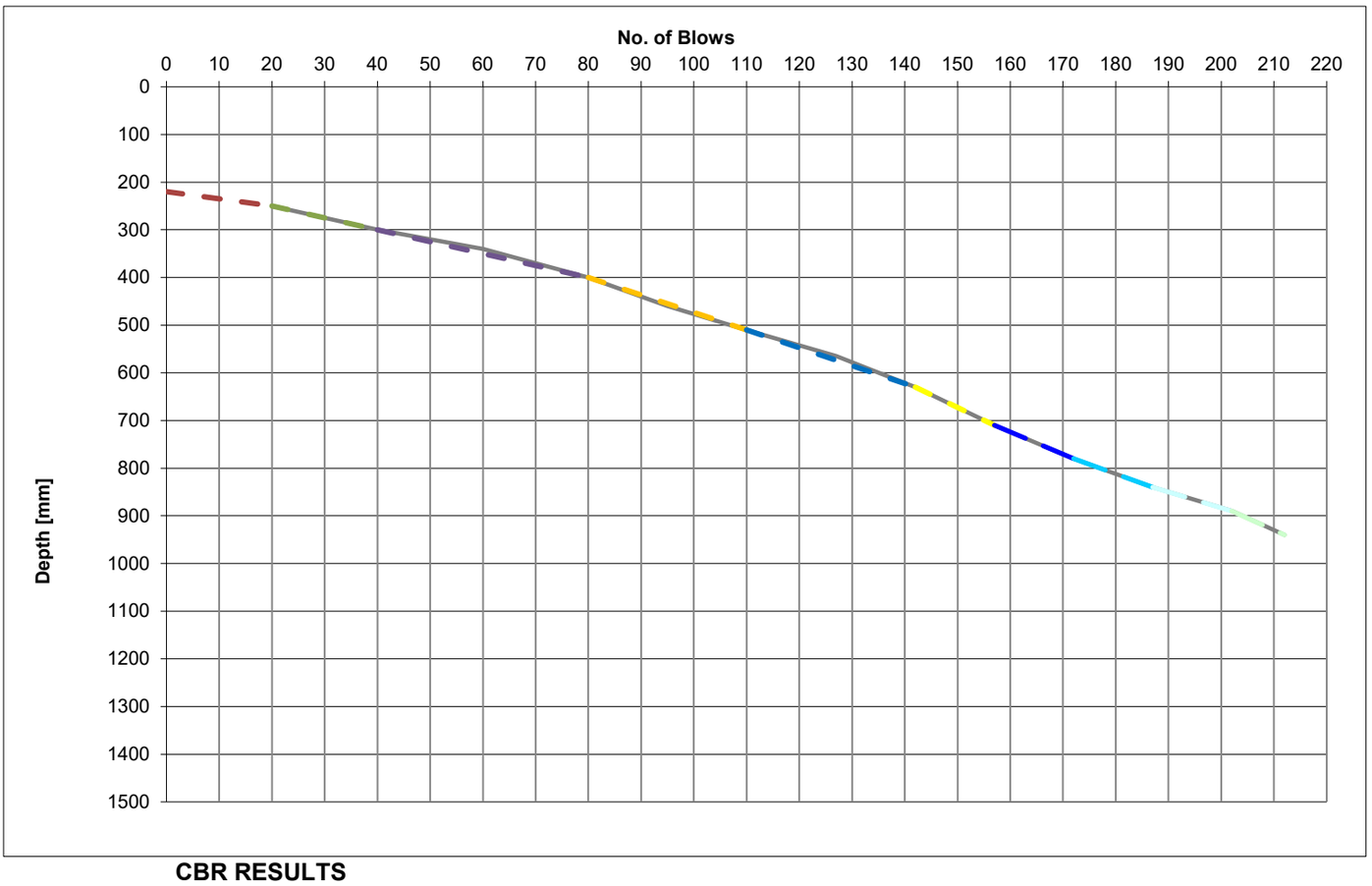
Checked By: GD **Approved By:** GD

Created using Pebble Geo

CBR Data Interpretation

Drilling Ltd

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)			
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)			
Location	CBR 01 - Jaguar Land Rover, Liverpool			
Coordinates	E: 345536.5	N: 38436.491	Level (m AOD):	22.872
Date	19/01/2026			

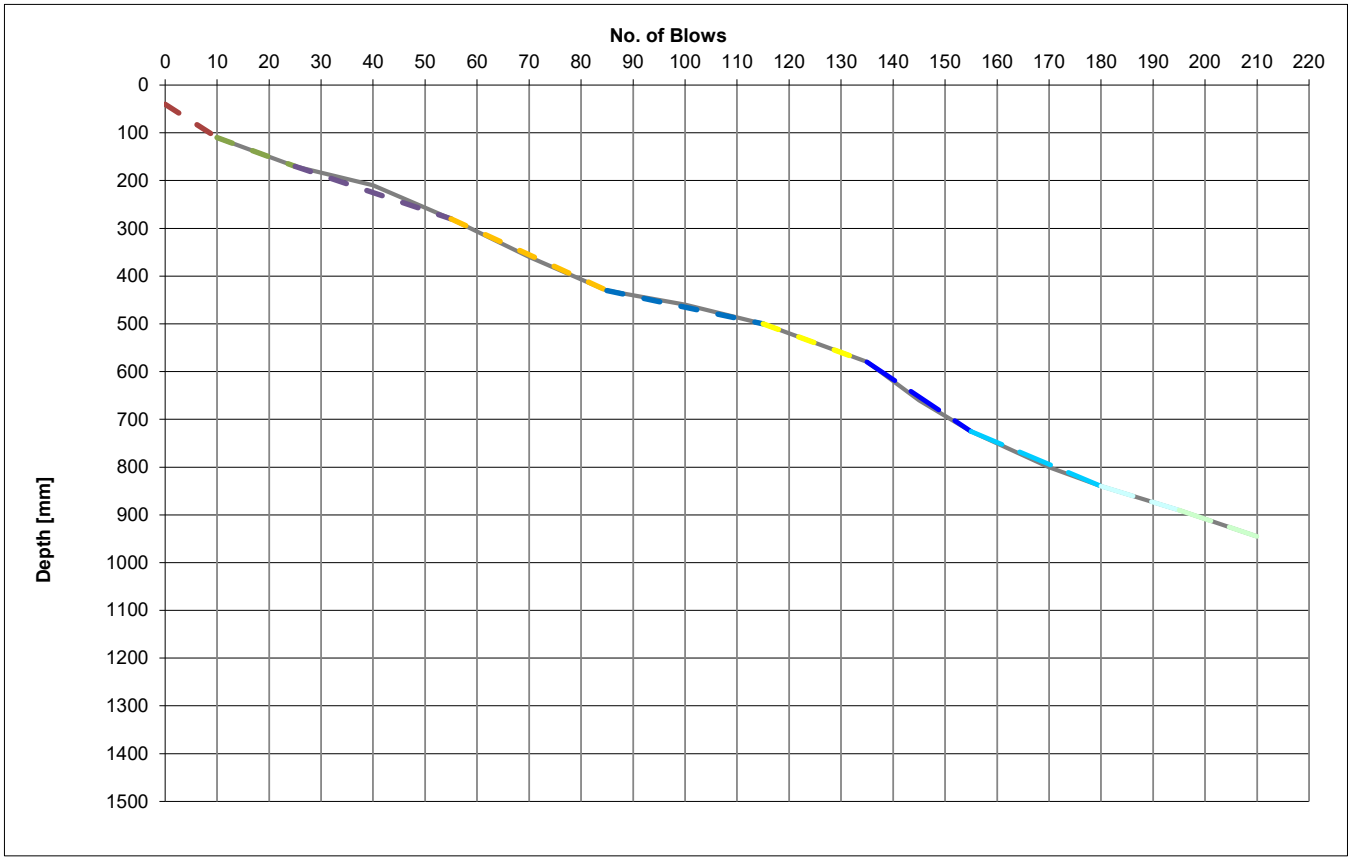


CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 01	0.22	0.25	196.7
CBR 01	0.25	0.30	114.7
CBR 01	0.30	0.40	114.7
CBR 01	0.40	0.51	76.5
CBR 01	0.51	0.63	74.7
CBR 01	0.63	0.71	51.5
CBR 01	0.71	0.78	59.3
CBR 01	0.78	0.84	69.8
CBR 01	0.84	0.89	84.6
CBR 01	0.89	0.94	55.1

CBR Data Interpretation

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)
Location	CBR 02 - Jaguar Land Rover, Liverpool
Coordinates	E: 345560.319 N: 384363.567 Level (m AOD): 22.882
Date	19/01/2026

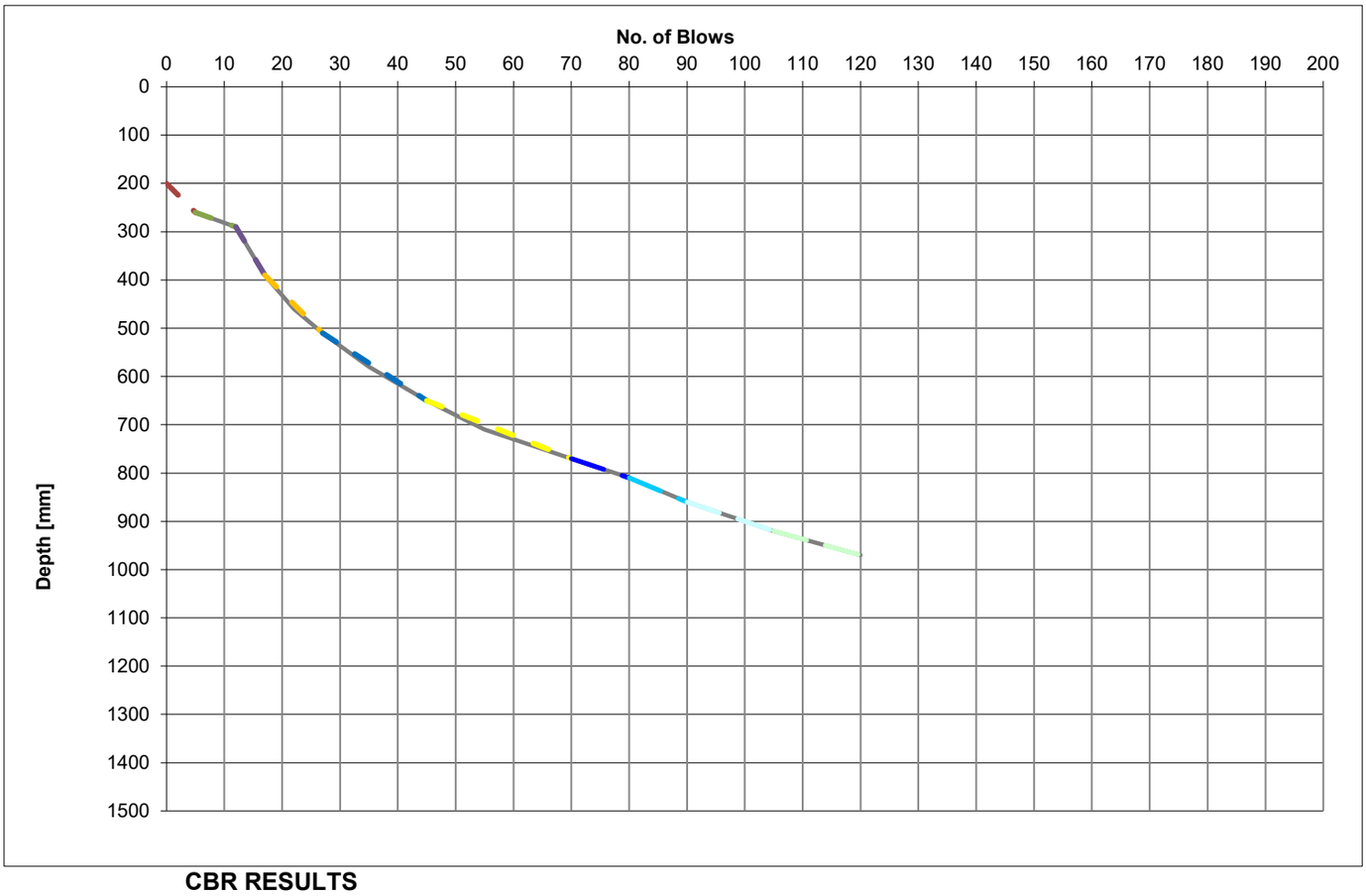


CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 02	0.04	0.11	38.6
CBR 02	0.11	0.17	69.8
CBR 02	0.17	0.28	76.5
CBR 02	0.28	0.43	55.1
CBR 02	0.43	0.50	123.3
CBR 02	0.50	0.58	69.8
CBR 02	0.58	0.73	37.2
CBR 02	0.73	0.84	60.2
CBR 02	0.84	0.89	84.6
CBR 02	0.89	0.95	76.5

CBR Data Interpretation

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)
Location	CBR 03 - Jaguar Land Rover, Liverpool
Coordinates	E: 345607.293 N: 384376.968 Level (m AOD): 22.282
Date	19/01/2026

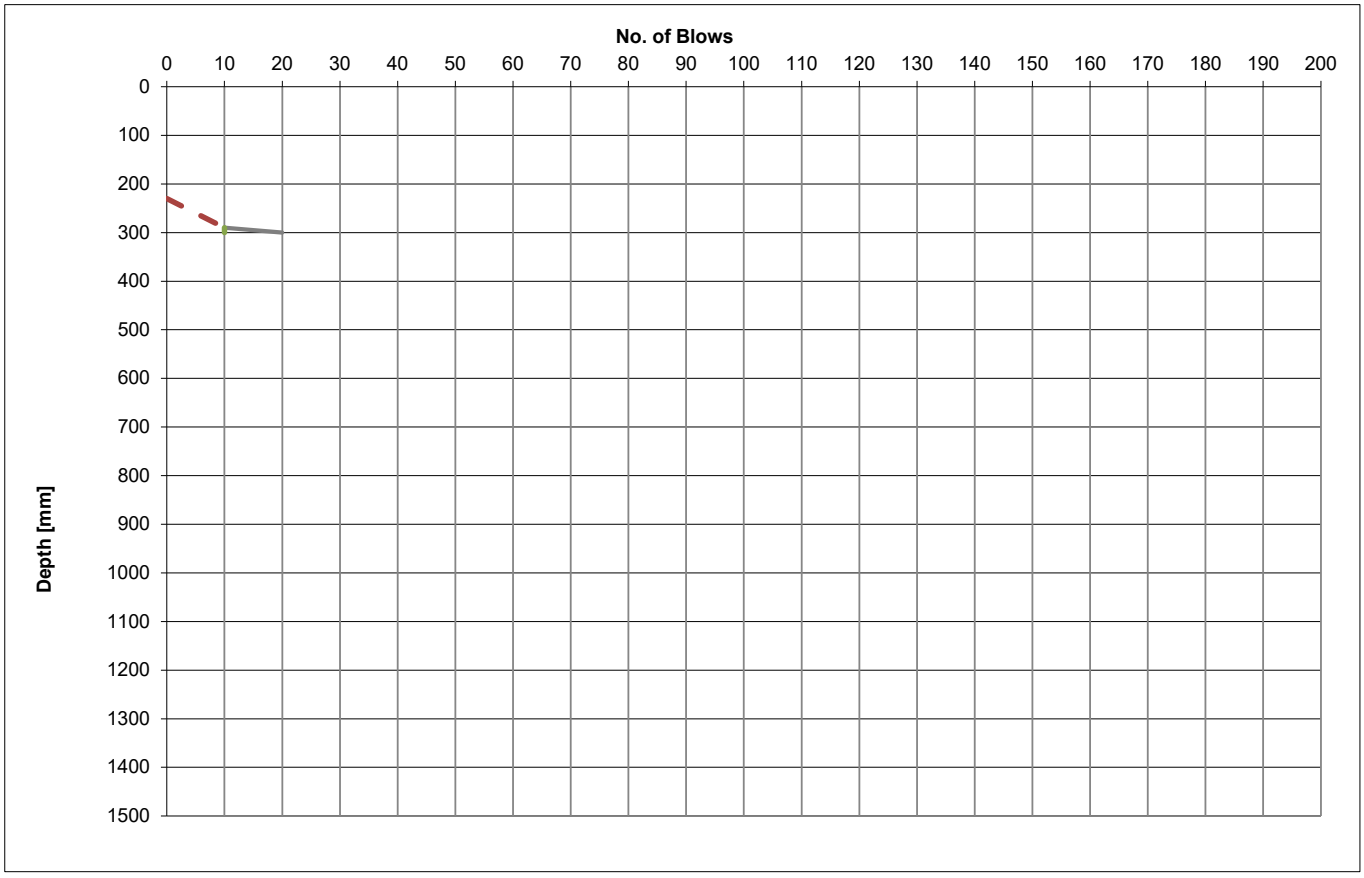


CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 03	0.20	0.26	21.8
CBR 03	0.26	0.29	64.9
CBR 03	0.29	0.39	12.7
CBR 03	0.39	0.51	21.8
CBR 03	0.51	0.65	34.5
CBR 03	0.65	0.77	57.5
CBR 03	0.77	0.81	69.8
CBR 03	0.81	0.86	55.1
CBR 03	0.86	0.92	69.8
CBR 03	0.92	0.97	84.6

CBR Data Interpretation

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)			
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)			
Location	CBR 04 - Jaguar Land Rover, Liverpool			
Coordinates	E: 345566.421	N: 384343.672	Level (m AOD):	22.521
Date	19/01/2026			



CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 04	0.23	0.29	45.4
CBR 04	0.29	0.30	

CBR Data Interpretation

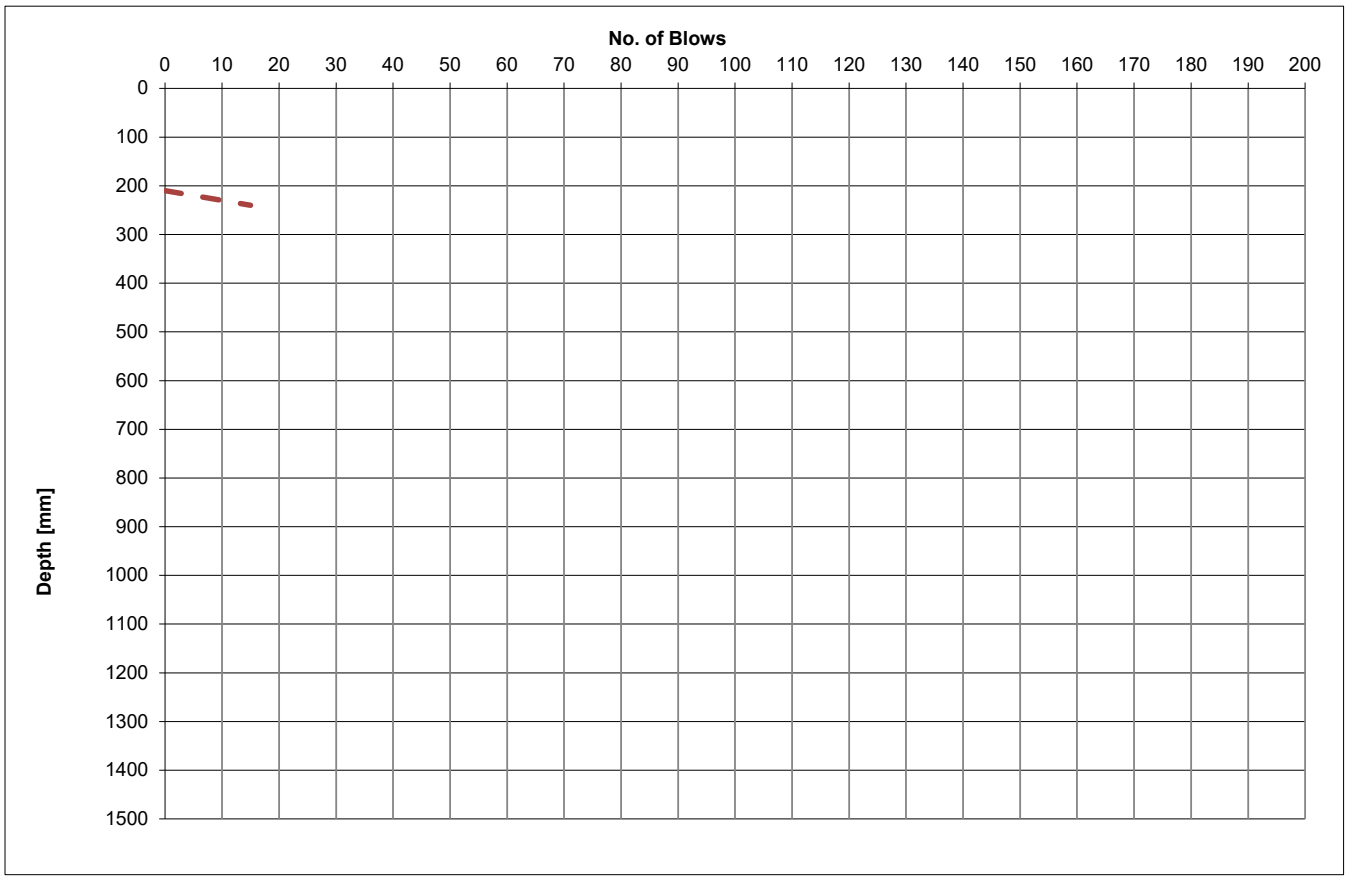
Method: CS 229- Data for pavement assessment Section 6 (Mar 2020)

Formula: Log10(CBR)=2.48 - 1.057 Log10(mm/blow)

Location CBR 04A- Jaguar Land Rover, Liverpool

Coordinates E: 345566.422 N: 384343.673 Level (m AOD): 22.522

Date 22/01/2026

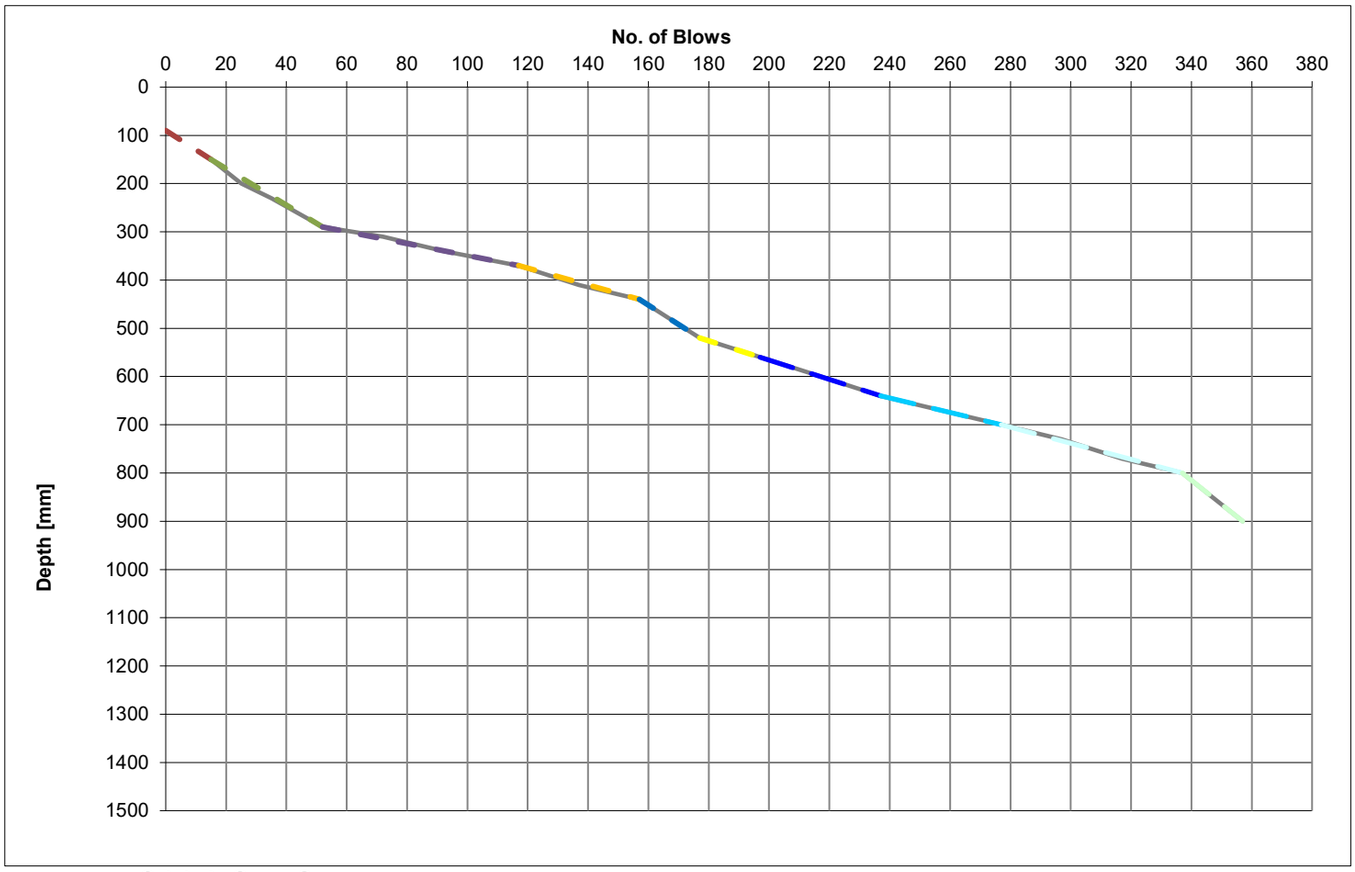


CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 04A	0.21	0.24	145.1

CBR Data Interpretation

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)
Location	CBR 05 - Jaguar Land Rover, Liverpool
Coordinates	E: 345517.251 N: 384330.627 Level (m AOD): 22.592
Date	19/01/2026

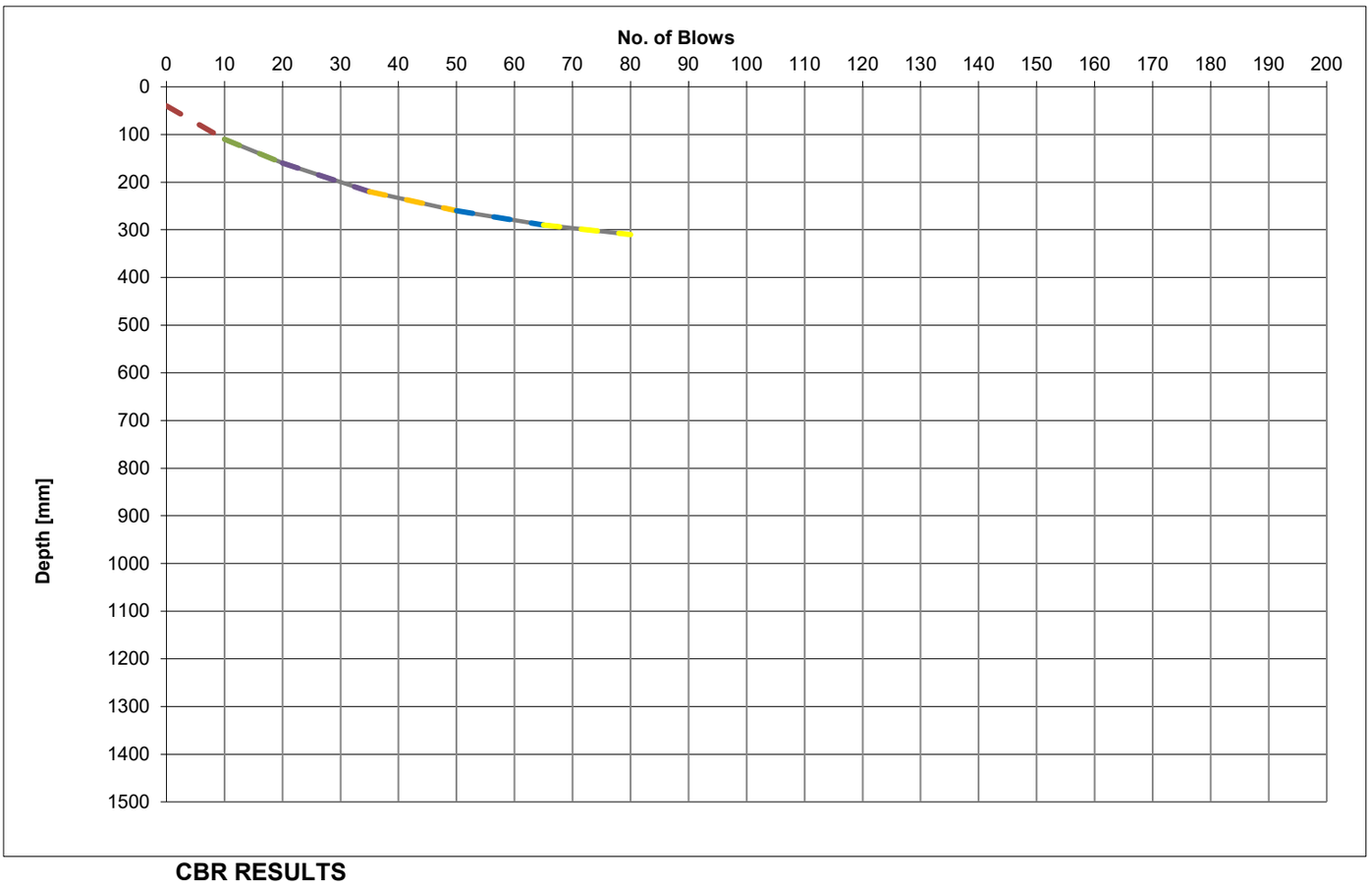


CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 05	0.09	0.15	69.8
CBR 05	0.15	0.29	74.0
CBR 05	0.29	0.37	242.5
CBR 05	0.37	0.44	167.2
CBR 05	0.44	0.52	69.8
CBR 05	0.52	0.56	145.1
CBR 05	0.56	0.64	145.1
CBR 05	0.64	0.70	196.7
CBR 05	0.70	0.80	176.0
CBR 05	0.80	0.90	55.1

CBR Data Interpretation

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)
Location	CBR 06 - Jaguar Land Rover, Liverpool
Coordinates	E: 345539.636 N: 384312.787 Level (m AOD): 22.408
Date	19/01/2026



CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 06	0.04	0.11	38.6
CBR 06	0.11	0.16	55.1
CBR 06	0.16	0.22	69.8
CBR 06	0.22	0.26	107.1
CBR 06	0.26	0.29	145.1
CBR 06	0.29	0.31	222.8

CBR Data Interpretation

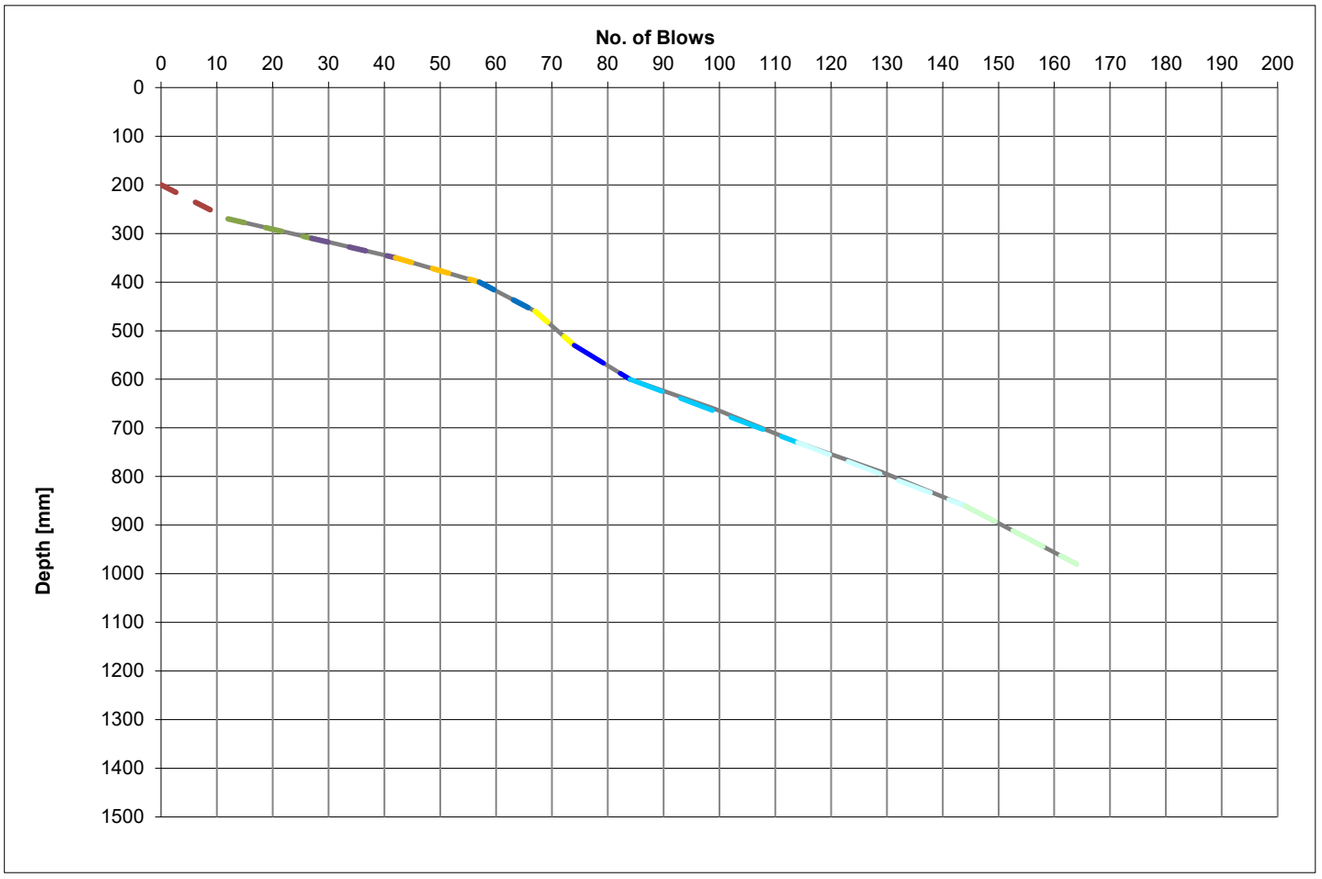
Method: CS 229- Data for pavement assessment Section 6 (Mar 2020)

Formula: Log10(CBR)=2.48 - 1.057 Log10(mm/blow)

Location CBR 06A - Jaguar Land Rover, Liverpool

Coordinates E: 345539.638 N: 384312.789 Level (m AOD): 22.409

Date 19/01/2026



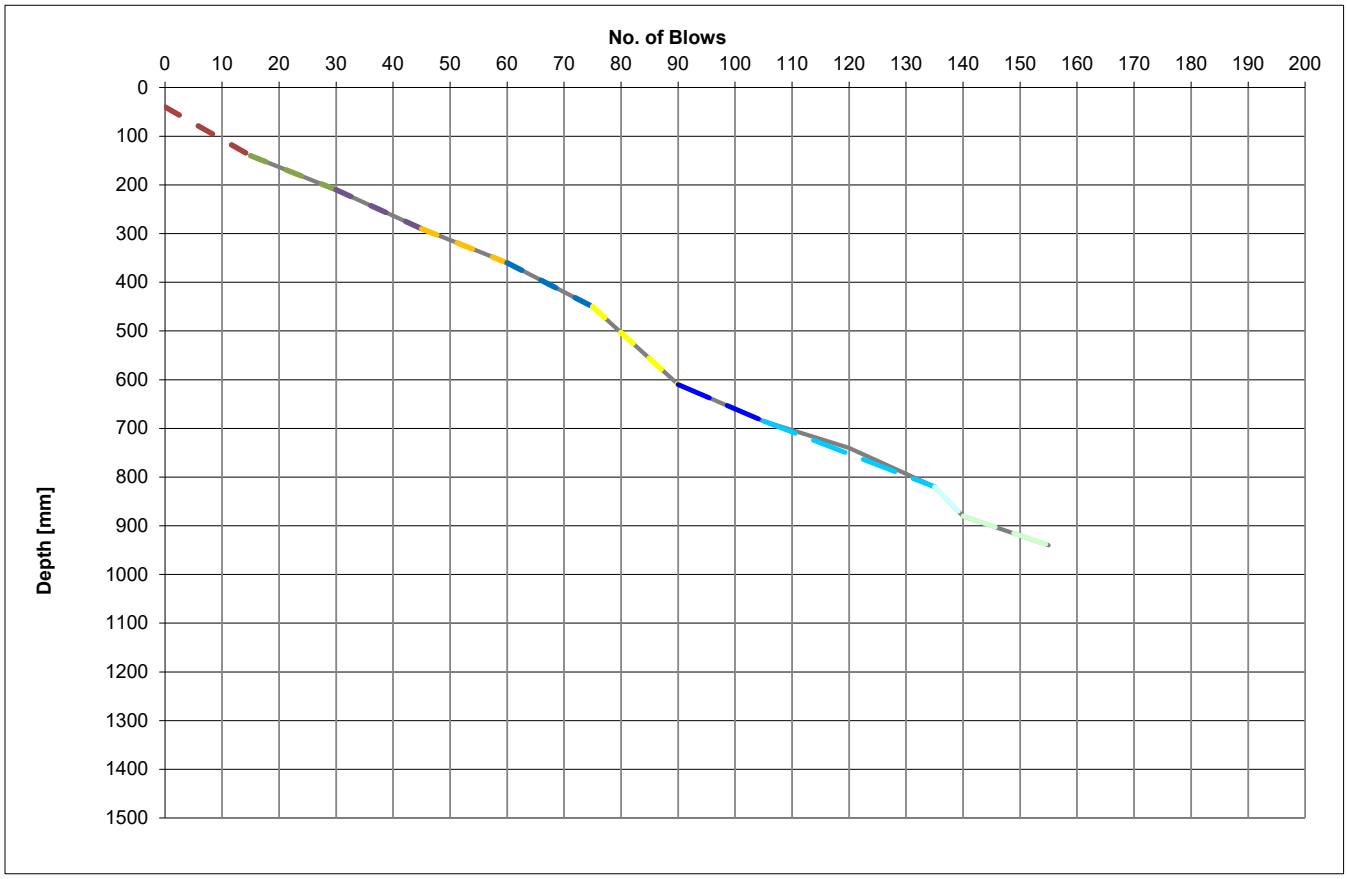
CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 06A	0.20	0.27	46.8
CBR 06A	0.27	0.31	107.1
CBR 06A	0.31	0.35	107.1
CBR 06A	0.35	0.40	84.6
CBR 06A	0.40	0.46	45.4
CBR 06A	0.46	0.53	26.5
CBR 06A	0.53	0.60	38.6
CBR 06A	0.60	0.73	64.1
CBR 06A	0.73	0.86	64.1
CBR 06A	0.86	0.98	45.4

CBR Data Interpretation

Drilling Ltd

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)			
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)			
Location	CBR 07- Jaguar Land Rover, Liverpool			
Coordinates	E: 345567.646	N: 384318.673	Level (m AOD):	22.345
Date	19/01/2026			

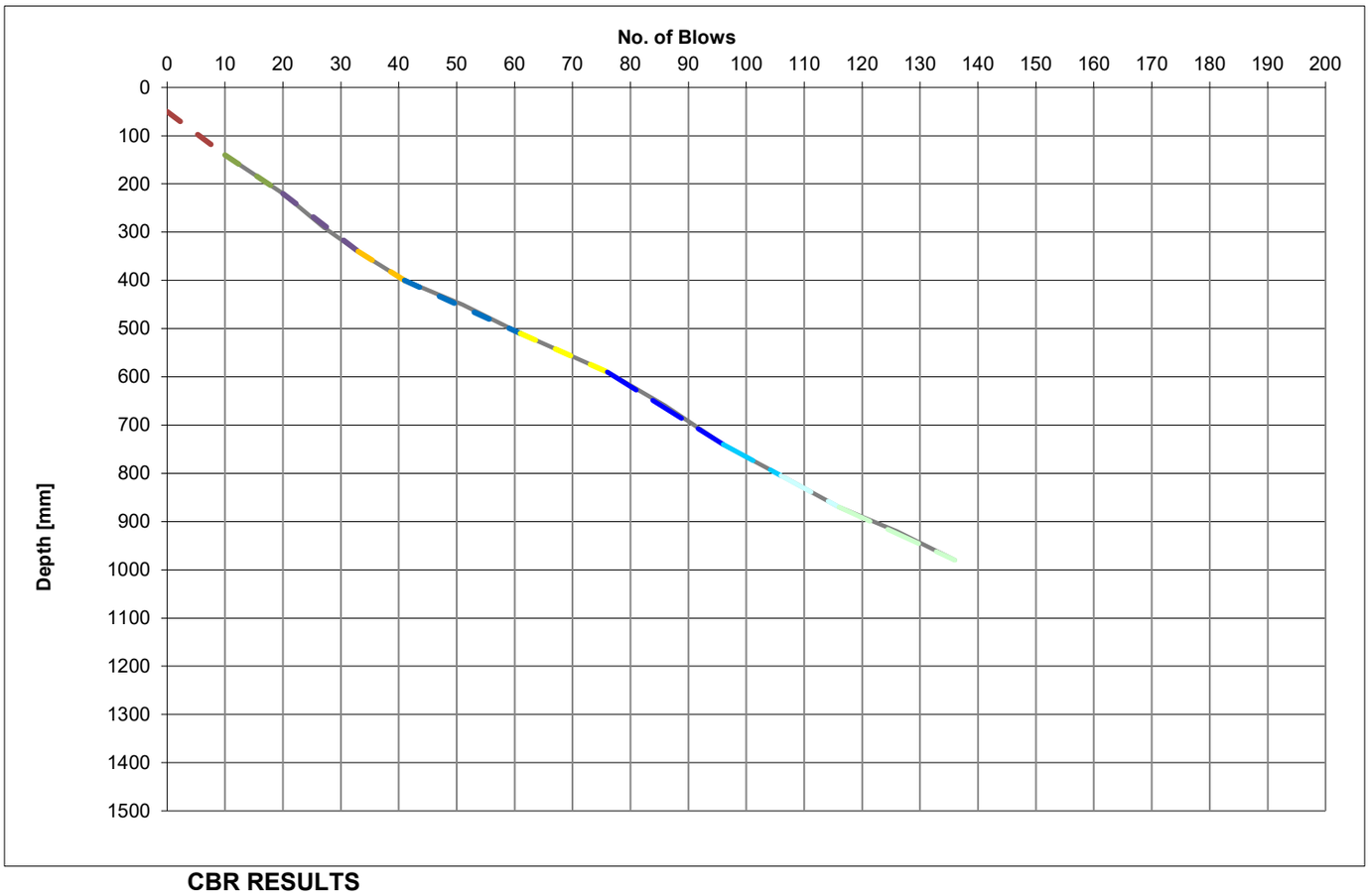


CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 07	0.04	0.14	40.7
CBR 07	0.14	0.21	59.3
CBR 07	0.21	0.29	51.5
CBR 07	0.29	0.36	59.3
CBR 07	0.36	0.45	45.4
CBR 07	0.45	0.61	24.7
CBR 07	0.61	0.69	55.1
CBR 07	0.69	0.82	61.6
CBR 07	0.82	0.88	21.8
CBR 07	0.88	0.94	69.8

CBR Data Interpretation

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)			
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)			
Location	CBR 08 - Jaguar Landrover, Liverpool			
Coordinates	E: 345602.127	N: 384332.228	Level (m AOD):	22.105
Date	19/01/2026			

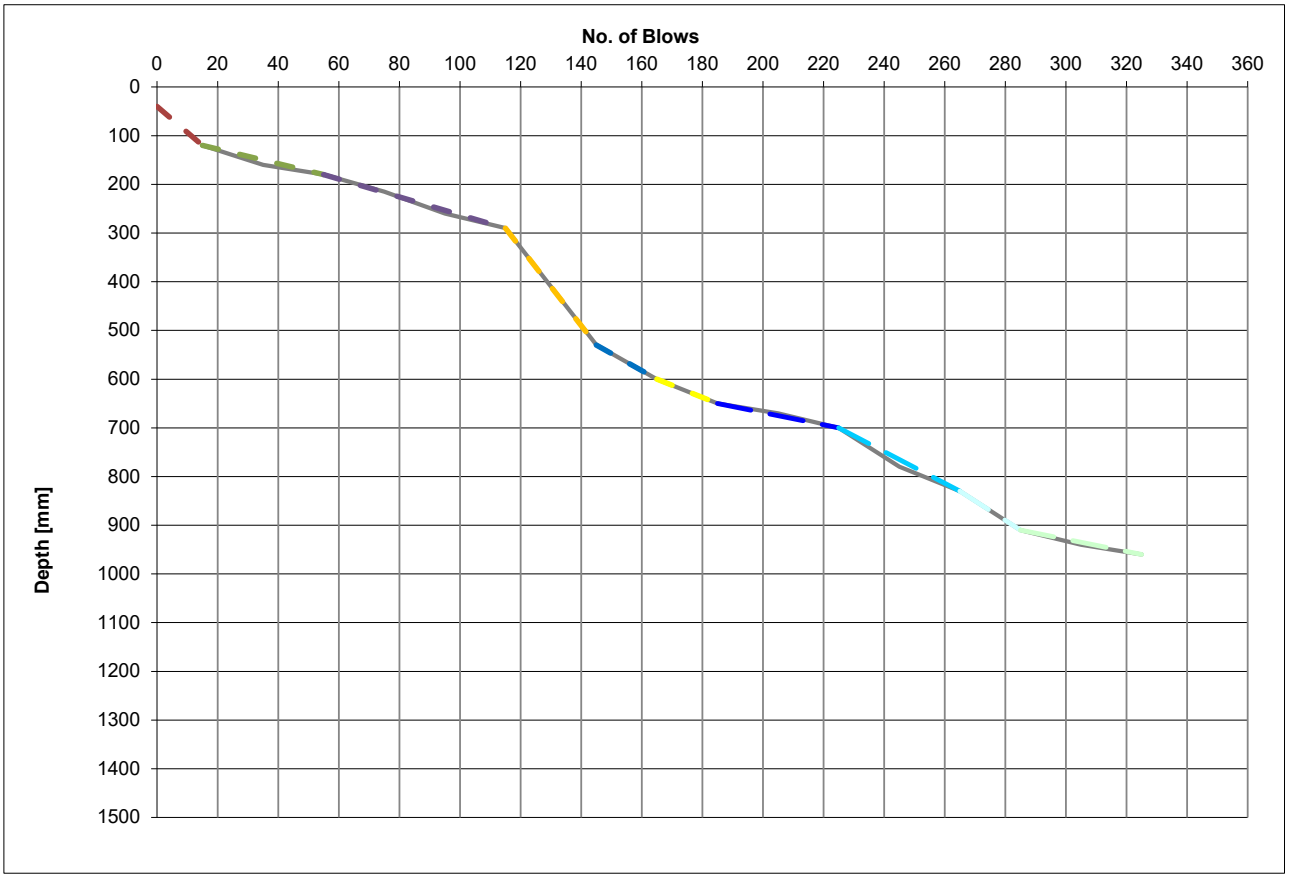


CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 08	0.05	0.14	29.6
CBR 08	0.14	0.22	33.5
CBR 08	0.22	0.34	28.8
CBR 08	0.34	0.40	35.9
CBR 08	0.40	0.51	49.8
CBR 08	0.51	0.59	51.5
CBR 08	0.59	0.74	35.9
CBR 08	0.74	0.81	41.8
CBR 08	0.81	0.87	41.8
CBR 08	0.87	0.98	49.8

CBR Data Interpretation

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)
Location	CBR 09 - Jaguar Land Rover, Liverpool
Coordinates	E: 345531.994 N: 384273.794 Level (m AOD): 21.772
Date	01/12/2022



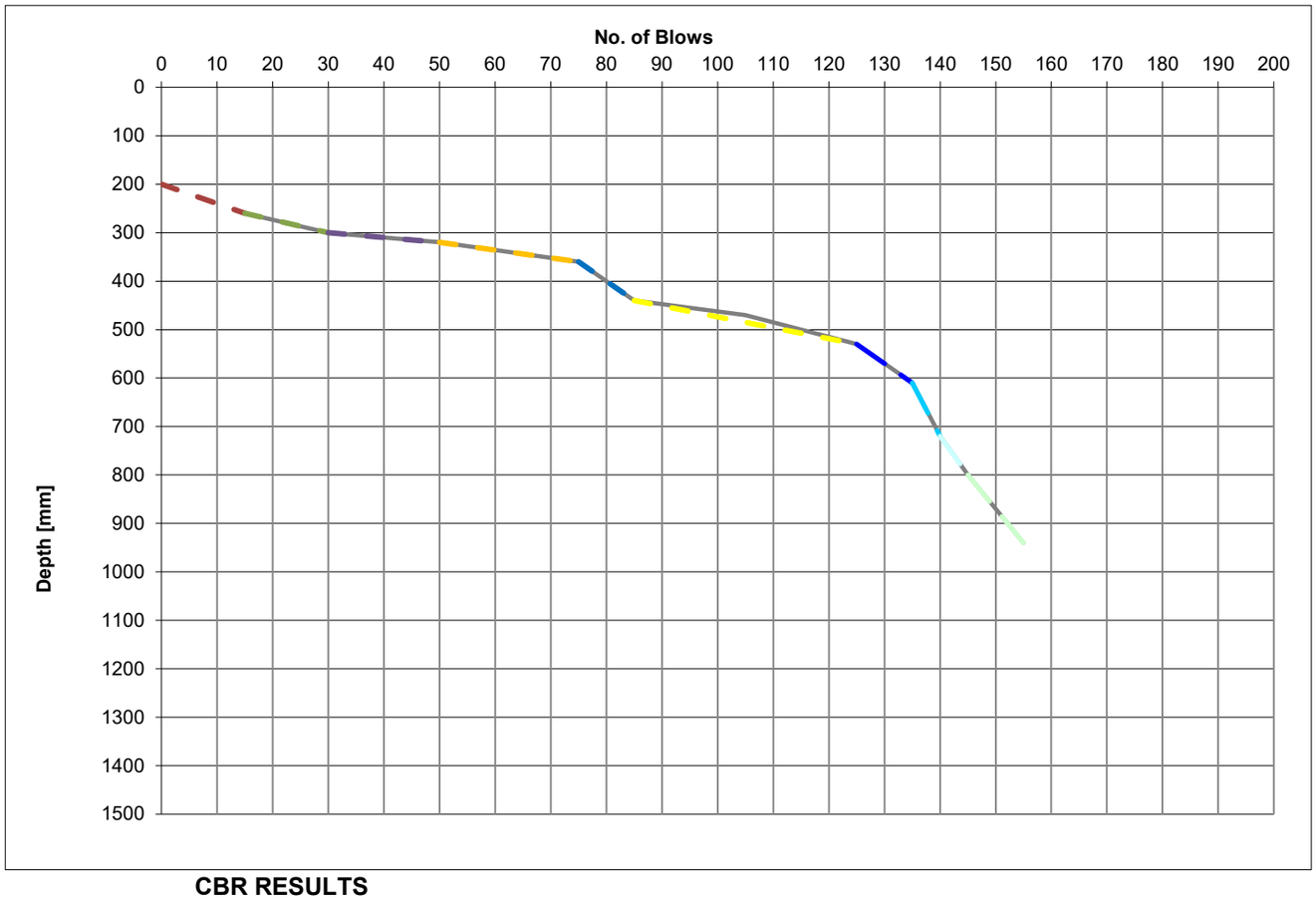
CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 09	0.04	0.12	51.5
CBR 09	0.12	0.18	196.7
CBR 09	0.18	0.29	159.1
CBR 09	0.29	0.53	33.5
CBR 09	0.53	0.60	80.3
CBR 09	0.60	0.65	114.7
CBR 09	0.65	0.70	238.5
CBR 09	0.70	0.83	86.9
CBR 09	0.83	0.91	69.8
CBR 09	0.91	0.96	238.5

CBR Data Interpretation

Drilling Ltd

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)
Location	CBR 10 - Jaguar Land Rover, Liverpool
Coordinates	E: 345585.519 N: 384282.804 Level (m AOD): 21.752
Date	19/01/2026



CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 10	0.20	0.26	69.8
CBR 10	0.26	0.30	107.1
CBR 10	0.30	0.32	302.0
CBR 10	0.32	0.36	183.8
CBR 10	0.36	0.44	33.5
CBR 10	0.44	0.53	128.2
CBR 10	0.53	0.61	33.5
CBR 10	0.61	0.72	11.5
CBR 10	0.72	0.80	16.1
CBR 10	0.80	0.94	18.6

CBR Data Interpretation

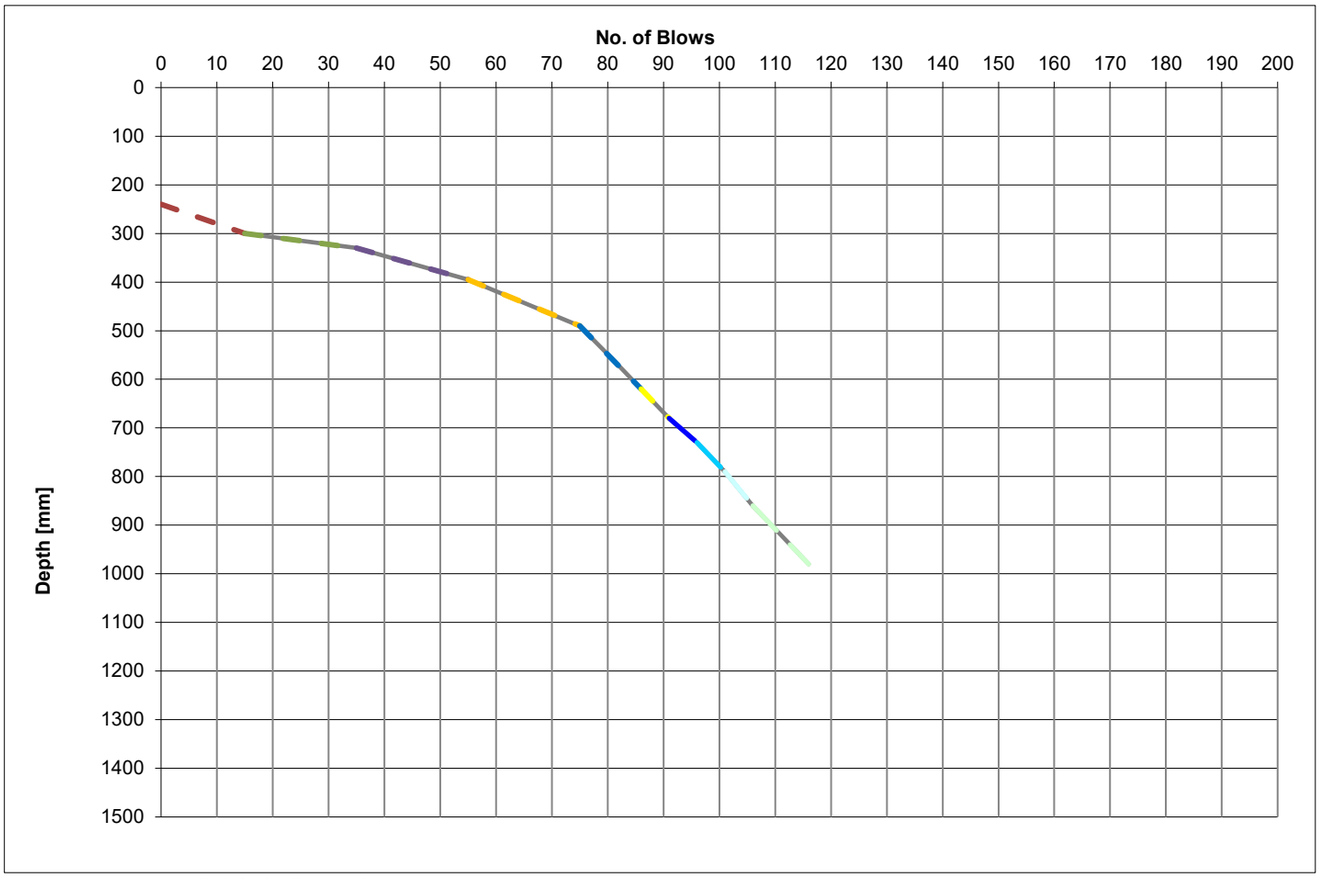
Method: CS 229- Data for pavement assessment Section 6 (Mar 2020)

Formula: Log10(CBR)=2.48 - 1.057 Log10(mm/blow)

Location CBR 11 - Jaguar Land Rover, Liverpool

Coordinates E: 345623.359 N: 384287.005 Level (m AOD): 21.632

Date 19/01/2026



CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 11	0.24	0.30	69.8
CBR 11	0.30	0.33	196.7
CBR 11	0.33	0.40	86.9
CBR 11	0.40	0.49	58.2
CBR 11	0.49	0.62	22.2
CBR 11	0.62	0.68	21.8
CBR 11	0.68	0.73	26.5
CBR 11	0.73	0.79	21.8
CBR 11	0.79	0.86	18.6
CBR 11	0.86	0.98	21.8

CBR Data Interpretation

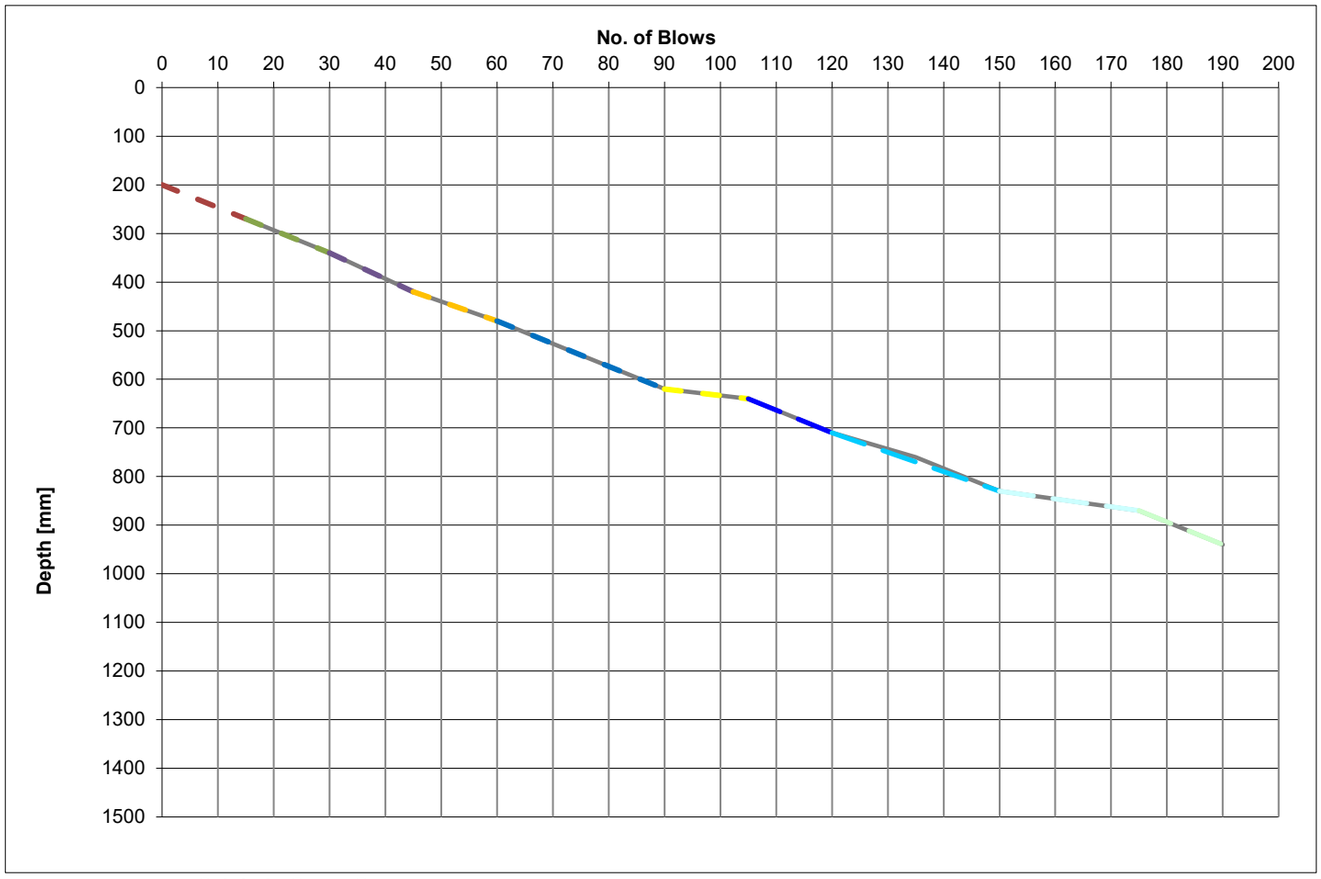
Method: CS 229- Data for pavement assessment Section 6 (Mar 2020)

Formula: Log10(CBR)=2.48 - 1.057 Log10(mm/blow)

Location CBR 12 - Jaguar Land Rover, Liverpool

Coordinates E: 345632.575 N: 384243.143 Level (m AOD): 21.502

Date 19/01/2025

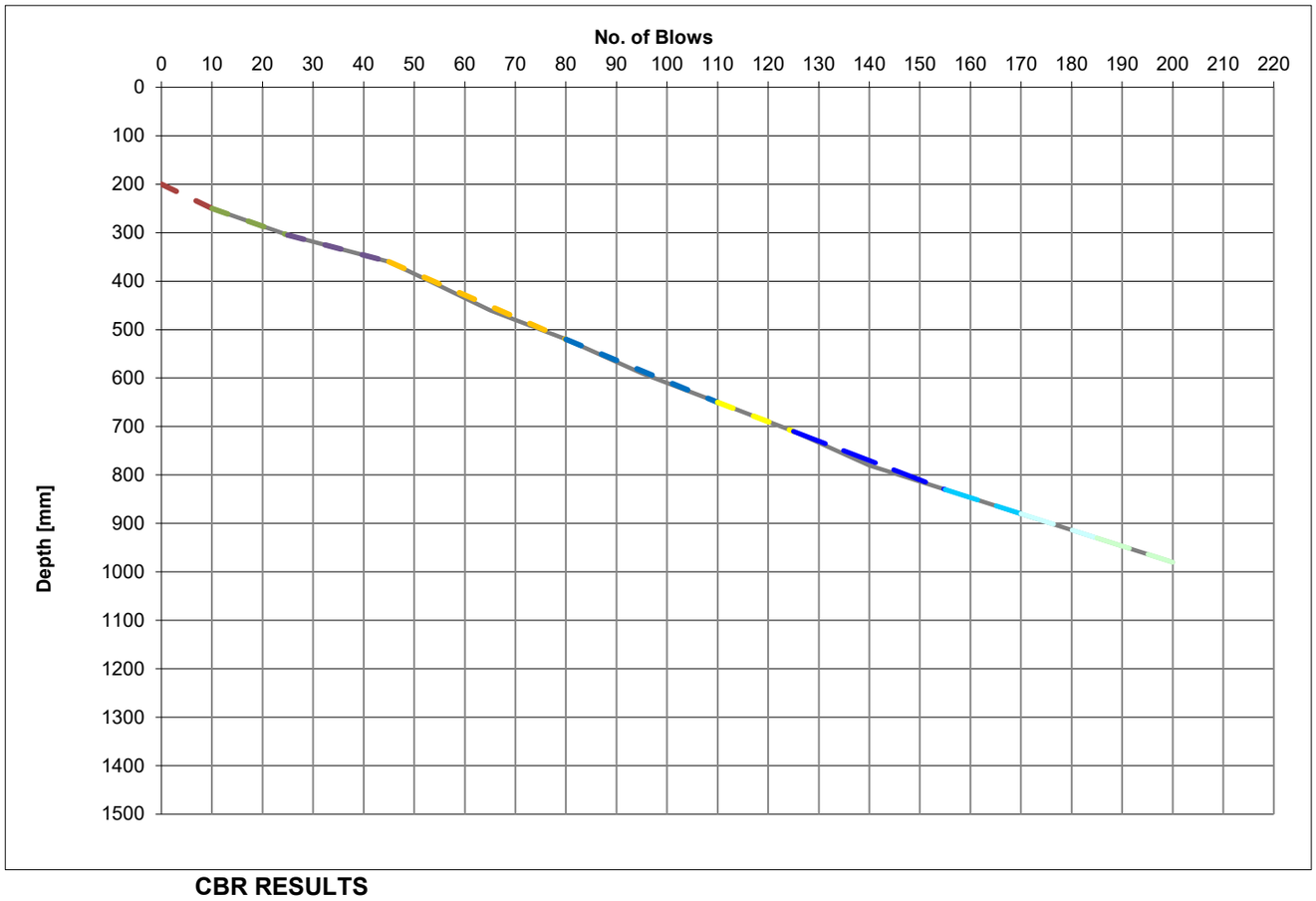


CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 12	0.20	0.27	59.3
CBR 12	0.27	0.34	59.3
CBR 12	0.34	0.42	51.5
CBR 12	0.42	0.48	69.8
CBR 12	0.48	0.62	59.3
CBR 12	0.62	0.64	222.8
CBR 12	0.64	0.71	59.3
CBR 12	0.71	0.83	69.8
CBR 12	0.83	0.87	183.8
CBR 12	0.87	0.94	59.3

CBR Data Interpretation

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)
Location	CBR 13 - Jaguar Land Rover, Liverpool
Coordinates	E: 345589.221 N: 384244.485 Level (m AOD): 21.845
Date	19/01/2026



CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 13	0.20	0.25	55.1
CBR 13	0.25	0.31	76.5
CBR 13	0.31	0.36	103.7
CBR 13	0.36	0.52	60.6
CBR 13	0.52	0.65	64.1
CBR 13	0.65	0.71	69.8
CBR 13	0.71	0.83	69.8
CBR 13	0.83	0.88	84.6
CBR 13	0.88	0.93	84.6
CBR 13	0.93	0.98	84.6

CBR Data Interpretation

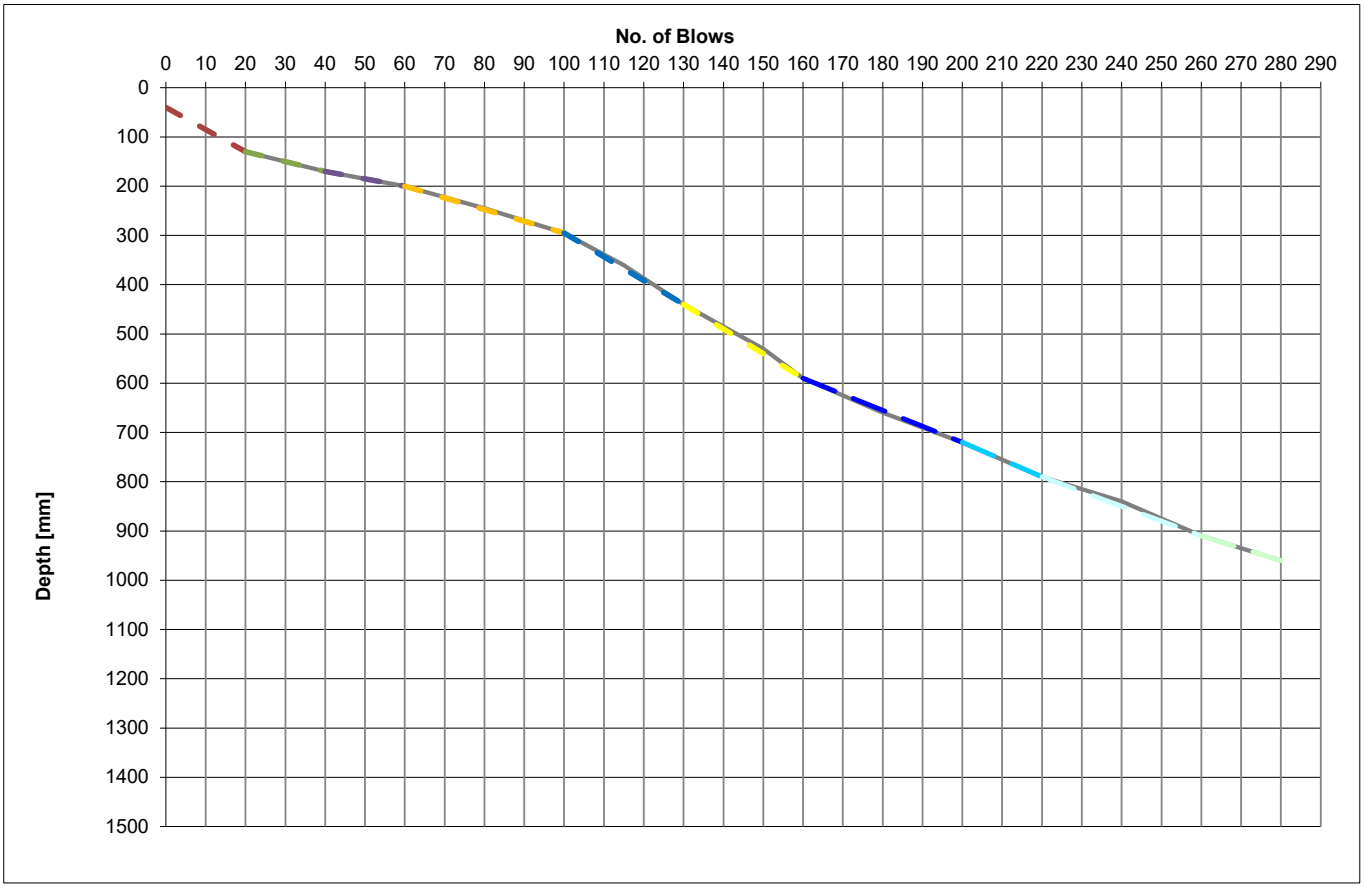
Method: CS 229- Data for pavement assessment Section 6 (Mar 2020)

Formula: Log10(CBR)=2.48 - 1.057 Log10(mm/blow)

Location CBR 14 - Jaguar Landrover, Liverpool

Coordinates E: 345543.807 N: 384239.155 Level (m AOD): 21.634

Date 19/01/2026



CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 14	0.04	0.13	61.6
CBR 14	0.13	0.17	145.1
CBR 14	0.17	0.20	196.7
CBR 14	0.20	0.30	121.0
CBR 14	0.30	0.44	57.1
CBR 14	0.44	0.59	55.1
CBR 14	0.59	0.72	86.9
CBR 14	0.72	0.79	80.3
CBR 14	0.79	0.91	94.6
CBR 14	0.91	0.96	114.7

CBR Data Interpretation

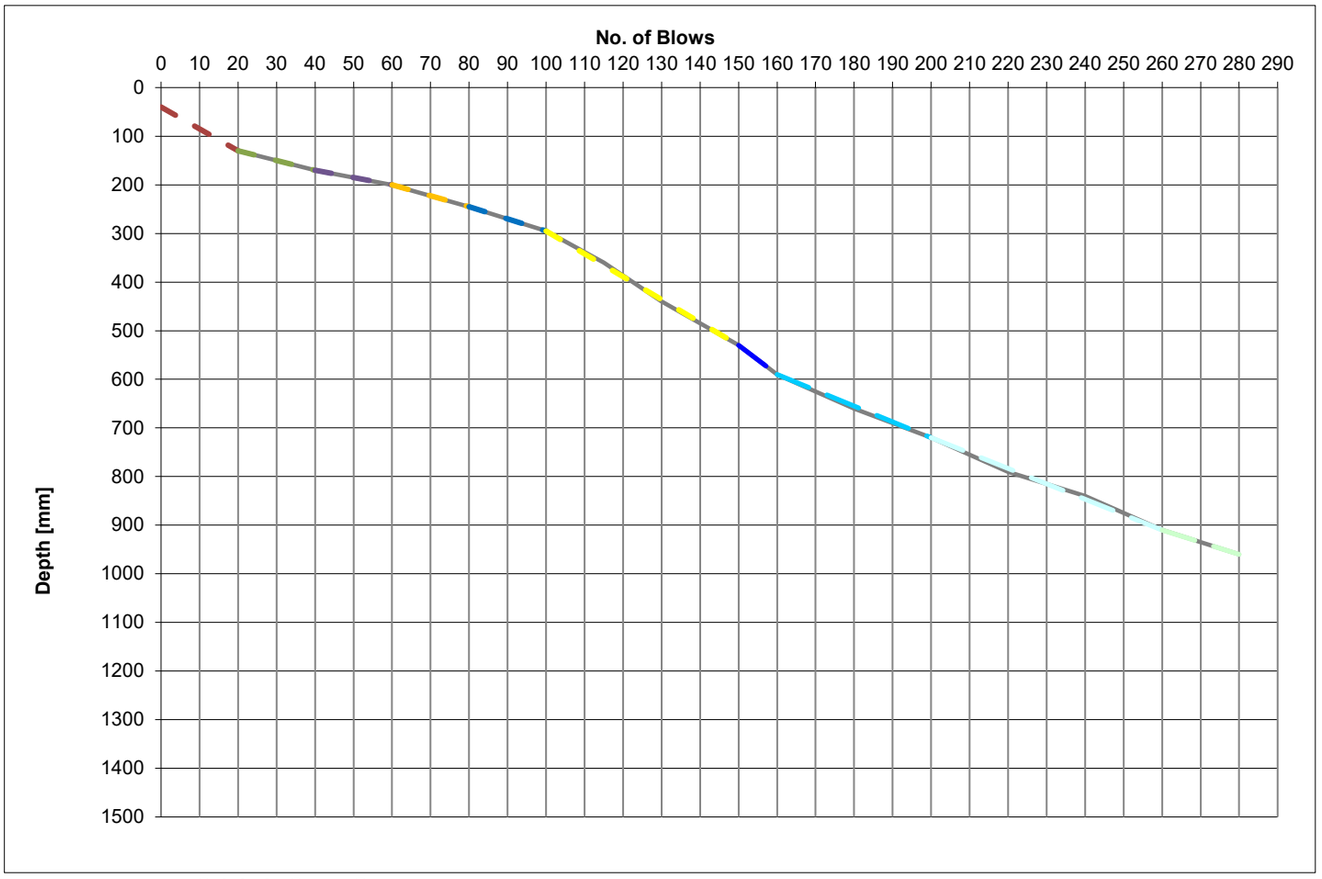
Method: CS 229- Data for pavement assessment Section 6 (Mar 2020)

Formula: Log10(CBR)=2.48 - 1.057 Log10(mm/blow)

Location CBR 15 - Jaguar Land Rover, Liverpool

Coordinates E: 345537.727 N: 384187.775 Level (m AOD): 21.586

Date 20/01/2026



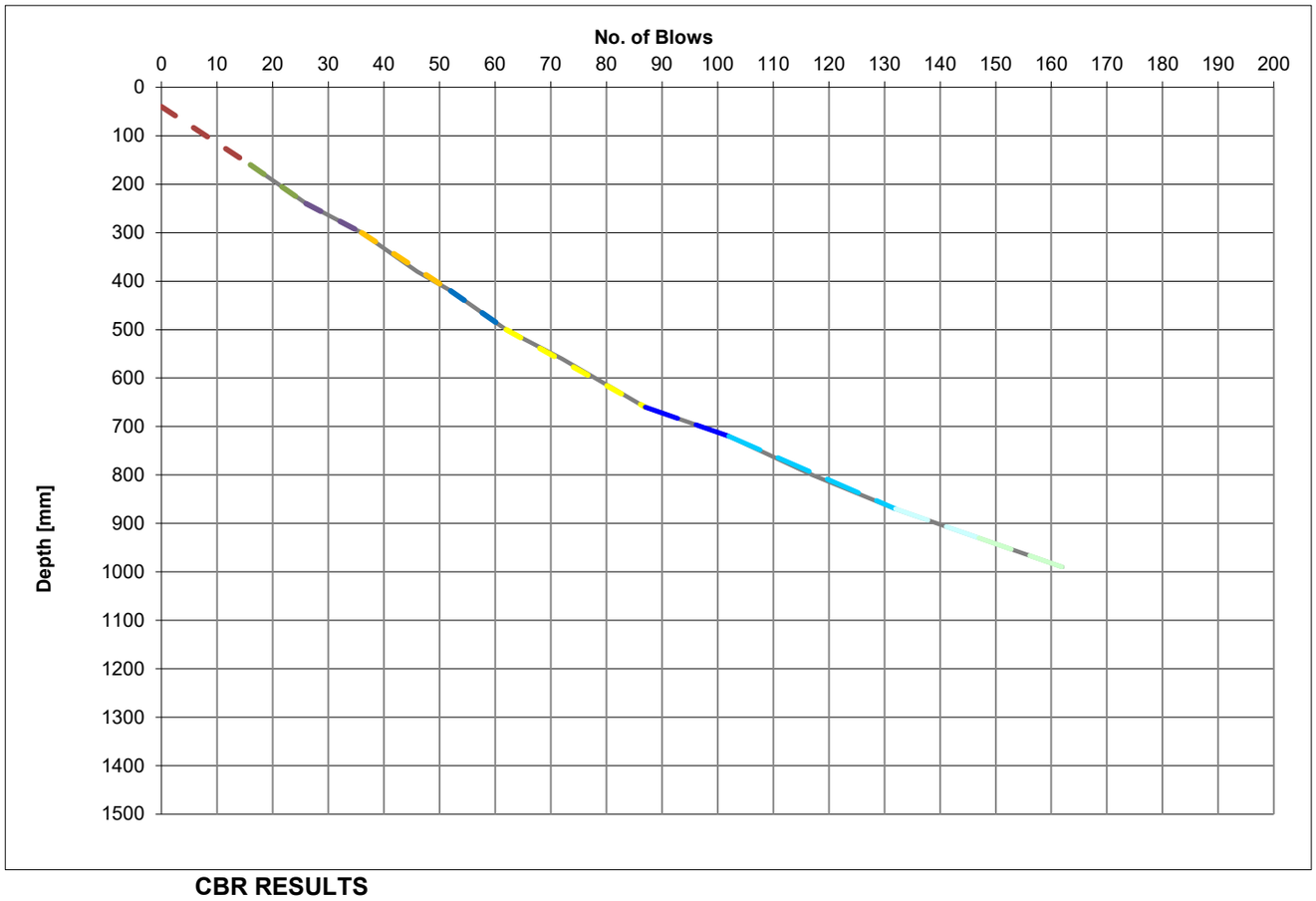
CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 15	0.04	0.13	61.6
CBR 15	0.13	0.17	145.1
CBR 15	0.17	0.20	196.7
CBR 15	0.20	0.25	128.2
CBR 15	0.25	0.30	114.7
CBR 15	0.30	0.53	58.8
CBR 15	0.53	0.59	45.4
CBR 15	0.59	0.72	86.9
CBR 15	0.72	0.91	89.3
CBR 15	0.91	0.96	114.7

CBR Data Interpretation

Drilling Ltd

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)
Location	CBR 16 - Jaguar Land Rover, Liverpool
Coordinates	E: 345589.577 N: 384212.528 Level (m AOD): 21.807
Date	20/01/2026



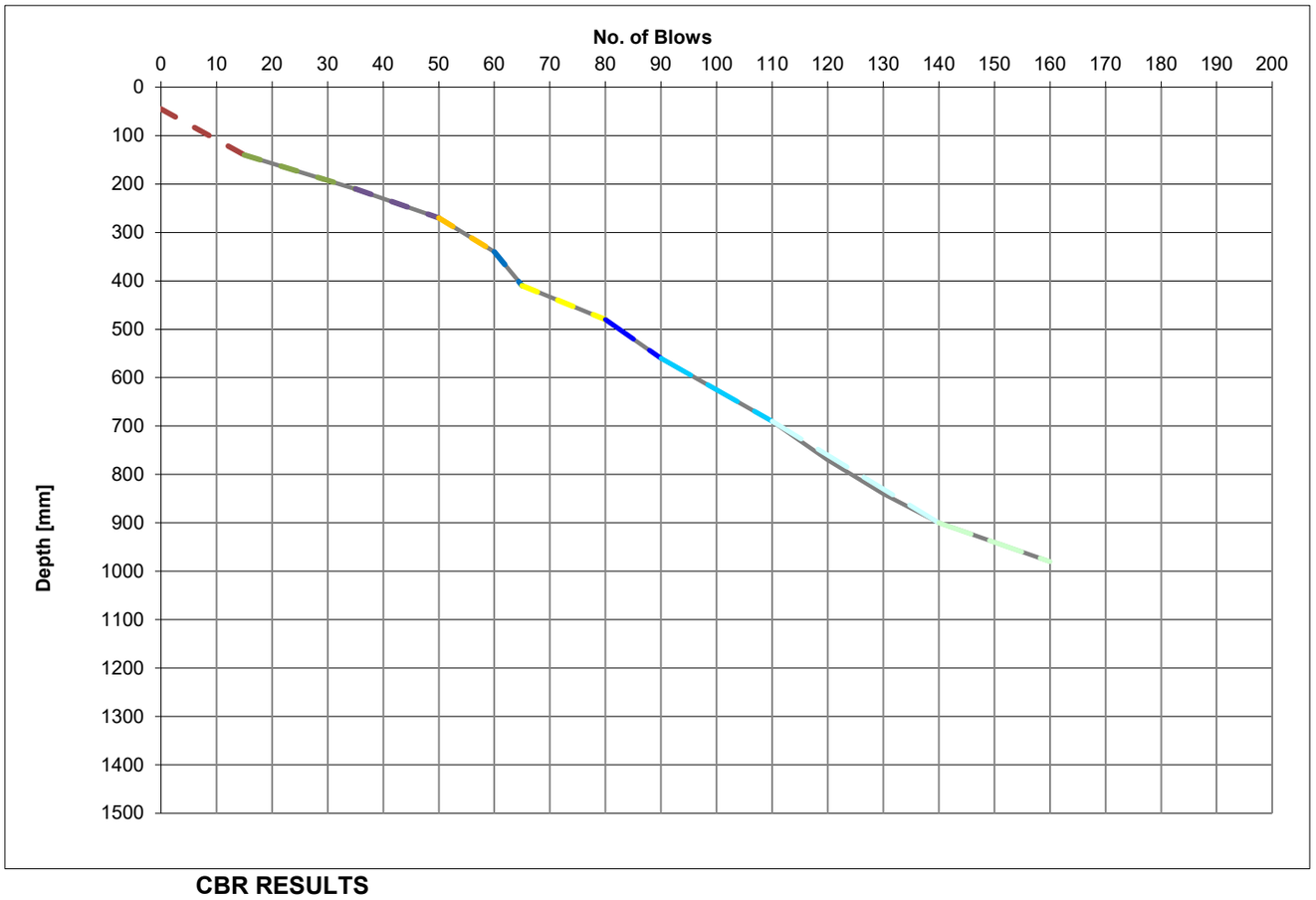
CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 16	0.04	0.16	35.9
CBR 16	0.16	0.24	33.5
CBR 16	0.24	0.30	45.4
CBR 16	0.30	0.42	35.9
CBR 16	0.42	0.50	33.5
CBR 16	0.50	0.66	42.4
CBR 16	0.66	0.72	69.8
CBR 16	0.72	0.87	55.1
CBR 16	0.87	0.93	69.8
CBR 16	0.93	0.99	69.8

CBR Data Interpretation

Drilling Ltd

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)
Location	CBR 17 - Jaguar Land Rover, Liverpool
Coordinates	E: 345632.862 N: 384191.895 Level (m AOD): 21.429
Date	20/01/2026

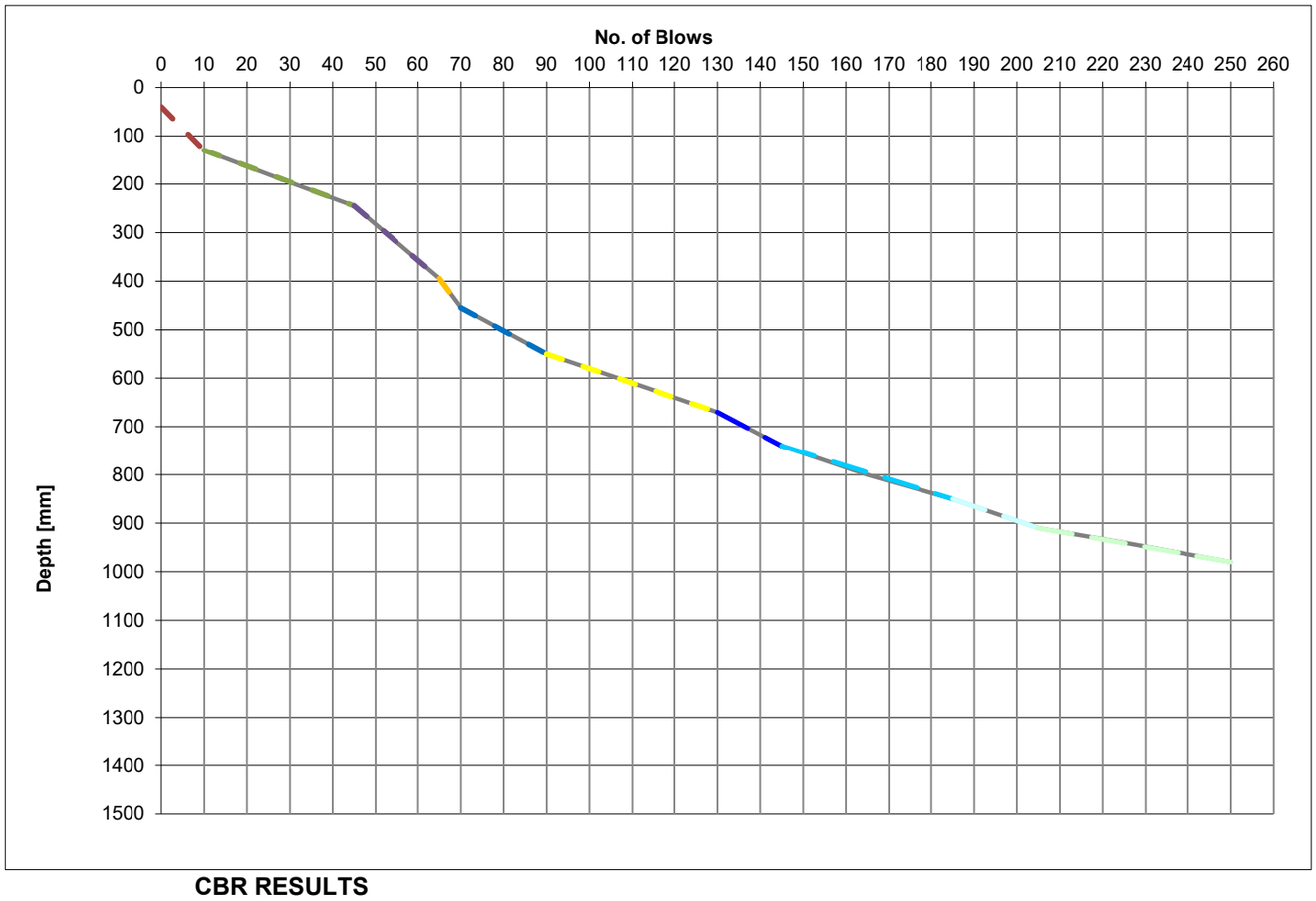


CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 17	0.05	0.14	42.9
CBR 17	0.14	0.21	80.3
CBR 17	0.21	0.27	69.8
CBR 17	0.27	0.34	38.6
CBR 17	0.34	0.41	18.6
CBR 17	0.41	0.48	59.3
CBR 17	0.48	0.56	33.5
CBR 17	0.56	0.69	41.8
CBR 17	0.69	0.90	38.6
CBR 17	0.90	0.98	69.8

CBR Data Interpretation

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)
Location	CBR 18 - Jaguar Land Rover, Liverpool
Coordinates	E: 345622.258 N: 384156.648 Level (m AOD): 21.465
Date	20/01/2026

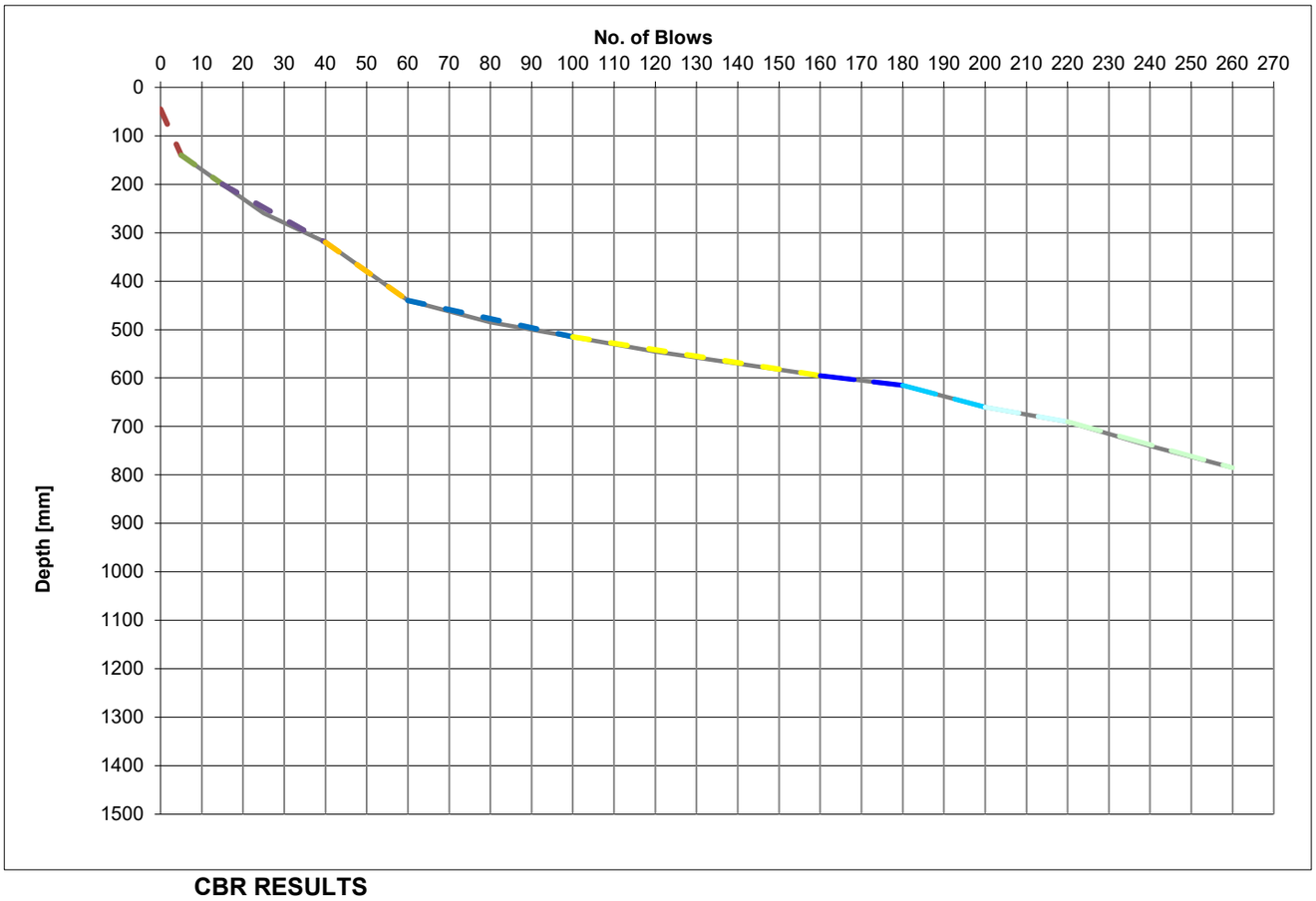


CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 18	0.04	0.13	29.6
CBR 18	0.13	0.25	85.9
CBR 18	0.25	0.40	35.9
CBR 18	0.40	0.46	21.8
CBR 18	0.46	0.55	58.2
CBR 18	0.55	0.67	94.6
CBR 18	0.67	0.74	59.3
CBR 18	0.74	0.85	103.7
CBR 18	0.85	0.91	94.6
CBR 18	0.91	0.98	189.3

CBR Data Interpretation

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)			
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)			
Location	CBR 19 - Janguar Land Rover, Liverpool			
Coordinates	E: 345574.25	N: 384162.722	Level (m AOD):	21.63
Date	21/01/2026			



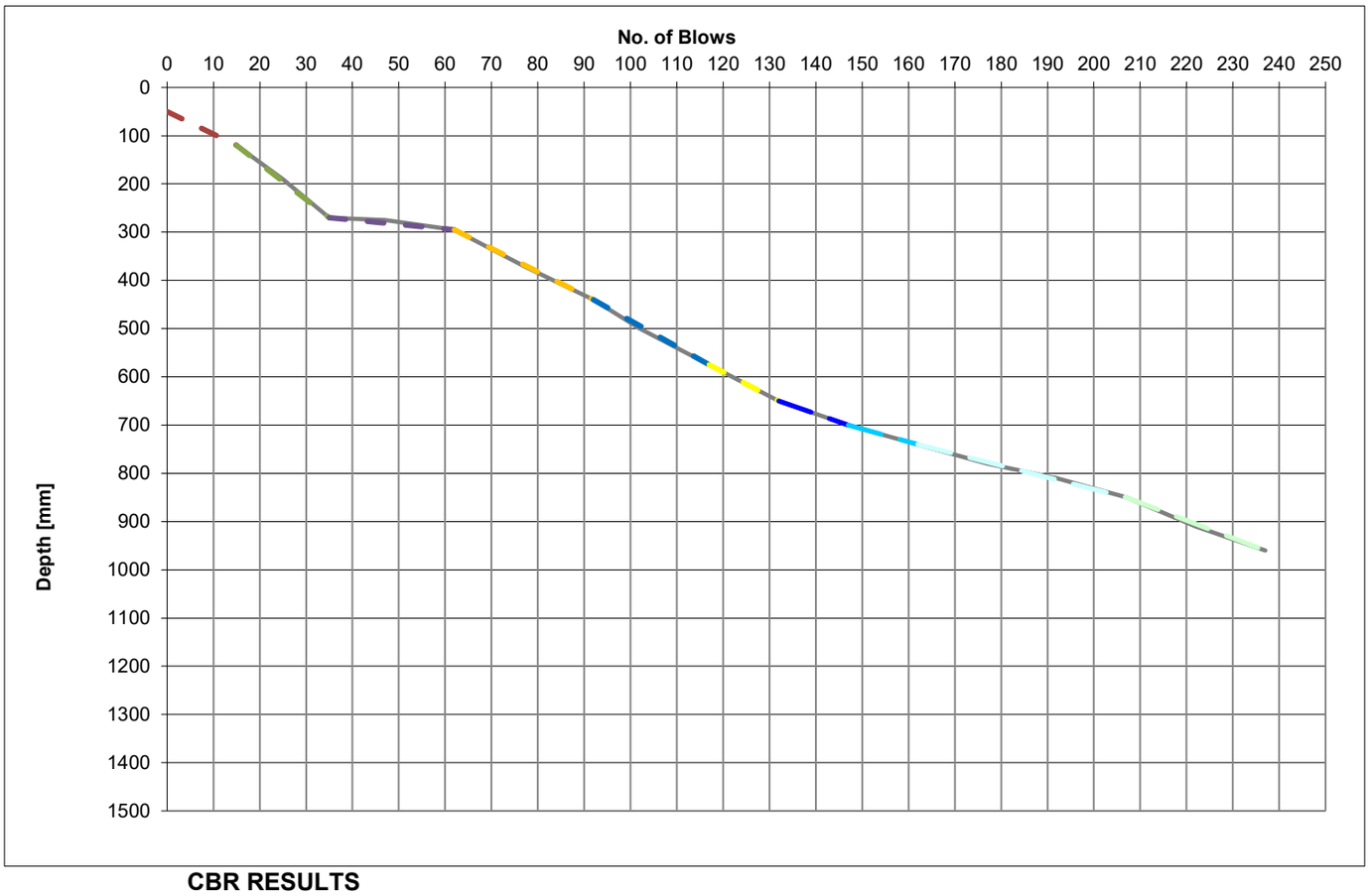
CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 19	0.05	0.14	13.4
CBR 19	0.14	0.20	45.4
CBR 19	0.20	0.32	57.5
CBR 19	0.32	0.44	45.4
CBR 19	0.44	0.52	155.4
CBR 19	0.52	0.60	222.8
CBR 19	0.60	0.62	302.0
CBR 19	0.62	0.66	128.2
CBR 19	0.66	0.69	196.7
CBR 19	0.69	0.79	121.0

CBR Data Interpretation

Drilling Ltd

Method:	CS 229- Data for pavement assessment Section 6 (Mar 2020)			
Formula:	Log10(CBR)=2.48 - 1.057 Log10(mm/blow)			
Location	CBR 20 - Jaguar Land Rover, Liverpool			
Coordinates	E: 345529.517	N: 384161.614	Level (m AOD):	21.552
Date	21/01/2026			



CBR RESULTS

TEST	Depth m		CBR Value
No	From	To	%
CBR 20	0.05	0.12	59.3
CBR 20	0.12	0.27	35.9
CBR 20	0.27	0.30	327.6
CBR 20	0.30	0.44	57.1
CBR 20	0.44	0.58	50.8
CBR 20	0.58	0.65	55.1
CBR 20	0.65	0.70	84.6
CBR 20	0.70	0.74	107.1
CBR 20	0.74	0.85	117.4
CBR 20	0.85	0.96	76.5

Appendix 03

Soakaway Testing and Groundwater Monitoring Records

LandWise
geo-environmental consultants

Project Number:	LW25-136
Site:	Eastlands, JLR
Date:	16/02/2026
Readings taken by:	HOL

Background Data		
	Weather Conditions	Clear
	Ground Conditions (dry/wet):	Wet
	Air Temperature (°C)	7
	Atmospheric Pressure (mB) (start):	997
	Atmospheric Pressure (mB) (finish):	997
	O2 (%)	
	Time (hh:mm)	11:00

Borehole No.	Interval	Gas													Groundwater		Sampling			PID Results
		Oxygen O_2 (%)		Carbon Dioxide CO_2 (%)		Methane CH_4 (%)		Hydrogen Sulphide H_2S (PPM)		Carbon Monoxide CO (PPM)		Lower Explosive Limit (LEL)	Flow (l/hr)		Wd[3] (mbgl)	DoW[4] (m)	Pr[5]	R[6]	S[7]	
		P[1]	SS[2]	P[1]	SS[2]	P[1]	SS[2]	P[1]	SS[2]	P[1]	SS[2]		P[1]	SS[2]						
BH01															2.32	4.85	6	Yes	Yes	
BH02															0.47	3.03	6	Yes	Yes	
BH03															0.66	2.78	6	Yes	Yes	
BH08															0.80	2.56	6	Yes	Yes	
BH09															1.19	3.82	2	No	No	
BH12															2.70	4.70	3	No	No	
BH17															2.36	3.90	1	No	No	
BH19															DRY	3.67	No	No	No	
BH23															0.72	2.47	1	No	No	
BH25																				

Remarks	BH25 could not be located - abundant standing water
Borehole Damage Record/ Installation Record	All boreholes noted to be in a fully servicable condition
Borehole Condition Statement	Boreholes all in a good condition, and left safe.

Key:
1 – Peak
2 – Steady state
3 – Groundwater depth
4 – Depth of well
5 –Purged well volumes
6 – Recharge (yes/no)
7 – Sampled (yes/no)

Gas Monitor Model:	Serial No:	Recalibration Due:

SA01 — SOAKAWAY TEST RESULT

LandWise geo-environmental consultants

Project Name:	Jarguar Land Rover	Test Duration:	mins
Project No:	LW25-136	Length:	2.00 m
Client:	GBX Remediation	Width:	0.70 m
Date of Test:	19/01/2026	Depth of Pit at Start of Test:	2.20 m
		Depth of Pit at End of Test:	2.20 m
		Porosity of Infill:	100 % (100% if no infill)

First Fill

Time (mins)	Water Level (mBGL)
0	1.31
1	1.31
2	1.31
3	1.31
4	1.31
5	1.31
6	1.31
7	1.31
8	1.31
9	1.31
10	1.31
15	1.32
20	1.32
25	1.32
30	1.32
45	1.32
60	1.32
90	1.32
120	1.32
180	1.32

Test carried out to BRE Digest 365: 2016 - Soakaway Design

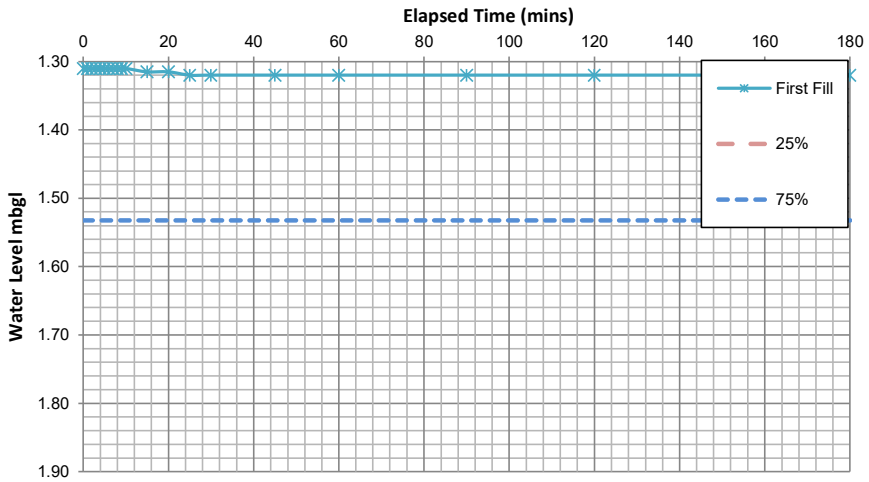
Soil Infiltration Rate = $\frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

where f = soil infiltration rate, Vp75-25 = volume outflowing between 75% and 25% effective depth (m3)
ap50 = mean surface area (pit sides to 50% effective depth + base) (m2),
tp75-25 = time for outflow between 75% and 25% effective depth (seconds)

Note:

Soil Infiltration Rate = - m/s

Test Zone Material: MADE GROUND: Brown sandy very gravelly clay with frequent extraneous material.



SA02 — SOAKAWAY TEST RESULT

LandWise geo-environmental consultants

Project Name:	Jarguar Land Rover	Test Duration:	mins
Project No:	LW25-136	Length:	2.20 m
Client:	GBX Remediation	Width:	0.70 m
Date of Test:	19/01/2026	Depth of Pit at Start of Test:	2.20 m
		Depth of Pit at End of Test:	2.20 m
		Porosity of Infill:	100 % (100% if no infill)

First Fill	
Time (mins)	**Water Level (mBGL)**
0	1.59
1	1.59
2	1.59
3	1.59
4	1.59
5	1.59
6	1.59
7	1.59
8	1.59
9	1.59
10	1.59
15	1.59
20	1.59
25	1.59
30	1.59
45	1.59
60	1.59
90	1.59
120	1.59
180	1.59

Test carried out to BRE Digest 365: 2016 - Soakaway Design

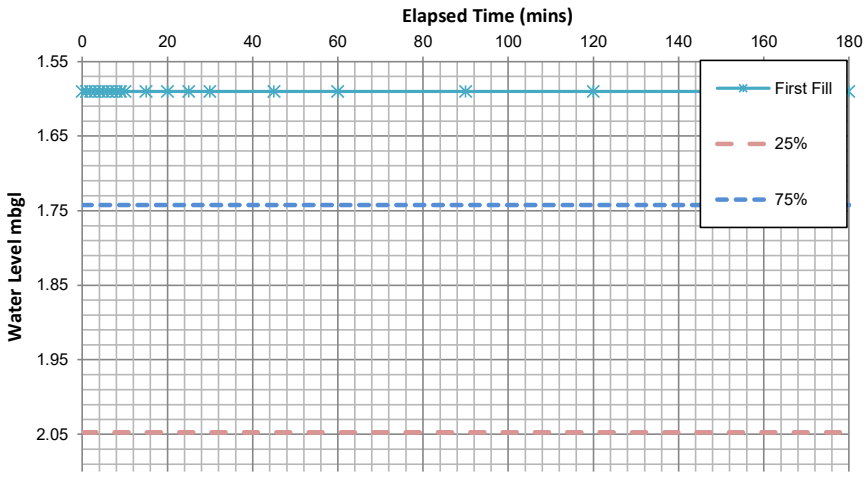
Soil Infiltration Rate = $\frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

where f = soil infiltration rate, Vp75-25 = volume outflowing between 75% and 25% effective depth (m3)
ap50 = mean surface area (pit sides to 50% effective depth + base) (m2),
tp75-25 = time for outflow between 75% and 25% effective depth (seconds)

Note:

Soil Infiltration Rate = - m/s

Test Zone Material: MADE GROUND: Dark grey sandy very gravelly clay with frequent extraneous material.



SA03 SOAKAWAY TEST RESULT

LandWise geo-environmental consultants

Project Name:	Jarguar Land Rover	Test Duration:	mins
Project No:	LW25-136	Length:	1.80 m
Client:	GBX Remediation	Width:	0.70 m
Date of Test:	19/01/2026	Depth of Pit at Start of Test:	1.94 m
		Depth of Pit at End of Test:	1.94 m
		Porosity of Infill:	100 % (100% if no infill)

First Fill

Time (mins)	Water Level (mBGL)
0	1.38
1	1.39
2	1.40
3	1.41
4	1.41
5	1.42
6	1.42
7	1.43
8	1.43
9	1.44
10	1.44
15	1.45
20	1.46
25	1.47
30	1.48
45	1.51
60	1.54
90	1.57
120	1.60
180	1.64

Test carried out to BRE Digest 365: 2016 - Soakaway Design

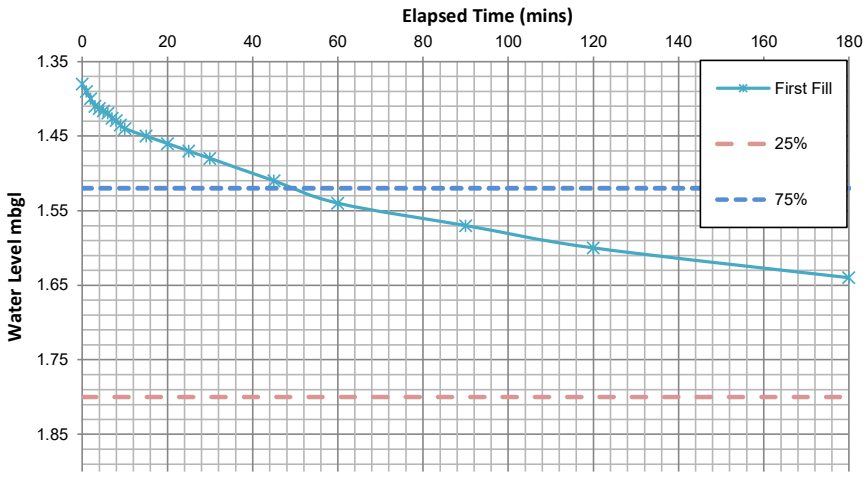
Soil Infiltration Rate = $\frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

where f = soil infiltration rate, Vp75-25 = volume outflowing between 75% and 25% effective depth (m3)
ap50 = mean surface area (pit sides to 50% effective depth + base) (m2),
tp75-25 = time for outflow between 75% and 25% effective depth (seconds)

Note:

Soil Infiltration Rate = - m/s

Test Zone Material: MADE GROUND: Brown very gravelly clay with occasional extraneous material.



SA04 — SOAKAWAY TEST RESULT

LandWise geo-environmental consultants

Project Name:	Jarguar Land Rover	Test Duration:	45	mins
Project No:	LW25-136	Length:	1.80	m
Client:	GBX Remediation	Width:	0.70	m
Date of Test:	19/01/2026	Depth of Pit at Start of Test:	2.10	m
		Depth of Pit at End of Test:	2.10	m
		Porosity of Infill:	100	% (100% if no infill)

First Fill	
Time (mins)	**Water Level (mBGL)**
0	1.72
1	1.73
2	1.75
3	1.77
4	1.79
5	1.82
6	1.85
7	1.87
8	1.89
9	1.90
10	1.91
15	1.97
20	2.01
25	2.05
30	2.09

Second Fill	
Time (mins)	**Water Level (mBGL)**
0	1.58
1	1.60
2	1.62
3	1.64
4	1.66
5	1.69
6	1.72
7	1.75
8	1.77
9	1.80
10	1.82
15	1.88
20	1.93
25	1.98
30	2.03
45	2.10

Test carried out to BRE Digest 365: 2016 - Soakaway Design

Soil Infiltration Rate = $\frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$

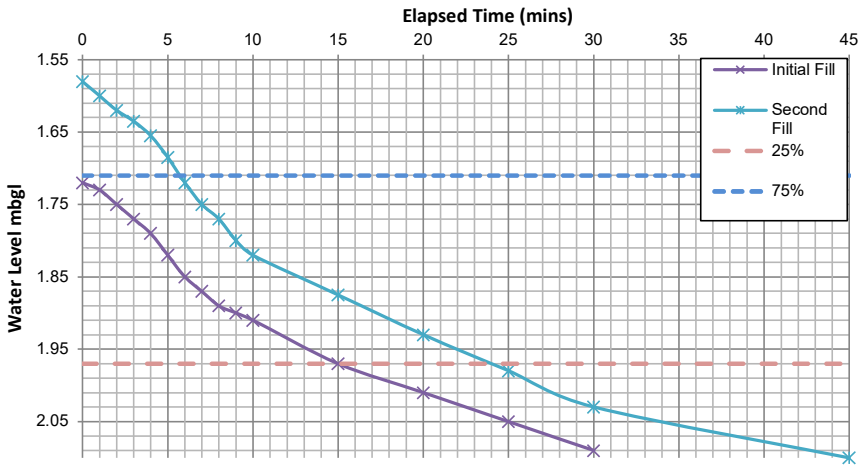
where f = soil infiltration rate, Vp75-25 = volume outflowing between 75% and 25% effective depth (m3)
ap50 = mean surface area (pit sides to 50% effective depth + base) (m2),
tp75-25 = time for outflow between 75% and 25% effective depth (seconds)

Note:

Soil Infiltration Rate = 1.18E-04 m/s

Test Zone Material:

MADE GROUND: Dark grey clayey gravelly fine to coarse sand with frequent extraneous material.



Appendix 04

Laboratory Chemical Test Certificates

Certificate of Analysis

Certificate Number	26-02041	*Issued:*	10-Feb-26
Client	Landwise Consulting Ltd 43 Buchanan Drive Cambuslang Glasgow G72 8BD		
Our Reference	26-02041		
Client Reference ~	LW25-136		
Order No ~	(not supplied)		
Contract Title ~	LW25-136 Jaguar Landrover, Halewood		
Description	39 Soil samples, 9 Leachate prepared by DETS samples.		
Date Received	29-Jan-26		
Date Started	29-Jan-26		
Date Completed	10-Feb-26		
Test Procedures	Identified by prefix DETSn (details on request).		
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.		

Approved By

Reyhan Irfan
Operations Manager

2139

Sample Deviations present. See Deviation Table Section for details.

Summary of Chemical Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

	Lab No	2633102	2633103	2633104	2633105	2633106	2633107
	Sample ID ~	BH01	BH02	BH03	BH04	BH05	BH06
	Depth ~	0.80	3.00	3.00	0.50	1.00	1.00
	Other ID ~						
	Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampling Date ~	21/01/2026	21/01/2026	20/01/2026	21/01/2026	21/01/2026	21/01/2026
	Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Asbestos Quantification (Gravimetric)	DETSC 1102	0.001	%						
Preparation									
Moisture Content	DETSC 1004	0.1	%	11	15	16	10	9.4	14
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	5.1	6.9	7.3	7.4	7.4	8.8
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	0.3	0.5	0.8	1.9	0.8	1.1
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	0.2	0.2	0.2	0.1	0.2
Chromium	DETSC 2301#	0.15	mg/kg	19	28	59	26	19	13
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	12	16	600	18	44	97
Lead	DETSC 2301#	0.3	mg/kg	5.2	26	72	47	220	1200
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	0.08	0.18	1.1	0.34
Nickel	DETSC 2301#	1	mg/kg	22	19	13	18	14	10
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	31	39	56	37	71	210
Inorganics									
pH	DETSC 2008#		pH	9.4	10.4	10.4	8.5	9.3	9.0
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%	< 0.5	0.6	1.3	3.6	1.6	2.0
Organic Matter (by calculation)	*	0.1	%	0.7	1.0	2.3	6.1	2.7	3.4
Sulphide	DETSC 2024*	10	mg/kg	16	36	68	24	40	< 10
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.03	0.06	0.10	0.23	0.10	0.43
Petroleum Hydrocarbons									
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	11	< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	12	< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	21	< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	32	< 1.4
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	76	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	76	< 10

Summary of Chemical Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

			Lab No	2633102	2633103	2633104	2633105	2633106	2633107
			Sample ID ~	BH01	BH02	BH03	BH04	BH05	BH06
			Depth ~	0.80	3.00	3.00	0.50	1.00	1.00
			Other ID ~						
			Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date ~	21/01/2026	21/01/2026	20/01/2026	21/01/2026	21/01/2026	21/01/2026
			Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	0.29	14	0.16
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.53	0.33	20	0.62
Fluorene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.31	0.25	26	0.50
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	1.1	1.2	140	3.3
Anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.50	0.45	25	0.83
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	1.1	1.4	82	3.7
Pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	1.1	1.3	91	3.5
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.25	0.47	34	1.0
Chrysene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.40	0.51	38	1.3
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.39	0.50	18	1.6
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.23	0.37	11	0.60
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.94	1.1	30	1.7
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.36	0.60	15	1.0
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.39	0.21	2.2	0.16
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.19	0.34	10	0.83
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	7.8	9.2	550	21
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	1.4	< 0.3

Summary of Chemical Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

			Lab No	2633108	2633109	2633110	2633111	2633112	2633113
			Sample ID ~	BH07	BH08	BH09	BH10	BH11	BH12
			Depth ~	3.00	0.50	2.00	3.00	0.50	2.00
			Other ID ~						
			Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date ~	21/01/2026	21/01/2026	21/01/2026	19/01/2026	19/01/2026	19/01/2026
			Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Asbestos Quantification (Gravimetric)	DETSC 1102	0.001	%			0.005	0.011		< 0.001
Preparation									
Moisture Content	DETSC 1004	0.1	%	14	9.8	19	15	8.0	15
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	17	5.2	18	45	9.1	11
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	1.7	0.5	1.4	1.7	0.8	2.4
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.1	0.3	1.7	0.2	0.3
Chromium	DETSC 2301#	0.15	mg/kg	48	32	52	80	11	24
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	40	16	42	58	20	25
Lead	DETSC 2301#	0.3	mg/kg	120	120	130	240	27	87
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	0.14	0.76	< 0.05	0.10
Nickel	DETSC 2301#	1	mg/kg	19	10	20	19	13	17
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	1.4	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	79	45	85	250	43	90
Inorganics									
pH	DETSC 2008#		pH	9.8	10.4	10.5	10.5	11.3	9.5
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.1	< 0.1	< 0.1	0.5	< 0.1	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%	2.0	1.9	1.2	2.3	1.1	1.5
Organic Matter (by calculation)	*	0.1	%	3.4	3.2	2.0	3.9	2.0	2.6
Sulphide	DETSC 2024*	10	mg/kg	80	48	72	140	32	76
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.21	0.17	0.22	0.40	0.46	0.21
Petroleum Hydrocarbons									
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	1.5	< 1.2
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	7.0	< 1.5
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	19	< 3.4
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	27	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	27	< 10

Summary of Chemical Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

			Lab No	2633108	2633109	2633110	2633111	2633112	2633113
			Sample ID ~	BH07	BH08	BH09	BH10	BH11	BH12
			Depth ~	3.00	0.50	2.00	3.00	0.50	2.00
			Other ID ~						
			Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date ~	21/01/2026	21/01/2026	21/01/2026	19/01/2026	19/01/2026	19/01/2026
			Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.77
Fluorene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.61
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.28	1.8
Anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.39	0.28
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.68	0.61
Pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.47	0.64
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.30	0.51
Chrysene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.22	0.54
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.31	0.28
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.18	0.15
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.61	0.11
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.27	0.26
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.13	0.14
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.15	0.17
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	< 1.6	< 1.6	4.0	6.8
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.4	< 0.3	< 0.3	0.9	0.7	0.4

Summary of Chemical Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

			Lab No	2633114	2633115	2633116	2633117	2633118	2633119
			Sample ID ~	BH13	BH14	BH15	BH16	BH18	BH19
			Depth ~	0.80	0.50	3.00	0.50	0.80	0.50
			Other ID ~						
			Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date ~	19/01/2026	19/01/2026	19/01/2026	20/01/2026	20/01/2026	21/01/2026
			Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Asbestos Quantification (Gravimetric)	DETSC 1102	0.001	%						
Preparation									
Moisture Content	DETSC 1004	0.1	%	8.5	8.6	8.8	11	13	14
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	4.1	6.1	7.4	9.8	17	6.7
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	0.8	0.8	1.0	1.2	1.6	2.0
Cadmium	DETSC 2301#	0.1	mg/kg	0.1	0.5	0.5	0.4	0.4	0.2
Chromium	DETSC 2301#	0.15	mg/kg	7.8	26	41	48	69	58
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	12	20	24	32	86	9.7
Lead	DETSC 2301#	0.3	mg/kg	14	32	36	41	76	28
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	0.06	0.37	< 0.05
Nickel	DETSC 2301#	1	mg/kg	7.7	15	18	19	16	6.2
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	0.7	< 0.5
Zinc	DETSC 2301#	1	mg/kg	31	59	63	77	120	53
Inorganics									
pH	DETSC 2008#		pH	11.2	10.3	10.2	10.3	10.6	11.5
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.3
Total Organic Carbon	DETSC 2084#	0.5	%	1.0	2.4	2.2	1.6	1.7	1.6
Organic Matter (by calculation)	*	0.1	%	1.7	4.2	3.7	2.8	2.9	2.8
Sulphide	DETSC 2024*	10	mg/kg	52	100	150	64	130	76
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.23	0.22	0.18	0.14	0.18	0.23
Petroleum Hydrocarbons									
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	7.8	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	22	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	9.8	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg	< 3.4	14	98	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	< 10	14	140	< 10	< 10	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	14	< 0.9	< 0.9	< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	27	< 0.5	< 0.5	< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	29	< 0.6	< 0.6	< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	190	< 1.4	< 1.4	< 1.4
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10	< 10	260	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10	14	400	< 10	< 10	< 10

Summary of Chemical Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

			Lab No	2633114	2633115	2633116	2633117	2633118	2633119
			Sample ID ~	BH13	BH14	BH15	BH16	BH18	BH19
			Depth ~	0.80	0.50	3.00	0.50	0.80	0.50
			Other ID ~						
			Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date ~	19/01/2026	19/01/2026	19/01/2026	20/01/2026	20/01/2026	21/01/2026
			Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.14	< 0.10
Fluorene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.47	< 0.10
Anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.39	< 0.10
Pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.54	< 0.10
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.24	< 0.10
Chrysene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.49	< 0.10
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.27	< 0.10
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.11	< 0.10
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.18	< 0.10
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.24	< 0.10
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.22	< 0.10
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.22	< 0.10
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	< 1.6	< 1.6	3.4	< 1.6
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.4	< 0.3	< 0.3	< 0.3	0.6	< 0.3

Summary of Chemical Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

				Lab No	2633120	2633121	2633122	2633123	2633124	2633125
				Sample ID ~	BH20	BH21	BH22	BH23	BH24	BH25
				Depth ~	1.00	0.80	2.50	1.00	0.80	0.80
				Other ID ~						
				Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sampling Date ~	21/01/2026	21/01/2026	21/01/2026	21/01/2026	21/01/2026	21/01/2026
				Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Asbestos Quantification (Gravimetric)	DETSC 1102	0.001	%						< 0.001	
Preparation										
Moisture Content	DETSC 1004	0.1	%	15	10	12	16	13	13
Metals										
Arsenic	DETSC 2301#	0.2	mg/kg	7.7	14	6.1	7.0	8.8	6.4
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	0.8	1.2	0.4	1.0	1.5	1.1
Cadmium	DETSC 2301#	0.1	mg/kg	0.1	0.2	< 0.1	< 0.1	0.2	0.2
Chromium	DETSC 2301#	0.15	mg/kg	26	32	17	11	6.5	230
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	21	26	11	19	62	17
Lead	DETSC 2301#	0.3	mg/kg	19	43	5.7	50	290	21
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.07	< 0.05	0.06	0.28	< 0.05
Nickel	DETSC 2301#	1	mg/kg	21	20	21	11	8.3	10
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.0
Zinc	DETSC 2301#	1	mg/kg	64	64	30	34	100	51
Inorganics										
pH	DETSC 2008#		pH	9.9	10.2	9.0	7.8	8.5	11.3
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.1	< 0.1	0.1
Total Organic Carbon	DETSC 2084#	0.5	%	0.8	0.8	< 0.5	2.4	3.5	2.0
Organic Matter (by calculation)	*	0.1	%	1.4	1.3	0.8	4.2	6.0	3.5
Sulphide	DETSC 2024*	10	mg/kg	68	80	40	< 10	44	68
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.10	0.12	0.05	0.05	0.11	0.33
Petroleum Hydrocarbons										
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10

Summary of Chemical Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

			Lab No	2633120	2633121	2633122	2633123	2633124	2633125
			Sample ID ~	BH20	BH21	BH22	BH23	BH24	BH25
			Depth ~	1.00	0.80	2.50	1.00	0.80	0.80
			Other ID ~						
			Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date ~	21/01/2026	21/01/2026	21/01/2026	21/01/2026	21/01/2026	21/01/2026
			Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.24	0.38
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.51
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.49	0.46
Fluorene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.94
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	2.4	10
Anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.89	< 0.10
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	3.6	8.6
Pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	4.0	7.5
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	1.6	3.0
Chrysene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	1.3	2.8
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	1.1	1.9
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.67	1.5
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	2.1	3.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.95	1.9
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.18	0.30
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.71	1.3
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	< 1.6	< 1.6	20	45
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	0.4	0.5	< 0.3

Summary of Chemical Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

				Lab No	2633126	2633127	2633128	2633129	2633130	2633131
				Sample ID ~	TP01	TP02	TP03	TP04	TP05	TP06
				Depth ~	0.50	0.50	0.50	0.40	0.50	0.80
				Other ID ~						
				Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Sampling Date ~	20/01/2026	20/01/2026	20/01/2026	21/01/2026	21/01/2026	20/01/2026
				Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Asbestos Quantification (Gravimetric)	DETSC 1102	0.001	%	0.002			< 0.001		
Preparation										
Moisture Content	DETSC 1004	0.1	%	11	12	7.0	9.8	12	10
Metals										
Arsenic	DETSC 2301#	0.2	mg/kg	7.7	7.4	5.6	7.1	14	8.6
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	1.2	0.7	1.2	0.9	0.8	0.9
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.1	0.2	0.2	0.5	0.3
Chromium	DETSC 2301#	0.15	mg/kg	22	34	18	45	35	72
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	27	22	22	46	39	25
Lead	DETSC 2301#	0.3	mg/kg	130	29	25	75	100	62
Mercury	DETSC 2325#	0.05	mg/kg	0.13	0.07	< 0.05	0.29	0.17	0.08
Nickel	DETSC 2301#	1	mg/kg	16	15	16	16	22	20
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	0.9	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	72	37	53	55	140	87
Inorganics										
pH	DETSC 2008#		pH	8.4	8.9	9.8	9.8	8.6	10.2
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.9	0.2	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%	2.1	2.1	1.0	0.8	1.5	1.3
Organic Matter (by calculation)	*	0.1	%	3.7	3.7	1.8	1.4	2.6	2.3
Sulphide	DETSC 2024*	10	mg/kg	44	28	52	36	60	76
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.13	0.05	0.12	0.08	0.15	0.31
Petroleum Hydrocarbons										
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	2.4
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	1.5	7.1
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	23	9.7
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	190	30
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	210	49
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	4.5
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	10
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	3.0	25
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	49	48
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	52	88
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	260	140

Summary of Chemical Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

			Lab No	2633126	2633127	2633128	2633129	2633130	2633131
			Sample ID ~	TP01	TP02	TP03	TP04	TP05	TP06
			Depth ~	0.50	0.50	0.50	0.40	0.50	0.80
			Other ID ~						
			Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date ~	20/01/2026	20/01/2026	20/01/2026	21/01/2026	21/01/2026	20/01/2026
			Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	0.37	< 0.10	0.20
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	0.79	0.53	0.53
Fluorene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	0.78	1.0	0.57
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	3.2	1.3	1.2
Anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	0.54	0.85	0.27
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	2.3	9.8	1.5
Pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	2.6	9.4	1.6
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	0.97	< 0.10	0.54
Chrysene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	1.6	< 0.10	1.0
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	0.83	< 0.10	0.63
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	0.36	< 0.10	0.26
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	1.2	< 0.10	0.66
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	0.84	< 0.10	0.64
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	0.21	< 0.10	0.17
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	0.67	< 0.10	0.54
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	< 1.6	17	23	10
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Summary of Chemical Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

			Lab No	2633132	2633133	2633134	2633135	2633136	2633137
			Sample ID ~	TP07	TP08	TP09	TP10	TP11	TP12
			Depth ~	0.20	1.00	0.80	0.50	0.20	0.60
			Other ID ~						
			Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date ~	21/01/2026	21/01/2026	21/01/2026	21/01/2026	21/01/2026	21/01/2026
			Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Asbestos Quantification (Gravimetric)	DETSC 1102	0.001	%						< 0.001
Preparation									
Moisture Content	DETSC 1004	0.1	%	11	12	9.0	14	10	14
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	4.2	8.1	3.3	7.0	1.3	10
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	1.3	0.8	1.4	1.0	1.4	0.8
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	0.4	< 0.1	0.5	< 0.1	0.7
Chromium	DETSC 2301#	0.15	mg/kg	6.1	390	16	52	3.2	63
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	14	36	7.2	27	3.4	70
Lead	DETSC 2301#	0.3	mg/kg	12	54	6.0	77	3.6	140
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.11
Nickel	DETSC 2301#	1	mg/kg	6.8	14	9.3	15	1.9	23
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	2.7	0.7	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	24	93	18	96	13	350
Inorganics									
pH	DETSC 2008#		pH	10.6	11.6	10.8	10.6	11.8	9.2
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	1.0	0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%	0.7	2.5	< 0.5	1.7	0.8	5.0
Organic Matter (by calculation)	*	0.1	%	1.2	4.2	0.8	2.9	1.3	8.7
Sulphide	DETSC 2024*	10	mg/kg	40	32	60	36	12	60
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.58	0.49	0.68	0.26	0.35	0.14
Petroleum Hydrocarbons									
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	2.4	< 1.2	1.8
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	12	< 1.5	7.5
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	51	< 3.4	21
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	64	< 10	30
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	< 0.9	3.2	< 0.9	7.9	< 0.9	< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	< 0.5	4.6	< 0.5	14	< 0.5	< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	< 0.6	13	< 0.6	28	< 0.6	< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	< 1.4	18	< 1.4	120	< 1.4	< 1.4
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10	38	< 10	170	< 10	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10	38	< 10	230	< 10	30

Summary of Chemical Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

			Lab No	2633132	2633133	2633134	2633135	2633136	2633137
			Sample ID ~	TP07	TP08	TP09	TP10	TP11	TP12
			Depth ~	0.20	1.00	0.80	0.50	0.20	0.60
			Other ID ~						
			Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date ~	21/01/2026	21/01/2026	21/01/2026	21/01/2026	21/01/2026	21/01/2026
			Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.10	0.48	< 0.10	< 0.10	< 0.10	0.10
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.10	0.18	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.10	0.40	0.51	0.22	< 0.10	0.42
Fluorene	DETSC 3301	0.1	mg/kg	< 0.10	0.45	< 0.10	0.23	< 0.10	0.31
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.10	2.4	2.8	0.66	< 0.10	2.3
Anthracene	DETSC 3301	0.1	mg/kg	< 0.10	0.47	1.1	0.57	< 0.10	1.0
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	2.0	3.5	1.3	< 0.10	7.1
Pyrene	DETSC 3301	0.1	mg/kg	< 0.10	1.8	2.7	1.2	< 0.10	7.9
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	1.2	0.49	0.55	< 0.10	2.7
Chrysene	DETSC 3301	0.1	mg/kg	< 0.10	1.6	0.84	0.67	< 0.10	2.9
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	1.1	0.87	0.44	< 0.10	2.6
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	0.60	0.47	0.38	< 0.10	1.5
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	1.1	1.4	1.1	< 0.10	4.2
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	1.0	0.53	0.42	< 0.10	2.4
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	0.18	0.10	< 0.10	0.22
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.10	0.89	0.45	0.26	< 0.10	1.8
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	16	16	7.9	< 1.6	37
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Summary of Chemical Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

			Lab No	2633138	2633139	2633140
			Sample ID ~	TP13	TP14	TP15
			Depth ~	2.20	1.20	1.00
			Other ID ~			
			Sample Type ~	SOIL	SOIL	SOIL
			Sampling Date ~	21/01/2026	21/01/2026	21/01/2026
			Sampling Time ~	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Asbestos Quantification (Gravimetric)	DETSC 1102	0.001	%	< 0.001	0.002	
Preparation						
Moisture Content	DETSC 1004	0.1	%	12	12	14
Metals						
Arsenic	DETSC 2301#	0.2	mg/kg	4.9	6.4	6.0
Boron, Water Soluble (2.5:1)	DETSC 2311#	0.2	mg/kg	0.9	0.7	0.4
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.3	0.2
Chromium	DETSC 2301#	0.15	mg/kg	16	36	18
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	17	31	25
Lead	DETSC 2301#	0.3	mg/kg	53	35	23
Mercury	DETSC 2325#	0.05	mg/kg	0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	12	21	19
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	52	100	53
Inorganics						
pH	DETSC 2008#		pH	10.0	10.1	8.9
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.3	< 0.1	< 0.1
Total Organic Carbon	DETSC 2084#	0.5	%	1.6	1.8	0.9
Organic Matter (by calculation)	*	0.1	%	2.7	3.1	1.6
Sulphide	DETSC 2024*	10	mg/kg	40	76	< 10
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.09	0.15	0.13
Petroleum Hydrocarbons						
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg	1.8	< 1.2	< 1.2
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	3.8	< 1.5	< 1.5
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg	19	< 3.4	< 3.4
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	25	< 10	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	4.1	< 0.9	< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	10	< 0.5	< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	21	< 0.6	< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	44	< 1.4	< 1.4
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	79	< 10	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	100	< 10	< 10

Summary of Chemical Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

			Lab No	2633138	2633139	2633140
			Sample ID ~	TP13	TP14	TP15
			Depth ~	2.20	1.20	1.00
			Other ID ~			
			Sample Type ~	SOIL	SOIL	SOIL
			Sampling Date ~	21/01/2026	21/01/2026	21/01/2026
			Sampling Time ~	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
PAHs						
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Acenaphthene	DETSC 3301	0.1	mg/kg	0.99	< 0.10	< 0.10
Fluorene	DETSC 3301	0.1	mg/kg	1.2	< 0.10	< 0.10
Phenanthrene	DETSC 3301	0.1	mg/kg	3.2	< 0.10	< 0.10
Anthracene	DETSC 3301	0.1	mg/kg	0.68	< 0.10	< 0.10
Fluoranthene	DETSC 3301	0.1	mg/kg	2.7	< 0.10	< 0.10
Pyrene	DETSC 3301	0.1	mg/kg	2.1	< 0.10	< 0.10
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	0.90	< 0.10	< 0.10
Chrysene	DETSC 3301	0.1	mg/kg	1.6	< 0.10	< 0.10
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	0.78	< 0.10	< 0.10
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.39	< 0.10	< 0.10
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	0.88	< 0.10	< 0.10
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	0.65	< 0.10	< 0.10
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.17	< 0.10	< 0.10
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	0.54	< 0.10	< 0.10
PAH 16 Total	DETSC 3301	1.6	mg/kg	17	< 1.6	< 1.6
Phenols						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	0.4

Summary of Chemical Analysis
Leachate Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

				Lab No	2633141	2633142	2633143	2633144	2633145	2633146	2633147
				Sample ID ~	BH03	BH04	BH09	BH12	BH14	TP01	TP11
				Depth ~	3.00	0.50	2.00	2.00	0.50	0.50	0.20
				Other ID ~							
				Sample Type ~	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE	LEACHATE
				Sampling Date ~	20/01/2026	21/01/2026	21/01/2026	19/01/2026	19/01/2026	20/01/2026	21/01/2026
				Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**								
Preparation											
Leachate 2:1 250g Non-WAC	DETSC 1009*			Y	Y	Y	Y	Y	Y	Y
Metals											
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	3.68	0.59	9.93	4.10	3.26	2.27	9.21
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.04	< 0.03	0.09	0.07	0.06	< 0.03	0.09
Calcium, Dissolved	DETSC 2306	0.09	mg/l	11	15	7.7	10	10	12	11
Chromium, Dissolved	DETSC 2306	0.25	ug/l	11.03	0.76	12.03	8.17	5.27	4.84	16.50
Copper, Dissolved	DETSC 2306	0.4	ug/l	8.84	2.11	10.08	6.63	5.04	5.32	12.46
Lead, Dissolved	DETSC 2306	0.09	ug/l	34.48	3.20	36.05	19.29	13.00	19.65	23.84
Magnesium, Dissolved	DETSC 2306	0.02	mg/l	1.9	0.81	2.8	2.1	1.0	1.9	3.1
Mercury, Dissolved (Low Level)	DETSC 2324	0.001	ug/l	< 0.0010	0.0066	0.0023	0.0056	0.0034	0.0060	0.0036
Nickel, Dissolved	DETSC 2306	0.5	ug/l	7.17	< 0.50	8.63	5.29	3.53	3.04	11.30
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.56	0.35	1.36	0.78	0.55	0.38	0.94
Zinc, Dissolved	DETSC 2306	1.3	ug/l	24.17	2.39	33.75	25.34	21.70	16.08	51.00
Inorganics										
Total Hardness as CaCO3	DETSC 2303	0.1	mg/l	35.1	41.3	30.6	34.3	30.1	39.1	41.3
Sulphate as SO4	DETSC 2055	0.1	mg/l	6.3	20	3.7	13	7.4	26	4.8
Sulphide	DETSC 2208	10	ug/l	< 10	< 10	61	39	20	24	78
Phenols										
Total Phenol	DETSC 3451*	0.5	ug/l	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Summary of Chemical Analysis
Leachate Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

			Lab No	2633148	2633149
			Sample ID ~	TP12	TP13
			Depth ~	0.60	2.20
			Other ID ~		
			Sample Type ~	LEACHATE	LEACHATE
			Sampling Date ~	21/01/2026	21/01/2026
			Sampling Time ~	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Preparation					
Leachate 2:1 250g Non-WAC	DETSC 1009*			Y	Y
Metals					
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	2.71	1.85
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.07	< 0.03
Calcium, Dissolved	DETSC 2306	0.09	mg/l	8.3	8.7
Chromium, Dissolved	DETSC 2306	0.25	ug/l	5.55	4.27
Copper, Dissolved	DETSC 2306	0.4	ug/l	9.90	5.49
Lead, Dissolved	DETSC 2306	0.09	ug/l	26.82	8.85
Magnesium, Dissolved	DETSC 2306	0.02	mg/l	1.0	1.1
Mercury, Dissolved (Low Level)	DETSC 2324	0.001	ug/l	0.0083	0.0051
Nickel, Dissolved	DETSC 2306	0.5	ug/l	4.79	2.89
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.35	< 0.25
Zinc, Dissolved	DETSC 2306	1.3	ug/l	111.6	22.04
Inorganics					
Total Hardness as CaCO3	DETSC 2303	0.1	mg/l	24.9	26.0
Sulphate as SO4	DETSC 2055	0.1	mg/l	8.7	7.9
Sulphide	DETSC 2208	10	ug/l	26	29
Phenols					
Total Phenol	DETSC 3451*	0.5	ug/l	< 0.50	< 0.50

Summary of Asbestos Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2633102	BH01 0.80	SOIL	NAD	none	Steven Lambert
2633103	BH02 3.00	SOIL	NAD	none	Steven Lambert
2633104	BH03 3.00	SOIL	NAD	none	Steven Lambert
2633105	BH04 0.50	SOIL	NAD	none	Steven Lambert
2633106	BH05 1.00	SOIL	NAD	none	Steven Lambert
2633107	BH06 1.00	SOIL	NAD	none	Steven Lambert
2633108	BH07 3.00	SOIL	NAD	none	Steven Lambert
2633109	BH08 0.50	SOIL	NAD	none	Steven Lambert
2633110	BH09 2.00	SOIL	Chrysotile	Chrysotile present in microscopic insulation	Steven Lambert
2633111	BH10 3.00	SOIL	Chrysotile Amosite	Chrysotile & Amosite present in microscopic insulation	Steven Lambert
2633112	BH11 0.50	SOIL	NAD	none	Steven Lambert
2633113	BH12 2.00	SOIL	Chrysotile	Chrysotile present as fibre bundles	Steven Lambert
2633114	BH13 0.80	SOIL	NAD	none	Steven Lambert
2633115	BH14 0.50	SOIL	NAD	none	Steven Lambert
2633116	BH15 3.00	SOIL	NAD	none	Steven Lambert
2633117	BH16 0.50	SOIL	NAD	none	Steven Lambert
2633118	BH18 0.80	SOIL	NAD	none	Steven Lambert
2633119	BH19 0.50	SOIL	NAD	none	Steven Lambert
2633120	BH20 1.00	SOIL	NAD	none	Steven Lambert
2633121	BH21 0.80	SOIL	NAD	none	Steven Lambert
2633122	BH22 2.50	SOIL	NAD	none	Steven Lambert
2633123	BH23 1.00	SOIL	NAD	none	Steven Lambert
2633124	BH24 0.80	SOIL	Chrysotile	Chrysotile present as fibre bundles	Steven Lambert
2633125	BH25 0.80	SOIL	NAD	none	Steven Lambert
2633126	TP01 0.50	SOIL	Amosite Chrysotile	Amosite & Chrysotile present as fibre bundles	Steven Lambert
2633127	TP02 0.50	SOIL	NAD	none	Steven Lambert
2633128	TP03 0.50	SOIL	NAD	none	Steven Lambert
2633129	TP04 0.40	SOIL	Amosite	Amosite present as fibre bundles	Steven Lambert
2633130	TP05 0.50	SOIL	NAD	none	Steven Lambert
2633131	TP06 0.80	SOIL	NAD	none	Steven Lambert
2633132	TP07 0.20	SOIL	NAD	none	Steven Lambert
2633133	TP08 1.00	SOIL	NAD	none	Steven Lambert
2633134	TP09 0.80	SOIL	NAD	none	Steven Lambert
2633135	TP10 0.50	SOIL	NAD	none	Steven Lambert
2633136	TP11 0.20	SOIL	NAD	none	Steven Lambert
2633137	TP12 0.60	SOIL	Amosite	Amosite present as fibre bundles	Steven Lambert
2633138	TP13 2.20	SOIL	Amosite	Amosite present as fibre bundles	Steven Lambert
2633139	TP14 1.20	SOIL	Chrysotile	Chrysotile present in microscopic bitumen	Steven Lambert
2633140	TP15 1.00	SOIL	NAD	none	Steven Lambert

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples

Summary of Asbestos Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

Lab No	Sample ID	Material Type	Result	Comment*	Analyst

are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Summary of Asbestos Quantification Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

			Lab No	2633110	2633111	2633113
			Sample ID ~	BH09	BH10	BH12
			Depth ~	2.00	3.00	2.00
			Other ID ~			
			Sample Type ~			
			Sampling Date ~	21/01/2026	19/01/2026	19/01/2026
			Sampling Time ~			
Test	**Method**	**LOQ**	**Units**			
Total Mass% Asbestos (a+b+c)	DETSC 1102	< 0.001	Mass %	**0.005**	**0.011**	**< 0.001**
Gravimetric Quantification (a)	DETSC 1102	< 0.001	Mass %	0.005	0.011	na
Detailed Gravimetric Quantification (b)	DETSC 1102	< 0.001	Mass %	na	na	<0.001
Quantification by PCOM (c)	DETSC 1102	< 0.001	Mass %	na	na	na
Potentially Respirable Fibres (d)	DETSC 1102	< 0.001	Fibres/g	na	na	na
Breakdown of Gravimetric Analysis (a)						
Mass of Sample			g	28.48	391.39	273.59
ACMs present*			type	Insulation	Insulation	
Mass of ACM in sample			g	0.0018	0.0520	
% ACM by mass			%	0.006	0.013	
% asbestos in ACM			%	85	85	
% asbestos in sample			%	0.005	0.011	
Breakdown of Detailed Gravimetric Analysis (b)						
% Amphibole bundles in sample			Mass %	na	na	na
% Chrysotile bundles in sample			Mass %	na	na	<0.001
Breakdown of PCOM Analysis (c)						
% Amphibole fibres in sample			Mass %	na	na	na
% Chrysotile fibres in sample			Mass %	na	na	na
Breakdown of Potentially Respirable Fibre Analysis (d)						
Amphibole fibres			Fibres/g	na	na	na
Chrysotile fibres			Fibres/g	na	na	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by
by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
denotes deviating sample
The results are based on dry weight.

Summary of Asbestos Quantification Analysis

Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

			Lab No	2633124	2633126	2633129
			Sample ID ~	BH24	TP01	TP04
			Depth ~	0.80	0.50	0.40
			Other ID ~			
			Sample Type ~			
			Sampling Date ~	21/01/2026	20/01/2026	21/01/2026
			Sampling Time ~			
Test	**Method**	**LOQ**	**Units**			
Total Mass% Asbestos (a+b+c)	DETSC 1102	< 0.001	Mass %	**< 0.001**	**0.002**	**< 0.001**
Gravimetric Quantification (a)	DETSC 1102	< 0.001	Mass %	na	na	na
Detailed Gravimetric Quantification (b)	DETSC 1102	< 0.001	Mass %	<0.001	0.002	<0.001
Quantification by PCOM (c)	DETSC 1102	< 0.001	Mass %	na	na	na
Potentially Respirable Fibres (d)	DETSC 1102	< 0.001	Fibres/g	na	na	na
Breakdown of Gravimetric Analysis (a)						
Mass of Sample			g	85.74	589.82	638.69
ACMs present*			type			
Mass of ACM in sample			g			
% ACM by mass			%			
% asbestos in ACM			%			
% asbestos in sample			%			
Breakdown of Detailed Gravimetric Analysis (b)						
% Amphibole bundles in sample			Mass %	na	<0.001	<0.001
% Chrysotile bundles in sample			Mass %	<0.001	0.001	na
Breakdown of PCOM Analysis (c)						
% Amphibole fibres in sample			Mass %	na	na	na
% Chrysotile fibres in sample			Mass %	na	na	na
Breakdown of Potentially Respirable Fibre Analysis (d)						
Amphibole fibres			Fibres/g	na	na	na
Chrysotile fibres			Fibres/g	na	na	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by
by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
denotes deviating sample
The results are based on dry weight.

Summary of Asbestos Quantification Analysis
Soil Samples

Our Ref 26-02041
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood

Lab No	2633137	2633138	2633139
Sample ID ~	TP12	TP13	TP14
Depth ~	0.60	2.20	1.20
Other ID ~			
Sample Type ~			
Sampling Date ~	21/01/2026	21/01/2026	21/01/2026
Sampling Time ~			

Test	Method	LOQ	Units			
Total Mass% Asbestos (a+b+c)	DETSC 1102	< 0.001	Mass %	**< 0.001**	**< 0.001**	**0.002**
Gravimetric Quantification (a)	DETSC 1102	< 0.001	Mass %	na	na	0.002
Detailed Gravimetric Quantification (b)	DETSC 1102	< 0.001	Mass %	<0.001	<0.001	na
Quantification by PCOM (c)	DETSC 1102	< 0.001	Mass %	na	na	na
Potentially Respirable Fibres (d)	DETSC 1102	< 0.001	Fibres/g	na	na	na
Breakdown of Gravimetric Analysis (a)						
Mass of Sample			g	659.82	759.89	663.65
ACMs present*			type			Bitumen
Mass of ACM in sample			g			0.1798
% ACM by mass			%			0.027
% asbestos in ACM			%			8
% asbestos in sample			%			0.002
Breakdown of Detailed Gravimetric Analysis (b)						
% Amphibole bundles in sample			Mass %	<0.001	<0.001	na
% Chrysotile bundles in sample			Mass %	na	na	na
Breakdown of PCOM Analysis (c)						
% Amphibole fibres in sample			Mass %	na	na	na
% Chrysotile fibres in sample			Mass %	na	na	na
Breakdown of Potentially Respirable Fibre Analysis (d)						
Amphibole fibres			Fibres/g	na	na	na
Chrysotile fibres			Fibres/g	na	na	na

* Denotes test or material description outside of UKAS accreditation.
% asbestos in Asbestos Containing Materials (ACMs) is determined by
by reference to HSG 264.
Recommended sample size for quantification is approximately 1kg
denotes deviating sample
The results are based on dry weight.

Information in Support of the Analytical Results

Our Ref 26-02041
Client Ref ~ LW25-136
Contract ~ LW25-136 Jaguar Landrover, Halewood

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests	Headspace in container for tests
2633102	BH01 0.80 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633103	BH02 3.00 SOIL	21/01/26	GJ 250ml ((Headspace)), GJ 60ml ((Headspace)), PT 1L ((Headspace))	pH + Conductivity (7 days)		BTEX/C5-10, HS
2633104	BH03 3.00 SOIL	20/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633105	BH04 0.50 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633106	BH05 1.00 SOIL	21/01/26	GJ 250ml ((Headspace)), GJ 60ml ((Headspace)), PT 1L ((Headspace))	pH + Conductivity (7 days)		BTEX/C5-10, HS
2633107	BH06 1.00 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633108	BH07 3.00 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633109	BH08 0.50 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633110	BH09 2.00 SOIL	21/01/26	GJ 250ml ((Headspace)), GJ 60ml ((Headspace)), PT 1L ((Headspace))	pH + Conductivity (7 days)		BTEX/C5-10, HS
2633111	BH10 3.00 SOIL	19/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633112	BH11 0.50 SOIL	19/01/26	GJ 250ml ((Headspace)), GJ 60ml ((Headspace))	pH + Conductivity (7 days)		BTEX/C5-10, HS
2633113	BH12 2.00 SOIL	19/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633114	BH13 0.80 SOIL	19/01/26	GJ 250ml ((Headspace)), GJ 60ml ((Headspace)), PT 1L ((Headspace))	pH + Conductivity (7 days)		BTEX/C5-10, HS
2633115	BH14 0.50 SOIL	19/01/26	GJ 250ml ((Headspace)), GJ 60ml ((Headspace)), PT 1L ((Headspace))	pH + Conductivity (7 days)		BTEX/C5-10, HS
2633116	BH15 3.00 SOIL	19/01/26	GJ 250ml ((Headspace)), GJ 60ml ((Headspace)), PT 1L ((Headspace))	pH + Conductivity (7 days)		BTEX/C5-10, HS
2633117	BH16 0.50 SOIL	20/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633118	BH18 0.80 SOIL	20/01/26	GJ 250ml ((Headspace)), GJ 60ml ((Headspace)), PT 1L ((Headspace))	pH + Conductivity (7 days)		BTEX/C5-10, HS
2633119	BH19 0.50 SOIL	21/01/26	GJ 250ml ((Headspace)), GJ 60ml ((Headspace)), PT 1L ((Headspace))	pH + Conductivity (7 days)		BTEX/C5-10, HS
2633120	BH20 1.00 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		

Information in Support of the Analytical Results

Our Ref 26-02041
Client Ref ~ LW25-136
Contract ~ LW25-136 Jaguar Landrover, Halewood

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests	Headspace in container for tests
2633121	BH21 0.80 SOIL	21/01/26	GJ 250ml ((Headspace)), GJ 60ml ((Headspace)), PT 1L ((Headspace))	pH + Conductivity (7 days)		BTEX/C5-10, HS
2633122	BH22 2.50 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633123	BH23 1.00 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633124	BH24 0.80 SOIL	21/01/26	GJ 250ml ((Headspace)), GJ 60ml ((Headspace)), PT 1L ((Headspace))	pH + Conductivity (7 days)		BTEX/C5-10, HS
2633125	BH25 0.80 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633126	TP01 0.50 SOIL	20/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633127	TP02 0.50 SOIL	20/01/26	GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633128	TP03 0.50 SOIL	20/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633129	TP04 0.40 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633130	TP05 0.50 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633131	TP06 0.80 SOIL	20/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633132	TP07 0.20 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633133	TP08 1.00 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633134	TP09 0.80 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633135	TP10 0.50 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633136	TP11 0.20 SOIL	21/01/26	GJ 250ml ((Headspace)), GJ 60ml ((Headspace)), PT 1L ((Headspace))	pH + Conductivity (7 days)		BTEX/C5-10, HS
2633137	TP12 0.60 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633138	TP13 2.20 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633139	TP14 1.20 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633140	TP15 1.00 SOIL	21/01/26	GJ 250ml, GJ 60ml, PT 1L	pH + Conductivity (7 days)		
2633141	BH03 3.00 LEACHATE	20/01/26	GJ 250ml, GJ 60ml, PT 1L	Hardness (7 days), Kone (Sulphide) (7 days)		
2633142	BH04 0.50 LEACHATE	21/01/26	GJ 250ml, GJ 60ml, PT 1L	Hardness (7 days), Kone (Sulphide) (7 days)		
2633143	BH09 2.00 LEACHATE	21/01/26	GJ 250ml, GJ 60ml, PT 1L	Hardness (7 days), Kone (Sulphide) (7 days)		
2633144	BH12 2.00 LEACHATE	19/01/26	GJ 250ml, GJ 60ml, PT 1L	Hardness (7 days), Kone (Sulphide) (7 days)		
2633145	BH14 0.50 LEACHATE	19/01/26	GJ 250ml, GJ 60ml, PT 1L	Hardness (7 days), Kone (Sulphide) (7 days)		

Information in Support of the Analytical Results

Our Ref 26-02041
Client Ref ~ LW25-136
Contract ~ LW25-136 Jaguar Landrover, Halewood

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests	Headspace in container for tests
2633146	TP01 0.50 LEACHATE	20/01/26	GJ 250ml, GJ 60ml, PT 1L	Hardness (7 days), Kone (Sulphide) (7 days)		
2633147	TP11 0.20 LEACHATE	21/01/26	GJ 250ml, GJ 60ml, PT 1L	Hardness (7 days), Kone (Sulphide) (7 days)		
2633148	TP12 0.60 LEACHATE	21/01/26	GJ 250ml, GJ 60ml, PT 1L	Hardness (7 days), Kone (Sulphide) (7 days)		
2633149	TP13 2.20 LEACHATE	21/01/26	GJ 250ml, GJ 60ml, PT 1L	Hardness (7 days), Kone (Sulphide) (7 days)		

Key: G-Glass P-Plastic J-Jar T-Tub

Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det	Acronym
Aliphatic C5-C6	HS_1D_AL
Aliphatic C6-C8	HS_1D_AL
Aliphatic C8-C10	HS_1D_AL
Aliphatic C10-C12	EH_CU_1D_AL
Aliphatic C12-C16	EH_CU_1D_AL
Aliphatic C16-C21	EH_CU_1D_AL
Aliphatic C21-C35	EH_CU_1D_AL
Aliphatic C5-C35	EH_CU+HS_1D_AL
Aromatic C5-C7	HS_1D_AR
Aromatic C7-C8	HS_1D_AR
Aromatic C8-C10	HS_1D_AR
Aromatic C10-C12	EH_CU_1D_AR
Aromatic C12-C16	EH_CU_1D_AR
Aromatic C16-C21	EH_CU_1D_AR
Aromatic C21-C35	EH_CU_1D_AR
Aromatic C5-C35	EH_CU+HS_1D_AR
TPH Ali/Aro Total C5-C35	EH_CU+HS_1D_Total

Key:

~ Sample details are provided by the client and can affect the validity of the results

***** -not accredited.

-MCERTS (accreditation only applies if report carries the MCERTS logo).

$ -subcontracted.

n/s -not supplied.

I/S -insufficient sample.

U/S -unsuitable sample.

t/f -to follow.

nd -not detected.

End of Report Ver 25.10.03

Interim Report of Analysis

Certificate Number	26-03869	*Issued:*	03-Mar-26

Client Landwise Consulting Ltd
43 Buchanan Drive
Cambuslang
Glasgow
G72 8BD

Our Reference	26-03869
Client Reference ~	LW25-136
Order No ~	(not supplied)
Contract Title ~	LW25-136 Jaguar Landrover, Halewood, Liverpool
Description	4 Groundwater samples.
Date Received	18-Feb-26
Date Started	18-Feb-26

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

2139

Sample Deviations present. See Deviation Table Section for details.

Summary of Chemical Analysis
Water Samples

Our Ref 26-03869
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood, Liverpool

			Lab No	2643813	2643814	2643815	2643816
			Sample ID ~	BH01	BH02	BH03	BH08
			Depth ~				
			Other ID ~				
			Sample Type ~	GROUND WATER	GROUND WATER	GROUND WATER	GROUND WATER
			Sampling Date ~	16/02/2026	16/02/2026	16/02/2026	16/02/2026
			Sampling Time ~	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	3.18	21.40	10.24	1.80
Boron, Dissolved	DETSC 2306*	12	ug/l	86.33	82.20	115.3	141.4
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03	< 0.03	< 0.03
Calcium, Dissolved	DETSC 2306	0.09	mg/l	120	110	32	58
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.91	1.31	0.33	1.65
Copper, Dissolved	DETSC 2306	0.4	ug/l	< 0.40	< 0.40	< 0.40	< 0.40
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.21	4.11	2.21	0.36
Magnesium, Dissolved	DETSC 2306	0.02	mg/l	37	3.6	0.89	10
Mercury, Dissolved (Low Level)	DETSC 2324	0.001	ug/l	< 0.0010	0.0047	0.019	0.0014
Nickel, Dissolved	DETSC 2306	0.5	ug/l	3.48	24.29	4.65	1.96
Selenium, Dissolved	DETSC 2306	0.25	ug/l	1.91	3.12	0.61	0.42
Zinc, Dissolved	DETSC 2306	1.3	ug/l	63.52	11.64	41.17	53.53
Inorganics							
pH	DETSC 2008		pH	7.2	9.9	9.8	8.1
Cyanide, Total Low Level	DETSC 2131	0.1	ug/l	2.6	13	11	2.2
Dissolved, Oxygen	DETSC 2048*	0.1	mg/l	3.6	3.2	3.9	3.2
Dissolved Organic Carbon	DETSC 2085	2	mg/l	33	26	89	14
Total Hardness as CaCO3	DETSC 2303	0.1	mg/l	441	297	82.4	187
Sulphate as SO4	DETSC 2055	0.1	mg/l	79	310	29	26
Sulphide	DETSC 2208	10	ug/l	100	27	190	31
Petroleum Hydrocarbons							
Aliphatic C5-C6: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072*	1	ug/l	11	< 1.0	< 1.0	< 10.0
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072*	1	ug/l	23	2.5	< 1.0	< 10.0
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072*	1	ug/l	130	16	< 1.0	< 10.0
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072*	1	ug/l	600	99	< 1.0	< 10.0
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	ug/l	< 756.1	< 117.8	< 10	< 40.3
Aromatic C5-C7: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	13	10	54
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072*	1	ug/l	< 1.0	13	9.9	160
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072*	1	ug/l	41	15	7.0	130
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072*	1	ug/l	280	43	5.4	140
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	ug/l	< 317.6	< 82.8	< 33.0	< 487.7
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	ug/l	< 1073.7	< 200.6	< 33.3	< 528.0
PAHs							
Naphthalene	DETSC 3304	0.05	ug/l	3.1	170	3.5	3.3

Summary of Chemical Analysis
Water Samples

Our Ref 26-03869
Client Ref ~ LW25-136
Contract Title ~ LW25-136 Jaguar Landrover, Halewood, Liverpool

			Lab No	2643813	2643814	2643815	2643816
			Sample ID ~	BH01	BH02	BH03	BH08
			Depth ~				
			Other ID ~				
			Sample Type ~	GROUND WATER	GROUND WATER	GROUND WATER	GROUND WATER
			Sampling Date ~	16/02/2026	16/02/2026	16/02/2026	16/02/2026
			Sampling Time ~	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Acenaphthylene	DETSC 3304	0.01	ug/l	0.28	< 10.00	0.15	0.14
Acenaphthene	DETSC 3304	0.01	ug/l	2.8	120	t/f	t/f
Fluorene	DETSC 3304	0.01	ug/l	2.0	89	2.8	2.6
Phenanthrene	DETSC 3304	0.01	ug/l	6.8	450	3.7	3.3
Anthracene	DETSC 3304	0.01	ug/l	1.6	130	1.7	1.1
Fluoranthene	DETSC 3304	0.01	ug/l	8.1	450	6.6	5.6
Pyrene	DETSC 3304	0.01	ug/l	8.0	410	5.6	4.8
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	4.3	170	1.7	0.90
Chrysene	DETSC 3304	0.01	ug/l	3.4	130	0.96	0.70
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	4.9	220	1.1	0.77
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	2.1	110	0.52	0.38
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	4.2	160	0.99	0.70
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	2.5	110	0.55	0.39
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	0.57	25	0.11	0.09
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	2.6	110	0.46	0.34
PAH Total	DETSC 3304	0.2	ug/l	57	2800	t/f	t/f
Phenols							
Total Phenol	DETSC 3451*	0.5	ug/l	t/f	t/f	t/f	t/f

Information in Support of the Analytical Results

Our Ref 26-03869
Client Ref ~ LW25-136
Contract ~ LW25-136 Jaguar Landrover, Halewood, Liverpool

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2643813	BH01 GROUND WATER	16/02/26	GB 1L, GV, PB 1L	pH/Cond (1 days)	
2643814	BH02 GROUND WATER	16/02/26	GB 1L, GV, PB 1L	pH/Cond (1 days)	
2643815	BH03 GROUND WATER	16/02/26	GB 1L, GV, PB 1L	pH/Cond (1 days)	
2643816	BH08 GROUND WATER	16/02/26	GB 1L, GV, PB 1L	pH/Cond (1 days)	

Key: G-Glass P-Plastic B-Bottle V-Vial

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Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det	Acronym
Aliphatic C5-C6	HS_1D_AL
Aliphatic C6-C8	HS_1D_AL
Aliphatic C8-C10	HS_1D_AL
Aliphatic C10-C12	EH_CU_1D_AL
Aliphatic C12-C16	EH_CU_1D_AL
Aliphatic C16-C21	EH_CU_1D_AL
Aliphatic C21-C35	EH_CU_1D_AL
Aliphatic C5-C35	EH_CU+HS_1D_AL
Aromatic C5-C7	HS_1D_AR
Aromatic C7-C8	HS_1D_AR
Aromatic C8-C10	HS_1D_AR
Aromatic C10-C12	EH_CU_1D_AR
Aromatic C12-C16	EH_CU_1D_AR
Aromatic C16-C21	EH_CU_1D_AR
Aromatic C21-C35	EH_CU_1D_AR
Aromatic C5-C35	EH_CU+HS_1D_AR
TPH Ali/Aro Total C5-C35	EH_CU+HS_1D_Total

Key:

~ Sample details are provided by the client and can affect the validity of the results

***** -not accredited.

-MCERTS (accreditation only applies if report carries the MCERTS logo).

$ -subcontracted.

n/s -not supplied.

I/S -insufficient sample.

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t/f -to follow.

nd -not detected.

End of Report Ver 25.10.03

Appendix 05

Groundwater Modelling Sheets

Metal Bioavailability Assessment Tool (M-BAT)

Back

Calculate

Clear Data

INPUT DATA											RESULTS (Copper)				RESULTS (Zinc)				RESULTS (Mn)				RESULTS (Ni)			
ID	Location	Waterbody	Date	Measured Cu Concentration (dissolved) (µg l-1)	Measured Zn Concentration (dissolved) (µg l-1)	Measured Mn Concentration (dissolved) (µg l-1)	Measured Ni Concentration (dissolved) (µg l-1)	pH	DOC	Ca	Site-specific PNEC Dissolved Copper (µg l-1)	BioF	Bioavailable Copper Concentration (µg l-1)	Risk Characterisation Ratio	Site-specific PNEC Dissolved Zinc (µg l-1)	BioF	Bioavailable Zinc Concentration (µg l-1)	Risk Characterisation Ratio	Site-specific PNEC Dissolved Manganese (µg l-1)	BioF	Bioavailable Manganese Concentration (µg l-1)	Risk Characterisation Ratio	Site-specific PNEC Dissolved Nickel (µg l-1)	BioF	Bioavailable Nickel Concentration (µg l-1)	Risk Characterisation Ratio
1	BH01	Rams Brook	16/02/2026	0.4	63.52		3.48	7.2	3.6	120	15.62	0.06	0.03	0.03	23.29	0.47	10.94	2.77	1033.09	0.12			16.87	0.24	0.83	0.21
2	BH02	Rams Brook	16/02/2026	0.4	11.64		24.29	9.9	3.2	110	4.08	0.24	0.10	0.10	23.30	0.47	5.44	0.50	123.00	1.00			4.90	1.00	24.29	4.96
3	BH03	Rams Brook	16/02/2026	0.4	41.17		4.65	9.8	3.9	32	6.31	0.16	0.06	0.06	24.07	0.46	18.54	1.71	123.00	1.00			8.29	1.00	4.65	0.56
4	BH04	Rams Brook	16/02/2026	0.4	53.53		1.96	8.1	3.2	58	7.84	0.13	0.05	0.05	23.21	0.47	25.11	2.31	123.00	1.00			8.27	0.48	0.95	0.24

Pb Screening Tool 1.0

Back

Calculate

Clear Data

INPUT DATA						RESULTS (Pb)			
ID	Location	Waterbody	Date	Measured Pb Concentration (dissolved) (µg l^{-1})	DOC	Site Specific PNEC Dissolved Pb (µg l^{-1})	BioF	Available Pb (µg l^{-1})	Risk Characterisation Ratio
1	BH02	Rams Brook	16/02/2026	4.11	3.20	3.84	0.31	1.28	1.07
2	BH03	Rams Brook	16/02/2026	2.21	3.90	4.68	0.26	0.57	0.47

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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Liability: The Environment Agency does not promise that the worksheet will provide any particular facilities or functions. You must ensure that the worksheet meets your needs and you remain solely responsible for the competent use of the worksheet. You are entirely responsible for the consequences of any use of the worksheet and the Agency provides no warranty about the fitness for purpose or performance of any part of the worksheet. We do not promise that the media will always be free from defects, computer viruses, software locks or other similar code or that the operation of the worksheet will be uninterrupted or error free. You should carry out all necessary virus checks prior to installing on your computing system.

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Acenaphthene			
Target Concentration (C_T)	0.00001	mg/l	Origin of C_T:	LoD

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		Acenaphthene		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.20E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	2.04E+02	days	*Howard et al*
Calculated decay rate	λ	3.40E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-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 — 0.00E+00 — fraction

Organic carbon partition coefficient — Koc — 2.17E+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 — 0.00E+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	2.10E+01	6.34E+00	m
Transverse dispersivity	az	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	ay	0.00E+00	2.10E-01	6.34E-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

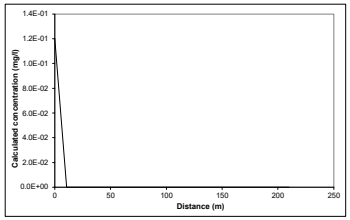
Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	3.40E-03	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	2.97E-97	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**4.04E+95**	

Remedial Targets

Remedial Target		**4.04E+90**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**210**	**m**	
Concentration of contaminant at compliance point	**C_{CED}/C_0**	**2.97E-97**	**mg/l**	Domenico - Steady state

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:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	**1.2E-01**
10.5	**7.90E-07**
21.0	**1.07E-11**
31.5	**1.65E-16**
42.0	**2.70E-21**
52.5	**4.55E-26**
63.0	**7.82E-31**
73.5	**1.36E-35**
84.0	**2.40E-40**
94.5	**4.26E-45**
105.0	**7.60E-50**
115.5	**1.36E-54**
126.0	**2.46E-59**
136.5	**4.44E-64**
147.0	**8.04E-69**
157.5	**1.46E-73**
168.0	**2.66E-78**
178.5	**4.85E-83**
189.0	**8.87E-88**
199.5	**1.62E-92**
210.0	**2.97E-97**

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Acenephthylene			
Target Concentration (C_T)	0.00001	mg/l	Origin of C_T:	LoD

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		Acenephthylene		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.80E-04	mg/l	*BH01*
Half life for degradation of contaminant in water	$t_{1/2}$	1.20E+02	days	*Howard et al*
Calculated decay rate	λ	5.78E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	7.68E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	7.68E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	5.70E-02	fraction	*hydraulic gradient calculated between BH01 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.20E+02	m	*Distance between BH01 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.20E+01	m	*see options*
Transverse dispersivity	az	2.20E+00	m	*see options*
Vertical dispersivity	ay	2.20E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	8.95E-05	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	5.78E-03	d^{-1}
Rate of contaminant flow due to retardation	u	8.95E-05	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	6.07E-167	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**4.61E+162**	

Remedial Targets

Remedial Target		**4.61E+157**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**220**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**6.07E-167**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	4.61E+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	0.00E+00	l/kg

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

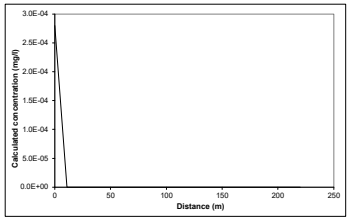
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.20E+01	6.48E+00	m
Transverse dispersivity	**az**	0.00E+00	2.20E+00	6.48E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.20E-01	6.48E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	2.8E-04
11.0	6.47E-13
22.0	3.91E-21
33.0	2.71E-29
44.0	1.99E-37
55.0	1.50E-45
66.0	1.16E-53
77.0	9.10E-62
88.0	7.21E-70
99.0	5.75E-78
110.0	4.61E-86
121.0	3.72E-94
132.0	3.01E-102
143.0	2.45E-110
154.0	1.99E-118
165.0	1.63E-126
176.0	1.33E-134
187.0	1.09E-142
198.0	8.97E-151
209.0	7.38E-159
220.0	6.07E-167

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	aliphatic C10-C12			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	LoD

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		aliphatic C10-C12		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)

Domenico - Steady state — 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 valu

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.10E-02	mg/l	*BH01*
Half life for degradation of contaminant in water	$t_{1/2}$	1.02E+02	days	*Howard et al*
Calculated decay rate	λ	6.80E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	7.68E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	7.68E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	5.70E-02	fraction	*hydraulic gradient calculated between BH01*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.20E+02	m	*Distance between BH01 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.20E+01	m	*see options*
Transverse dispersivity	az	2.20E+00	m	*see options*
Vertical dispersivity	ay	2.20E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	8.95E-05	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	6.80E-03	d^{-1}
Rate of contaminant flow due to retardation	u	8.95E-05	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	3.38E-179	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.26E+176**	

Remedial Targets

Remedial Target		**3.26E+173**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**220**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**3.38E-179**	**mg/l**	Domenico - Steady state

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 — 0.00E+00 — fraction

Organic carbon partition coefficient — Koc — 3.16E+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 — 0.00E+00 — l/kg

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

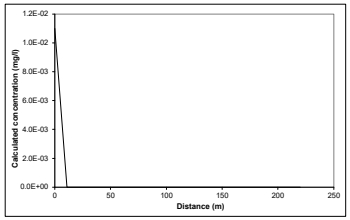
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.20E+01	6.48E+00	m
Transverse dispersivity	**az**	0.00E+00	2.20E+00	6.48E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.20E-01	6.48E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.1E-02
11.0	5.16E-12
22.0	6.32E-21
33.0	8.90E-30
44.0	1.33E-38
55.0	2.04E-47
66.0	3.20E-56
77.0	5.09E-65
88.0	8.17E-74
99.0	1.32E-82
110.0	2.16E-91
121.0	3.53E-100
132.0	5.80E-109
143.0	9.58E-118
154.0	1.58E-126
165.0	2.63E-135
176.0	4.36E-144
187.0	7.26E-153
198.0	1.21E-161
209.0	2.02E-170
220.0	3.38E-179

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	aliphatic C12-C16			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	LoD

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		aliphatic C12-C16		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.30E-02	mg/l	*BH01*
Half life for degradation of contaminant in water	$t_{1/2}$	4.40E+02	days	*Howard et al*
Calculated decay rate	λ	1.58E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	7.68E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	7.68E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	5.70E-02	fraction	*hydraulic gradient calculated between BH01 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.20E+02	m	*Distance between BH01 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.20E+01	m	*see options*
Transverse dispersivity	az	2.20E+00	m	*see options*
Vertical dispersivity	ay	2.20E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	8.95E-05	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	1.58E-03	d^{-1}
Rate of contaminant flow due to retardation	u	8.95E-05	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	7.13E-87	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.23E+84**	

Remedial Targets

Remedial Target		**3.23E+81**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**220**	**m**	
Concentration of contaminant at compliance point	**C_{CED}/C_0**	**7.13E-87**	**mg/l**	Domenico - Steady state

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 — 0.00E+00 — fraction

Organic carbon partition coefficient — Koc — 5.01E+06 — 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 — 0.00E+00 — l/kg

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

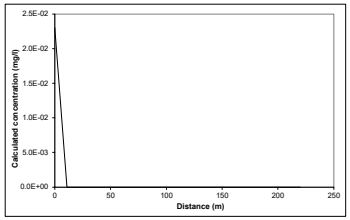
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.20E+01	6.48E+00	m
Transverse dispersivity	**az**	0.00E+00	2.20E+00	6.48E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.20E-01	6.48E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	2.3E-02
11.0	4.29E-07
22.0	2.10E-11
33.0	1.18E-15
44.0	6.97E-20
55.0	4.27E-24
66.0	2.67E-28
77.0	1.69E-32
88.0	1.08E-36
99.0	6.98E-41
110.0	4.53E-45
121.0	2.95E-49
132.0	1.93E-53
143.0	1.27E-57
154.0	8.37E-62
165.0	5.53E-66
176.0	3.66E-70
187.0	2.42E-74
198.0	1.61E-78
209.0	1.07E-82
220.0	7.13E-87

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	aliphatic C16-C21			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	LoD

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		aliphatic C16-C21		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.30E-01	mg/l	*BH01*
Half life for degradation of contaminant in water	$t_{1/2}$	5.30E+02	days	*Howard et al*
Calculated decay rate	λ	1.31E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	7.68E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	7.68E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	5.70E-02	fraction	*hydraulic gradient calculated between BH01 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.20E+02	m	*Distance between BH01 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.20E+01	m	*see options*
Transverse dispersivity	az	2.20E+00	m	*see options*
Vertical dispersivity	ay	2.20E-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 — 0.00E+00 — fraction

Organic carbon partition coefficient — Koc — 3.98E+08 — 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 — 0.00E+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	2.20E+01	6.48E+00	m
Transverse dispersivity	az	0.00E+00	2.20E+00	6.48E-01	m
Vertical dispersivity	ay	0.00E+00	2.20E-01	6.48E-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	8.95E-05	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	1.31E-03	d^{-1}
Rate of contaminant flow due to retardation	u	8.95E-05	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.56E-78	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**8.31E+76**	

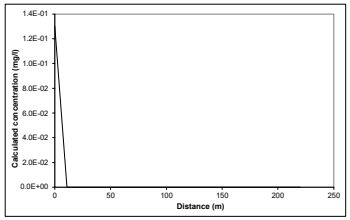
Remedial Targets

Remedial Target		**8.31E+73**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**220**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.56E-78**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	**1.3E-01**
11.0	**5.82E-06**
22.0	**6.81E-10**
33.0	**9.14E-14**
44.0	**1.30E-17**
55.0	**1.91E-21**
66.0	**2.85E-25**
77.0	**4.33E-29**
88.0	**6.64E-33**
99.0	**1.03E-36**
110.0	**1.60E-40**
121.0	**2.49E-44**
132.0	**3.91E-48**
143.0	**6.15E-52**
154.0	**9.71E-56**
165.0	**1.54E-59**
176.0	**2.44E-63**
187.0	**3.87E-67**
198.0	**6.16E-71**
209.0	**9.81E-75**
220.0	**1.56E-78**

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	aliphatic C21-C35			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	LoD

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		aliphatic C21-C35		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	6.00E-01	mg/l	*BH01*
Half life for degradation of contaminant in water	$t_{1/2}$	7.30E+02	days	*Howard et al*
Calculated decay rate	λ	9.50E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	7.68E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	7.68E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	5.70E-02	fraction	*hydraulic gradient calculated between BH01 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.20E+02	m	*Distance between BH01 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.20E+01	m	*see options*
Transverse dispersivity	az	2.20E+00	m	*see options*
Vertical dispersivity	ay	2.20E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	8.95E-05	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	9.50E-04	d^{-1}
Rate of contaminant flow due to retardation	u	8.95E-05	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	2.34E-66	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.56E+65**	

Remedial Targets

Remedial Target		**2.56E+62**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**220**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**2.34E-66**	**mg/l**	Domenico - Steady state

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 — 0.00E+00 — fraction

Organic carbon partition coefficient — Koc — 3.98E+08 — 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 — 0.00E+00 — l/kg

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

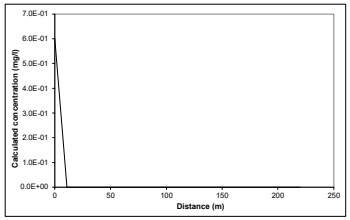
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.20E+01	6.48E+00	m
Transverse dispersivity	**az**	0.00E+00	2.20E+00	6.48E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.20E-01	6.48E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	**6.0E-01**
11.0	**1.01E-04**
22.0	**4.45E-08**
33.0	**2.25E-11**
44.0	**1.20E-14**
55.0	**6.64E-18**
66.0	**3.74E-21**
77.0	**2.14E-24**
88.0	**1.23E-27**
99.0	**7.17E-31**
110.0	**4.19E-34**
121.0	**2.47E-37**
132.0	**1.46E-40**
143.0	**8.62E-44**
154.0	**5.12E-47**
165.0	**3.05E-50**
176.0	**1.82E-53**
187.0	**1.09E-56**
198.0	**6.51E-60**
209.0	**3.90E-63**
220.0	**2.34E-66**

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.30E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	9.20E+02	days	*Howard et al*
Calculated decay rate	λ	7.54E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	7.54E-04	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	4.15E-46	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.13E+44**	

Remedial Targets

Remedial Target		**3.13E+40**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**210**	**m**
Concentration of contaminant at compliance point	**C_{CED}/C_0**	**4.15E-46**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	3.17E+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	0.00E+00	l/kg

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

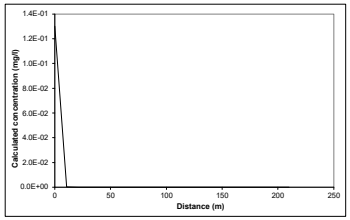
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.3E-01
10.5	3.08E-04
21.0	1.50E-06
31.5	8.30E-09
42.0	4.87E-11
52.5	2.95E-13
63.0	1.82E-15
73.5	1.14E-17
84.0	7.23E-20
94.5	4.61E-22
105.0	2.96E-24
115.5	1.91E-26
126.0	1.23E-28
136.5	8.01E-31
147.0	5.22E-33
157.5	3.41E-35
168.0	2.23E-37
178.5	1.46E-39
189.0	9.59E-42
199.5	6.31E-44
210.0	4.15E-46

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:	**JLR, Halewood, Liverpool**			
Site Address:	**JLR, Halewood, Liverpool**			
Completed by:	**HOL**			
Date:	**03-Mar-26**		**Version:**	**3.2**
Contaminant	**Aromatic C10-C12**			
Target Concentration (C_T)	**0.001**	**mg/l**	**Origin of C_T:**	**LoD**

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		Aromatic C10-C12		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)

Domenico - Steady state — 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 valu**

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	5.40E-02	mg/l	*BH08*
Half life for degradation of contaminant in water	$t_{1/2}$	1.02E+02	days	*Howard et al*
Calculated decay rate	λ	6.80E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.20E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.20E+00	m	BH08 = GW level recorded between 0.80mbgl and rockh
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	8.59E-02	fraction	*hydraulic gradient calculated between BH08 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.40E+02	m	*Distance between BH08 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.40E+01	m	*see options*
Transverse dispersivity	az	2.40E+00	m	*see options*
Vertical dispersivity	ay	2.40E-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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	3.16E+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	0.00E+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	2.40E+01	6.73E+00	m
Transverse dispersivity	**az**	0.00E+00	2.40E+00	6.73E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.40E-01	6.73E-02	

Note values of dispersivity must be > 0

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

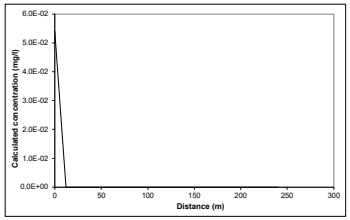
Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Calculated Parameters	Variable		
Groundwater flow velocity	v	1.35E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	6.80E-03	d^{-1}
Rate of contaminant flow due to retardation	u	1.35E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	4.95E-152	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.09E+150**	

Remedial Targets

Remedial Target		**1.09E+147**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**240**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**4.95E-152**	**mg/l**	Domenico - Steady state

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:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	5.4E-02
12.0	5.81E-10
24.0	1.50E-17
36.0	4.42E-25
48.0	1.38E-32
60.0	4.46E-40
72.0	1.47E-47
84.0	4.91E-55
96.0	1.65E-62
108.0	5.62E-70
120.0	1.92E-77
132.0	6.60E-85
144.0	2.28E-92
156.0	7.87E-100
168.0	2.73E-107
180.0	9.49E-115
192.0	3.31E-122
204.0	1.15E-129
216.0	4.03E-137
228.0	1.41E-144
240.0	4.95E-152

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Aromatic C12-C16			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	LoD

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		Aromatic C12-C16		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.60E-01	mg/l	*BH08*
Half life for degradation of contaminant in water	$t_{1/2}$	4.40E+02	days	*Howard et al*
Calculated decay rate	λ	1.58E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.20E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.20E+00	m	BH08 = GW level recorded between 0.80mbgl and rockh
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	8.59E-02	fraction	*hydraulic gradient calculated between BH08 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.40E+02	m	*Distance between BH08 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.40E+01	m	*see options*
Transverse dispersivity	az	2.40E+00	m	*see options*
Vertical dispersivity	ay	2.40E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.35E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	1.58E-03	d^{-1}
Rate of contaminant flow due to retardation	u	1.35E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	2.87E-73	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**5.58E+71**	

Remedial Targets

Remedial Target		**5.58E+68**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**240**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**2.87E-73**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	6.31E+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	0.00E+00	l/kg

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

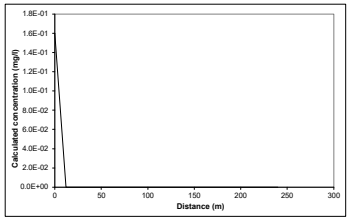
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.40E+01	6.73E+00	m
Transverse dispersivity	**az**	0.00E+00	2.40E+00	6.73E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.40E-01	6.73E-02	m

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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.6E-01
12.0	1.41E-05
24.0	3.00E-09
36.0	7.27E-13
48.0	1.87E-16
60.0	4.95E-20
72.0	1.34E-23
84.0	3.67E-27
96.0	1.02E-30
108.0	2.84E-34
120.0	7.97E-38
132.0	2.25E-41
144.0	6.37E-45
156.0	1.81E-48
168.0	5.16E-52
180.0	1.47E-55
192.0	4.21E-59
204.0	1.21E-62
216.0	3.47E-66
228.0	9.97E-70
240.0	2.87E-73

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Aromatic C16-C21			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	LoD

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		Aromatic C16-C21		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)

Domenico - Steady state — 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 valu

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.30E-01	mg/l	*BH08*
Half life for degradation of contaminant in water	$t_{1/2}$	5.30E+02	days	*Howard et al*
Calculated decay rate	λ	1.31E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.20E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.20E+00	m	BH08 = GW level recorded between 0.80mbgl and rockh
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	8.59E-02	fraction	*hydraulic gradient calculated between BH08 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.40E+02	m	*Distance between BH08 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.40E+01	m	*see options*
Transverse dispersivity	az	2.40E+00	m	*see options*
Vertical dispersivity	ay	2.40E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.35E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	1.31E-03	d^{-1}
Rate of contaminant flow due to retardation	u	1.35E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	6.69E-67	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.94E+65**	

Remedial Targets

Remedial Target		**1.94E+62**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**240**	**m**	
Concentration of contaminant at compliance point	**C_{CED}/C_0**	**6.69E-67**	**mg/l**	Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	1.58E+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	0.00E+00	l/kg

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

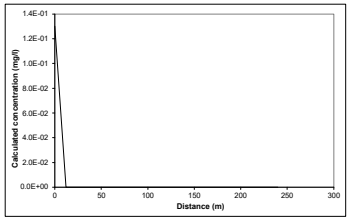
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.40E+01	6.73E+00	m
Transverse dispersivity	**az**	0.00E+00	2.40E+00	6.73E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.40E-01	6.73E-02	m

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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	**1.3E-01**
12.0	**2.42E-05**
24.0	**1.08E-08**
36.0	**5.49E-12**
48.0	**2.97E-15**
60.0	**1.65E-18**
72.0	**9.41E-22**
84.0	**5.43E-25**
96.0	**3.16E-28**
108.0	**1.86E-31**
120.0	**1.10E-34**
132.0	**6.50E-38**
144.0	**3.88E-41**
156.0	**2.32E-44**
168.0	**1.39E-47**
180.0	**8.34E-51**
192.0	**5.02E-54**
204.0	**3.03E-57**
216.0	**1.83E-60**
228.0	**1.10E-63**
240.0	**6.69E-67**

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Aromatic C21-C35			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	LoD

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 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.

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		Aromatic C21-C35		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)

Domenico - Steady state — 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 valu**

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.80E-01	mg/l	*BH08*
Half life for degradation of contaminant in water	$t_{1/2}$	7.30E+02	days	*Howard et al*
Calculated decay rate	λ	9.50E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.20E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.20E+00	m	BH08 = GW level recorded between 0.80mbgl and rockh
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	8.59E-02	fraction	*hydraulic gradient calculated between BH08 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.40E+02	m	*Distance between BH08 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.40E+01	m	*see options*
Transverse dispersivity	az	2.40E+00	m	*see options*
Vertical dispersivity	ay	2.40E-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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	1.26E+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	0.00E+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	2.40E+01	6.73E+00	m
Transverse dispersivity	az	0.00E+00	2.40E+00	6.73E-01	m
Vertical dispersivity	ay	0.00E+00	2.40E-01	6.73E-02	

Note values of dispersivity must be > 0

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

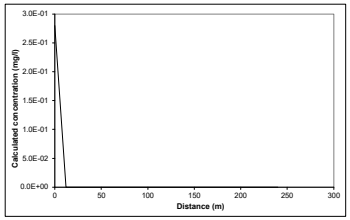
Xu & Eckstein (1995) report ax = $0.83(\log_{10}x)^{2.414}$; az = ax/10, ay = ax/100 are assumed

Calculated Parameters	Variable		
Groundwater flow velocity	v	1.35E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	9.50E-04	d^{-1}
Rate of contaminant flow due to retardation	u	1.35E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	8.97E-57	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.12E+55**	

Remedial Targets

Remedial Target		**3.12E+52**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**240**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**8.97E-57**	**mg/l**	Domenico - Steady state

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:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	2.8E-01
12.0	1.61E-04
24.0	2.21E-07
36.0	3.49E-10
48.0	5.82E-13
60.0	1.00E-15
72.0	1.76E-18
84.0	3.13E-21
96.0	5.63E-24
108.0	1.02E-26
120.0	1.86E-29
132.0	3.41E-32
144.0	6.28E-35
156.0	1.16E-37
168.0	2.15E-40
180.0	3.98E-43
192.0	7.40E-46
204.0	1.38E-48
216.0	2.57E-51
228.0	4.80E-54
240.0	8.97E-57

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Benzo(a)anthracene			
Target Concentration (C_T)	0.00001	mg/l	Origin of C_T:	LoD

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		Benzo(a)anthracene		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)

Domenico - Steady state — 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 valu**

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.70E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.36E+03	days	*Howard et al*
Calculated decay rate	λ	5.09E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	5.09E-04	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	6.74E-38	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.52E+36**	

Remedial Targets

Remedial Target		**2.52E+31**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**210**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**6.74E-38**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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 — 0.00E+00 — fraction

Organic carbon partition coefficient — Koc — 1.48E+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 — 0.00E+00 — l/kg

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

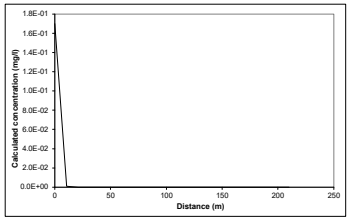
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	**1.7E-01**
10.5	**1.02E-03**
21.0	**1.26E-05**
31.5	**1.78E-07**
42.0	**2.65E-09**
52.5	**4.07E-11**
63.0	**6.39E-13**
73.5	**1.02E-14**
84.0	**1.63E-16**
94.5	**2.64E-18**
105.0	**4.31E-20**
115.5	**7.05E-22**
126.0	**1.16E-23**
136.5	**1.91E-25**
147.0	**3.16E-27**
157.5	**5.24E-29**
168.0	**8.70E-31**
178.5	**1.45E-32**
189.0	**2.41E-34**
199.5	**4.03E-36**
210.0	**6.74E-38**

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		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).
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(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)

Domenico - Steady state — 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 valu**

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.60E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.06E+03	days	*Howard et al*
Calculated decay rate	λ	6.55E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	6.55E-04	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	6.19E-43	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.58E+41**	

Remedial Targets

Remedial Target		**4.39E+34**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**210**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**6.19E-43**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	4.02E+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	0.00E+00	l/kg

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

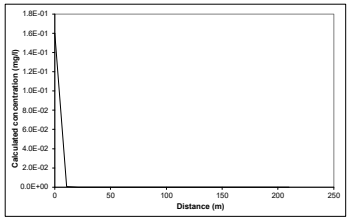
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.6E-01
10.5	5.40E-04
21.0	3.74E-06
31.5	2.96E-08
42.0	2.48E-10
52.5	2.14E-12
63.0	1.89E-14
73.5	1.69E-16
84.0	1.52E-18
94.5	1.38E-20
105.0	1.27E-22
115.5	1.16E-24
126.0	1.07E-26
136.5	9.96E-29
147.0	9.25E-31
157.5	8.61E-33
168.0	8.04E-35
178.5	7.51E-37
189.0	7.03E-39
199.5	6.59E-41
210.0	6.19E-43

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:	**JLR, Halewood, Liverpool**			
Site Address:	**JLR, Halewood, Liverpool**			
Completed by:	**HOL**			
Date:	**03-Mar-26**		**Version:**	**3.2**
Contaminant	**Benzo(b)fluoranthene**			
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.
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	1.70E-07	mg/l	from Level 1

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

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.20E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.22E+03	days	*Howard et al*
Calculated decay rate	λ	5.69E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	5.69E-04	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	6.58E-40	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.35E+38**	

Remedial Targets

Remedial Target		**5.69E+31**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**210**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**6.58E-40**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	4.41E+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	0.00E+00	l/kg

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

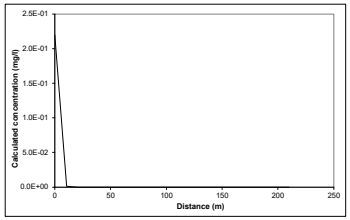
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	2.2E-01
10.5	1.04E-03
21.0	1.00E-05
31.5	1.10E-07
42.0	1.29E-09
52.5	1.55E-11
63.0	1.91E-13
73.5	2.38E-15
84.0	2.99E-17
94.5	3.79E-19
105.0	4.84E-21
115.5	6.21E-23
126.0	7.99E-25
136.5	1.03E-26
147.0	1.34E-28
157.5	1.74E-30
168.0	2.26E-32
178.5	2.94E-34
189.0	3.84E-36
199.5	5.02E-38
210.0	6.58E-40

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Benzo(ghi)perylene			
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		Benzo(ghi)perylene		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.10E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.31E+03	days	*Howard et al*
Calculated decay rate	λ	5.28E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	5.28E-04	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	9.35E-39	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.18E+37**	

Remedial Targets

Remedial Target		**2.00E+30**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**210**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**9.35E-39**	**mg/l**	Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	2.32E+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	0.00E+00	l/kg

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

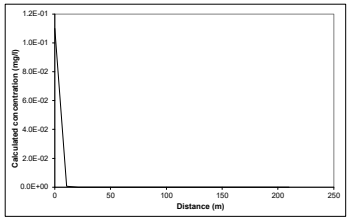
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.1E-01
10.5	6.12E-04
21.0	6.99E-06
31.5	9.13E-08
42.0	1.26E-09
52.5	1.79E-11
63.0	2.61E-13
73.5	3.84E-15
84.0	5.71E-17
94.5	8.56E-19
105.0	1.29E-20
115.5	1.96E-22
126.0	2.98E-24
136.5	4.55E-26
147.0	6.96E-28
157.5	1.07E-29
168.0	1.64E-31
178.5	2.53E-33
189.0	3.91E-35
199.5	6.04E-37
210.0	9.35E-39

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:	**JLR, Halewood, Liverpool**			
Site Address:	**JLR, Halewood, Liverpool**			
Completed by:	**HOL**			
Date:	**03-Mar-26**		**Version:**	**3.2**
Contaminant	**Benzo(k)fluoranthene**			
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.
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-07	mg/l	from Level 1

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

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.10E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	4.27E+03	days	*Howard et al*
Calculated decay rate	λ	1.62E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	1.62E-04	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	7.60E-22	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.45E+20**	

Remedial Targets

Remedial Target		**2.46E+13**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**210**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**7.60E-22**	**mg/l**	Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	1.10E+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	0.00E+00	l/kg

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

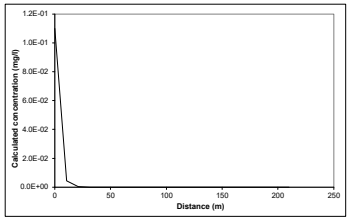
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.1E-01
10.5	4.29E-03
21.0	3.43E-04
31.5	3.14E-05
42.0	3.04E-06
52.5	3.03E-07
63.0	3.08E-08
73.5	3.18E-09
84.0	3.32E-10
94.5	3.48E-11
105.0	3.68E-12
115.5	3.91E-13
126.0	4.17E-14
136.5	4.46E-15
147.0	4.78E-16
157.5	5.14E-17
168.0	5.54E-18
178.5	5.99E-19
189.0	6.47E-20
199.5	7.01E-21
210.0	7.60E-22

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Chrysene			
Target Concentration (C_T)	0.00001	mg/l	Origin of C_T:	LoD

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		Chrysene		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)

Domenico - Steady state — 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 valu

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.30E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	2.00E+03	days	*Howard et al*
Calculated decay rate	λ	3.47E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	3.47E-04	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.75E-31	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**7.41E+29**	

Remedial Targets

Remedial Target		**7.41E+24**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**210**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.75E-31**	**mg/l**	Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	9.92E+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	0.00E+00	l/kg

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

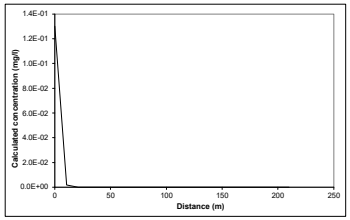
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.3E-01
10.5	1.66E-03
21.0	4.34E-05
31.5	1.30E-06
42.0	4.10E-08
52.5	1.34E-09
63.0	4.45E-11
73.5	1.50E-12
84.0	5.12E-14
94.5	1.76E-15
105.0	6.08E-17
115.5	2.11E-18
126.0	7.36E-20
136.5	2.57E-21
147.0	9.03E-23
157.5	3.18E-24
168.0	1.12E-25
178.5	3.95E-27
189.0	1.40E-28
199.5	4.95E-30
210.0	1.75E-31

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:	**JLR, Halewood, Liverpool**			
Site Address:	**JLR, Halewood, Liverpool**			
Completed by:	**HOL**			
Date:	**03-Mar-26**		**Version:**	**3.2**
Contaminant	**cyanide**			
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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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-03	mg/l	from Level 1

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

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.30E-02	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+08	days	*Assumed no decay*
Calculated decay rate	λ	6.93E-09	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	6.93E-09	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	1.03E-03	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.26E+01**	

Remedial Targets

Remedial Target		**1.26E-02**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**210**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.03E-03**	**mg/l**	Domenico - Steady state

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		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	0.00E+00	l/kg

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

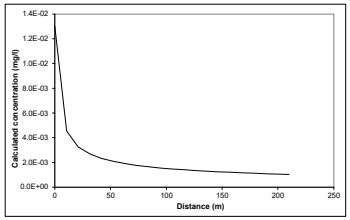
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.3E-02
10.5	4.55E-03
21.0	3.27E-03
31.5	2.68E-03
42.0	2.33E-03
52.5	2.09E-03
63.0	1.90E-03
73.5	1.76E-03
84.0	1.65E-03
94.5	1.56E-03
105.0	1.48E-03
115.5	1.41E-03
126.0	1.35E-03
136.5	1.29E-03
147.0	1.25E-03
157.5	1.20E-03
168.0	1.16E-03
178.5	1.13E-03
189.0	1.09E-03
199.5	1.06E-03
210.0	1.03E-03

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Dibenzo(a,h)anthracene			
Target Concentration (C_T)	0.00001	mg/l	Origin of C_T:	LoD

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		Dibenzo(a,h)anthracene		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.50E-02	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.88E+03	days	*Howard et al*
Calculated decay rate	λ	3.69E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	3.69E-04	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	3.56E-33	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**7.01E+30**	

Remedial Targets

Remedial Target		**7.01E+25**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**210**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**3.56E-33**	**mg/l**	Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	4.41E+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	0.00E+00	l/kg

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

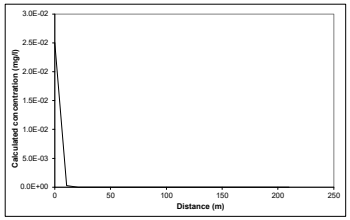
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	2.5E-02
10.5	2.85E-04
21.0	6.66E-06
31.5	1.78E-07
42.0	5.03E-09
52.5	1.47E-10
63.0	4.36E-12
73.5	1.32E-13
84.0	4.01E-15
94.5	1.23E-16
105.0	3.80E-18
115.5	1.18E-19
126.0	3.67E-21
136.5	1.15E-22
147.0	3.60E-24
157.5	1.13E-25
168.0	3.56E-27
178.5	1.12E-28
189.0	3.55E-30
199.5	1.12E-31
210.0	3.56E-33

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:	**JLR, Halewood, Liverpool**			
Site Address:	**JLR, Halewood, Liverpool**			
Completed by:	**HOL**			
Date:	**03-Mar-26**		**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).
Site details entered on this page are automatically copied to Level 1, 2 and 3 Worksheets.
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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		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	4.50E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	8.80E+02	days	*Howard et al*
Calculated decay rate	λ	7.88E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	7.88E-04	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	1.35E-46	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.33E+45**	

Remedial Targets

Remedial Target		**2.10E+40**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**210**	**m**
Concentration of contaminant at compliance point	**C_{CED}/C_0**	**1.35E-46**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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 — 0.00E+00 — fraction

Organic carbon partition coefficient — Koc — 5.90E+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 — 0.00E+00 — l/kg

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

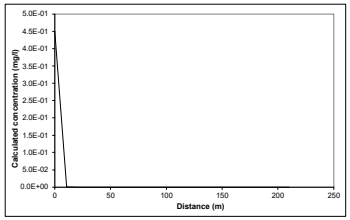
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein	
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00 m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01 m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	4.5E-01
10.5	9.46E-04
21.0	4.09E-06
31.5	2.02E-08
42.0	1.05E-10
52.5	5.66E-13
63.0	3.11E-15
73.5	1.73E-17
84.0	9.72E-20
94.5	5.51E-22
105.0	3.14E-24
115.5	1.80E-26
126.0	1.03E-28
136.5	5.97E-31
147.0	3.46E-33
157.5	2.01E-35
168.0	1.17E-37
178.5	6.79E-40
189.0	3.96E-42
199.5	2.31E-44
210.0	1.35E-46

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Fluorine			
Target Concentration (C_T)	0.00001	mg/l	Origin of C_T:	LoD

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 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		Fluorine		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	8.90E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.20E+02	days	*Howard et al*
Calculated decay rate	λ	5.78E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	5.78E-03	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	9.55E-126	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**9.32E+124**	

Remedial Targets

Remedial Target		**9.32E+119**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**210**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**9.55E-126**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	2.37E+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	0.00E+00	l/kg

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

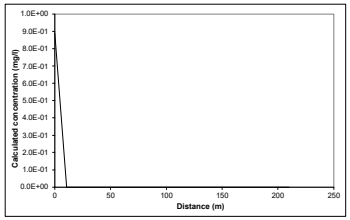
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	8.9E-01
10.5	1.99E-07
21.0	9.18E-14
31.5	4.83E-20
42.0	2.68E-26
52.5	1.54E-32
63.0	9.00E-39
73.5	5.34E-45
84.0	3.20E-51
94.5	1.93E-57
105.0	1.17E-63
115.5	7.16E-70
126.0	4.39E-76
136.5	2.70E-82
147.0	1.67E-88
157.5	1.03E-94
168.0	6.38E-101
178.5	3.96E-107
189.0	2.46E-113
199.5	1.53E-119
210.0	9.55E-126

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:	**JLR, Halewood, Liverpool**			
Site Address:	**JLR, Halewood, Liverpool**			
Completed by:	**HOL**			
Date:	**03-Mar-26**		**Version:**	**3.2**
Contaminant	**Indeno(123)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.
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		Indeno(123)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)

Domenico - Steady state — 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 valu

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.10E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.46E+03	days	*Howard et al*
Calculated decay rate	λ	4.75E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	4.75E-04	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	8.36E-37	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.32E+35**	

Remedial Targets

Remedial Target		**2.24E+28**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**210**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**8.36E-37**	**mg/l**	Domenico - Steady state

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 — 0.00E+00 — fraction

Organic carbon partition coefficient — Koc — 9.23E+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 — 0.00E+00 — l/kg

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

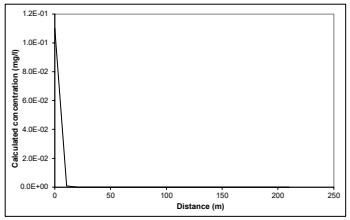
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.1E-01
10.5	7.66E-04
21.0	1.10E-05
31.5	1.79E-07
42.0	3.09E-09
52.5	5.52E-11
63.0	1.00E-12
73.5	1.85E-14
84.0	3.44E-16
94.5	6.46E-18
105.0	1.22E-19
115.5	2.31E-21
126.0	4.41E-23
136.5	8.43E-25
147.0	1.62E-26
157.5	3.11E-28
168.0	5.98E-30
178.5	1.15E-31
189.0	2.23E-33
199.5	4.31E-35
210.0	8.36E-37

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Lead			
Target Concentration (C_T)	0.0012	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		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)

Domenico - Steady state — 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 valu

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	4.11E-03	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+08	days	*Assumed no decay*
Calculated decay rate	λ	6.93E-09	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*SAND (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-4(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	1.58E+04	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	5.79E+04	fraction
Decay rate used	λ	6.93E-09	d^{-1}
Rate of contaminant flow due to retardation	u	2.49E-09	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	2.48E-35	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.66E+32**	

Remedial Targets

Remedial Target		**1.99E+29**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**210**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**2.48E-35**	**mg/l**	Domenico - Steady state

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	1.58E+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	1.58E+04	l/kg

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

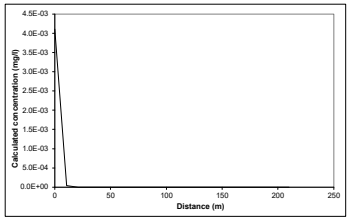
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	4.1E-03
10.5	4.00E-05
21.0	7.98E-07
31.5	1.82E-08
42.0	4.39E-10
52.5	1.09E-11
63.0	2.78E-13
73.5	7.15E-15
84.0	1.86E-16
94.5	4.87E-18
105.0	1.28E-19
115.5	3.40E-21
126.0	9.05E-23
136.5	2.41E-24
147.0	6.46E-26
157.5	1.73E-27
168.0	4.66E-29
178.5	1.26E-30
189.0	3.39E-32
199.5	9.15E-34
210.0	2.48E-35

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Mercury			
Target Concentration (C_T)	0.00007	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		Mercury		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)

Domenico - Steady state — 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 valu

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.43E-02	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+08	days	*Assumed no decay*
Calculated decay rate	λ	6.93E-09	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	6.31E+03	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	2.31E+04	fraction
Decay rate used	λ	6.93E-09	d^{-1}
Rate of contaminant flow due to retardation	u	6.25E-09	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	2.44E-22	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**9.97E+19**	

Remedial Targets

Remedial Target		**6.98E+15**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**210**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**2.44E-22**	**mg/l**	Domenico - Steady state

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	6.31E+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	6.31E+03	l/kg

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

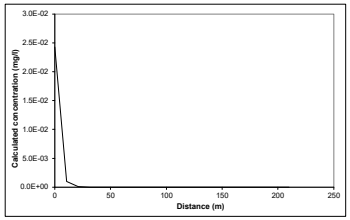
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	2.4E-02
10.5	9.65E-04
21.0	7.87E-05
31.5	7.33E-06
42.0	7.22E-07
52.5	7.34E-08
63.0	7.61E-09
73.5	8.00E-10
84.0	8.50E-11
94.5	9.09E-12
105.0	9.79E-13
115.5	1.06E-13
126.0	1.15E-14
136.5	1.25E-15
147.0	1.37E-16
157.5	1.50E-17
168.0	1.65E-18
178.5	1.81E-19
189.0	2.00E-20
199.5	2.20E-21
210.0	2.44E-22

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		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.
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		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.70E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	2.58E+02	days	*Howard et al*
Calculated decay rate	λ	2.69E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	2.69E-03	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	2.14E-86	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**7.95E+84**	

Remedial Targets

Remedial Target		**1.59E+82**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**210**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**2.14E-86**	**mg/l**	Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	4.99E+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	0.00E+00	l/kg

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

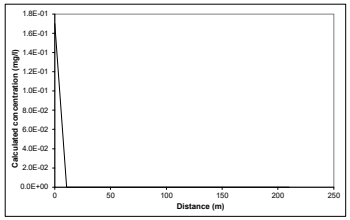
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.7E-01
10.5	3.84E-06
21.0	1.78E-10
31.5	9.44E-15
42.0	5.29E-19
52.5	3.06E-23
63.0	1.80E-27
73.5	1.08E-31
84.0	6.51E-36
94.5	3.96E-40
105.0	2.43E-44
115.5	1.49E-48
126.0	9.22E-53
136.5	5.72E-57
147.0	3.55E-61
157.5	2.21E-65
168.0	1.38E-69
178.5	8.65E-74
189.0	5.42E-78
199.5	3.40E-82
210.0	2.14E-86

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Phenanthrene			
Target Concentration (C_T)	0.00001	mg/l	Origin of C_T:	LoD

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		Phenanthrene		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	4.50E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	4.02E+02	days	*Howard et al*
Calculated decay rate	λ	1.73E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	1.73E-03	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	6.26E-69	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**7.19E+67**	

Remedial Targets

Remedial Target		**7.19E+62**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**210**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**6.26E-69**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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 — 0.00E+00 — fraction

Organic carbon partition coefficient — Koc — 4.55E+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 — 0.00E+00 — l/kg

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

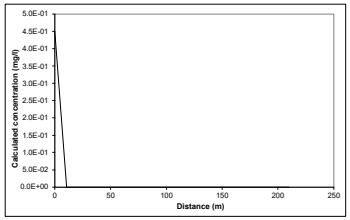
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	4.5E-01
10.5	7.23E-05
21.0	2.39E-08
31.5	9.00E-12
42.0	3.59E-15
52.5	1.48E-18
63.0	6.19E-22
73.5	2.64E-25
84.0	1.13E-28
94.5	4.90E-32
105.0	2.14E-35
115.5	9.35E-39
126.0	4.11E-42
136.5	1.81E-45
147.0	8.02E-49
157.5	3.56E-52
168.0	1.58E-55
178.5	7.04E-59
189.0	3.14E-62
199.5	1.40E-65
210.0	6.26E-69

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Pyrene			
Target Concentration (C_T)	0.00001	mg/l	Origin of C_T:	LoD

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		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	4.10E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	3.80E+03	days	*Howard et al*
Calculated decay rate	λ	1.83E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	9.17E-02	fraction	*hydraulic gradient calculated between BH02 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.10E+02	m	*Distance between BH02 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.10E+01	m	*see options*
Transverse dispersivity	az	2.10E+00	m	*see options*
Vertical dispersivity	ay	2.10E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	1.44E-04	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	1.83E-04	d^{-1}
Rate of contaminant flow due to retardation	u	1.44E-04	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{CED}	1.50E-22	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.73E+21**	

Remedial Targets

Remedial Target		**2.73E+16**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**210**	**m**
Concentration of contaminant at compliance point	**C_{CED}/C_0**	**1.50E-22**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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 — 0.00E+00 — fraction

Organic carbon partition coefficient — Koc — 6.72E+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 — 0.00E+00 — l/kg

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

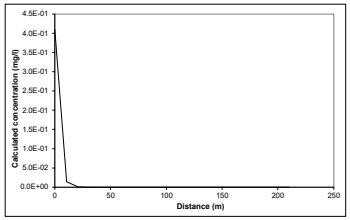
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.10E+01	6.34E+00	m
Transverse dispersivity	**az**	0.00E+00	2.10E+00	6.34E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.10E-01	6.34E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	4.1E-01
10.5	1.38E-02
21.0	9.54E-04
31.5	7.53E-05
42.0	6.29E-06
52.5	5.42E-07
63.0	4.76E-08
73.5	4.24E-09
84.0	3.82E-10
94.5	3.46E-11
105.0	3.16E-12
115.5	2.90E-13
126.0	2.67E-14
136.5	2.46E-15
147.0	2.28E-16
157.5	2.12E-17
168.0	1.97E-18
178.5	1.84E-19
189.0	1.72E-20
199.5	1.61E-21
210.0	1.50E-22

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

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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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Zinc			
Target Concentration (C_T)	0.0109	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		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)

Domenico - Steady state — 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 valu**

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	6.35E-02	mg/l	*BH01*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+08	days	*Assumed no decay*
Calculated decay rate	λ	6.93E-09	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	7.68E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	7.68E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.01E+00	g/cm^3	*Testing of the made ground soils indicated to be 2.01*
Effective porosity of aquifer	n	5.50E-01	fraction	*Glacial Till (Freeze and Cheery 1979)*
Hydraulic gradient	i	5.70E-02	fraction	*hydraulic gradient calculated between BH01 and Rams Brook*
Hydraulic conductivity of aquifer	K	8.64E-04	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.20E+02	m	*Distance between BH01 and Rams Brook*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	3.07E+04	l/kg	*see options*
Longitudinal dispersivity	ax	2.20E+01	m	*see options*
Transverse dispersivity	az	2.20E+00	m	*see options*
Vertical dispersivity	ay	2.20E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	8.95E-05	m/d
Retardation factor	Rf	1.12E+05	fraction
Decay rate used	λ	6.93E-09	d^{-1}
Rate of contaminant flow due to retardation	u	7.99E-10	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	5.50E-61	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.16E+59**	

Remedial Targets

Remedial Target		**1.26E+57**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**220**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**5.50E-61**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	3.07E+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	3.07E+04	l/kg

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

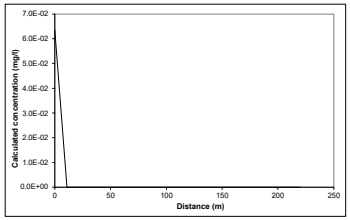
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.20E+01	6.48E+00	m
Transverse dispersivity	**az**	0.00E+00	2.20E+00	6.48E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.20E-01	6.48E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	6.4E-02
11.0	2.22E-05
22.0	2.03E-08
33.0	2.13E-11
44.0	2.37E-14
55.0	2.71E-17
66.0	3.17E-20
77.0	3.76E-23
88.0	4.51E-26
99.0	5.44E-29
110.0	6.61E-32
121.0	8.07E-35
132.0	9.89E-38
143.0	1.22E-40
154.0	1.50E-43
165.0	1.86E-46
176.0	2.30E-49
187.0	2.85E-52
198.0	3.54E-55
209.0	4.41E-58
220.0	5.50E-61

Hydrogeological risk assessment for land contamination

Remedial Targets Worksheet , Release 3.2

First released: 2006. Version 3.2: January 2013

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Details to be completed for each assessment				
Site Name:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Acenaphthene			
Target Concentration (C_T)	0.00001	mg/l	Origin of C_T:	LoD

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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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		Acenaphthene		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.20E-01	mg/l	BH02
Half life for degradation of contaminant in water	$t_{1/2}$	2.04E+02	days	Howard et al
Calculated decay rate	λ	3.40E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	Maximum width of site (W-E)
Plume thickness at source	Sy	9.53E-01	m	10% aquifer thickness
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	Sandstone (Freeze and Cheery 1979)
Effective porosity of aquifer	n	2.00E-01	fraction	Sandstone (Freeze and Cheery 1979)
Hydraulic gradient	i	1.00E-02	fraction	Published Merseyside Permo-Triassic sandstone aquifer gradient
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	Sandstone (Freeze and Cheery 1979)
Distance to compliance point	x	2.50E+02	m	as per EA guidance in urban area
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+100	days	time variant options only
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	see options
Longitudinal dispersivity	ax	2.50E+01	m	see options
Transverse dispersivity	az	2.50E+00	m	see options
Vertical dispersivity	ay	2.50E-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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	2.17E+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	0.00E+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	2.50E+01	6.86E+00	m
Transverse dispersivity	az	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	ay	0.00E+00	2.50E-01	6.86E-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	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	3.40E-03	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	4.94E-20	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.43E+18**	

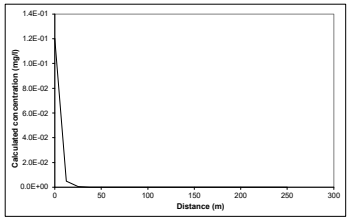
Remedial Targets

Remedial Target		**2.43E+13**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**4.94E-20**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.2E-01
12.5	4.91E-03
25.0	4.85E-04
37.5	5.48E-05
50.0	6.56E-06
62.5	8.10E-07
75.0	1.02E-07
87.5	1.30E-08
100.0	1.68E-09
112.5	2.19E-10
125.0	2.86E-11
137.5	3.76E-12
150.0	4.96E-13
162.5	6.56E-14
175.0	8.71E-15
187.5	1.16E-15
200.0	1.54E-16
212.5	2.06E-17
225.0	2.75E-18
237.5	3.69E-19
250.0	4.94E-20

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Acenaphthylene			
Target Concentration (C_T)	0.00001	mg/l	Origin of C_T:	LoD

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		Acenaphthylene		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.80E-04	mg/l	*BH01*
Half life for degradation of contaminant in water	$t_{1/2}$	1.20E+02	days	*Howard et al*
Calculated decay rate	λ	5.78E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	7.68E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	7.68E+00	m	BH01 = GW level recorded between 2.32mbgl and rockh
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	4.61E+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	0.00E+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	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-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	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	5.78E-03	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.40E-28	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.01E+24**	

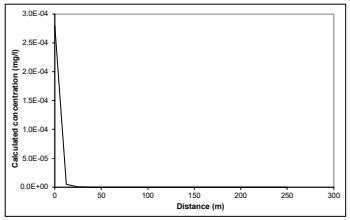
Remedial Targets

Remedial Target		**2.01E+19**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.40E-28**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	2.8E-04
12.5	4.77E-06
25.0	2.40E-07
37.5	1.38E-08
50.0	8.46E-10
62.5	5.34E-11
75.0	3.44E-12
87.5	2.25E-13
100.0	1.48E-14
112.5	9.86E-16
125.0	6.60E-17
137.5	4.43E-18
150.0	2.99E-19
162.5	2.03E-20
175.0	1.37E-21
187.5	9.35E-23
200.0	6.37E-24
212.5	4.35E-25
225.0	2.98E-26
237.5	2.04E-27
250.0	1.40E-28

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Aliphatic C10-C12			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	LoD

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		Aliphatic C10-C12		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	3.10E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.02E+02	days	*Howard et al*
Calculated decay rate	λ	6.80E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	6.80E-03	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.46E-27	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.12E+26**	

Remedial Targets

Remedial Target		**2.12E+23**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.46E-27**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	3.16E+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	0.00E+00	l/kg

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

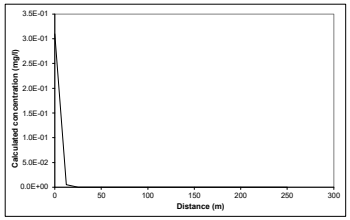
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	3.1E-01
12.5	5.09E-03
25.0	2.01E-04
37.5	9.12E-06
50.0	4.37E-07
62.5	2.16E-08
75.0	1.09E-09
87.5	5.59E-11
100.0	2.89E-12
112.5	1.51E-13
125.0	7.90E-15
137.5	4.16E-16
150.0	2.20E-17
162.5	1.17E-18
175.0	6.21E-20
187.5	3.31E-21
200.0	1.77E-22
212.5	9.46E-24
225.0	5.07E-25
237.5	2.72E-26
250.0	1.46E-27

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Aliphatic C16-C21			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	LoD

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		Aliphatic C16-C21		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.30E-01	mg/l	*BH01*
Half life for degradation of contaminant in water	$t_{1/2}$	5.30E+02	days	*Howard et al*
Calculated decay rate	λ	1.31E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	7.68E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	7.68E+00	m	BH01 = GW level recorded between 2.32mbgl and rockh
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	3.98E+08	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	0.00E+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	2.50E+01	6.86E+00	m
Transverse dispersivity	az	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	ay	0.00E+00	2.50E-01	6.86E-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	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	1.31E-03	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	7.44E-13	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.75E+11**	

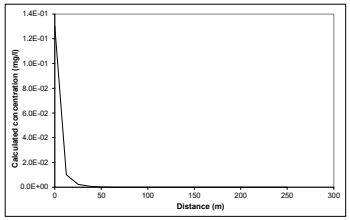
Remedial Targets

Remedial Target		**1.75E+08**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**7.44E-13**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.3E-01
12.5	9.95E-03
25.0	2.25E-03
37.5	5.84E-04
50.0	1.61E-04
62.5	4.56E-05
75.0	1.32E-05
87.5	3.89E-06
100.0	1.15E-06
112.5	3.45E-07
125.0	1.04E-07
137.5	3.14E-08
150.0	9.52E-09
162.5	2.90E-09
175.0	8.85E-10
187.5	2.71E-10
200.0	8.30E-11
212.5	2.55E-11
225.0	7.84E-12
237.5	2.41E-12
250.0	7.44E-13

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Aliphatic C12-C16			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	LoD

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		Aliphatic C12-C16		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.30E-01	mg/l	*BH01*
Half life for degradation of contaminant in water	$t_{1/2}$	4.40E+02	days	*Howard et al*
Calculated decay rate	λ	1.58E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	7.68E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	7.68E+00	m	BH01 = GW level recorded between 2.32mbgl and rockh
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	5.01E+06	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	0.00E+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	2.50E+01	6.86E+00	m
Transverse dispersivity	az	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	ay	0.00E+00	2.50E-01	6.86E-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

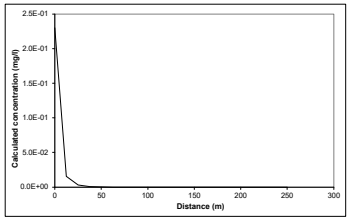
Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	1.58E-03	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	9.36E-14	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.46E+12**	

Remedial Targets

Remedial Target		**2.46E+09**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**250**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**9.36E-14**	**mg/l**	Domenico - Steady state

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:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	2.3E-01
12.5	1.54E-02
25.0	3.06E-03
37.5	6.95E-04
50.0	1.68E-04
62.5	4.17E-05
75.0	1.06E-05
87.5	2.73E-06
100.0	7.09E-07
112.5	1.86E-07
125.0	4.90E-08
137.5	1.30E-08
150.0	3.45E-09
162.5	9.20E-10
175.0	2.46E-10
187.5	6.60E-11
200.0	1.77E-11
212.5	4.77E-12
225.0	1.28E-12
237.5	3.47E-13
250.0	9.36E-14

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Aliphatic C21-C35			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	LoD

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		Aliphatic C21-C35		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)

Domenico - Steady state — 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 valu**

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	6.00E-01	mg/l	*BH01*
Half life for degradation of contaminant in water	$t_{1/2}$	7.30E+02	days	*Howard et al*
Calculated decay rate	λ	9.50E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	7.68E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	7.68E+00	m	BH01 = GW level recorded between 2.32mbgl and rockh
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	3.98E+08	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	0.00E+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	2.50E+01	6.86E+00	m
Transverse dispersivity	az	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	ay	0.00E+00	2.50E-01	6.86E-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	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	9.50E-04	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.86E-10	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.22E+09**	

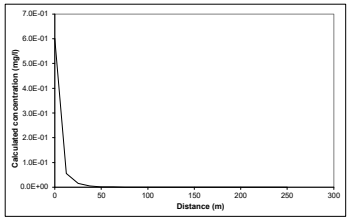
Remedial Targets

Remedial Target		**3.22E+06**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.86E-10**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	6.0E-01
12.5	5.61E-02
25.0	1.55E-02
37.5	4.91E-03
50.0	1.65E-03
62.5	5.72E-04
75.0	2.02E-04
87.5	7.25E-05
100.0	2.63E-05
112.5	9.60E-06
125.0	3.53E-06
137.5	1.30E-06
150.0	4.82E-07
162.5	1.79E-07
175.0	6.68E-08
187.5	2.50E-08
200.0	9.34E-09
212.5	3.50E-09
225.0	1.32E-09
237.5	4.95E-10
250.0	1.86E-10

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:	**JLR, Halewood, Liverpool**			
Site Address:	**JLR, Halewood, Liverpool**			
Completed by:	**HOL**			
Date:	**03-Mar-26**		**Version:**	**3.2**
Contaminant	**Anthracene**			
Target Concentration (C_T)	**0.00001**	**mg/l**	**Origin of C_T:**	**LoD**

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		Anthracene		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.30E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	9.20E+02	days	*Howard et al*
Calculated decay rate	λ	7.54E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	3.17E+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	0.00E+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	2.50E+01	6.86E+00	m
Transverse dispersivity	az	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	ay	0.00E+00	2.50E-01	6.86E-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

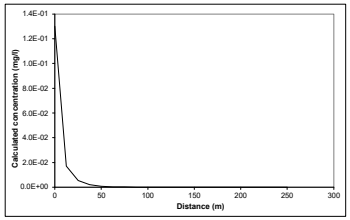
Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	7.54E-04	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	6.07E-10	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.14E+08**	

Remedial Targets

Remedial Target		**2.14E+03**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**250**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**6.07E-10**	**mg/l**	Domenico - Steady state

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:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.3E-01
12.5	1.69E-02
25.0	5.32E-03
37.5	1.91E-03
50.0	7.29E-04
62.5	2.86E-04
75.0	1.15E-04
87.5	4.67E-05
100.0	1.92E-05
112.5	7.93E-06
125.0	3.30E-06
137.5	1.38E-06
150.0	5.79E-07
162.5	2.44E-07
175.0	1.03E-07
187.5	4.36E-08
200.0	1.85E-08
212.5	7.85E-09
225.0	3.34E-09
237.5	1.42E-09
250.0	6.07E-10

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Aromatic C10-C12			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	LoD

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		Aromatic C10-C12		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	5.40E-02	mg/l	*BH08*
Half life for degradation of contaminant in water	$t_{1/2}$	1.02E+02	days	*Howard et al*
Calculated decay rate	λ	6.80E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.20E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.20E+00	m	BH08 = GW level recorded between 0.80mbgl and rockh
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	6.80E-03	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	2.46E-28	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.20E+26**	

Remedial Targets

Remedial Target		**2.20E+23**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**250**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**2.46E-28**	**mg/l**	Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	3.16E+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	0.00E+00	l/kg

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

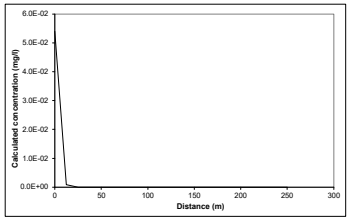
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	5.4E-02
12.5	8.57E-04
25.0	3.39E-05
37.5	1.53E-06
50.0	7.36E-08
62.5	3.64E-09
75.0	1.84E-10
87.5	9.41E-12
100.0	4.87E-13
112.5	2.54E-14
125.0	1.33E-15
137.5	7.00E-17
150.0	3.70E-18
162.5	1.96E-19
175.0	1.04E-20
187.5	5.57E-22
200.0	2.97E-23
212.5	1.59E-24
225.0	8.52E-26
237.5	4.57E-27
250.0	2.46E-28

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Aromatic C12-C16			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	LoD

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		Aromatic C12-C16		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)

Domenico - Steady state — 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 valu**

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.60E-01	mg/l	*BH08*
Half life for degradation of contaminant in water	$t_{1/2}$	4.40E+02	days	*Howard et al*
Calculated decay rate	λ	1.58E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.20E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.20E+00	m	BH08 = GW level recorded between 0.80mbgl and rockh
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	1.58E-03	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	7.80E-14	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**2.05E+12**	

Remedial Targets

Remedial Target		**2.05E+09**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**250**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**7.80E-14**	**mg/l**	Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	6.31E+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	0.00E+00	l/kg

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

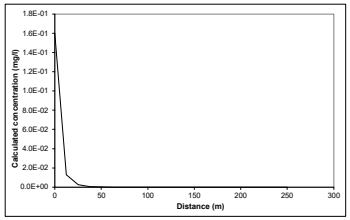
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	**1.6E-01**
12.5	**1.28E-02**
25.0	**2.54E-03**
37.5	**5.78E-04**
50.0	**1.39E-04**
62.5	**3.47E-05**
75.0	**8.81E-06**
87.5	**2.27E-06**
100.0	**5.90E-07**
112.5	**1.55E-07**
125.0	**4.08E-08**
137.5	**1.08E-08**
150.0	**2.87E-09**
162.5	**7.66E-10**
175.0	**2.05E-10**
187.5	**5.49E-11**
200.0	**1.48E-11**
212.5	**3.97E-12**
225.0	**1.07E-12**
237.5	**2.89E-13**
250.0	**7.80E-14**

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Aromatic C16-C21			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	LoD

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 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		Aromatic C16-C21		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)

Domenico - Steady state — 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 valu**

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.30E-01	mg/l	*BH08*
Half life for degradation of contaminant in water	$t_{1/2}$	5.30E+02	days	*Howard et al*
Calculated decay rate	λ	1.31E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.20E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.20E+00	m	BH08 = GW level recorded between 0.80mbgl and rockh
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	1.31E-03	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	8.91E-13	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.46E+11**	

Remedial Targets

Remedial Target		**1.46E+08**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**8.91E-13**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	1.58E+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	0.00E+00	l/kg

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

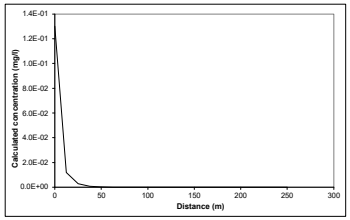
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-02	m

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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.3E-01
12.5	1.18E-02
25.0	2.69E-03
37.5	6.98E-04
50.0	1.92E-04
62.5	5.46E-05
75.0	1.58E-05
87.5	4.65E-06
100.0	1.38E-06
112.5	4.13E-07
125.0	1.24E-07
137.5	3.76E-08
150.0	1.14E-08
162.5	3.47E-09
175.0	1.06E-09
187.5	3.24E-10
200.0	9.94E-11
212.5	3.05E-11
225.0	9.38E-12
237.5	2.89E-12
250.0	8.91E-13

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Aromatic C21-C35			
Target Concentration (C_T)	0.001	mg/l	Origin of C_T:	LoD

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		Aromatic C21-C35		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.80E-01	mg/l	*BH01*
Half life for degradation of contaminant in water	$t_{1/2}$	7.30E+02	days	*Howard et al*
Calculated decay rate	λ	9.50E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	7.68E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	7.68E+00	m	BH01 = GW level recorded between 2.32mbgl and rockh
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	1.26E+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	0.00E+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	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-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

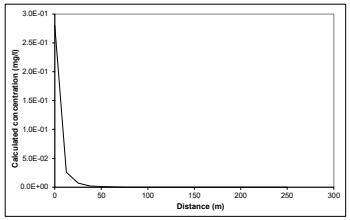
Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	9.50E-04	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	8.69E-11	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.22E+09**	

Remedial Targets

Remedial Target		**3.22E+06**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**250**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**8.69E-11**	**mg/l**	Domenico - Steady state

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:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	2.8E-01
12.5	2.62E-02
25.0	7.22E-03
37.5	2.29E-03
50.0	7.69E-04
62.5	2.67E-04
75.0	9.44E-05
87.5	3.39E-05
100.0	1.23E-05
112.5	4.48E-06
125.0	1.65E-06
137.5	6.07E-07
150.0	2.25E-07
162.5	8.37E-08
175.0	3.12E-08
187.5	1.17E-08
200.0	4.36E-09
212.5	1.64E-09
225.0	6.14E-10
237.5	2.31E-10
250.0	8.69E-11

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Arsenic			
Target Concentration (C_T)	0.1	mg/l	Origin of C_T:	MRV

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	1.00E-01	mg/l	from Level 1

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

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.14E-02	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+08	days	*Assumed no decay*
Calculated decay rate	λ	6.93E-09	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-01	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Glacial till 1X10-6(Freeze and Cheery 197*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.51E+03	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-02	m/d
Retardation factor	Rf	2.74E+04	fraction
Decay rate used	λ	6.93E-09	d^{-1}
Rate of contaminant flow due to retardation	u	1.57E-06	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	5.24E-04	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**4.08E+01**	

Remedial Targets

Remedial Target		**4.08E+00**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**250**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**5.24E-04**	**mg/l**	Domenico - Steady state

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	2.51E+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	2.51E+03	l/kg

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

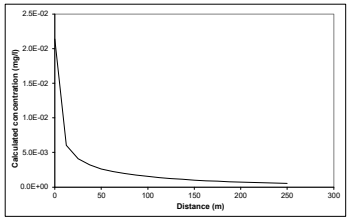
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	2.1E-02
12.5	6.04E-03
25.0	4.11E-03
37.5	3.21E-03
50.0	2.65E-03
62.5	2.26E-03
75.0	1.96E-03
87.5	1.73E-03
100.0	1.54E-03
112.5	1.38E-03
125.0	1.24E-03
137.5	1.13E-03
150.0	1.03E-03
162.5	9.37E-04
175.0	8.58E-04
187.5	7.87E-04
200.0	7.23E-04
212.5	6.66E-04
225.0	6.14E-04
237.5	5.67E-04
250.0	5.24E-04

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Benzo(a)anthracene			
Target Concentration (C_T)	0.00001	mg/l	Origin of C_T:	LoD

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(a)anthracene		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.70E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.36E+03	days	*Howard et al*
Calculated decay rate	λ	5.09E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	5.09E-04	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	2.89E-08	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**5.88E+06**	

Remedial Targets

Remedial Target		**5.88E+01**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**250**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**2.89E-08**	**mg/l**	Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	1.48E+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	0.00E+00	l/kg

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

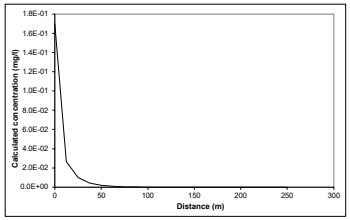
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.7E-01
12.5	2.65E-02
25.0	9.97E-03
37.5	4.29E-03
50.0	1.96E-03
62.5	9.20E-04
75.0	4.41E-04
87.5	2.15E-04
100.0	1.06E-04
112.5	5.23E-05
125.0	2.60E-05
137.5	1.30E-05
150.0	6.55E-06
162.5	3.30E-06
175.0	1.67E-06
187.5	8.45E-07
200.0	4.29E-07
212.5	2.18E-07
225.0	1.11E-07
237.5	5.66E-08
250.0	2.89E-08

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:	**JLR, Halewood, Liverpool**			
Site Address:	**JLR, Halewood, Liverpool**			
Completed by:	**HOL**			
Date:	**03-Mar-26**		**Version:**	**3.2**
Contaminant	**Benzo(a)pyrene**			
Target Concentration (C_T)	**0.0001**	**mg/l**	**Origin of C_T:**	**MRV**

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(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)

Domenico - Steady state — 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 valu**

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.60E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.06E+03	days	*Howard et al*
Calculated decay rate	λ	6.55E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	6.55E-04	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	2.95E-09	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**5.42E+07**	

Remedial Targets

Remedial Target		**5.42E+03**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**2.95E-09**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	4.02E+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	0.00E+00	l/kg

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

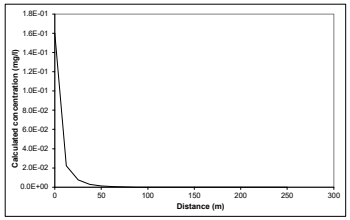
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	**1.6E-01**
12.5	**2.23E-02**
25.0	**7.51E-03**
37.5	**2.89E-03**
50.0	**1.18E-03**
62.5	**4.97E-04**
75.0	**2.13E-04**
87.5	**9.29E-05**
100.0	**4.09E-05**
112.5	**1.81E-05**
125.0	**8.07E-06**
137.5	**3.62E-06**
150.0	**1.63E-06**
162.5	**7.34E-07**
175.0	**3.32E-07**
187.5	**1.50E-07**
200.0	**6.83E-08**
212.5	**3.11E-08**
225.0	**1.42E-08**
237.5	**6.46E-09**
250.0	**2.95E-09**

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:	**JLR, Halewood, Liverpool**			
Site Address:	**JLR, Halewood, Liverpool**			
Completed by:	**HOL**			
Date:	**03-Mar-26**		**Version:**	**3.2**
Contaminant	**Benzo(b)fluoranthene**			
Target Concentration (C_T)	**0.0001**	**mg/l**	**Origin of C_T:**	**MRV**

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		Benzo(b)fluoranthene		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.20E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.22E+03	days	*Howard et al*
Calculated decay rate	λ	5.69E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	5.69E-04	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.46E-08	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.50E+07**	

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	4.41E+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	0.00E+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	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-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

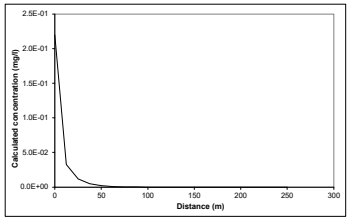
Remedial Targets

Remedial Target		**1.50E+03**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.46E-08**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	2.2E-01
12.5	3.27E-02
25.0	1.17E-02
37.5	4.82E-03
50.0	2.10E-03
62.5	9.41E-04
75.0	4.31E-04
87.5	2.00E-04
100.0	9.38E-05
112.5	4.43E-05
125.0	2.11E-05
137.5	1.01E-05
150.0	4.83E-06
162.5	2.32E-06
175.0	1.12E-06
187.5	5.41E-07
200.0	2.62E-07
212.5	1.27E-07
225.0	6.18E-08
237.5	3.00E-08
250.0	1.46E-08

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Benzo(ghi)perylene			
Target Concentration (C_T)	0.0001	mg/l	Origin of C_T:	MRV

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(ghi)perylene		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.10E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.31E+03	days	*Howard et al*
Calculated decay rate	λ	5.28E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	5.28E-04	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.39E-08	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**7.90E+06**	

Remedial Targets

Remedial Target		**7.90E+02**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.39E-08**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	2.32E+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	0.00E+00	l/kg

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

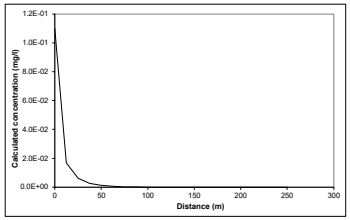
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.1E-01
12.5	1.69E-02
25.0	6.26E-03
37.5	2.66E-03
50.0	1.19E-03
62.5	5.53E-04
75.0	2.61E-04
87.5	1.25E-04
100.0	6.07E-05
112.5	2.96E-05
125.0	1.45E-05
137.5	7.17E-06
150.0	3.55E-06
162.5	1.76E-06
175.0	8.78E-07
187.5	4.38E-07
200.0	2.19E-07
212.5	1.10E-07
225.0	5.51E-08
237.5	2.77E-08
250.0	1.39E-08

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Benzo(k)fluoranthene			
Target Concentration (C_T)	0.0001	mg/l	Origin of C_T:	MRV

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	1.00E-04	mg/l	from Level 1

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

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.10E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	4.27E+03	days	*Howard et al*
Calculated decay rate	λ	1.62E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	1.62E-04	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	2.00E-05	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**5.51E+03**	

Remedial Targets

Remedial Target		**5.51E-01**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**2.00E-05**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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 — 0.00E+00 — fraction

Organic carbon partition coefficient — Koc — 1.10E+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 — 0.00E+00 — l/kg

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

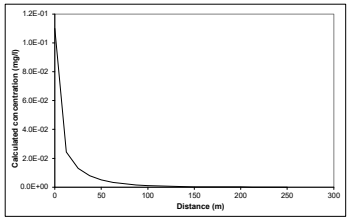
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.1E-01
12.5	2.43E-02
25.0	1.29E-02
37.5	7.90E-03
50.0	5.10E-03
62.5	3.40E-03
75.0	2.31E-03
87.5	1.59E-03
100.0	1.11E-03
112.5	7.80E-04
125.0	5.50E-04
137.5	3.90E-04
150.0	2.78E-04
162.5	1.99E-04
175.0	1.42E-04
187.5	1.02E-04
200.0	7.34E-05
212.5	5.29E-05
225.0	3.82E-05
237.5	2.76E-05
250.0	2.00E-05

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:	**JLR, Halewood, Liverpool**			
Site Address:	**JLR, Halewood, Liverpool**			
Completed by:	**HOL**			
Date:	**03-Mar-26**		**Version:**	**3.2**
Contaminant	**Chrysene**			
Target Concentration (C_T)	**0.00001**	**mg/l**	**Origin of C_T:**	**LoD**

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		Chrysene		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.30E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	2.00E+03	days	*Howard et al*
Calculated decay rate	λ	3.47E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	3.47E-04	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	3.86E-07	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.37E+05**	

Remedial Targets

Remedial Target		**3.37E+00**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**250**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**3.86E-07**	**mg/l**	Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	9.92E+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	0.00E+00	l/kg

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

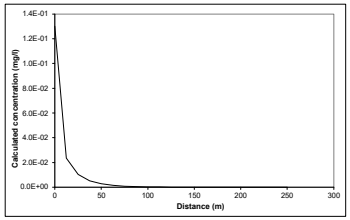
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-02	m

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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.3E-01
12.5	2.34E-02
25.0	1.01E-02
37.5	5.04E-03
50.0	2.65E-03
62.5	1.44E-03
75.0	7.96E-04
87.5	4.47E-04
100.0	2.53E-04
112.5	1.45E-04
125.0	8.32E-05
137.5	4.80E-05
150.0	2.78E-05
162.5	1.62E-05
175.0	9.44E-06
187.5	5.52E-06
200.0	3.23E-06
212.5	1.90E-06
225.0	1.11E-06
237.5	6.55E-07
250.0	3.86E-07

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Dibenzo(ah)anthracene			
Target Concentration (C_T)	0.00001	mg/l	Origin of C_T:	LoD

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		Dibenzo(ah)anthracene		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)

Domenico - Steady state — 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 valu

				Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.50E-02	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.88E+03	days	*Howard et al*
Calculated decay rate	λ	3.69E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters | Variable

Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	3.69E-04	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	4.85E-08	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**5.15E+05**	

Remedial Targets

Remedial Target		**5.15E+00**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**250**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**4.85E-08**	**mg/l**	Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	4.41E+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	0.00E+00	l/kg

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

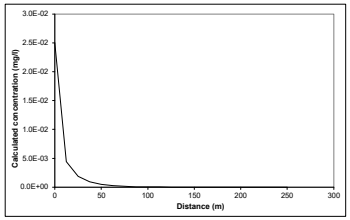
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-02	m

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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	**2.5E-02**
12.5	**4.40E-03**
25.0	**1.87E-03**
37.5	**9.09E-04**
50.0	**4.68E-04**
62.5	**2.49E-04**
75.0	**1.35E-04**
87.5	**7.41E-05**
100.0	**4.11E-05**
112.5	**2.30E-05**
125.0	**1.29E-05**
137.5	**7.32E-06**
150.0	**4.15E-06**
162.5	**2.36E-06**
175.0	**1.35E-06**
187.5	**7.72E-07**
200.0	**4.43E-07**
212.5	**2.54E-07**
225.0	**1.46E-07**
237.5	**8.42E-08**
250.0	**4.85E-08**

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:	**JLR, Halewood, Liverpool**			
Site Address:	**JLR, Halewood, Liverpool**			
Completed by:	**HOL**			
Date:	**03-Mar-26**		**Version:**	**3.2**
Contaminant	**Fluoranthene**			
Target Concentration (C_T)	**0.0001**	**mg/l**	**Origin of C_T:**	**MRV**

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		Fluoranthene		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	4.50E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	8.80E+02	days	*Howard et al*
Calculated decay rate	λ	7.88E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	7.88E-04	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.33E-09	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.39E+08**	

Remedial Targets

Remedial Target		**3.39E+04**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.33E-09**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	5.90E+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	0.00E+00	l/kg

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

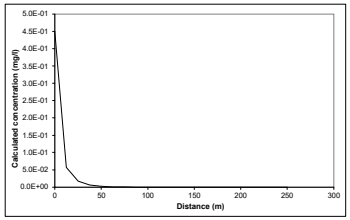
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-02	m

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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	4.5E-01
12.5	5.73E-02
25.0	1.76E-02
37.5	6.18E-03
50.0	2.30E-03
62.5	8.84E-04
75.0	3.46E-04
87.5	1.38E-04
100.0	5.52E-05
112.5	2.23E-05
125.0	9.08E-06
137.5	3.71E-06
150.0	1.52E-06
162.5	6.27E-07
175.0	2.59E-07
187.5	1.07E-07
200.0	4.43E-08
212.5	1.84E-08
225.0	7.65E-09
237.5	3.19E-09
250.0	1.33E-09

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Fluorine			
Target Concentration (C_T)	0.00001	mg/l	Origin of C_T:	LoD

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		Fluorine		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	8.90E-02	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.20E+02	days	*Howard et al*
Calculated decay rate	λ	5.78E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	5.78E-03	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	5.51E-26	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.62E+24**	

Remedial Targets

Remedial Target		**1.62E+19**	**mg/l**	For comparison with measured groundwater concentration.
Domenico - Steady state				
Distance to compliance point		**250**	**m**	
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**5.51E-26**	**mg/l**	Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	2.37E+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	0.00E+00	l/kg

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

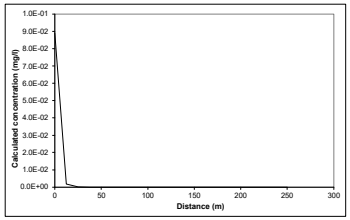
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-02	m

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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	8.9E-02
12.5	1.86E-03
25.0	9.41E-05
37.5	5.44E-06
50.0	3.33E-07
62.5	2.10E-08
75.0	1.36E-09
87.5	8.86E-11
100.0	5.84E-12
112.5	3.89E-13
125.0	2.60E-14
137.5	1.75E-15
150.0	1.18E-16
162.5	7.98E-18
175.0	5.42E-19
187.5	3.69E-20
200.0	2.51E-21
212.5	1.72E-22
225.0	1.17E-23
237.5	8.03E-25
250.0	5.51E-26

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:	**JLR, Halewood, Liverpool**			
Site Address:	**JLR, Halewood, Liverpool**			
Completed by:	**HOL**			
Date:	**03-Mar-26**		**Version:**	**3.2**
Contaminant	**Indeno(123)pyrene**			
Target Concentration (C_T)	**0.0001**	**mg/l**	**Origin of C_T:**	**MRV**

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		Indeno(123)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)

Domenico - Steady state — 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 valu**

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.10E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.46E+03	days	*Howard et al*
Calculated decay rate	λ	4.75E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	4.75E-04	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	3.29E-08	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**3.34E+06**	

Remedial Targets

Remedial Target		**3.34E+02**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**3.29E-08**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	9.23E+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	0.00E+00	l/kg

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

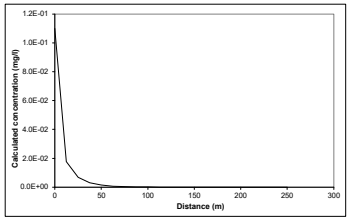
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-02	m

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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.1E-01
12.5	1.76E-02
25.0	6.82E-03
37.5	3.02E-03
50.0	1.42E-03
62.5	6.85E-04
75.0	3.38E-04
87.5	1.69E-04
100.0	8.56E-05
112.5	4.36E-05
125.0	2.23E-05
137.5	1.15E-05
150.0	5.95E-06
162.5	3.08E-06
175.0	1.60E-06
187.5	8.35E-07
200.0	4.36E-07
212.5	2.28E-07
225.0	1.19E-07
237.5	6.27E-08
250.0	3.29E-08

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Napthalene			
Target Concentration (C_T)	0.0001	mg/l	Origin of C_T:	LoD

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.

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Nickel			
Target Concentration (C_T)	0.2	mg/l	Origin of C_T:	MRV

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-01	mg/l	from Level 1

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

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	2.43E-02	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+08	days	*Assumed no decay*
Calculated decay rate	λ	6.93E-09	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-01	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	5.63E+03	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-02	m/d
Retardation factor	Rf	6.15E+04	fraction
Decay rate used	λ	6.93E-09	d^{-1}
Rate of contaminant flow due to retardation	u	7.02E-07	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	2.09E-04	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.16E+02**	

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	5.63E+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	5.63E+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	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-02	m

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

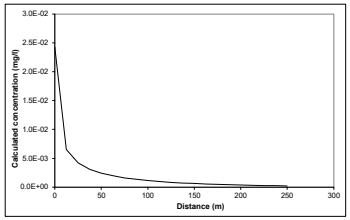
Remedial Targets

Remedial Target		**2.33E+01**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**2.09E-04**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	2.4E-02
12.5	6.51E-03
25.0	4.21E-03
37.5	3.11E-03
50.0	2.44E-03
62.5	1.97E-03
75.0	1.63E-03
87.5	1.36E-03
100.0	1.15E-03
112.5	9.77E-04
125.0	8.36E-04
137.5	7.19E-04
150.0	6.21E-04
162.5	5.38E-04
175.0	4.68E-04
187.5	4.07E-04
200.0	3.55E-04
212.5	3.10E-04
225.0	2.72E-04
237.5	2.38E-04
250.0	2.09E-04

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Phenanthrene			
Target Concentration (C_T)	0.00001	mg/l	Origin of C_T:	LoD

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		Phenanthrene		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	4.50E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	4.02E+02	days	*Howard et al*
Calculated decay rate	λ	1.73E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	1.73E-03	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	5.62E-14	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**8.00E+12**	

Remedial Targets

Remedial Target		**8.00E+07**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**5.62E-14**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	4.55E+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	0.00E+00	l/kg

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

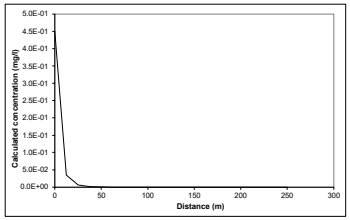
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-02	m

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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	4.5E-01
12.5	3.46E-02
25.0	6.43E-03
37.5	1.37E-03
50.0	3.07E-04
62.5	7.13E-05
75.0	1.69E-05
87.5	4.05E-06
100.0	9.83E-07
112.5	2.40E-07
125.0	5.91E-08
137.5	1.46E-08
150.0	3.62E-09
162.5	9.01E-10
175.0	2.25E-10
187.5	5.62E-11
200.0	1.41E-11
212.5	3.53E-12
225.0	8.87E-13
237.5	2.23E-13
250.0	5.62E-14

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Pyrene			
Target Concentration (C_T)	0.00001	mg/l	Origin of C_T:	LoD

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		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)

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	4.10E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	3.80E+03	days	*Howard et al*
Calculated decay rate	λ	1.83E-04	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	1.83E-04	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	4.40E-05	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**9.32E+03**	

Remedial Targets

Remedial Target		**9.32E-02**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**4.40E-05**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	6.72E+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	0.00E+00	l/kg

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

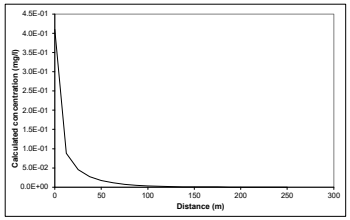
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	4.1E-01
12.5	8.83E-02
25.0	4.58E-02
37.5	2.72E-02
50.0	1.71E-02
62.5	1.11E-02
75.0	7.36E-03
87.5	4.95E-03
100.0	3.35E-03
112.5	2.29E-03
125.0	1.58E-03
137.5	1.09E-03
150.0	7.56E-04
162.5	5.26E-04
175.0	3.67E-04
187.5	2.57E-04
200.0	1.80E-04
212.5	1.26E-04
225.0	8.87E-05
237.5	6.24E-05
250.0	4.40E-05

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:	JLR, Halewood, Liverpool			
Site Address:	JLR, Halewood, Liverpool			
Completed by:	HOL			
Date:	03-Mar-26		Version:	3.2
Contaminant	Sulphate			
Target Concentration (C_T)	0.25	mg/l	Origin of C_T:	MRV

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		Sulphate		from Level 1
Target Concentration	C_T	2.50E-01	mg/l	from Level 1

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

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	3.10E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	1.00E+08	days	*Assumed no decay*
Calculated decay rate	λ	6.93E-09	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	2.14E+01	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable	
Groundwater flow velocity	v	4.32E-03 m/d
Retardation factor	Rf	2.35E+02 fraction
Decay rate used	λ	6.93E-09 d^{-1}
Rate of contaminant flow due to retardation	u	1.84E-05 m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	1.88E-02 mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.65E+01**

Remedial Targets

Remedial Target		**4.12E+00**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**1.88E-02**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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 — 2.14E+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 — 2.14E+01 l/kg

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

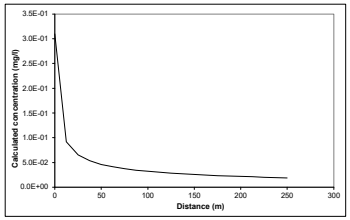
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-02	m

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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	3.1E-01
12.5	9.16E-02
25.0	6.53E-02
37.5	5.33E-02
50.0	4.60E-02
62.5	4.10E-02
75.0	3.73E-02
87.5	3.44E-02
100.0	3.20E-02
112.5	3.00E-02
125.0	2.84E-02
137.5	2.69E-02
150.0	2.56E-02
162.5	2.45E-02
175.0	2.34E-02
187.5	2.25E-02
200.0	2.16E-02
212.5	2.09E-02
225.0	2.01E-02
237.5	1.94E-02
250.0	1.88E-02

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	1.00E-04	mg/l	from Level 1

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

Domenico - Steady state — 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 valu

	Variable	Value	Unit	Source of parameter value
Initial contaminant concentration in groundwater at plume core	C_0	1.70E-01	mg/l	*BH02*
Half life for degradation of contaminant in water	$t_{1/2}$	2.58E+02	days	*Howard et al*
Calculated decay rate	λ	2.69E-03	$days^{-1}$	
Width of plume in aquifer at source (perpendicular to flow)	Sz	1.65E+02	m	*Maximum width of site (W-E)*
Plume thickness at source	Sy	9.53E-01	m	*10% aquifer thickness*
Saturated aquifer thickness	da	9.53E+00	m	GW level recorded between 0.47mbgl and rockhead lev
Bulk density of aquifer materials	ρ	2.19E+00	g/cm^3	*Sandstone (Freeze and Cheery 1979)*
Effective porosity of aquifer	n	2.00E-01	fraction	*Sandstone (Freeze and Cheery 1979)*
Hydraulic gradient	i	1.00E-02	fraction	*Published Merseyside Permo-Triassic sandstone aquifer gradient*
Hydraulic conductivity of aquifer	K	8.64E-02	m/d	*Sandstone (Freeze and Cheery 1979)*
Distance to compliance point	x	2.50E+02	m	*as per EA guidance in urban area*
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+100	days	*time variant options only*
Parameters values determined from options				
Partition coefficient	Kd	0.00E+00	l/kg	*see options*
Longitudinal dispersivity	ax	2.50E+01	m	*see options*
Transverse dispersivity	az	2.50E+00	m	*see options*
Vertical dispersivity	ay	2.50E-01	m	*see options*

Calculated Parameters

	Variable		
Groundwater flow velocity	v	4.32E-03	m/d
Retardation factor	Rf	1.00E+00	fraction
Decay rate used	λ	2.69E-03	d^{-1}
Rate of contaminant flow due to retardation	u	4.32E-03	m/d
Contaminant concentration at distance x, assuming one-way vertical dispersion	C_{ED}	9.19E-18	mg/l
Attenuation factor (one way vertical dispersion, CO/CED)	**AF**	**1.85E+16**	

Remedial Targets

Remedial Target		**1.85E+12**	**mg/l**
Domenico - Steady state			
Distance to compliance point		**250**	**m**
Concentration of contaminant at compliance point	**C_{ED}/C_0**	**9.19E-18**	**mg/l**

For comparison with measured groundwater concentration.

Domenico - Steady state

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	0.00E+00	fraction
Organic carbon partition coefficient	Koc	4.99E+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	0.00E+00	l/kg

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

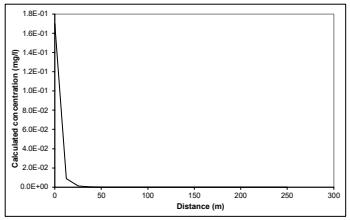
Dispersivities 10%, 1%, 0.1% of pathway length

		Enter value	Calc value Xu & Eckstein		
Longitudinal dispersivity	**ax**	0.00E+00	2.50E+01	6.86E+00	m
Transverse dispersivity	**az**	0.00E+00	2.50E+00	6.86E-01	m
Vertical dispersivity	**ay**	0.00E+00	2.50E-01	6.86E-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

Site being assessed:	JLR, Halewood, Liverpool
Completed by:	HOL
Date:	########
Version:	3.2

Calculated concentrations for distance-concentration graph

Domenico - Steady state
From calculation sheet

Distance	Concentration
	mg/l
0	1.7E-01
12.5	8.88E-03
25.0	1.12E-03
37.5	1.61E-04
50.0	2.46E-05
62.5	3.88E-06
75.0	6.25E-07
87.5	1.02E-07
100.0	1.68E-08
112.5	2.78E-09
125.0	4.64E-10
137.5	7.79E-11
150.0	1.31E-11
162.5	2.21E-12
175.0	3.75E-13
187.5	6.37E-14
200.0	1.08E-14
212.5	1.84E-15
225.0	3.15E-16
237.5	5.38E-17
250.0	9.19E-18

Appendix 06

Haz-Waste online Screening Report

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

RTRXA-M05MA-LSDOI

Report is invalid if pages are removed.

Job name

JLR, Halewood, Liverpool

Description/Comments

To assess potential excess material for offsite disposal as part of a car park development.

Project

LW25-136

Site

JLR, Halewood, Liverpool

Classified by

Name:
Hugh O Leary
Date:
22 Feb 2026 13:54 GMT
Telephone:
07342938690

Company:
LandWise Consulting Ltd
Cambuslang
Glasgow
G72 8BD

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification: **CERTIFIED**

Course	Date
Hazardous Waste Classification	04 Dec 2025

Next 3 year Refresher due by Dec 2028

Purpose of classification

2 - Material Characterisation

Address of the waste

Eastlands, JLR, Halewood, Liverpool **Post Code** L249LE

SIC for the process giving rise to the waste

41201 Construction of commercial buildings

Description of industry/producer giving rise to the waste

car manufacturing and land development

Description of the specific process, sub-process and/or activity that created the waste

car manufacturing and waste soils from the development of other sites within the Halewood Facility.

Description of the waste

The majority of the made ground deposits were typically sandy gravelly clay soils with much extraneous material, predominantly demolition rubble with timber, ceramic, glass, burnt shale with more rare waste materials such as slag and ash. Locally made ground was more granular including crushed brick ‘orange fine to coarse angular gravel of crushed brick and blaes with abundant whole bricks’ or demolition materials without significant soil matrix ‘multicoloured sandy gravelly cobbles and boulders of demolition rubble with rare timber.

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	BH01	0.80	Non Hazardous		3
2	BH02	3.00	Non Hazardous		5
3	BH03	3.00	Non Hazardous		7
4	BH04	0.50	Non Hazardous		9
5	BH05	1.00	Non Hazardous		11
6	BH06	1.00	Hazardous	HP 7	13
7	BH07	3.00	Non Hazardous		15
8	BH08	0.50	Non Hazardous		17
9	BH09	2.00	Non Hazardous		19
10	BH10	3.00	Non Hazardous		21
11	BH11	0.50	Non Hazardous		23
12	BH12	2.00	Non Hazardous		25
13	BH13	0.80	Non Hazardous		27
14	BH14	0.50	Non Hazardous		29
15	BH15	3.00	Non Hazardous		31
16	BH16	0.50	Non Hazardous		33
17	BH18	0.80	Non Hazardous		35
18	BH19	0.50	Hazardous	HP 8	37
19	BH20	1.00	Non Hazardous		39
20	BH21	0.80	Non Hazardous		41
21	BH22	2.50	Non Hazardous		43
22	BH23	1.00	Non Hazardous		45
23	BH24	0.80	Non Hazardous		47
24	BH25	0.80	Non Hazardous		49
25	TP01	0.50	Non Hazardous		51
26	TP02	0.50	Non Hazardous		53
27	TP03	0.50	Non Hazardous		55
28	TP04	0.40	Non Hazardous		57
29	TP05	0.50	Non Hazardous		59
30	TP06	0.80	Non Hazardous		61
31	TP07	0.20	Non Hazardous		63
32	TP08	1.00	Hazardous	HP 8	65
33	TP09	0.80	Non Hazardous		67
34	TP10	0.50	Non Hazardous		69
35	TP11	0.20	Hazardous	HP 8	71
36	TP12	0.60	Non Hazardous		73
37	TP13	2.20	Non Hazardous		76
38	TP14	1.20	Non Hazardous		79
39	TP15	1.00	Non Hazardous		81

Related documents

#	Name	Description
1	Example worst case waste stream template: 17 05 04 or 17 05 03 *	waste stream template used to create this Job

Report

Created by: Hugh O Leary

Created date: 22 Feb 2026 13:54 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	83
Appendix B: Rationale for selection of metal species	84
Appendix C: Version	85

Classification of sample: BH01

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH01
Sample Depth:
0.80 m
Moisture content:
11%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 11% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				5.1 mg/kg	1.895	8.705 mg/kg	0.00087 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.3 mg/kg	5.719	1.546 mg/kg	0.000155 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		<0.1 mg/kg	1.855	<0.185 mg/kg	<0.0000185 %		<**LOD**
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		19 mg/kg	1.462	25.018 mg/kg	0.0025 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		12 mg/kg	3.929	42.476 mg/kg	0.00425 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	5.2 mg/kg		4.685 mg/kg	0.000468 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		22 mg/kg	5.358	106.201 mg/kg	0.0106 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		31 mg/kg	2.774	77.476 mg/kg	0.00775 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		9.4 pH		9.4 pH	9.4 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
21		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
22		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0266 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH02

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH02
Sample Depth:
3.00 m
Moisture content:
15%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 15% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				6.9 mg/kg	1.895	11.367 mg/kg	0.00114 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.5 mg/kg	5.719	2.487 mg/kg	0.000249 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.2 mg/kg	1.855	0.323 mg/kg	0.0000323 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		28 mg/kg	1.462	35.586 mg/kg	0.00356 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		16 mg/kg	3.929	54.665 mg/kg	0.00547 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	26 mg/kg		22.609 mg/kg	0.00226 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		19 mg/kg	5.358	88.529 mg/kg	0.00885 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		39 mg/kg	2.774	94.08 mg/kg	0.00941 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		10.4 pH		10.4 pH	10.4 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
21		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
22		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.031 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH03

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH03
Sample Depth:
3.00 m
Moisture content:
16%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 16% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				7.3 mg/kg	1.895	11.922 mg/kg	0.00119 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.8 mg/kg	5.719	3.944 mg/kg	0.000394 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.2 mg/kg	1.855	0.32 mg/kg	0.000032 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		59 mg/kg	1.462	74.338 mg/kg	0.00743 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		600 mg/kg	3.929	2032.269 mg/kg	0.203 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	72 mg/kg		62.069 mg/kg	0.00621 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.08 mg/kg	1.353	0.0933 mg/kg	0.00000933 %	✓	
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		13 mg/kg	5.358	60.05 mg/kg	0.00601 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		56 mg/kg	2.774	133.924 mg/kg	0.0134 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				0.1 mg/kg	1.884	0.162 mg/kg	0.0000162 %	✓	
14	pH			PH		10.4 pH		10.4 pH	10.4 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				0.53	mg/kg		0.457	mg/kg	0.0000457 %	✓	
			201-469-6	83-32-9									
18		fluorene				0.31	mg/kg		0.267	mg/kg	0.0000267 %	✓	
			201-695-5	86-73-7									
19		phenanthrene				1.1	mg/kg		0.948	mg/kg	0.0000948 %	✓	
			201-581-5	85-01-8									
20		anthracene				0.5	mg/kg		0.431	mg/kg	0.0000431 %	✓	
			204-371-1	120-12-7									
21		fluoranthene				1.1	mg/kg		0.948	mg/kg	0.0000948 %	✓	
			205-912-4	206-44-0									
22		pyrene				1.1	mg/kg		0.948	mg/kg	0.0000948 %	✓	
			204-927-3	129-00-0									
23		benzo[a]anthracene				0.25	mg/kg		0.216	mg/kg	0.0000216 %	✓	
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				0.4	mg/kg		0.345	mg/kg	0.0000345 %	✓	
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				0.39	mg/kg		0.336	mg/kg	0.0000336 %	✓	
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				0.23	mg/kg		0.198	mg/kg	0.0000198 %	✓	
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				0.94	mg/kg		0.81	mg/kg	0.000081 %	✓	
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				0.36	mg/kg		0.31	mg/kg	0.000031 %	✓	
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				0.39	mg/kg		0.336	mg/kg	0.0000336 %	✓	
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				0.19	mg/kg		0.164	mg/kg	0.0000164 %	✓	
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.239 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH04

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH04
Sample Depth:
0.50 m
Moisture content:
10%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 10% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				7.4 mg/kg	1.895	12.745 mg/kg	0.00127 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1.9 mg/kg	5.719	9.879 mg/kg	0.000988 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.2 mg/kg	1.855	0.337 mg/kg	0.0000337 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		26 mg/kg	1.462	34.546 mg/kg	0.00345 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		18 mg/kg	3.929	64.294 mg/kg	0.00643 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	47 mg/kg		42.727 mg/kg	0.00427 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.18 mg/kg	1.353	0.221 mg/kg	0.0000221 %	✓	
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		18 mg/kg	5.358	87.682 mg/kg	0.00877 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		37 mg/kg	2.774	93.312 mg/kg	0.00933 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		8.5 pH		8.5 pH	8.5 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		0.29 mg/kg		0.264 mg/kg	0.0000264 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				0.33	mg/kg		0.3	mg/kg	0.00003 %	✓	
			201-469-6	83-32-9									
18		fluorene				0.25	mg/kg		0.227	mg/kg	0.0000227 %	✓	
			201-695-5	86-73-7									
19		phenanthrene				1.2	mg/kg		1.091	mg/kg	0.000109 %	✓	
			201-581-5	85-01-8									
20		anthracene				0.45	mg/kg		0.409	mg/kg	0.0000409 %	✓	
			204-371-1	120-12-7									
21		fluoranthene				1.4	mg/kg		1.273	mg/kg	0.000127 %	✓	
			205-912-4	206-44-0									
22		pyrene				1.3	mg/kg		1.182	mg/kg	0.000118 %	✓	
			204-927-3	129-00-0									
23		benzo[a]anthracene				0.47	mg/kg		0.427	mg/kg	0.0000427 %	✓	
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				0.51	mg/kg		0.464	mg/kg	0.0000464 %	✓	
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				0.5	mg/kg		0.455	mg/kg	0.0000455 %	✓	
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				0.37	mg/kg		0.336	mg/kg	0.0000336 %	✓	
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				1.1	mg/kg		1	mg/kg	0.0001 %	✓	
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				0.6	mg/kg		0.545	mg/kg	0.0000545 %	✓	
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				0.21	mg/kg		0.191	mg/kg	0.0000191 %	✓	
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				0.34	mg/kg		0.309	mg/kg	0.0000309 %	✓	
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0354 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH05

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH05
Sample Depth:
1.00 m
Moisture content:
9.4%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 9.4% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				7.4 mg/kg	1.895	12.815 mg/kg	0.00128 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.8 mg/kg	5.719	4.182 mg/kg	0.000418 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.1 mg/kg	1.855	0.17 mg/kg	0.000017 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		19 mg/kg	1.462	25.384 mg/kg	0.00254 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		44 mg/kg	3.929	158.024 mg/kg	0.0158 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	220 mg/kg		201.097 mg/kg	0.0201 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		1.1 mg/kg	1.353	1.361 mg/kg	0.000136 %	✓	
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		14 mg/kg	5.358	68.571 mg/kg	0.00686 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		71 mg/kg	2.774	180.041 mg/kg	0.018 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		76 mg/kg		69.47 mg/kg	0.00695 %	✓	
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		9.3 pH		9.3 pH	9.3 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		14 mg/kg		12.797 mg/kg	0.00128 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				20	mg/kg		18.282	mg/kg	0.00183 %	✓	
			201-469-6	83-32-9									
18		fluorene				26	mg/kg		23.766	mg/kg	0.00238 %	✓	
			201-695-5	86-73-7									
19		phenanthrene				140	mg/kg		127.971	mg/kg	0.0128 %	✓	
			201-581-5	85-01-8									
20		anthracene				25	mg/kg		22.852	mg/kg	0.00229 %	✓	
			204-371-1	120-12-7									
21		fluoranthene				82	mg/kg		74.954	mg/kg	0.0075 %	✓	
			205-912-4	206-44-0									
22		pyrene				91	mg/kg		83.181	mg/kg	0.00832 %	✓	
			204-927-3	129-00-0									
23		benzo[a]anthracene				34	mg/kg		31.079	mg/kg	0.00311 %	✓	
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				38	mg/kg		34.735	mg/kg	0.00347 %	✓	
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				18	mg/kg		16.453	mg/kg	0.00165 %	✓	
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				11	mg/kg		10.055	mg/kg	0.00101 %	✓	
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				30	mg/kg		27.422	mg/kg	0.00274 %	✓	
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				15	mg/kg		13.711	mg/kg	0.00137 %	✓	
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				2.2	mg/kg		2.011	mg/kg	0.000201 %	✓	
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				10	mg/kg		9.141	mg/kg	0.000914 %	✓	
			205-883-8	191-24-2									
31		phenol				1.4	mg/kg		1.28	mg/kg	0.000128 %	✓	
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.123 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous Property to non-hazardous for cumulative determinand results below the concentration of: 500 mg/kg (0.05%) because: We do not consider the concentrations of the recorded individual TPH fractions to be flammable. The number of fractions detected and their low concentrations does not suggest a single source such as diesel of petrol. No specific trend can be identified from the concentration of aliphatic or aromatic fractions

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group (conc.: 0.00695%)

Classification of sample: BH06

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample name:
BH06
Sample Depth:
1.00 m
Moisture content:
14%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1A; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

lead compounds with the exception of those specified elsewhere in this Annex (worst case) (Note 1 conc.: 0.105%)

Determinands

Moisture content: 14% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				8.8 mg/kg	1.895	14.624 mg/kg	0.00146 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1.1 mg/kg	5.719	5.519 mg/kg	0.000552 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.2 mg/kg	1.855	0.325 mg/kg	0.0000325 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		13 mg/kg	1.462	16.667 mg/kg	0.00167 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		97 mg/kg	3.929	334.314 mg/kg	0.0334 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	1200 mg/kg		1052.632 mg/kg	0.105 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.34 mg/kg	1.353	0.404 mg/kg	0.0000404 %	✓	
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		10 mg/kg	5.358	47.003 mg/kg	0.0047 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		210 mg/kg	2.774	511.027 mg/kg	0.0511 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
13		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<**LOD**
14		pH			PH		9	pH		9	pH	9pH		
15		naphthalene	601-052-00-2	202-049-5	91-20-3		0.16	mg/kg		0.14	mg/kg	0.000014 %	✓	
16		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
17		acenaphthene		201-469-6	83-32-9		0.62	mg/kg		0.544	mg/kg	0.0000544 %	✓	
18		fluorene		201-695-5	86-73-7		0.5	mg/kg		0.439	mg/kg	0.0000439 %	✓	
19		phenanthrene		201-581-5	85-01-8		3.3	mg/kg		2.895	mg/kg	0.000289 %	✓	
20		anthracene		204-371-1	120-12-7		0.83	mg/kg		0.728	mg/kg	0.0000728 %	✓	
21		fluoranthene		205-912-4	206-44-0		3.7	mg/kg		3.246	mg/kg	0.000325 %	✓	
22		pyrene		204-927-3	129-00-0		3.5	mg/kg		3.07	mg/kg	0.000307 %	✓	
23		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		1	mg/kg		0.877	mg/kg	0.0000877 %	✓	
24		chrysene	601-048-00-0	205-923-4	218-01-9		1.3	mg/kg		1.14	mg/kg	0.000114 %	✓	
25		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		1.6	mg/kg		1.404	mg/kg	0.00014 %	✓	
26		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.6	mg/kg		0.526	mg/kg	0.0000526 %	✓	
27		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		1.7	mg/kg		1.491	mg/kg	0.000149 %	✓	
28		indeno[123-cd]pyrene		205-893-2	193-39-5		1	mg/kg		0.877	mg/kg	0.0000877 %	✓	
29		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.16	mg/kg		0.14	mg/kg	0.000014 %	✓	
30		benzo[ghi]perylene		205-883-8	191-24-2		0.83	mg/kg		0.728	mg/kg	0.0000728 %	✓	
31		phenol	604-001-00-2	203-632-7	108-95-2		<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
											Total:	0.2 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Hazardous result
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH07

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH07
Sample Depth:
3.00 m
Moisture content:
14%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 14% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				17 mg/kg	1.895	28.252 mg/kg	0.00283 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1.7 mg/kg	5.719	8.529 mg/kg	0.000853 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.3 mg/kg	1.855	0.488 mg/kg	0.0000488 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		48 mg/kg	1.462	61.539 mg/kg	0.00615 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<LOD
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		40 mg/kg	3.929	137.862 mg/kg	0.0138 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	120 mg/kg		105.263 mg/kg	0.0105 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<LOD
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		19 mg/kg	5.358	89.305 mg/kg	0.00893 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<LOD
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		79 mg/kg	2.774	192.243 mg/kg	0.0192 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				0.1 mg/kg	1.884	0.165 mg/kg	0.0000165 %	✓	
14	pH			PH		9.8 pH		9.8 pH	9.8 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
21		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
22		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
31		phenol				0.4	mg/kg		0.351	mg/kg	0.0000351 %	✓	
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0624 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH08

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH08
Sample Depth:
0.50 m
Moisture content:
9.8%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 9.8% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				5.2 mg/kg	1.895	8.972 mg/kg	0.000897 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.5 mg/kg	5.719	2.604 mg/kg	0.00026 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.1 mg/kg	1.855	0.169 mg/kg	0.0000169 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		32 mg/kg	1.462	42.595 mg/kg	0.00426 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		16 mg/kg	3.929	57.254 mg/kg	0.00573 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	120 mg/kg		109.29 mg/kg	0.0109 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		10 mg/kg	5.358	48.801 mg/kg	0.00488 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		45 mg/kg	2.774	113.695 mg/kg	0.0114 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		10.4 pH		10.4 pH	10.4 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
21		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
22		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0383 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH09

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH09
Sample Depth:
2.00 m
Moisture content:
19%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 19% Dry Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1		asbestos	650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		0.005 %		0.0042 %	0.0042 %	✓	
2		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				18 mg/kg	1.895	28.657 mg/kg	0.00287 %	✓	
3		boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1.4 mg/kg	5.719	6.728 mg/kg	0.000673 %	✓	
4		cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.3 mg/kg	1.855	0.468 mg/kg	0.0000468 %	✓	
5		chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		52 mg/kg	1.462	63.866 mg/kg	0.00639 %	✓	
6		chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
7		copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		42 mg/kg	3.929	138.672 mg/kg	0.0139 %	✓	
8		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	130 mg/kg		109.244 mg/kg	0.0109 %	✓	
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.14 mg/kg	1.353	0.159 mg/kg	0.0000159 %	✓	
10		nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		20 mg/kg	5.358	90.056 mg/kg	0.00901 %	✓	
11		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
12		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		85 mg/kg	2.774	198.153 mg/kg	0.0198 %	✓	
13		TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<**LOD**
15		pH			PH		10.5	pH		10.5	pH	10.5 pH		
16		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
17		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
18		acenaphthene		201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
19		fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
20		phenanthrene		201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
21		anthracene		204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
22		fluoranthene		205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
23		pyrene		204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
24		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
25		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
26		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
27		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
28		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
29		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
30		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
31		benzo[ghi]perylene		205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
32		phenol	604-001-00-2	203-632-7	108-95-2		<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
											Total:	0.0678 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH10

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH10
Sample Depth:
3.00 m
Moisture content:
15%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 15% Dry Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1		asbestos	650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		0.011 %		0.0095 %	0.00957 %	✓	
2		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				45 mg/kg	1.895	74.134 mg/kg	0.00741 %	✓	
3		boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1.7 mg/kg	5.719	8.454 mg/kg	0.000845 %	✓	
4		cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		1.7 mg/kg	1.855	2.742 mg/kg	0.000274 %	✓	
5		chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		80 mg/kg	1.462	101.673 mg/kg	0.0102 %	✓	
6		chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
7		copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		58 mg/kg	3.929	198.161 mg/kg	0.0198 %	✓	
8		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	240 mg/kg		208.696 mg/kg	0.0209 %	✓	
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.76 mg/kg	1.353	0.894 mg/kg	0.0000894 %	✓	
10		nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		19 mg/kg	5.358	88.529 mg/kg	0.00885 %	✓	
11		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		1.4 mg/kg	2.554	3.109 mg/kg	0.000311 %	✓	
12		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		250 mg/kg	2.774	603.075 mg/kg	0.0603 %	✓	
13		TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				0.5	mg/kg	1.884	0.819	mg/kg	0.0000819 %	✓	
15		pH			PH		10.5	pH		10.5	pH	10.5 pH		
16		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
17		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
18		acenaphthene		201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
19		fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
20		phenanthrene		201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
21		anthracene		204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
22		fluoranthene		205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
23		pyrene		204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
24		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
25		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
26		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
27		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
28		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
29		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
30		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
31		benzo[ghi]perylene		205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
32		phenol	604-001-00-2	203-632-7	108-95-2		0.9	mg/kg		0.783	mg/kg	0.0000783 %	✓	
											Total:	0.139 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH11

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH11
Sample Depth:
0.50 m
Moisture content:
8%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 8% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				9.1 mg/kg	1.895	15.963 mg/kg	0.0016 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.8 mg/kg	5.719	4.236 mg/kg	0.000424 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.2 mg/kg	1.855	0.343 mg/kg	0.0000343 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		11 mg/kg	1.462	14.886 mg/kg	0.00149 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		20 mg/kg	3.929	72.76 mg/kg	0.00728 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	27 mg/kg		25 mg/kg	0.0025 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		13 mg/kg	5.358	64.498 mg/kg	0.00645 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		43 mg/kg	2.774	110.452 mg/kg	0.011 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		27 mg/kg		25 mg/kg	0.0025 %	✓	
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		11.3 pH		11.3 pH	11.3 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				0.28	mg/kg		0.259	mg/kg	0.0000259 %	✓	
			201-581-5	85-01-8									
20		anthracene				0.39	mg/kg		0.361	mg/kg	0.0000361 %	✓	
			204-371-1	120-12-7									
21		fluoranthene				0.68	mg/kg		0.63	mg/kg	0.000063 %	✓	
			205-912-4	206-44-0									
22		pyrene				0.47	mg/kg		0.435	mg/kg	0.0000435 %	✓	
			204-927-3	129-00-0									
23		benzo[a]anthracene				0.3	mg/kg		0.278	mg/kg	0.0000278 %	✓	
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				0.22	mg/kg		0.204	mg/kg	0.0000204 %	✓	
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				0.31	mg/kg		0.287	mg/kg	0.0000287 %	✓	
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				0.18	mg/kg		0.167	mg/kg	0.0000167 %	✓	
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				0.61	mg/kg		0.565	mg/kg	0.0000565 %	✓	
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				0.27	mg/kg		0.25	mg/kg	0.000025 %	✓	
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				0.13	mg/kg		0.12	mg/kg	0.000012 %	✓	
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				0.15	mg/kg		0.139	mg/kg	0.0000139 %	✓	
			205-883-8	191-24-2									
31		phenol				0.7	mg/kg		0.648	mg/kg	0.0000648 %	✓	
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0337 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous Property to non-hazardous for cumulative determinand results below the concentration of: 500 mg/kg (0.05%) because: We do not consider the concentrations of the recorded individual TPH fractions to be flammable. The number of fractions detected and their low concentrations does not suggest a single source such as diesel of petrol. No specific trend can be identified from the concentration of aliphatic or aromatic fractions

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group (conc.: 0.0025%)

Classification of sample: BH12

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH12
Sample Depth:
2.00 m
Moisture content:
15%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 15% Dry Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1		asbestos	650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		<0.001 %		<0.001 %	<0.001 %		**<LOD**
2		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				11 mg/kg	1.895	18.122 mg/kg	0.00181 %	✓	
3		boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		2.4 mg/kg	5.719	11.936 mg/kg	0.00119 %	✓	
4		cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.3 mg/kg	1.855	0.484 mg/kg	0.0000484 %	✓	
5		chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		24 mg/kg	1.462	30.502 mg/kg	0.00305 %	✓	
6		chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		**<LOD**
7		copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		25 mg/kg	3.929	85.414 mg/kg	0.00854 %	✓	
8		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	87 mg/kg		75.652 mg/kg	0.00757 %	✓	
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.1 mg/kg	1.353	0.118 mg/kg	0.0000118 %	✓	
10		nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		17 mg/kg	5.358	79.21 mg/kg	0.00792 %	✓	
11		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		**<LOD**
12		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		90 mg/kg	2.774	217.107 mg/kg	0.0217 %	✓	
13		TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		**<LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<**LOD**
15		pH			PH		9.5	pH		9.5	pH	9.5 pH		
16		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
17		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
18		acenaphthene		201-469-6	83-32-9		0.77	mg/kg		0.67	mg/kg	0.000067 %	✓	
19		fluorene		201-695-5	86-73-7		0.61	mg/kg		0.53	mg/kg	0.000053 %	✓	
20		phenanthrene		201-581-5	85-01-8		1.8	mg/kg		1.565	mg/kg	0.000157 %	✓	
21		anthracene		204-371-1	120-12-7		0.28	mg/kg		0.243	mg/kg	0.0000243 %	✓	
22		fluoranthene		205-912-4	206-44-0		0.61	mg/kg		0.53	mg/kg	0.000053 %	✓	
23		pyrene		204-927-3	129-00-0		0.64	mg/kg		0.557	mg/kg	0.0000557 %	✓	
24		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		0.51	mg/kg		0.443	mg/kg	0.0000443 %	✓	
25		chrysene	601-048-00-0	205-923-4	218-01-9		0.54	mg/kg		0.47	mg/kg	0.000047 %	✓	
26		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		0.28	mg/kg		0.243	mg/kg	0.0000243 %	✓	
27		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.15	mg/kg		0.13	mg/kg	0.000013 %	✓	
28		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		0.11	mg/kg		0.0957	mg/kg	0.00000957 %	✓	
29		indeno[123-cd]pyrene		205-893-2	193-39-5		0.26	mg/kg		0.226	mg/kg	0.0000226 %	✓	
30		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.14	mg/kg		0.122	mg/kg	0.0000122 %	✓	
31		benzo[ghi]perylene		205-883-8	191-24-2		0.17	mg/kg		0.148	mg/kg	0.0000148 %	✓	
32		phenol	604-001-00-2	203-632-7	108-95-2		0.4	mg/kg		0.348	mg/kg	0.0000348 %	✓	
											Total:	0.0525 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH13

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH13
Sample Depth:
0.80 m
Moisture content:
8.5%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 8.5% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				4.1	mg/kg	1.895	7.159	mg/kg	0.000716 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.8	mg/kg	5.719	4.217	mg/kg	0.000422 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.1	mg/kg	1.855	0.171	mg/kg	0.0000171 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		7.8	mg/kg	1.462	10.507	mg/kg	0.00105 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1	mg/kg	2.27	<2.27	mg/kg	<0.000227 %		<LOD
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		12	mg/kg	3.929	43.455	mg/kg	0.00435 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	14	mg/kg		12.903	mg/kg	0.00129 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05	mg/kg	1.353	<0.0677	mg/kg	<0.00000677 %		<LOD
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		7.7	mg/kg	5.358	38.027	mg/kg	0.0038 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5	mg/kg	2.554	<1.277	mg/kg	<0.000128 %		<LOD
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		31	mg/kg	2.774	79.261	mg/kg	0.00793 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<LOD
14	pH			PH		11.2	pH		11.2	pH	11.2 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene	205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
17		acenaphthene	201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
18		fluorene	201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
19		phenanthrene	201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
20		anthracene	204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
21		fluoranthene	205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
22		pyrene	204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
23		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
24		chrysene	601-048-00-0	205-923-4	218-01-9	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
25		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
26		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
27		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
28		indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
29		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
30		benzo[ghi]perylene	205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
31		phenol	604-001-00-2	203-632-7	108-95-2	0.4	mg/kg		0.369	mg/kg	0.0000369 %	✓	
										Total:	0.0196 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH14

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH14
Sample Depth:
0.50 m
Moisture content:
8.6%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 8.6% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				6.1 mg/kg	1.895	10.641 mg/kg	0.00106 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.8 mg/kg	5.719	4.213 mg/kg	0.000421 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.5 mg/kg	1.855	0.854 mg/kg	0.0000854 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		26 mg/kg	1.462	34.991 mg/kg	0.0035 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		20 mg/kg	3.929	72.358 mg/kg	0.00724 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	32 mg/kg		29.466 mg/kg	0.00295 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		15 mg/kg	5.358	74.01 mg/kg	0.0074 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		59 mg/kg	2.774	150.713 mg/kg	0.0151 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		14 mg/kg		12.891 mg/kg	0.00129 %	✓	
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		10.3 pH		10.3 pH	10.3 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-695-5	86-73-7									
19		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			204-371-1	120-12-7									
21		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-912-4	206-44-0									
22		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.039 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous Property to non-hazardous for cumulative determinand results below the concentration of: 500 mg/kg (0.05%) because: We do not consider the concentrations of the recorded individual TPH fractions to be flammable. The number of fractions detected and their low concentrations does not suggest a single source such as diesel of petrol. No specific trend can be identified from the concentration of aliphatic or aromatic fractions

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group (conc.: 0.00129%)

Classification of sample: BH15

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH15
Sample Depth:
3.00 m
Moisture content:
8.8%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 8.8% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				7.4	mg/kg	1.895	12.886	mg/kg	0.00129 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1	mg/kg	5.719	5.257	mg/kg	0.000526 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.5	mg/kg	1.855	0.852	mg/kg	0.0000852 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		41	mg/kg	1.462	55.077	mg/kg	0.00551 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1	mg/kg	2.27	<2.27	mg/kg	<0.000227 %		<LOD
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		24	mg/kg	3.929	86.67	mg/kg	0.00867 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	36	mg/kg		33.088	mg/kg	0.00331 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05	mg/kg	1.353	<0.0677	mg/kg	<0.00000677 %		<LOD
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		18	mg/kg	5.358	88.649	mg/kg	0.00886 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5	mg/kg	2.554	<1.277	mg/kg	<0.000128 %		<LOD
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		63	mg/kg	2.774	160.635	mg/kg	0.0161 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		400	mg/kg		367.647	mg/kg	0.0368 %	✓	
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<LOD
14	pH			PH		10.2	pH		10.2	pH	10.2 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-695-5	86-73-7									
19		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			204-371-1	120-12-7									
21		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-912-4	206-44-0									
22		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0811 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous Property to non-hazardous for cumulative determinand results below the concentration of: 500 mg/kg (0.05%) because: We do not consider the concentrations of the recorded individual TPH fractions to be flammable. The number of fractions detected and their low concentrations does not suggest a single source such as diesel of petrol. No specific trend can be identified from the concentration of aliphatic or aromatic fractions

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group (conc.: 0.0368%)

Classification of sample: BH16

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH16
Sample Depth:
0.50 m
Moisture content:
11%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 11% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				9.8 mg/kg	1.895	16.726 mg/kg	0.00167 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1.2 mg/kg	5.719	6.183 mg/kg	0.000618 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.4 mg/kg	1.855	0.668 mg/kg	0.0000668 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		48 mg/kg	1.462	63.202 mg/kg	0.00632 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		32 mg/kg	3.929	113.27 mg/kg	0.0113 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	41 mg/kg		36.937 mg/kg	0.00369 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.06 mg/kg	1.353	0.0732 mg/kg	0.00000732 %	✓	
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		19 mg/kg	5.358	91.719 mg/kg	0.00917 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		77 mg/kg	2.774	192.441 mg/kg	0.0192 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				0.1 mg/kg	1.884	0.17 mg/kg	0.000017 %	✓	
14	pH			PH		10.3 pH		10.3 pH	10.3 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
21		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
22		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0521 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH18

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH18
Sample Depth:
0.80 m
Moisture content:
13%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 13% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				17 mg/kg	1.895	28.502 mg/kg	0.00285 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1.6 mg/kg	5.719	8.098 mg/kg	0.00081 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.4 mg/kg	1.855	0.656 mg/kg	0.0000656 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		69 mg/kg	1.462	89.245 mg/kg	0.00892 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<LOD
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		86 mg/kg	3.929	299.025 mg/kg	0.0299 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	76 mg/kg		67.257 mg/kg	0.00673 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.37 mg/kg	1.353	0.443 mg/kg	0.0000443 %	✓	
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		16 mg/kg	5.358	75.87 mg/kg	0.00759 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.7 mg/kg	2.554	1.582 mg/kg	0.000158 %	✓	
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		120 mg/kg	2.774	294.6 mg/kg	0.0295 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<LOD
14	pH			PH		10.6 pH		10.6 pH	10.6 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				0.14	mg/kg		0.124	mg/kg	0.0000124 %	✓	
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				0.47	mg/kg		0.416	mg/kg	0.0000416 %	✓	
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
21		fluoranthene				0.39	mg/kg		0.345	mg/kg	0.0000345 %	✓	
			205-912-4	206-44-0									
22		pyrene				0.54	mg/kg		0.478	mg/kg	0.0000478 %	✓	
			204-927-3	129-00-0									
23		benzo[a]anthracene				0.24	mg/kg		0.212	mg/kg	0.0000212 %	✓	
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				0.49	mg/kg		0.434	mg/kg	0.0000434 %	✓	
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				0.27	mg/kg		0.239	mg/kg	0.0000239 %	✓	
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				0.11	mg/kg		0.0973	mg/kg	0.00000973 %	✓	
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				0.18	mg/kg		0.159	mg/kg	0.0000159 %	✓	
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				0.24	mg/kg		0.212	mg/kg	0.0000212 %	✓	
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				0.22	mg/kg		0.195	mg/kg	0.0000195 %	✓	
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				0.22	mg/kg		0.195	mg/kg	0.0000195 %	✓	
			205-883-8	191-24-2									
31		phenol				0.6	mg/kg		0.531	mg/kg	0.0000531 %	✓	
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0869 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH19

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample name:
BH19
Sample Depth:
0.50 m
Moisture content:
14%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

HP 8: Corrosive "waste which on application can cause skin corrosion"

pH; pH "Assumed to be irritant/corrosive because of pH value"

Because of determinand:

pH (conc.: 11.5 pH)

Determinands

Moisture content: 14% Dry Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				6.7	mg/kg	1.895	11.134	mg/kg	0.00111 %	✓	
2		boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		2	mg/kg	5.719	10.034	mg/kg	0.001 %	✓	
3		cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.2	mg/kg	1.855	0.325	mg/kg	0.0000325 %	✓	
4		chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		58	mg/kg	1.462	74.36	mg/kg	0.00744 %	✓	
5		chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1	mg/kg	2.27	<2.27	mg/kg	<0.000227 %		<**LOD**
6		copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		9.7	mg/kg	3.929	33.431	mg/kg	0.00334 %	✓	
7		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	28	mg/kg		24.561	mg/kg	0.00246 %	✓	
8		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05	mg/kg	1.353	<0.0677	mg/kg	<0.00000677 %		<**LOD**
9		nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		6.2	mg/kg	5.358	29.142	mg/kg	0.00291 %	✓	
10		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5	mg/kg	2.554	<1.277	mg/kg	<0.000128 %		<**LOD**
11		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		53	mg/kg	2.774	128.973	mg/kg	0.0129 %	✓	
12		TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<**LOD**
13		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides,					0.3	mg/kg	1.884	0.496	mg/kg	0.0000496 %	✓	

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5											
14		pH			PH		11.5	pH		11.5	pH	11.5 pH		
15		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
16		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
17		acenaphthene		201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
18		fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
19		phenanthrene		201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
20		anthracene		204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
21		fluoranthene		205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
22		pyrene		204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
23		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
24		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
25		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
26		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
27		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
28		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
29		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
30		benzo[ghi]perylene		205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
31		phenol	604-001-00-2	203-632-7	108-95-2		<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<LOD
											Total:	0.0312 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Hazardous result
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH20

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH20
Sample Depth:
1.00 m
Moisture content:
15%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 15% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				7.7 mg/kg	1.895	12.685 mg/kg	0.00127 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.8 mg/kg	5.719	3.979 mg/kg	0.000398 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.1 mg/kg	1.855	0.161 mg/kg	0.0000161 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		26 mg/kg	1.462	33.044 mg/kg	0.0033 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		21 mg/kg	3.929	71.748 mg/kg	0.00717 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	19 mg/kg		16.522 mg/kg	0.00165 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		21 mg/kg	5.358	97.848 mg/kg	0.00978 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		64 mg/kg	2.774	154.387 mg/kg	0.0154 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		9.9 pH		9.9 pH	9.9 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
21		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
22		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.039 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH21

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH21
Sample Depth:
0.80 m
Moisture content:
10%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 10% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				14 mg/kg	1.895	24.112 mg/kg	0.00241 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1.2 mg/kg	5.719	6.239 mg/kg	0.000624 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.2 mg/kg	1.855	0.337 mg/kg	0.0000337 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		32 mg/kg	1.462	42.518 mg/kg	0.00425 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		26 mg/kg	3.929	92.869 mg/kg	0.00929 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	43 mg/kg		39.091 mg/kg	0.00391 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.07 mg/kg	1.353	0.0861 mg/kg	0.00000861 %	✓	
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		20 mg/kg	5.358	97.424 mg/kg	0.00974 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		64 mg/kg	2.774	161.405 mg/kg	0.0161 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		10.2 pH		10.2 pH	10.2 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
21		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
22		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0464 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH22

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH22
Sample Depth:
2.50 m
Moisture content:
12%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 12% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				6.1 mg/kg	1.895	10.318 mg/kg	0.00103 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.4 mg/kg	5.719	2.043 mg/kg	0.000204 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		<0.1 mg/kg	1.855	<0.185 mg/kg	<0.0000185 %		<**LOD**
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		17 mg/kg	1.462	22.184 mg/kg	0.00222 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		11 mg/kg	3.929	38.589 mg/kg	0.00386 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	5.7 mg/kg		5.089 mg/kg	0.000509 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		21 mg/kg	5.358	100.468 mg/kg	0.01 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		30 mg/kg	2.774	74.307 mg/kg	0.00743 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		9 pH		9 pH	9pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
21		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
22		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0253 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH23

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH23
Sample Depth:
1.00 m
Moisture content:
16%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 16% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				7 mg/kg	1.895	11.432 mg/kg	0.00114 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1 mg/kg	5.719	4.93 mg/kg	0.000493 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		<0.1 mg/kg	1.855	<0.185 mg/kg	<0.0000185 %		<**LOD**
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		11 mg/kg	1.462	13.86 mg/kg	0.00139 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		19 mg/kg	3.929	64.355 mg/kg	0.00644 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	50 mg/kg		43.103 mg/kg	0.00431 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.06 mg/kg	1.353	0.07 mg/kg	0.000007 %	✓	
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		11 mg/kg	5.358	50.812 mg/kg	0.00508 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		34 mg/kg	2.774	81.311 mg/kg	0.00813 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				0.1 mg/kg	1.884	0.162 mg/kg	0.0000162 %	✓	
14	pH			PH		7.8 pH		7.8 pH	7.8 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
21		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
22		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
31		phenol				0.4	mg/kg		0.345	mg/kg	0.0000345 %	✓	
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.027 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH24

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH24
Sample Depth:
0.80 m
Moisture content:
13%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 13% Dry Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1		asbestos	650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		<0.001 %		<0.001 %	<0.001 %		**<LOD**
2		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				8.8 mg/kg	1.895	14.754 mg/kg	0.00148 %	✓	
3		boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1.5 mg/kg	5.719	7.592 mg/kg	0.000759 %	✓	
4		cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.2 mg/kg	1.855	0.328 mg/kg	0.0000328 %	✓	
5		chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		6.5 mg/kg	1.462	8.407 mg/kg	0.000841 %	✓	
6		chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		**<LOD**
7		copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		62 mg/kg	3.929	215.576 mg/kg	0.0216 %	✓	
8		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	290 mg/kg		256.637 mg/kg	0.0257 %	✓	
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.28 mg/kg	1.353	0.335 mg/kg	0.0000335 %	✓	
10		nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		8.3 mg/kg	5.358	39.358 mg/kg	0.00394 %	✓	
11		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		**<LOD**
12		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		100 mg/kg	2.774	245.5 mg/kg	0.0245 %	✓	
13		TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		**<LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<**LOD**
15		pH			PH		8.5	pH		8.5	pH	8.5 pH		
16		naphthalene	601-052-00-2	202-049-5	91-20-3		0.24	mg/kg		0.212	mg/kg	0.0000212 %	✓	
17		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
18		acenaphthene		201-469-6	83-32-9		0.49	mg/kg		0.434	mg/kg	0.0000434 %	✓	
19		fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
20		phenanthrene		201-581-5	85-01-8		2.4	mg/kg		2.124	mg/kg	0.000212 %	✓	
21		anthracene		204-371-1	120-12-7		0.89	mg/kg		0.788	mg/kg	0.0000788 %	✓	
22		fluoranthene		205-912-4	206-44-0		3.6	mg/kg		3.186	mg/kg	0.000319 %	✓	
23		pyrene		204-927-3	129-00-0		4	mg/kg		3.54	mg/kg	0.000354 %	✓	
24		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		1.6	mg/kg		1.416	mg/kg	0.000142 %	✓	
25		chrysene	601-048-00-0	205-923-4	218-01-9		1.3	mg/kg		1.15	mg/kg	0.000115 %	✓	
26		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		1.1	mg/kg		0.973	mg/kg	0.0000973 %	✓	
27		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		0.67	mg/kg		0.593	mg/kg	0.0000593 %	✓	
28		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		2.1	mg/kg		1.858	mg/kg	0.000186 %	✓	
29		indeno[123-cd]pyrene		205-893-2	193-39-5		0.95	mg/kg		0.841	mg/kg	0.0000841 %	✓	
30		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.18	mg/kg		0.159	mg/kg	0.0000159 %	✓	
31		benzo[ghi]perylene		205-883-8	191-24-2		0.71	mg/kg		0.628	mg/kg	0.0000628 %	✓	
32		phenol	604-001-00-2	203-632-7	108-95-2		0.5	mg/kg		0.442	mg/kg	0.0000442 %	✓	
											Total:	0.0807 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: BH25

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
BH25
Sample Depth:
0.80 m
Moisture content:
13%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 13% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				6.4 mg/kg	1.895	10.73 mg/kg	0.00107 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1.1 mg/kg	5.719	5.567 mg/kg	0.000557 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.2 mg/kg	1.855	0.328 mg/kg	0.0000328 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		230 mg/kg	1.462	297.485 mg/kg	0.0297 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		17 mg/kg	3.929	59.11 mg/kg	0.00591 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	21 mg/kg		18.584 mg/kg	0.00186 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		10 mg/kg	5.358	47.419 mg/kg	0.00474 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		1 mg/kg	2.554	2.26 mg/kg	0.000226 %	✓	
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		51 mg/kg	2.774	125.205 mg/kg	0.0125 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				0.1 mg/kg	1.884	0.167 mg/kg	0.0000167 %	✓	
14	pH			PH		11.3 pH		11.3 pH	11.3 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		0.38 mg/kg		0.336 mg/kg	0.0000336 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				0.51	mg/kg		0.451	mg/kg	0.0000451 %	✓	
			205-917-1	208-96-8									
17		acenaphthene				0.46	mg/kg		0.407	mg/kg	0.0000407 %	✓	
			201-469-6	83-32-9									
18		fluorene				0.94	mg/kg		0.832	mg/kg	0.0000832 %	✓	
			201-695-5	86-73-7									
19		phenanthrene				10	mg/kg		8.85	mg/kg	0.000885 %	✓	
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
21		fluoranthene				8.6	mg/kg		7.611	mg/kg	0.000761 %	✓	
			205-912-4	206-44-0									
22		pyrene				7.5	mg/kg		6.637	mg/kg	0.000664 %	✓	
			204-927-3	129-00-0									
23		benzo[a]anthracene				3	mg/kg		2.655	mg/kg	0.000265 %	✓	
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				2.8	mg/kg		2.478	mg/kg	0.000248 %	✓	
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				1.9	mg/kg		1.681	mg/kg	0.000168 %	✓	
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				1.5	mg/kg		1.327	mg/kg	0.000133 %	✓	
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				3.1	mg/kg		2.743	mg/kg	0.000274 %	✓	
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				1.9	mg/kg		1.681	mg/kg	0.000168 %	✓	
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				0.3	mg/kg		0.265	mg/kg	0.0000265 %	✓	
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				1.3	mg/kg		1.15	mg/kg	0.000115 %	✓	
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0606 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP01

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP01
Sample Depth:
0.50 m
Moisture content:
11%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 11% Dry Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		asbestos	650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		0.002	%		0.0018	%	0.0018 %	✓	
2		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				7.7	mg/kg	1.895	13.142	mg/kg	0.00131 %	✓	
3		boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1.2	mg/kg	5.719	6.183	mg/kg	0.000618 %	✓	
4		cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.3	mg/kg	1.855	0.501	mg/kg	0.0000501 %	✓	
5		chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		22	mg/kg	1.462	28.968	mg/kg	0.0029 %	✓	
6		chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1	mg/kg	2.27	<2.27	mg/kg	<0.000227 %		<**LOD**
7		copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		27	mg/kg	3.929	95.572	mg/kg	0.00956 %	✓	
8		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	130	mg/kg		117.117	mg/kg	0.0117 %	✓	
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.13	mg/kg	1.353	0.159	mg/kg	0.0000159 %	✓	
10		nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		16	mg/kg	5.358	77.237	mg/kg	0.00772 %	✓	
11		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5	mg/kg	2.554	<1.277	mg/kg	<0.000128 %		<**LOD**
12		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		72	mg/kg	2.774	179.945	mg/kg	0.018 %	✓	
13		TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<**LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<**LOD**
15		pH			PH		8.4	pH		8.4	pH	8.4 pH		
16		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
17		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
18		acenaphthene		201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
19		fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
20		phenanthrene		201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
21		anthracene		204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
22		fluoranthene		205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
23		pyrene		204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
24		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
25		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
26		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
27		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
28		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
29		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
30		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
31		benzo[ghi]perylene		205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
32		phenol	604-001-00-2	203-632-7	108-95-2		<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
											Total:	0.0537 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP02

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP02
Sample Depth:
0.50 m
Moisture content:
12%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 12% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				7.4 mg/kg	1.895	12.517 mg/kg	0.00125 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.7 mg/kg	5.719	3.574 mg/kg	0.000357 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.1 mg/kg	1.855	0.166 mg/kg	0.0000166 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		34 mg/kg	1.462	44.369 mg/kg	0.00444 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		22 mg/kg	3.929	77.178 mg/kg	0.00772 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	29 mg/kg		25.893 mg/kg	0.00259 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.07 mg/kg	1.353	0.0846 mg/kg	0.00000846 %	✓	
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		15 mg/kg	5.358	71.763 mg/kg	0.00718 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		37 mg/kg	2.774	91.646 mg/kg	0.00916 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		8.9 pH		8.9 pH	8.9 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
21		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
22		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0327 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP03

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP03
Sample Depth:
0.50 m
Moisture content:
7%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 7% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				5.6 mg/kg	1.895	9.915 mg/kg	0.000992 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1.2 mg/kg	5.719	6.414 mg/kg	0.000641 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.2 mg/kg	1.855	0.347 mg/kg	0.0000347 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		18 mg/kg	1.462	24.587 mg/kg	0.00246 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		22 mg/kg	3.929	80.784 mg/kg	0.00808 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	25 mg/kg		23.364 mg/kg	0.00234 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		16 mg/kg	5.358	80.124 mg/kg	0.00801 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		53 mg/kg	2.774	137.411 mg/kg	0.0137 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		9.8 pH		9.8 pH	9.8 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
21		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
22		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0363 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP04

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP04
Sample Depth:
0.40 m
Moisture content:
9.8%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 9.8% Dry Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1		asbestos	650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		<0.001 %		<0.001 %	<0.001 %		**<LOD**
2		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				7.1 mg/kg	1.895	12.251 mg/kg	0.00123 %	✓	
3		boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.9 mg/kg	5.719	4.688 mg/kg	0.000469 %	✓	
4		cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.2 mg/kg	1.855	0.338 mg/kg	0.0000338 %	✓	
5		chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		45 mg/kg	1.462	59.9 mg/kg	0.00599 %	✓	
6		chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		**<LOD**
7		copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		46 mg/kg	3.929	164.605 mg/kg	0.0165 %	✓	
8		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	75 mg/kg		68.306 mg/kg	0.00683 %	✓	
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.29 mg/kg	1.353	0.357 mg/kg	0.0000357 %	✓	
10		nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		16 mg/kg	5.358	78.081 mg/kg	0.00781 %	✓	
11		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.9 mg/kg	2.554	2.093 mg/kg	0.000209 %	✓	
12		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		55 mg/kg	2.774	138.96 mg/kg	0.0139 %	✓	
13		TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		**<LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
14		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.9	mg/kg	1.884	1.544	mg/kg	0.000154 %	✓	
		006-007-00-5											
15		pH				9.8	pH		9.8	pH	9.8 pH		
				PH									
16		naphthalene				0.37	mg/kg		0.337	mg/kg	0.0000337 %	✓	
		601-052-00-2	202-049-5	91-20-3									
17		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
18		acenaphthene				0.79	mg/kg		0.719	mg/kg	0.0000719 %	✓	
			201-469-6	83-32-9									
19		fluorene				0.78	mg/kg		0.71	mg/kg	0.000071 %	✓	
			201-695-5	86-73-7									
20		phenanthrene				3.2	mg/kg		2.914	mg/kg	0.000291 %	✓	
			201-581-5	85-01-8									
21		anthracene				0.54	mg/kg		0.492	mg/kg	0.0000492 %	✓	
			204-371-1	120-12-7									
22		fluoranthene				2.3	mg/kg		2.095	mg/kg	0.000209 %	✓	
			205-912-4	206-44-0									
23		pyrene				2.6	mg/kg		2.368	mg/kg	0.000237 %	✓	
			204-927-3	129-00-0									
24		benzo[a]anthracene				0.97	mg/kg		0.883	mg/kg	0.0000883 %	✓	
		601-033-00-9	200-280-6	56-55-3									
25		chrysene				1.6	mg/kg		1.457	mg/kg	0.000146 %	✓	
		601-048-00-0	205-923-4	218-01-9									
26		benzo[b]fluoranthene				0.83	mg/kg		0.756	mg/kg	0.0000756 %	✓	
		601-034-00-4	205-911-9	205-99-2									
27		benzo[k]fluoranthene				0.36	mg/kg		0.328	mg/kg	0.0000328 %	✓	
		601-036-00-5	205-916-6	207-08-9									
28		benzo[a]pyrene; benzo[def]chrysene				1.2	mg/kg		1.093	mg/kg	0.000109 %	✓	
		601-032-00-3	200-028-5	50-32-8									
29		indeno[123-cd]pyrene				0.84	mg/kg		0.765	mg/kg	0.0000765 %	✓	
			205-893-2	193-39-5									
30		dibenz[a,h]anthracene				0.21	mg/kg		0.191	mg/kg	0.0000191 %	✓	
		601-041-00-2	200-181-8	53-70-3									
31		benzo[ghi]perylene				0.67	mg/kg		0.61	mg/kg	0.000061 %	✓	
			205-883-8	191-24-2									
32		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0547 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP05

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP05
Sample Depth:
0.50 m
Moisture content:
12%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 12% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				14 mg/kg	1.895	23.682 mg/kg	0.00237 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.8 mg/kg	5.719	4.085 mg/kg	0.000409 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.5 mg/kg	1.855	0.828 mg/kg	0.0000828 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		35 mg/kg	1.462	45.674 mg/kg	0.00457 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		39 mg/kg	3.929	136.815 mg/kg	0.0137 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	100 mg/kg		89.286 mg/kg	0.00893 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.17 mg/kg	1.353	0.205 mg/kg	0.0000205 %	✓	
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		22 mg/kg	5.358	105.253 mg/kg	0.0105 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		140 mg/kg	2.774	346.768 mg/kg	0.0347 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		260 mg/kg		232.143 mg/kg	0.0232 %	✓	
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				0.2 mg/kg	1.884	0.336 mg/kg	0.0000336 %	✓	
14	pH			PH		8.6 pH		8.6 pH	8.6 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-917-1	208-96-8									
17		acenaphthene				0.53	mg/kg		0.473	mg/kg	0.0000473 %	✓	
			201-469-6	83-32-9									
18		fluorene				1	mg/kg		0.893	mg/kg	0.0000893 %	✓	
			201-695-5	86-73-7									
19		phenanthrene				1.3	mg/kg		1.161	mg/kg	0.000116 %	✓	
			201-581-5	85-01-8									
20		anthracene				0.85	mg/kg		0.759	mg/kg	0.0000759 %	✓	
			204-371-1	120-12-7									
21		fluoranthene				9.8	mg/kg		8.75	mg/kg	0.000875 %	✓	
			205-912-4	206-44-0									
22		pyrene				9.4	mg/kg		8.393	mg/kg	0.000839 %	✓	
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.101 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous Property to non-hazardous for cumulative determinand results below the concentration of: 500 mg/kg (0.05%) because: We do not consider the concentrations of the recorded individual TPH fractions to be flammable. The number of fractions detected and their low concentrations does not suggest a single source such as diesel of petrol. No specific trend can be identified from the concentration of aliphatic or aromatic fractions

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group (conc.: 0.0232%)

Classification of sample: TP06

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP06
Sample Depth:
0.80 m
Moisture content:
10%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 10% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				8.6 mg/kg	1.895	14.812 mg/kg	0.00148 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.9 mg/kg	5.719	4.679 mg/kg	0.000468 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.3 mg/kg	1.855	0.506 mg/kg	0.0000506 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		72 mg/kg	1.462	95.665 mg/kg	0.00957 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		25 mg/kg	3.929	89.297 mg/kg	0.00893 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	62 mg/kg		56.364 mg/kg	0.00564 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.08 mg/kg	1.353	0.0984 mg/kg	0.00000984 %	✓	
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		20 mg/kg	5.358	97.424 mg/kg	0.00974 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		87 mg/kg	2.774	219.41 mg/kg	0.0219 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		140 mg/kg		127.273 mg/kg	0.0127 %	✓	
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		10.2 pH		10.2 pH	10.2 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		0.2 mg/kg		0.182 mg/kg	0.0000182 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				0.53	mg/kg		0.482	mg/kg	0.0000482 %	✓	
			201-469-6	83-32-9									
18		fluorene				0.57	mg/kg		0.518	mg/kg	0.0000518 %	✓	
			201-695-5	86-73-7									
19		phenanthrene				1.2	mg/kg		1.091	mg/kg	0.000109 %	✓	
			201-581-5	85-01-8									
20		anthracene				0.27	mg/kg		0.245	mg/kg	0.0000245 %	✓	
			204-371-1	120-12-7									
21		fluoranthene				1.5	mg/kg		1.364	mg/kg	0.000136 %	✓	
			205-912-4	206-44-0									
22		pyrene				1.6	mg/kg		1.455	mg/kg	0.000145 %	✓	
			204-927-3	129-00-0									
23		benzo[a]anthracene				0.54	mg/kg		0.491	mg/kg	0.0000491 %	✓	
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				1	mg/kg		0.909	mg/kg	0.0000909 %	✓	
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				0.63	mg/kg		0.573	mg/kg	0.0000573 %	✓	
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				0.26	mg/kg		0.236	mg/kg	0.0000236 %	✓	
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				0.66	mg/kg		0.6	mg/kg	0.00006 %	✓	
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				0.64	mg/kg		0.582	mg/kg	0.0000582 %	✓	
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				0.17	mg/kg		0.155	mg/kg	0.0000155 %	✓	
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				0.54	mg/kg		0.491	mg/kg	0.0000491 %	✓	
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0715 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous Property to non-hazardous for cumulative determinand results below the concentration of: 500 mg/kg (0.05%) because: We do not consider the concentrations of the recorded individual TPH fractions to be flammable. The number of fractions detected and their low concentrations does not suggest a single source such as diesel of petrol. No specific trend can be identified from the concentration of aliphatic or aromatic fractions

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group (conc.: 0.0127%)

Classification of sample: TP07

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP07
Sample Depth:
0.20 m
Moisture content:
11%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 11% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				4.2 mg/kg	1.895	7.168 mg/kg	0.000717 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1.3 mg/kg	5.719	6.698 mg/kg	0.00067 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		<0.1 mg/kg	1.855	<0.185 mg/kg	<0.0000185 %		<**LOD**
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		6.1 mg/kg	1.462	8.032 mg/kg	0.000803 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		14 mg/kg	3.929	49.556 mg/kg	0.00496 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	12 mg/kg		10.811 mg/kg	0.00108 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		6.8 mg/kg	5.358	32.826 mg/kg	0.00328 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		24 mg/kg	2.774	59.982 mg/kg	0.006 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		10.6 pH		10.6 pH	10.6 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
21		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
22		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0175 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP08

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample name:
TP08
Sample Depth:
1.00 m
Moisture content:
12%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

HP 8: Corrosive "waste which on application can cause skin corrosion"

pH; pH "Assumed to be irritant/corrosive because of pH value"

Because of determinand:

pH (conc.: 11.6 pH)

Determinands

Moisture content: 12% Dry Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				8.1	mg/kg	1.895	13.701	mg/kg	0.00137 %	✓	
2		boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.8	mg/kg	5.719	4.085	mg/kg	0.000409 %	✓	
3		cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.4	mg/kg	1.855	0.662	mg/kg	0.0000662 %	✓	
4		chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		390	mg/kg	1.462	508.935	mg/kg	0.0509 %	✓	
5		chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1	mg/kg	2.27	<2.27	mg/kg	<0.000227 %		<**LOD**
6		copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		36	mg/kg	3.929	126.291	mg/kg	0.0126 %	✓	
7		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	54	mg/kg		48.214	mg/kg	0.00482 %	✓	
8		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05	mg/kg	1.353	<0.0677	mg/kg	<0.00000677 %		<**LOD**
9		nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		14	mg/kg	5.358	66.979	mg/kg	0.0067 %	✓	
10		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		2.7	mg/kg	2.554	6.157	mg/kg	0.000616 %	✓	
11		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		93	mg/kg	2.774	230.353	mg/kg	0.023 %	✓	
12		TPH (C6 to C40) petroleum group			TPH		38	mg/kg		33.929	mg/kg	0.00339 %	✓	
13		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides,					1	mg/kg	1.884	1.682	mg/kg	0.000168 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
		ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }											
		006-007-00-5											
14		pH				11.6	pH		11.6	pH	11.6 pH		
				PH									
15		naphthalene				0.48	mg/kg		0.429	mg/kg	0.0000429 %	✓	
		601-052-00-2	202-049-5	91-20-3									
16		acenaphthylene				0.18	mg/kg		0.161	mg/kg	0.0000161 %	✓	
			205-917-1	208-96-8									
17		acenaphthene				0.4	mg/kg		0.357	mg/kg	0.0000357 %	✓	
			201-469-6	83-32-9									
18		fluorene				0.45	mg/kg		0.402	mg/kg	0.0000402 %	✓	
			201-695-5	86-73-7									
19		phenanthrene				2.4	mg/kg		2.143	mg/kg	0.000214 %	✓	
			201-581-5	85-01-8									
20		anthracene				0.47	mg/kg		0.42	mg/kg	0.000042 %	✓	
			204-371-1	120-12-7									
21		fluoranthene				2	mg/kg		1.786	mg/kg	0.000179 %	✓	
			205-912-4	206-44-0									
22		pyrene				1.8	mg/kg		1.607	mg/kg	0.000161 %	✓	
			204-927-3	129-00-0									
23		benzo[a]anthracene				1.2	mg/kg		1.071	mg/kg	0.000107 %	✓	
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				1.6	mg/kg		1.429	mg/kg	0.000143 %	✓	
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				1.1	mg/kg		0.982	mg/kg	0.0000982 %	✓	
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				0.6	mg/kg		0.536	mg/kg	0.0000536 %	✓	
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				1.1	mg/kg		0.982	mg/kg	0.0000982 %	✓	
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				1	mg/kg		0.893	mg/kg	0.0000893 %	✓	
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				0.89	mg/kg		0.795	mg/kg	0.0000795 %	✓	
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<LOD
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.105 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Hazardous result
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous Property to non-hazardous for cumulative determinand results below the concentration of: 500 mg/kg (0.05%) because: We do not consider the concentrations of the recorded individual TPH fractions to be flammable. The number of fractions detected and their low concentrations does not suggest a single source such as diesel of petrol. No specific trend can be identified from the concentration of aliphatic or aromatic fractions

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group (conc.: 0.00339%)

Classification of sample: TP09

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP09
Sample Depth:
0.80 m
Moisture content:
9%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 9% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				3.3 mg/kg	1.895	5.736 mg/kg	0.000574 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1.4 mg/kg	5.719	7.346 mg/kg	0.000735 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		<0.1 mg/kg	1.855	<0.185 mg/kg	<0.0000185 %		<**LOD**
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		16 mg/kg	1.462	21.454 mg/kg	0.00215 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		7.2 mg/kg	3.929	25.953 mg/kg	0.0026 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	6 mg/kg		5.505 mg/kg	0.00055 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		9.3 mg/kg	5.358	45.718 mg/kg	0.00457 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		0.7 mg/kg	2.554	1.64 mg/kg	0.000164 %	✓	
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		18 mg/kg	2.774	45.812 mg/kg	0.00458 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				0.1 mg/kg	1.884	0.173 mg/kg	0.0000173 %	✓	
14	pH			PH		10.8 pH		10.8 pH	10.8 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				0.51	mg/kg		0.468	mg/kg	0.0000468 %	✓	
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				2.8	mg/kg		2.569	mg/kg	0.000257 %	✓	
			201-581-5	85-01-8									
20		anthracene				1.1	mg/kg		1.009	mg/kg	0.000101 %	✓	
			204-371-1	120-12-7									
21		fluoranthene				3.5	mg/kg		3.211	mg/kg	0.000321 %	✓	
			205-912-4	206-44-0									
22		pyrene				2.7	mg/kg		2.477	mg/kg	0.000248 %	✓	
			204-927-3	129-00-0									
23		benzo[a]anthracene				0.49	mg/kg		0.45	mg/kg	0.000045 %	✓	
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				0.84	mg/kg		0.771	mg/kg	0.0000771 %	✓	
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				0.87	mg/kg		0.798	mg/kg	0.0000798 %	✓	
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				0.47	mg/kg		0.431	mg/kg	0.0000431 %	✓	
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				1.4	mg/kg		1.284	mg/kg	0.000128 %	✓	
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				0.53	mg/kg		0.486	mg/kg	0.0000486 %	✓	
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				0.18	mg/kg		0.165	mg/kg	0.0000165 %	✓	
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				0.45	mg/kg		0.413	mg/kg	0.0000413 %	✓	
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0174 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP10

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP10
Sample Depth:
0.50 m
Moisture content:
14%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 14% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				7 mg/kg	1.895	11.633 mg/kg	0.00116 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1 mg/kg	5.719	5.017 mg/kg	0.000502 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.5 mg/kg	1.855	0.813 mg/kg	0.0000813 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		52 mg/kg	1.462	66.667 mg/kg	0.00667 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		27 mg/kg	3.929	93.057 mg/kg	0.00931 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	77 mg/kg		67.544 mg/kg	0.00675 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		15 mg/kg	5.358	70.504 mg/kg	0.00705 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		96 mg/kg	2.774	233.612 mg/kg	0.0234 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		230 mg/kg		201.754 mg/kg	0.0202 %	✓	
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		10.6 pH		10.6 pH	10.6 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				0.22	mg/kg		0.193	mg/kg	0.0000193 %	✓	
			201-469-6	83-32-9									
18		fluorene				0.23	mg/kg		0.202	mg/kg	0.0000202 %	✓	
			201-695-5	86-73-7									
19		phenanthrene				0.66	mg/kg		0.579	mg/kg	0.0000579 %	✓	
			201-581-5	85-01-8									
20		anthracene				0.57	mg/kg		0.5	mg/kg	0.00005 %	✓	
			204-371-1	120-12-7									
21		fluoranthene				1.3	mg/kg		1.14	mg/kg	0.000114 %	✓	
			205-912-4	206-44-0									
22		pyrene				1.2	mg/kg		1.053	mg/kg	0.000105 %	✓	
			204-927-3	129-00-0									
23		benzo[a]anthracene				0.55	mg/kg		0.482	mg/kg	0.0000482 %	✓	
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				0.67	mg/kg		0.588	mg/kg	0.0000588 %	✓	
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				0.44	mg/kg		0.386	mg/kg	0.0000386 %	✓	
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				0.38	mg/kg		0.333	mg/kg	0.0000333 %	✓	
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				1.1	mg/kg		0.965	mg/kg	0.0000965 %	✓	
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				0.42	mg/kg		0.368	mg/kg	0.0000368 %	✓	
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				0.1	mg/kg		0.0877	mg/kg	0.00000877 %	✓	
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				0.26	mg/kg		0.228	mg/kg	0.0000228 %	✓	
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0758 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous Property to non-hazardous for cumulative determinand results below the concentration of: 500 mg/kg (0.05%) because: We do not consider the concentrations of the recorded individual TPH fractions to be flammable. The number of fractions detected and their low concentrations does not suggest a single source such as diesel of petrol. No specific trend can be identified from the concentration of aliphatic or aromatic fractions

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group (conc.: 0.0202%)

Classification of sample: TP11

Hazardous Waste
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample name:
TP11
Sample Depth:
0.20 m
Moisture content:
10%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 03 * (Soil and stones containing hazardous substances)

Hazard properties

HP 8: Corrosive "waste which on application can cause skin corrosion"

pH; pH "Assumed to be irritant/corrosive because of pH value"

Because of determinand:

pH (conc.: 11.8 pH)

Determinands

Moisture content: 10% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				1.3 mg/kg	1.895	2.239 mg/kg	0.000224 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		1.4 mg/kg	5.719	7.279 mg/kg	0.000728 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		<0.1 mg/kg	1.855	<0.185 mg/kg	<0.0000185 %		<**LOD**
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		3.2 mg/kg	1.462	4.252 mg/kg	0.000425 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		3.4 mg/kg	3.929	12.144 mg/kg	0.00121 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	3.6 mg/kg		3.273 mg/kg	0.000327 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		1.9 mg/kg	5.358	9.255 mg/kg	0.000926 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		13 mg/kg	2.774	32.785 mg/kg	0.00328 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides,					<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
		ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }											
		006-007-00-5											
14		pH				11.8	pH		11.8	pH	11.8 pH		
				PH									
15		naphthalene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
16		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
17		acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
18		fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
19		phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
20		anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
21		fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
22		pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
23		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
24		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
25		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
26		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
27		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
28		indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
29		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
30		benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
31		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.00712 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Hazardous result
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP12

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP12
Sample Depth:
0.60 m
Moisture content:
14%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 14% Dry Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1		asbestos	650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		<0.001 %		<0.001 %	<0.001 %		**<LOD**
2		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				10 mg/kg	1.895	16.619 mg/kg	0.00166 %	✓	
3		boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.8 mg/kg	5.719	4.013 mg/kg	0.000401 %	✓	
4		cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.7 mg/kg	1.855	1.139 mg/kg	0.000114 %	✓	
5		chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		63 mg/kg	1.462	80.77 mg/kg	0.00808 %	✓	
6		chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		**<LOD**
7		copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		70 mg/kg	3.929	241.258 mg/kg	0.0241 %	✓	
8		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	140 mg/kg		122.807 mg/kg	0.0123 %	✓	
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.11 mg/kg	1.353	0.131 mg/kg	0.0000131 %	✓	
10		nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		23 mg/kg	5.358	108.106 mg/kg	0.0108 %	✓	
11		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		**<LOD**
12		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		350 mg/kg	2.774	851.712 mg/kg	0.0852 %	✓	
13		TPH (C6 to C40) petroleum group			TPH		30 mg/kg		26.316 mg/kg	0.00263 %	✓	

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<**LOD**
15		pH			PH		9.2	pH		9.2	pH	9.2 pH		
16		naphthalene	601-052-00-2	202-049-5	91-20-3		0.1	mg/kg		0.0877	mg/kg	0.00000877 %	✓	
17		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
18		acenaphthene		201-469-6	83-32-9		0.42	mg/kg		0.368	mg/kg	0.0000368 %	✓	
19		fluorene		201-695-5	86-73-7		0.31	mg/kg		0.272	mg/kg	0.0000272 %	✓	
20		phenanthrene		201-581-5	85-01-8		2.3	mg/kg		2.018	mg/kg	0.000202 %	✓	
21		anthracene		204-371-1	120-12-7		1	mg/kg		0.877	mg/kg	0.0000877 %	✓	
22		fluoranthene		205-912-4	206-44-0		7.1	mg/kg		6.228	mg/kg	0.000623 %	✓	
23		pyrene		204-927-3	129-00-0		7.9	mg/kg		6.93	mg/kg	0.000693 %	✓	
24		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		2.7	mg/kg		2.368	mg/kg	0.000237 %	✓	
25		chrysene	601-048-00-0	205-923-4	218-01-9		2.9	mg/kg		2.544	mg/kg	0.000254 %	✓	
26		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		2.6	mg/kg		2.281	mg/kg	0.000228 %	✓	
27		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		1.5	mg/kg		1.316	mg/kg	0.000132 %	✓	
28		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		4.2	mg/kg		3.684	mg/kg	0.000368 %	✓	
29		indeno[123-cd]pyrene		205-893-2	193-39-5		2.4	mg/kg		2.105	mg/kg	0.000211 %	✓	
30		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		0.22	mg/kg		0.193	mg/kg	0.0000193 %	✓	
31		benzo[ghi]perylene		205-883-8	191-24-2		1.8	mg/kg		1.579	mg/kg	0.000158 %	✓	
32		phenol	604-001-00-2	203-632-7	108-95-2		<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
											Total:	0.149 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous Property to non-hazardous for cumulative determinand results below the concentration of: 500 mg/kg (0.05%) because: We do not consider the concentrations of the recorded individual TPH fractions to be flammable. The number of fractions detected and their low concentrations does not suggest a single source such as diesel of petrol. No specific trend can be identified from the concentration of aliphatic or aromatic fractions

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group (conc.: 0.00263%)

Classification of sample: TP13

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP13
Sample Depth:
2.20 m
Moisture content:
12%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 12% Dry Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1		asbestos	650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		<0.001 %		<0.001 %	<0.001 %		<**LOD**
2		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				4.9 mg/kg	1.895	8.289 mg/kg	0.000829 %	✓	
3		boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.9 mg/kg	5.719	4.596 mg/kg	0.00046 %	✓	
4		cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.3 mg/kg	1.855	0.497 mg/kg	0.0000497 %	✓	
5		chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		16 mg/kg	1.462	20.879 mg/kg	0.00209 %	✓	
6		chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
7		copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		17 mg/kg	3.929	59.637 mg/kg	0.00596 %	✓	
8		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	53 mg/kg		47.321 mg/kg	0.00473 %	✓	
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.05 mg/kg	1.353	0.0604 mg/kg	0.00000604 %	✓	
10		nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		12 mg/kg	5.358	57.411 mg/kg	0.00574 %	✓	
11		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
12		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		52 mg/kg	2.774	128.8 mg/kg	0.0129 %	✓	
13		TPH (C6 to C40) petroleum group			TPH		100 mg/kg		89.286 mg/kg	0.00893 %	✓	

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
14		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				0.3	mg/kg	1.884	0.505	mg/kg	0.0000505 %	✓	
		006-007-00-5											
15		pH				10	pH		10	pH	10pH		
				PH									
16		naphthalene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
17		acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
18		acenaphthene				0.99	mg/kg		0.884	mg/kg	0.0000884 %	✓	
			201-469-6	83-32-9									
19		fluorene				1.2	mg/kg		1.071	mg/kg	0.000107 %	✓	
			201-695-5	86-73-7									
20		phenanthrene				3.2	mg/kg		2.857	mg/kg	0.000286 %	✓	
			201-581-5	85-01-8									
21		anthracene				0.68	mg/kg		0.607	mg/kg	0.0000607 %	✓	
			204-371-1	120-12-7									
22		fluoranthene				2.7	mg/kg		2.411	mg/kg	0.000241 %	✓	
			205-912-4	206-44-0									
23		pyrene				2.1	mg/kg		1.875	mg/kg	0.000188 %	✓	
			204-927-3	129-00-0									
24		benzo[a]anthracene				0.9	mg/kg		0.804	mg/kg	0.0000804 %	✓	
		601-033-00-9	200-280-6	56-55-3									
25		chrysene				1.6	mg/kg		1.429	mg/kg	0.000143 %	✓	
		601-048-00-0	205-923-4	218-01-9									
26		benzo[b]fluoranthene				0.78	mg/kg		0.696	mg/kg	0.0000696 %	✓	
		601-034-00-4	205-911-9	205-99-2									
27		benzo[k]fluoranthene				0.39	mg/kg		0.348	mg/kg	0.0000348 %	✓	
		601-036-00-5	205-916-6	207-08-9									
28		benzo[a]pyrene; benzo[def]chrysene				0.88	mg/kg		0.786	mg/kg	0.0000786 %	✓	
		601-032-00-3	200-028-5	50-32-8									
29		indeno[123-cd]pyrene				0.65	mg/kg		0.58	mg/kg	0.000058 %	✓	
			205-893-2	193-39-5									
30		dibenz[a,h]anthracene				0.17	mg/kg		0.152	mg/kg	0.0000152 %	✓	
		601-041-00-2	200-181-8	53-70-3									
31		benzo[ghi]perylene				0.54	mg/kg		0.482	mg/kg	0.0000482 %	✓	
			205-883-8	191-24-2									
32		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
										Total:	0.0432 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous Property to non-hazardous for cumulative determinand results below the concentration of: 500 mg/kg (0.05%) because: We do not consider the concentrations of the recorded individual TPH fractions to be flammable. The number of fractions detected and their low concentrations does not suggest a single source such as diesel of petrol. No specific trend can be identified from the concentration of aliphatic or aromatic fractions

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group (conc.: 0.00893%)

Classification of sample: TP14

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP14
Sample Depth:
1.20 m
Moisture content:
12%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 12% Dry Weight Moisture Correction applied (MC)

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1		asbestos	650-013-00-6	- - - - - - -	12001-28-4 132207-32-0 12172-73-5 77536-66-4 77536-68-6 77536-67-5 12001-29-5		0.002 %		0.0017 %	0.00179 %	✓	
2		arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				6.4 mg/kg	1.895	10.826 mg/kg	0.00108 %	✓	
3		boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.7 mg/kg	5.719	3.574 mg/kg	0.000357 %	✓	
4		cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.3 mg/kg	1.855	0.497 mg/kg	0.0000497 %	✓	
5		chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		36 mg/kg	1.462	46.979 mg/kg	0.0047 %	✓	
6		chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
7		copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		31 mg/kg	3.929	108.751 mg/kg	0.0109 %	✓	
8		lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	35 mg/kg		31.25 mg/kg	0.00313 %	✓	
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
10		nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		21 mg/kg	5.358	100.468 mg/kg	0.01 %	✓	
11		selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
12		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		100 mg/kg	2.774	247.692 mg/kg	0.0248 %	✓	
13		TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
14		cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1	mg/kg	1.884	<0.188	mg/kg	<0.0000188 %		<**LOD**
15		pH			PH		10.1	pH		10.1	pH	10.1 pH		
16		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
17		acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
18		acenaphthene		201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
19		fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
20		phenanthrene		201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
21		anthracene		204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
22		fluoranthene		205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
23		pyrene		204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
24		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
25		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
26		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
27		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
28		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
29		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
30		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
31		benzo[ghi]perylene		205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
32		phenol	604-001-00-2	203-632-7	108-95-2		<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
											Total:	0.0568 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP15

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP15
Sample Depth:
1.00 m
Moisture content:
14%
(dry weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 14% Dry Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	arsenic { arsenic acid and its salts with the exception of those specified elsewhere in this Annex }	033-005-00-1				6 mg/kg	1.895	9.971 mg/kg	0.000997 %	✓	
2	boron { boric acid; [1] boric acid; [2] }	005-007-00-2	233-139-2 [1] 234-343-4 [2]	10043-35-3 [1] 11113-50-1 [2]		0.4 mg/kg	5.719	2.007 mg/kg	0.000201 %	✓	
3	cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		0.2 mg/kg	1.855	0.325 mg/kg	0.0000325 %	✓	
4	chromium in Cr(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		18 mg/kg	1.462	23.077 mg/kg	0.00231 %	✓	
5	chromium in Cr(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<1 mg/kg	2.27	<2.27 mg/kg	<0.000227 %		<**LOD**
6	copper { copper sulphate pentahydrate }	029-023-00-4	231-847-6	7758-99-8		25 mg/kg	3.929	86.163 mg/kg	0.00862 %	✓	
7	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	23 mg/kg		20.175 mg/kg	0.00202 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.05 mg/kg	1.353	<0.0677 mg/kg	<0.00000677 %		<**LOD**
9	nickel { nickel dibromate }	028-053-00-5	238-596-1	14550-87-9		19 mg/kg	5.358	89.305 mg/kg	0.00893 %	✓	
10	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<0.5 mg/kg	2.554	<1.277 mg/kg	<0.000128 %		<**LOD**
11	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		53 mg/kg	2.774	128.973 mg/kg	0.0129 %	✓	
12	TPH (C6 to C40) petroleum group			TPH		<10 mg/kg		<10 mg/kg	<0.001 %		<**LOD**
13	cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.1 mg/kg	1.884	<0.188 mg/kg	<0.0000188 %		<**LOD**
14	pH			PH		8.9 pH		8.9 pH	8.9 pH		
15	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<**LOD**

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
16		acenaphthylene	205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
17		acenaphthene	201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
18		fluorene	201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
19		phenanthrene	201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
20		anthracene	204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
21		fluoranthene	205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
22		pyrene	204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
23		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
24		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
25		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
26		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
27		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
28		indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
29		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
30		benzo[ghi]perylene	205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
31		phenol	604-001-00-2	203-632-7	108-95-2		0.4	mg/kg		0.351	mg/kg	0.0000351 %	✓	
										Total:		0.036 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non GB MCL determinands

chromium(III) oxide (worst case) (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

lead compounds with the exception of those specified elsewhere in this Annex (worst case)

GB MCL index number: 082-001-00-6
Description/Comments: Worst Case: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following MCL protocols, considers lead compounds from smelting industries, flue dust and similar to be Carcinogenic category 1A
Additional Hazard Statement(s): Carc. 1A; H350
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 1A; H350 hazard statement sourced from:: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html (worst case lead compounds). Review date 29/09/2015

TPH (C6 to C40) petroleum group (CAS Number: TPH)

Description/Comments: Unknown Oil

Hazard statements taken from WM3 1st Edition 2015
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3; H226 , Asp. Tox. 1; H304 , STOT RE 2; H373 , Muta. 1B; H340 , Carc. 1B; H350 , Repr. 2; H361d , Aquatic Chronic 2; H411

salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex

GB MCL index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
20 Nov 2021 - EUH032 >= 0.2 % hazard statement sourced from:: WM3, Table C12.2

pH (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

acenaphthylene (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

acenaphthene (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Aquatic Chronic 2; H411

fluorene (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

phenanthrene (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

- **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

- **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2; H351

- **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

Appendix B: Rationale for selection of metal species

arsenic {arsenic acid and its salts with the exception of those specified elsewhere in this Annex}

Worst case CLP species based on hazard statements/molecular weight and conversion factor for arsenic acid H3AsO4. (edit as required)

boron {boric acid; [1] boric acid; [2]}

Reasonable worst case CLP species based on hazard statements/molecular weight and assuming water is or has been present. (edit as required)

cadmium {cadmium sulfate}

Worst case CLP species based on hazard statements/molecular weight. (edit as required)

chromium in Cr(III) compounds {chromium(III) oxide (worst case)}

Specific chromium compound not known

chromium in Cr(VI) compounds {chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex}

Worst case species based on hazard statements/molecular weight (edit as required)

copper {copper sulphate pentahydrate}

Worst case CLP species based on hazard statements/molecular weight. (edit as required)

lead {lead compounds with the exception of those specified elsewhere in this Annex (worst case)}

Specific lead compound not known

mercury {mercury dichloride}

Reasonable worst case CLP species based on hazard statements/molecular weight and assuming no evidence for the use of explosives. (edit as required)

nickel {nickel dibromate}

Worst case CLP species based on hazard statements/molecular weight. (edit as required)

selenium {nickel selenate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case as complex cyanides and those specified elsewhere in the annex are not likely to be present in this soil: [Note conversion factor based on a worst case compound: sodium cyanide] (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.2.GB - Oct 2021
HazWasteOnline Classification Engine Version: 2026.26.6955.12551 (26 Jan 2026)
HazWasteOnline Database: 2026.27.6959.12557 (27 Jan 2026)

This classification utilises the following guidance and legislation:
WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
GB MCL List - version 1.1 of 09 June 2021
GB MCL List v2.0 - version 2.0 of 20th October 2023
GB MCL List v3.0 - version 3.0 of 11th January 2024
GB MCL List v4.0 - version 4.0 of 2nd March 2024
GB MCL List v5.0 - version 5.0 of 26th June 2024
GB MCL List v6.0 - version 6.0 of 15th February 2025
GB MCL List v7.0 - version 7.0 of 23rd September 2025

Appendix 07

Laboratory Geotechnical Test Certificates

LABORATORY TEST CERTIFICATE

MATtest Limited
materials testing & consultancy

10 Queenslie Point
Queenslie Industrial Estate
120 Stepps Road
Glasgow
G33 3NQ

Certificate No : **26/173 - 01-1**

To : **Hugh O' Leary**

Client : **LandWise Consulting Ltd.**
43 Buchanan Drive
Cambuslang
Glasgow
G72 8BD

LABORATORY TESTING OF SOIL

Introduction

We refer to samples taken from Jaguar Landrover, Halewood, Eastlands, Liverpool and delivered to our laboratory on 13th February 2026.

Material & Source

Sample Reference	:	See Report Plates
Sampled By	:	Client
Sampling Certificate	:	Not Supplied
Location	:	See Report Plates
Description	:	See Page 2 to Page 3 inclusive
Date Sampled	:	Not Supplied
Date Tested	:	13th February 2026 Onwards
Source	:	LW25-136 - Jaguar Landrover, Halewood, Eastlands, Liverpool

Test Results

As Detailed On Page 2 to Page 27 inclusive

Comments

The results contained in this report relate to the sample(s) as received
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
All remaining samples for this project will be disposed of 28 days after issue of this test certificate

Remarks

Approved for Issue

T McLelland (Director)

Date 24/02/2026

UKAS TESTING
2643

BOREHOLE	SAMPLE	DEPTH (m)	SAMPLE DESCRIPTION
BH01	B	0.00-0.50	Brown / grey silty clayey fine to coarse CRUSHED ROCK / RECYCLED AGGREGATE.
BH01	U	1.00-1.90	Brown gravelly very sandy very silty CLAY. Gravel is fine to coarse.
BH01	U	2.00-2.90	Brown slightly gravelly slightly sandy CLAY. Gravel is fine to medium.
BH01	U	3.00-4.00	Brown gravelly sandy CLAY. Gravel is fine to coarse.
BH01	U	4.00-5.00	Brown slightly sandy slightly silty CLAY.
BH02	U	2.00-3.00	Brown very gravelly very silty very sandy CLAY. Gravel is fine to coarse.
BH03	U	1.20-2.00	Brown very gravelly very sandy CLAY with cobbles. Gravel is fine to coarse.
BH04	U	2.00-2.90	Brown gravelly very sandy CLAY. Gravel is fine to coarse.
BH05	U	1.20-2.00	Brown gravelly sandy CLAY. Gravel is fine to coarse.
BH06	B	1.80	Brown very clayey very silty fine to coarse CRUSHED ROCK / RECYCLED AGGREGATE.
BH07	B	0.00-0.50	Grey silty fine to coarse CRUSHED ROCK.
BH07	U	1.00-1.90	Brown gravelly slightly sandy CLAY. Gravel is fine to coarse.
BH07	U	4.00-4.60	Brown gravelly very sandy CLAY. Gravel is fine to coarse.
BH08	B	0.00-0.50	Brown fine to coarse CRUSHED ROCK with cobbles.
BH09	U	1.20-2.10	Brown slightly gravelly slightly sandy CLAY. Gravel is fine to medium.
BH10	U	1.00-1.50	Brown very gravelly silty very sandy CLAY. Gravel is fine to coarse.
BH11	B	0.00-0.50	Brown slightly clayey fine to coarse CRUSHED ROCK / RECYCLED AGGREGATE.
BH12	U	0.00-0.80	Brown slightly gravelly very silty very sandy CLAY. Gravel is fine to coarse.
BH13	U	1.00-1.15	Brown slightly gravelly sandy CLAY. Gravel is fine to medium.
BH14	U	2.00-2.80	Brown gravelly sandy CLAY. Gravel is fine to medium.
BH15	U	4.00-4.80	Brrown slightly gravelly slightly sandy CLAY. Gravel is fine to medium.
BH16	B	1.80	Brown gravelly sandy CLAY. Gravel is fine to medium.

SUMMARY OF SAMPLE DESCRIPTIONS

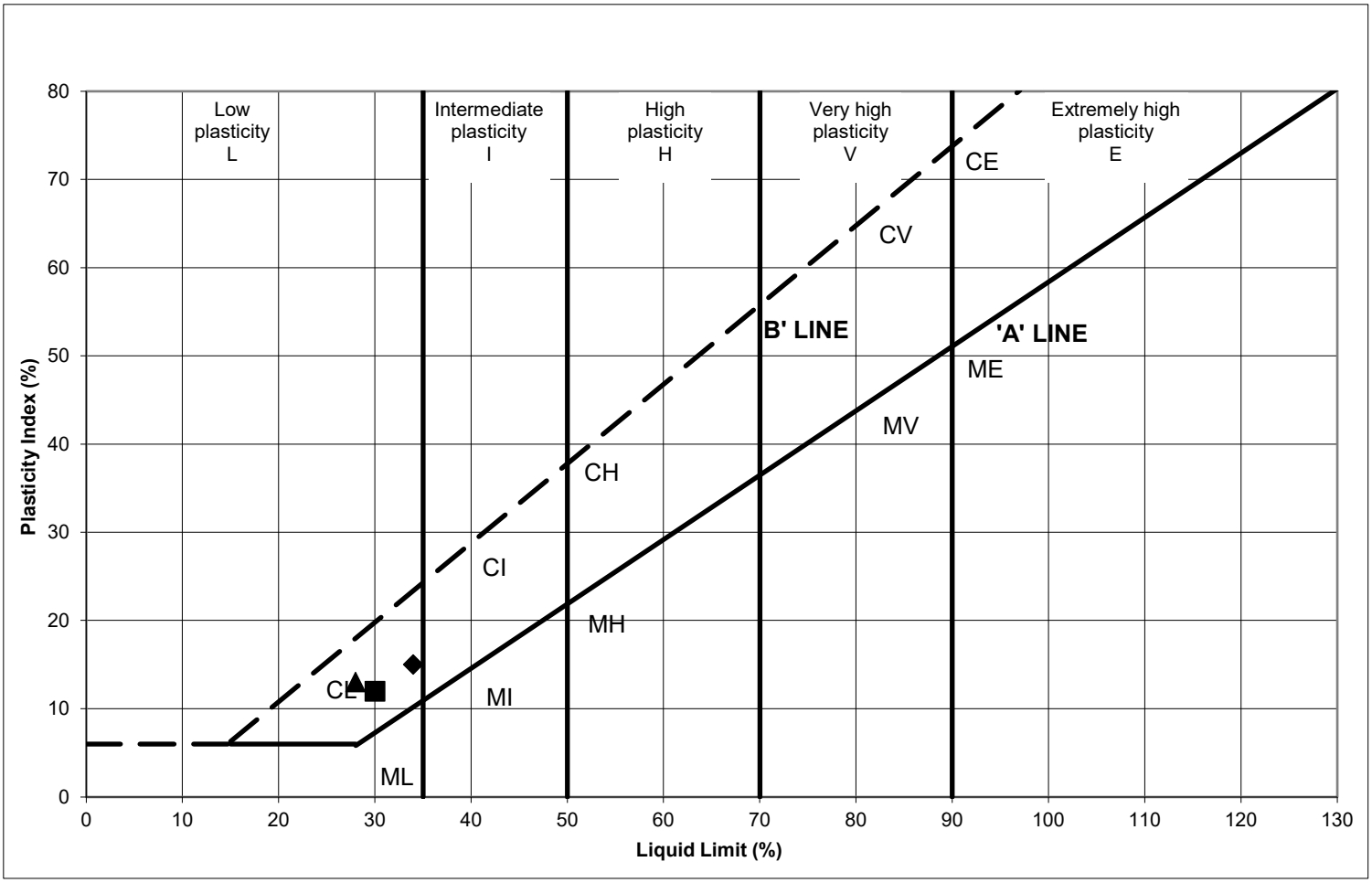
BOREHOLE	SAMPLE	DEPTH (m)	SAMPLE DESCRIPTION
BH17	U	1.20-2.00	Brown slightly gravelly sandy CLAY. Gravel is fine to coarse.
BH18	B	0.00-0.50	Brown slightly clayey fine to coarse CRUSHED ROCK / RECYCLED AGGREGATE with cobbles.
BH18	U	3.00-3.90	Brown slightly gravelly very sandy CLAY. Gravel is fine to coarse.
BH19	U	1.00-1.90	Brown very gravelly very sandy CLAY. Gravel is fine to coarse.
BH19	U	3.00-3.50	Brown gravelly sandy CLAY. Gravel is fine to coarse.
BH21	U	3.00-3.60	Brown gravelly sandy silty CLAY. Gravel is fine to medium.
BH22	U	1.20-1.80	Brown gravelly sandy CLAY. Gravel is fine to coarse.
BH23	B	0.50-1.00	Brown very gravelly very sandy CLAY. Gravel is fine to coarse.
BH24	B	0.00-0.50	Grey silty clayey fine to coarse CRUSHED ROCK / RECYCLED AGGREGATE with cobbles.
BH24	U	1.00-1.60	Brown / grey silty very clayey fine to coarse CRUSHED ROCK with fragments of brick.
BH24	U	3.00-3.60	Brown / grey slightly silty very sandy fine to coarse CRUSHED ROCK with fragments of brick.

SUMMARY OF SAMPLE DESCRIPTIONS

BOREHOLE	SAMPLE	DEPTH (m)	WATER CONTENT (%)
BH02	U	2.00	19.3
BH04	U	2.00	17.1
BH06	B	1.80	30.0
BH07	U	4.20	19.3
BH14	U	2.40	17.5
BH21	U	3.40	23.6

BS EN ISO 17892-1 : 2014 + A1 : 2022
BS 1377-2 : 2022

SUMMARY OF WATER CONTENT TEST RESULTS



Symbol	Borehole	Sample	Depth	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Passing 0.425mm Sieve	Remarks
■	BH07	U	4.30	19.3	30	18	12	61	Clay with low plasticity
◆	BH14	U	2.50	17.5	34	19	15	65	Clay with low plasticity
▲	BH21	U	3.50	23.6	28	15	13	73	Clay with low plasticity
●									
□									
◇									
△									
○									
×									
✳									

Tested in accordance with BS EN ISO 17892-12 : 2018 + A2 2022 : Clause 5.3, 5.5 & 6.5 : Four point method / BS 1377-2 : 2022
All samples were washed on a 0.425mm test sieve prior to test.

SUMMARY OF ATTERBERG LIMITS TEST RESULTS

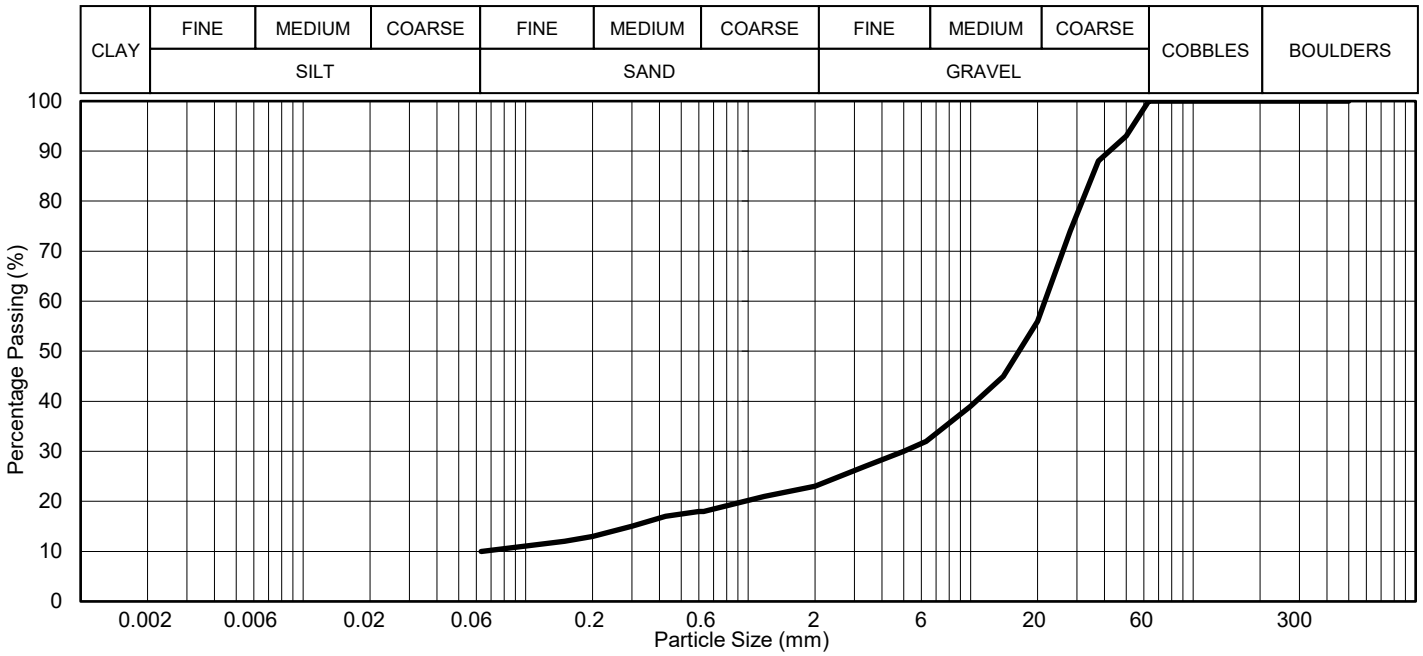
MATtest Limited
materials testing & consultancy

BOREHOLE	SAMPLE	DEPTH (m)	WATER CONTENT (%)	BULK DENSITY (Mg/m^3)	DRY DENSITY (Mg/m^3)
BH16	B	1.80	18.9	2.11	1.77
BH22	U	1.60	17.3	2.01	1.71

BS EN ISO 17892-2 : 2014 : 5.1 - Linear Measurement Method
BS 1377 - 2 : 2022

SUMMARY OF WATER CONTENT AND BULK DENSITY TEST RESULTS

Borehole	BH01
Sample	B
Depth (m)	0.00-0.50



SIEVING				SEDIMENTATION (Assumed ρs of 2.65Mg/m³)	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.0200	
300.0	100	-	-	0.0063	
125.0	100	-	-	0.0020	
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	**1A, 6E & 6R, 6F2, 6F3, 6I, 6M, 6N, 6P,**	
50.0	93	-	-		
37.5	88	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	74	-	-		
20.0	56	-	-		
14.0	45	-	-		
10.0	39	-	-	**PERCENTAGE SOIL TYPES**	
6.3	32	-	-		
5.0	30	-	-		
3.350	27	-	-		
2.000	23	-	-		
1.180	21	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.630	18	-	-		
0.600	18	-	-		
0.425	17	-	-		
0.300	15	-	-		
0.200	13	-	-		
0.150	12	-	-		
0.063	10	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
/	10	13	77	0

D10	D60	Specification
0.063	21.778	
UNIFORMITY COEFFICIENT 346		-

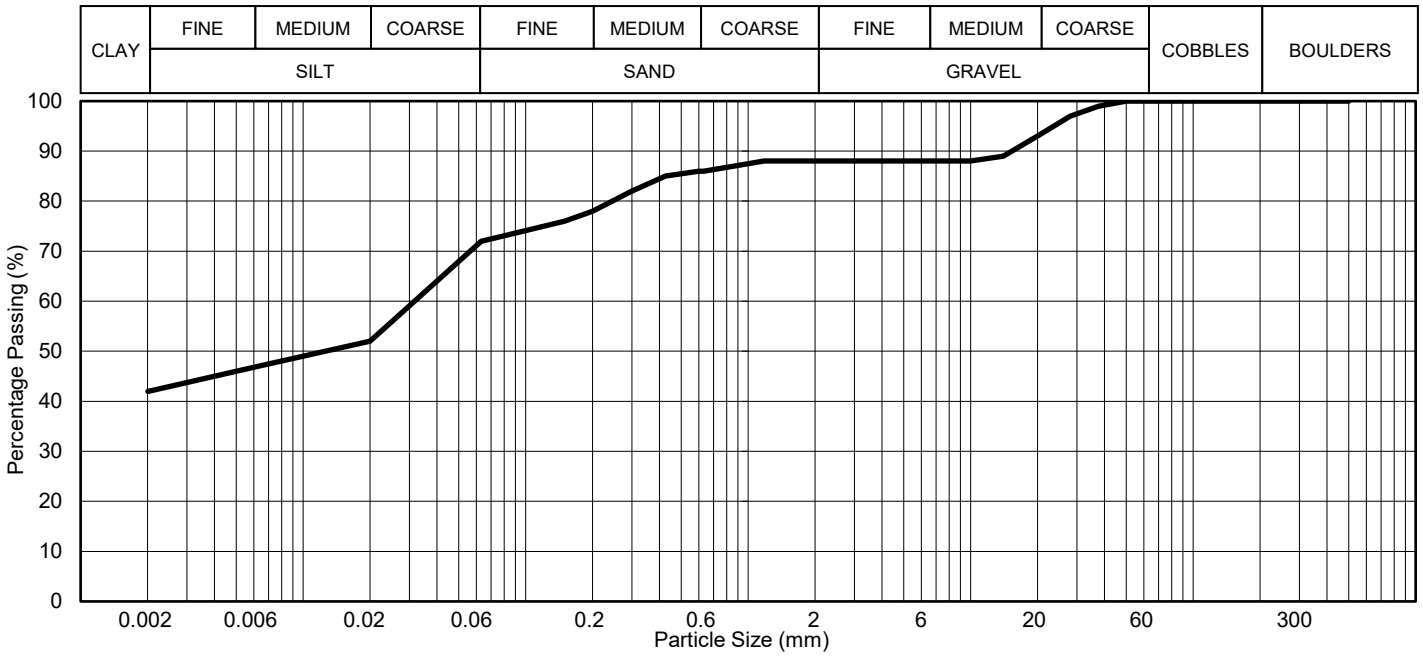
Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Sample does not meet minimum mass requirement for material type

Uniformity coefficient calculated using 0.063mm as d10 as no value was available.

Borehole	BH01
Sample	U
Depth (m)	1.00-1.90



SIEVING				SEDIMENTATION (Assumed ρs of 2.65Mg/m³)	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.0200	52
300.0	100	-	-	0.0063	47
125.0	100	-	-	0.0020	42
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	**2A & 2B, 7A, 7E, 7F, 7I,**	
50.0	100	-	-		
37.5	99	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	97	-	-		
20.0	93	-	-		
14.0	89	-	-		
10.0	88	-	-	**PERCENTAGE SOIL TYPES**	
6.3	88	-	-		
5.0	88	-	-		
3.350	88	-	-		
2.000	88	-	-		
1.180	88	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.630	86	-	-		
0.600	86	-	-		
0.425	85	-	-		
0.300	82	-	-		
0.200	78	-	-		
0.150	76	-	-		
0.063	72	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
42	30	16	12	0

D10	D60	Specification
0.002	0.037	
UNIFORMITY COEFFICIENT	**19**	-

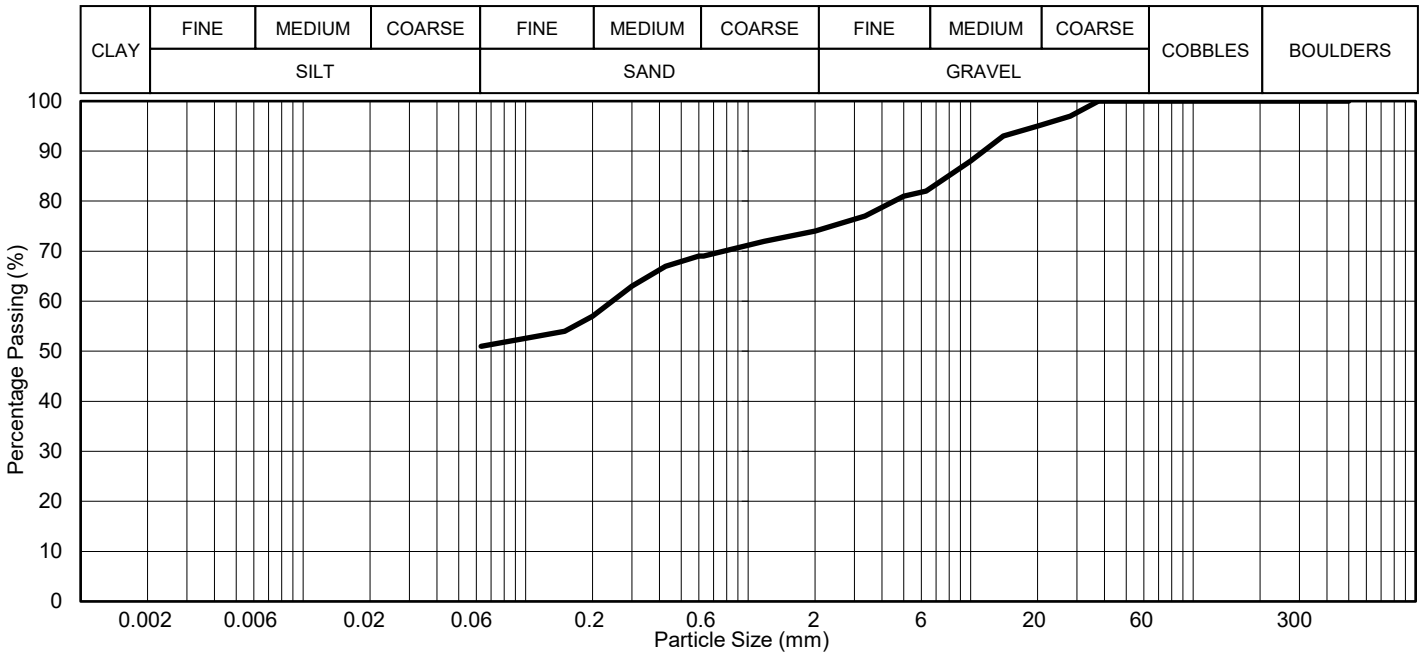
Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Uniformity coefficient calculated using 0.002mm as d10 as no value was available.

PARTICLE SIZE DISTRIBUTION - BS EN ISO 17892-4 : 2016 / BS 1377 - 2 : 2022

Borehole	BH02
Sample	U
Depth (m)	2.00-3.00



SIEVING				SEDIMENTATION (Assumed ρs of 2.65Mg/m³)	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.0200	
300.0	100	-	-	0.0063	
125.0	100	-	-	0.0020	
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	**2C, 7A, 7E, 7I,**	
50.0	100	-	-		
37.5	100	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	97	-	-		
20.0	95	-	-		
14.0	93	-	-		
10.0	88	-	-	**PERCENTAGE SOIL TYPES**	
6.3	82	-	-		
5.0	81	-	-		
3.350	77	-	-		
2.000	74	-	-		
1.180	72	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.630	69	-	-		
0.600	69	-	-		
0.425	67	-	-		
0.300	63	-	-		
0.200	57	-	-		
0.150	54	-	-		
0.063	51	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
/	51	23	26	0

D10	D60	Specification
0.063	0.250	
UNIFORMITY COEFFICIENT	**4**	-

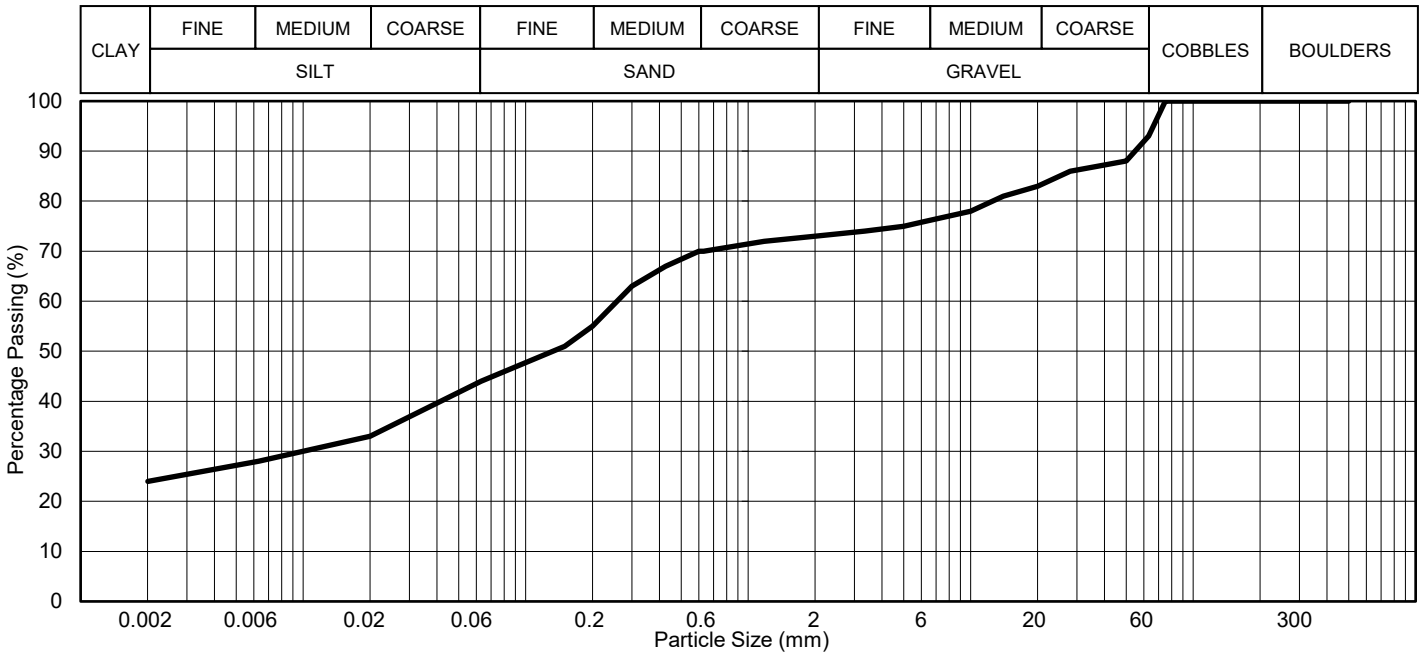
Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Uniformity coefficient calculated using 0.063mm as d10 as no value was available.

PARTICLE SIZE DISTRIBUTION - BS EN ISO 17892-4 : 2016 / BS 1377 - 2 : 2022

Borehole	BH03
Sample	U
Depth (m)	1.20-2.00



SIEVING				SEDIMENTATION (Assumed ρs of 2.65Mg/m³)	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.0200	33
300.0	100	-	-	0.0063	28
125.0	100	-	-	0.0020	24
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	93	-	-	**2C, 7A, 7F,**	
50.0	88	-	-		
37.5	87	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	86	-	-		
20.0	83	-	-		
14.0	81	-	-		
10.0	78	-	-	**PERCENTAGE SOIL TYPES**	
6.3	76	-	-	**CLAY** / **SILT ₸** / **SAND** / **GRAVEL** / **COBBLES**	
5.0	75	-	-		
3.350	74	-	-	24 / 20 / 29 / 20 / 7	
2.000	73	-	-		
1.180	72	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.630	70	-	-	**D10** / **D60** / **Specification**	
0.600	70	-	-		
0.425	67	-	-	0.002 / 0.263	
0.300	63	-	-	**UNIFORMITY COEFFICIENT 132** / **-**	
0.200	55	-	-		
0.150	51	-	-		
0.063	44	-	-		

Remarks

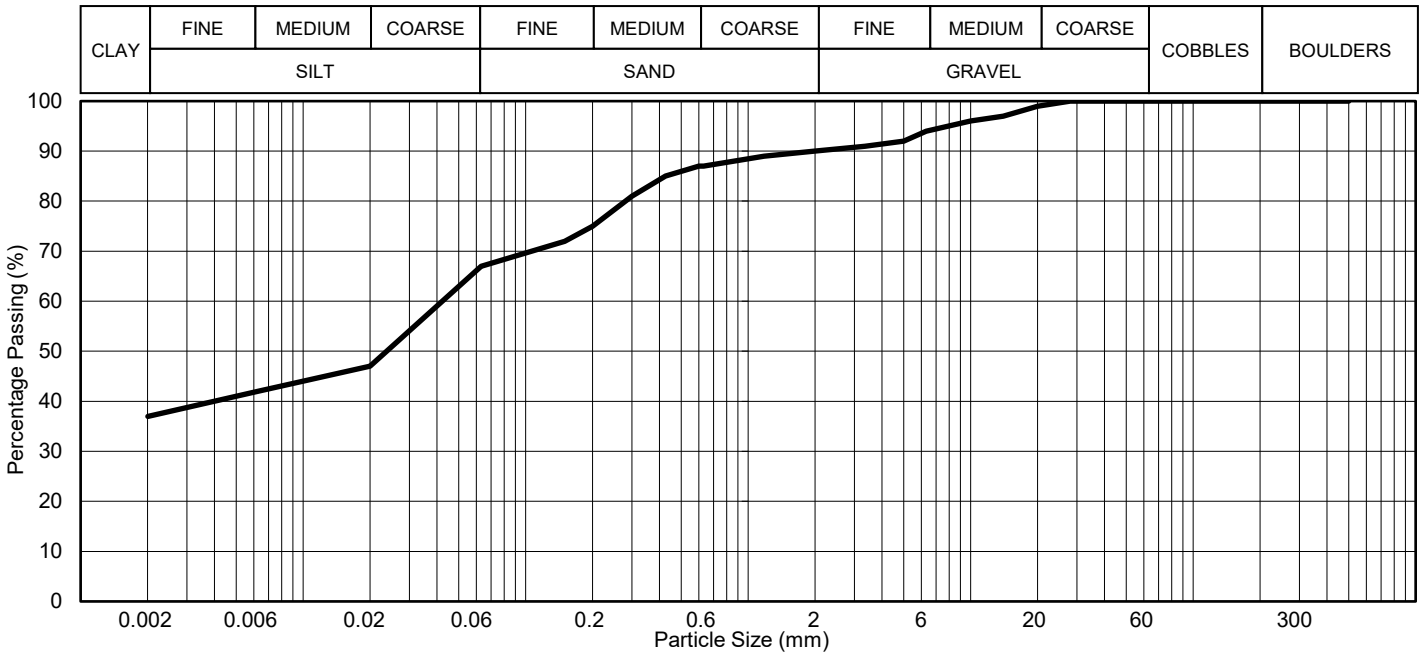
₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Sample does not meet minimum mass requirement for material type

Uniformity coefficient calculated using 0.002mm as d10 as no value was available.

PARTICLE SIZE DISTRIBUTION - BS EN ISO 17892-4 : 2016 / BS 1377 - 2 : 2022

Borehole	BH04
Sample	U
Depth (m)	2.00-2.90



SIEVING				SEDIMENTATION (Assumed ρs of 2.65Mg/m³)	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.0200	47
300.0	100	-	-	0.0063	42
125.0	100	-	-	0.0020	37
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	**2A & 2B, 7A, 7E, 7F, 7I,**	
50.0	100	-	-		
37.5	100	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	100	-	-		
20.0	99	-	-		
14.0	97	-	-		
10.0	96	-	-	**PERCENTAGE SOIL TYPES**	
6.3	94	-	-		
5.0	92	-	-		
3.350	91	-	-		
2.000	90	-	-		
1.180	89	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.630	87	-	-		
0.600	87	-	-		
0.425	85	-	-		
0.300	81	-	-		
0.200	75	-	-		
0.150	72	-	-		
0.063	67	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
37	30	23	10	0

D10	D60	Specification
0.002	0.048	
UNIFORMITY COEFFICIENT	**24**	-

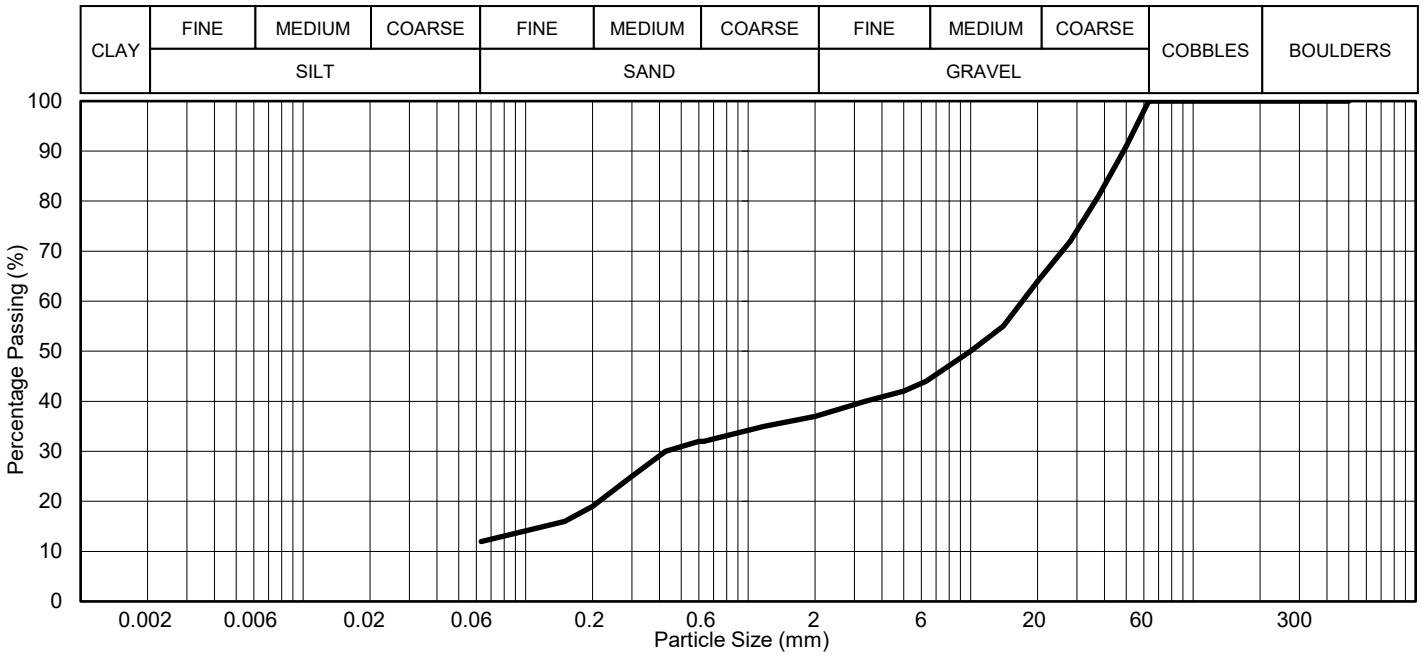
Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Uniformity coefficient calculated using 0.002mm as d10 as no value was available.

PARTICLE SIZE DISTRIBUTION - BS EN ISO 17892-4 : 2016 / BS 1377 - 2 : 2022

Borehole	BH06
Sample	B
Depth (m)	1.80



SIEVING				SEDIMENTATION (Assumed ρs of 2.65Mg/m³)	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.0200	
300.0	100	-	-	0.0063	
125.0	100	-	-	0.0020	
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	**1A, 6E & 6R, 6F1, 6I, 6N, 6P,**	
50.0	91	-	-		
37.5	81	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	72	-	-		
20.0	64	-	-		
14.0	55	-	-		
10.0	50	-	-	**PERCENTAGE SOIL TYPES**	
6.3	44	-	-		
5.0	42	-	-		
3.350	40	-	-		
2.000	37	-	-		
1.180	35	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.630	32	-	-		
0.600	32	-	-		
0.425	30	-	-		
0.300	25	-	-		
0.200	19	-	-		
0.150	16	-	-		
0.063	12	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
/	12	25	63	0

D10	D60	Specification
0.063	17.333	
UNIFORMITY COEFFICIENT	**275**	-

Remarks

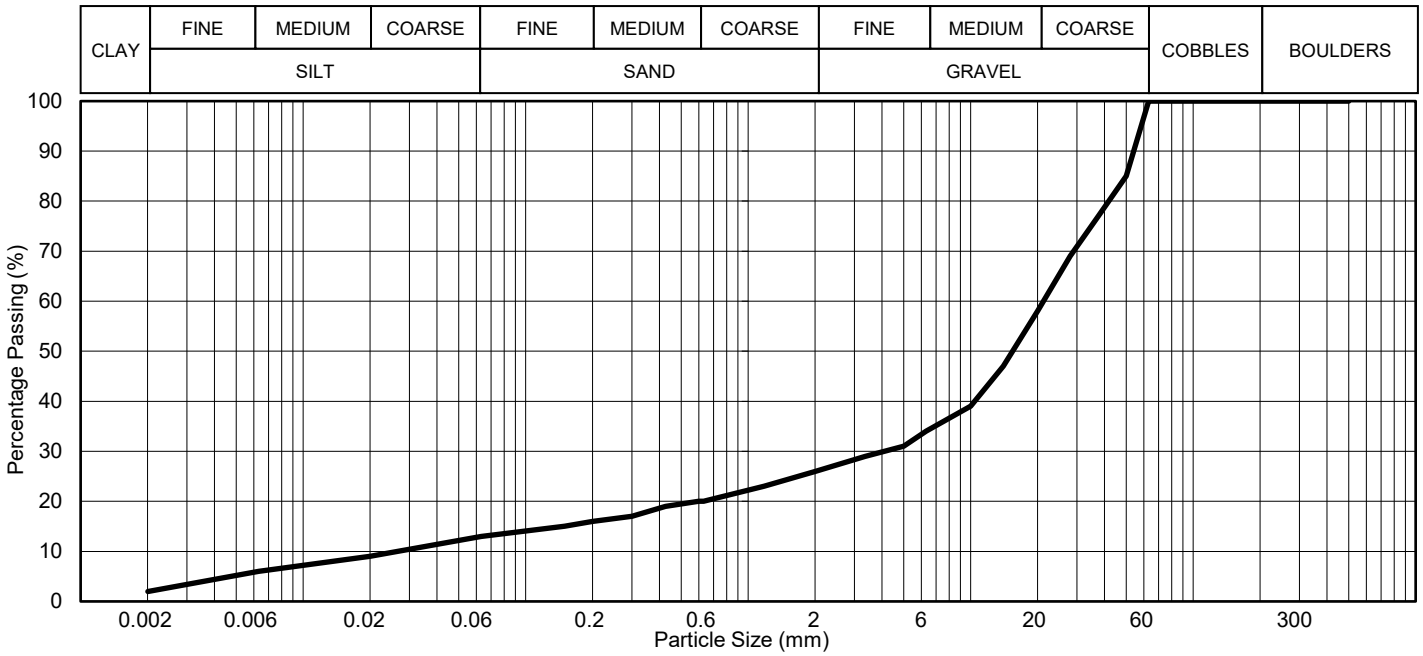
₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Sample does not meet minimum mass requirement for material type

Uniformity coefficient calculated using 0.063mm as d10 as no value was available.

PARTICLE SIZE DISTRIBUTION - BS EN ISO 17892-4 : 2016 / BS 1377 - 2 : 2022

Borehole	BH07
Sample	B
Depth (m)	0.00-0.50



SIEVING				SEDIMENTATION (Assumed ρs of 2.65Mg/m³)	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.0200	9
300.0	100	-	-	0.0063	6
125.0	100	-	-	0.0020	2
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	**1A, 6E & 6R, 6I, 6N, 6P,**	
50.0	85	-	-		
37.5	77	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	69	-	-		
20.0	58	-	-		
14.0	47	-	-		
10.0	39	-	-	**PERCENTAGE SOIL TYPES**	
6.3	34	-	-		
5.0	31	-	-		
3.350	29	-	-		
2.000	26	-	-		
1.180	23	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.630	20	-	-		
0.600	20	-	-		
0.425	19	-	-		
0.300	17	-	-		
0.200	16	-	-		
0.150	15	-	-		
0.063	13	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
2	11	13	74	0

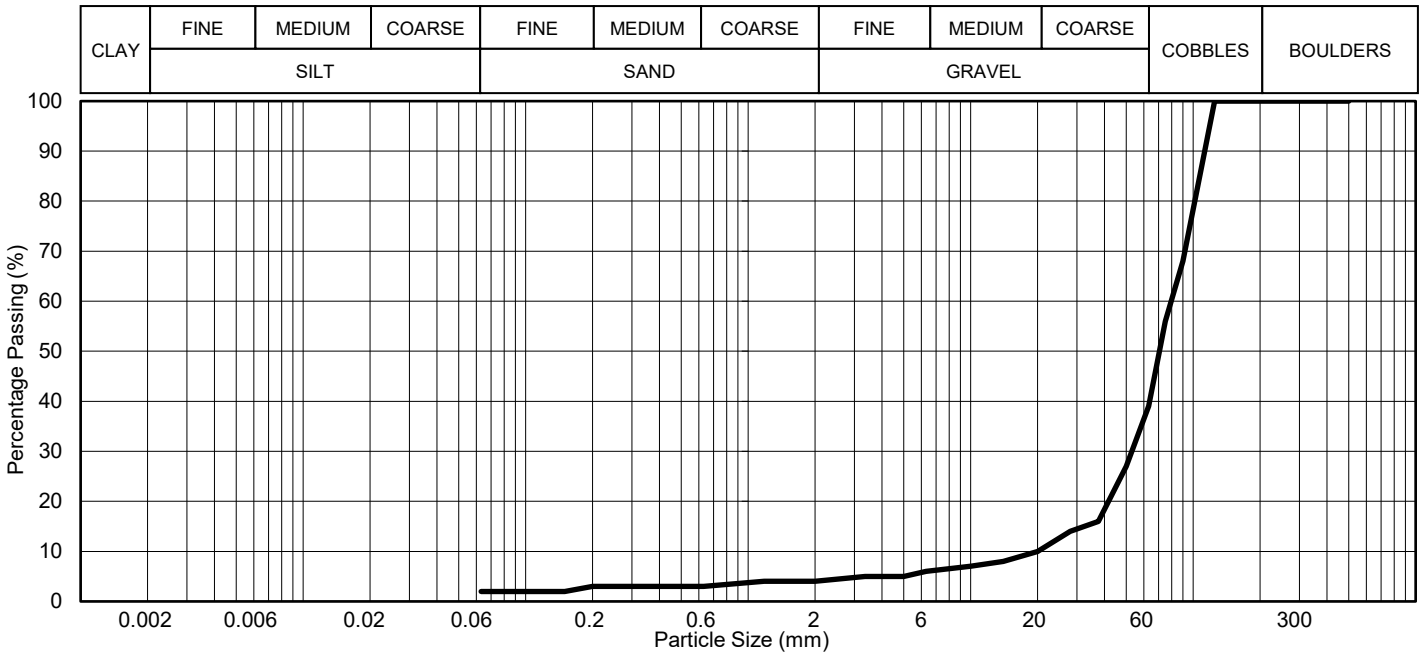
D10	D60	Specification
0.031	21.455	
UNIFORMITY COEFFICIENT	**692**	-

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Sample does not meet minimum mass requirement for material type

Borehole	BH08
Sample	B
Depth (m)	0.00-0.50



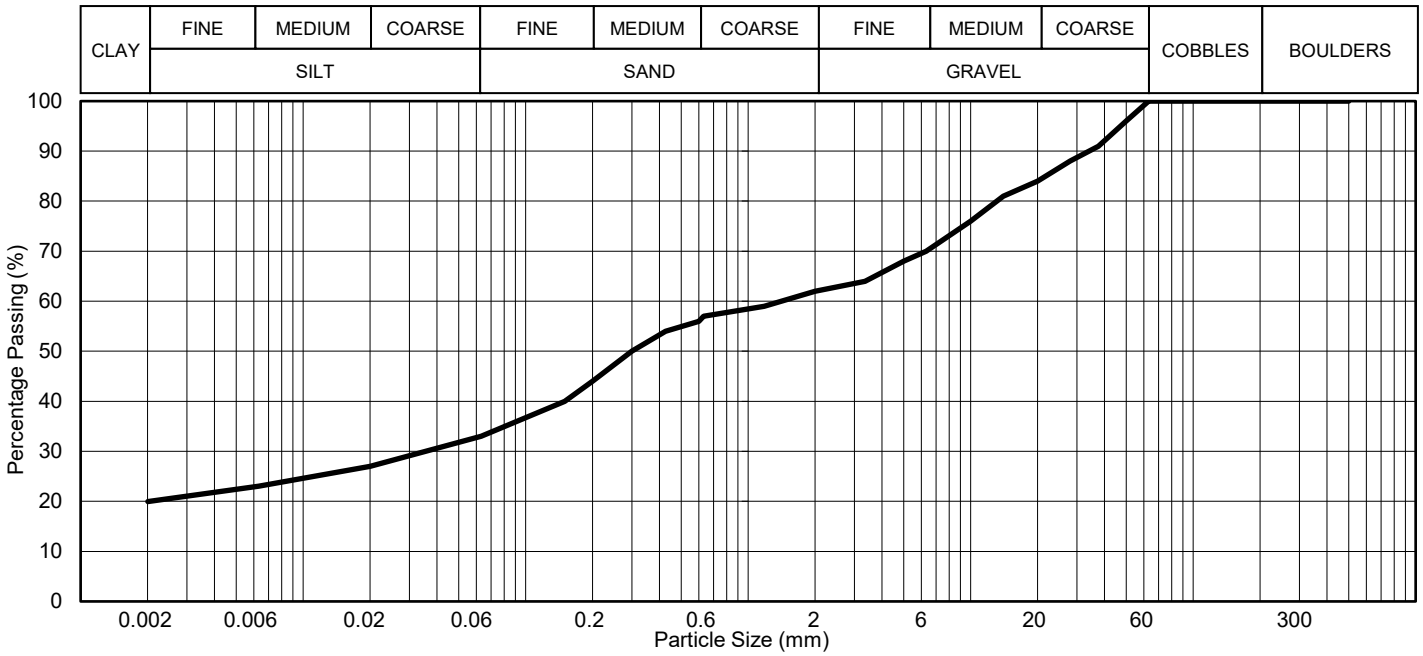
SIEVING				SEDIMENTATION (Assumed ρs of 2.65Mg/m³)	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.0200	
300.0	100	-	-	0.0063	
125.0	100	-	-	0.0020	
90.0	68	-	-		
75.0	56	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	39	-	-	**1B,**	
50.0	27	-	-		
37.5	16	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	14	-	-		
20.0	10	-	-		
14.0	8	-	-		
10.0	7	-	-	**PERCENTAGE SOIL TYPES**	
6.3	6	-	-	**CLAY** / **SILT ₸** / **SAND** / **GRAVEL** / **COBBLES**	
5.0	5	-	-		
3.350	5	-	-	/ 2 2 35 61	
2.000	4	-	-		
1.180	4	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.630	3	-	-	**D10** / **D60** / **Specification**	
0.600	3	-	-		
0.425	3	-	-	20.000 80.000	
0.300	3	-	-	**UNIFORMITY COEFFICIENT 4** -	
0.200	3	-	-		
0.150	2	-	-		
0.063	2	-	-		

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Sample does not meet minimum mass requirement for material type

Borehole	BH10
Sample	U
Depth (m)	1.00-1.50



SIEVING				SEDIMENTATION (Assumed ρs of 2.65Mg/m³)	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.0200	27
300.0	100	-	-	0.0063	23
125.0	100	-	-	0.0020	20
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	**2C, 7A, 7D, 7F,**	
50.0	96	-	-		
37.5	91	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	88	-	-		
20.0	84	-	-		
14.0	81	-	-		
10.0	76	-	-	**PERCENTAGE SOIL TYPES**	
6.3	70	-	-	**CLAY** / **SILT ₸** / **SAND** / **GRAVEL** / **COBBLES**	
5.0	68	-	-		
3.350	64	-	-	20 / 13 / 29 / 38 / 0	
2.000	62	-	-		
1.180	59	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.630	57	-	-	**D10** / **D60** / **Specification**	
0.600	56	-	-		
0.425	54	-	-	0.002 / 1.453	
0.300	50	-	-	**UNIFORMITY COEFFICIENT 727** / **-**	
0.200	44	-	-		
0.150	40	-	-		
0.063	33	-	-		

Remarks

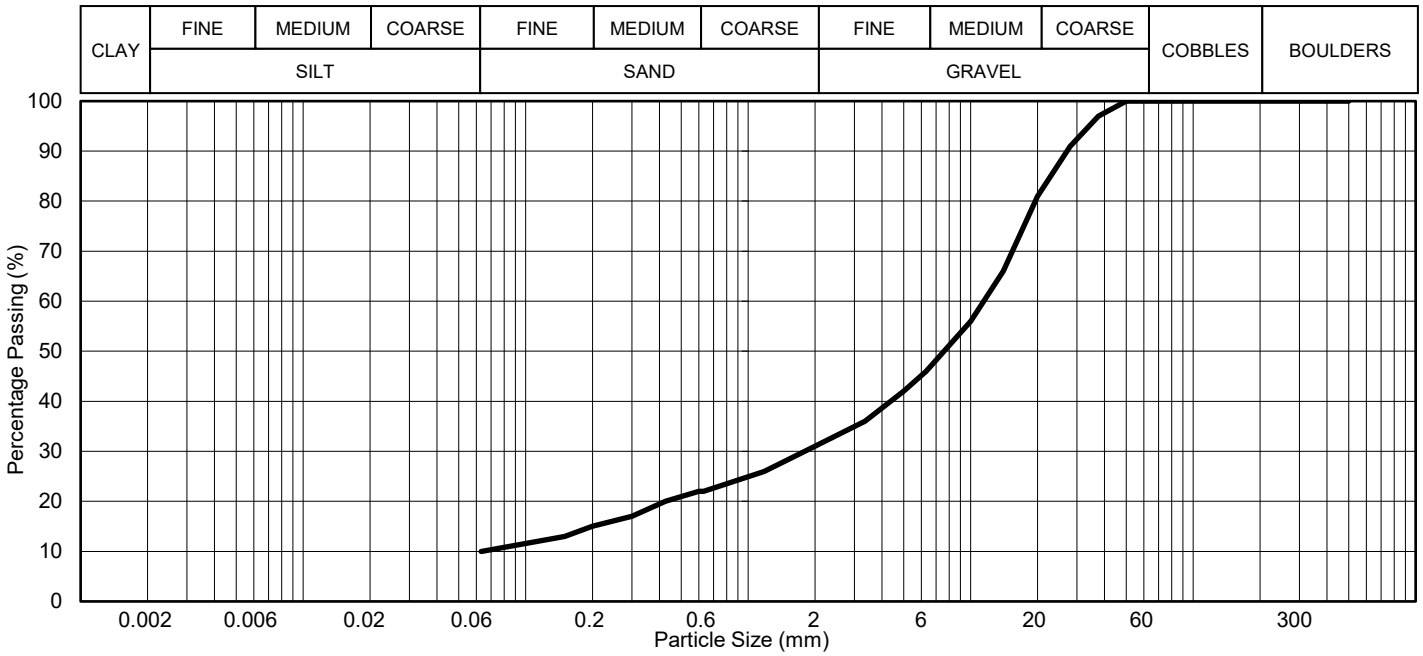
₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Sample does not meet minimum mass requirement for material type

Uniformity coefficient calculated using 0.002mm as d10 as no value was available.

PARTICLE SIZE DISTRIBUTION - BS EN ISO 17892-4 : 2016 / BS 1377 - 2 : 2022

Borehole	BH11
Sample	B
Depth (m)	0.00-0.50



SIEVING				SEDIMENTATION (Assumed ρs of 2.65Mg/m³)	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.0200	
300.0	100	-	-	0.0063	
125.0	100	-	-	0.0020	
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	**1A, 6E & 6R, 6F1, 6F2, 6F3, 6I, 6M, 6N, 6P,**	
50.0	100	-	-		
37.5	97	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	91	-	-		
20.0	81	-	-		
14.0	66	-	-		
10.0	56	-	-	**PERCENTAGE SOIL TYPES**	
6.3	46	-	-	**CLAY** / **SILT Ŧ** / **SAND** / **GRAVEL** / **COBBLES**	
5.0	42	-	-		
3.350	36	-	-	/ 10 21 69 0	
2.000	31	-	-		
1.180	26	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.630	22	-	-	**D10** / **D60** / **Specification**	
0.600	22	-	-		
0.425	20	-	-	0.063 / 11.600	
0.300	17	-	-	**UNIFORMITY COEFFICIENT 184** / -	
0.200	15	-	-		
0.150	13	-	-		
0.063	10	-	-		

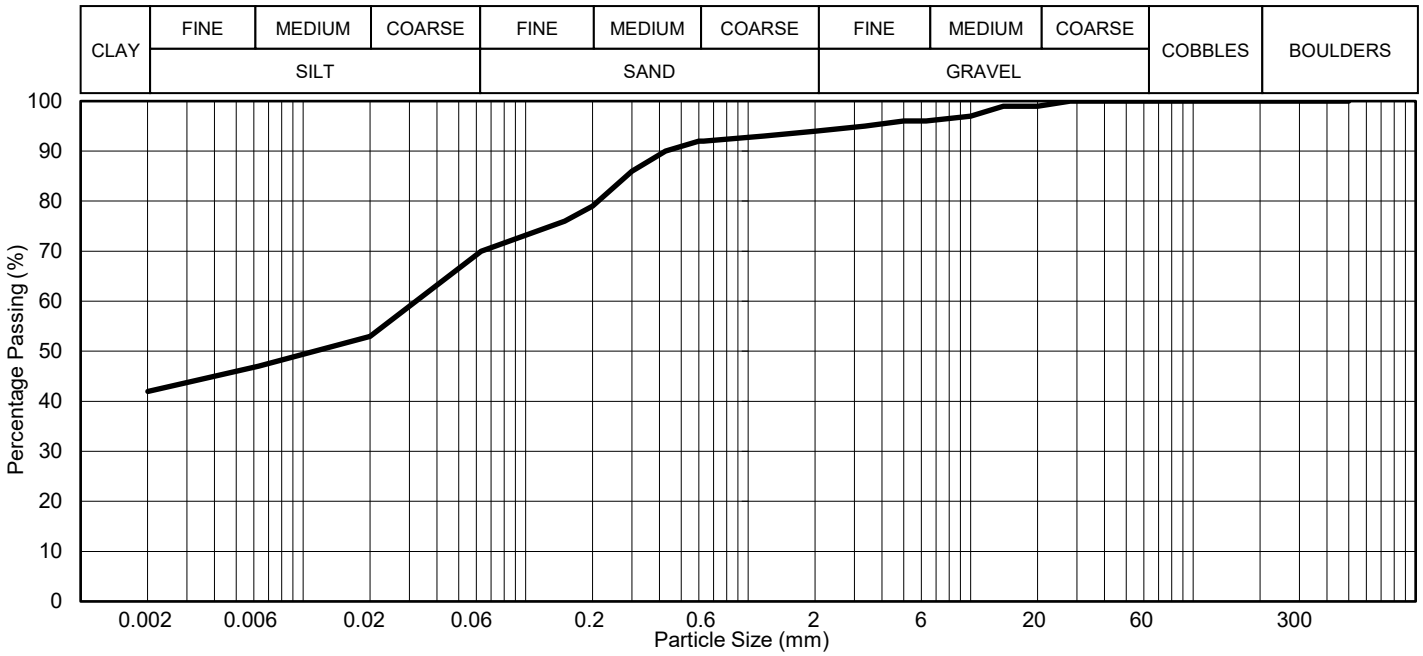
Remarks

Ŧ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Uniformity coefficient calculated using 0.063mm as d10 as no value was available.

PARTICLE SIZE DISTRIBUTION - BS EN ISO 17892-4 : 2016 / BS 1377 - 2 : 2022

Borehole	BH12
Sample	U
Depth (m)	0.00-0.80



SIEVING				SEDIMENTATION (Assumed ρs of 2.65Mg/m³)	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.0200	53
300.0	100	-	-	0.0063	47
125.0	100	-	-	0.0020	42
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	**2A & 2B, 7A, 7E, 7F, 7I,**	
50.0	100	-	-		
37.5	100	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	100	-	-		
20.0	99	-	-		
14.0	99	-	-		
10.0	97	-	-	**PERCENTAGE SOIL TYPES**	
6.3	96	-	-	**CLAY** / **SILT ₸** / **SAND** / **GRAVEL** / **COBBLES**	
5.0	96	-	-		
3.350	95	-	-	42 / 28 / 24 / 6 / 0	
2.000	94	-	-		
1.180	93	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.630	92	-	-	**D10** / **D60** / **Specification**	
0.600	92	-	-		
0.425	90	-	-	0.002 / 0.038	
0.300	86	-	-	**UNIFORMITY COEFFICIENT 19** / **-**	
0.200	79	-	-		
0.150	76	-	-		
0.063	70	-	-		

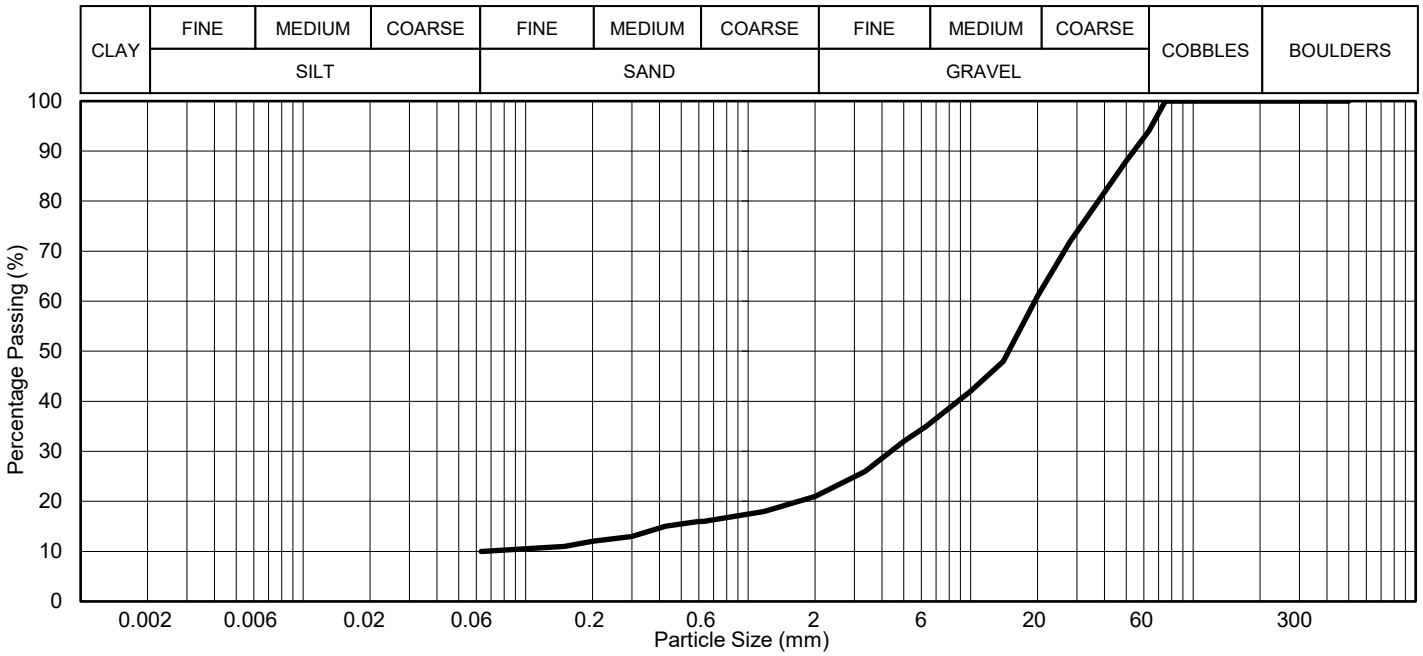
Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Uniformity coefficient calculated using 0.002mm as d10 as no value was available.

PARTICLE SIZE DISTRIBUTION - BS EN ISO 17892-4 : 2016 / BS 1377 - 2 : 2022

Borehole	BH18
Sample	B
Depth (m)	0.00-0.50



SIEVING				SEDIMENTATION (Assumed ρs of 2.65Mg/m³)	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.0200	
300.0	100	-	-	0.0063	
125.0	100	-	-	0.0020	
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	94	-	-	**1A, 6E & 6R, 6F1, 6F2, 6F3, 6I, 6M, 6N, 6P,**	
50.0	88	-	-		
37.5	80	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	72	-	-		
20.0	61	-	-		
14.0	48	-	-		
10.0	42	-	-	**PERCENTAGE SOIL TYPES**	
6.3	35	-	-	**CLAY** / **SILT Ŧ** / **SAND** / **GRAVEL** / **COBBLES**	
5.0	32	-	-		
3.350	26	-	-	/ 10 11 73 6	
2.000	21	-	-		
1.180	18	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.630	16	-	-	**D10** / **D60** / **Specification**	
0.600	16	-	-		
0.425	15	-	-	0.063 / 19.538	
0.300	13	-	-	**UNIFORMITY COEFFICIENT 310** / -	
0.200	12	-	-		
0.150	11	-	-		
0.063	10	-	-		

Remarks

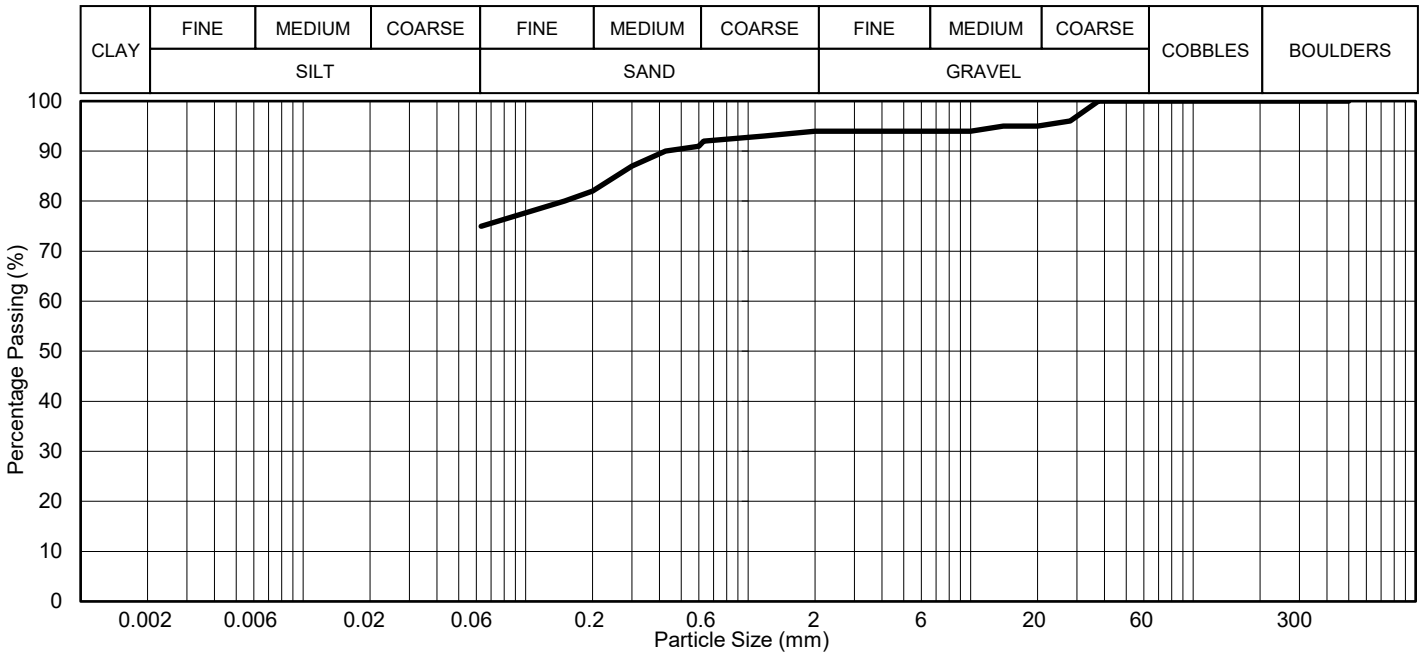
Ŧ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Sample does not meet minimum mass requirement for material type

Uniformity coefficient calculated using 0.063mm as d10 as no value was available.

PARTICLE SIZE DISTRIBUTION - BS EN ISO 17892-4 : 2016 / BS 1377 - 2 : 2022

Borehole	BH18
Sample	U
Depth (m)	3.00-3.90



SIEVING				SEDIMENTATION (Assumed ρs of 2.65Mg/m³)	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.0200	
300.0	100	-	-	0.0063	
125.0	100	-	-	0.0020	
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	**2A & 2B, 7A, 7E, 7I,**	
50.0	100	-	-		
37.5	100	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	96	-	-		
20.0	95	-	-		
14.0	95	-	-		
10.0	94	-	-	**PERCENTAGE SOIL TYPES**	
6.3	94	-	-		
5.0	94	-	-		
3.350	94	-	-		
2.000	94	-	-		
1.180	93	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.630	92	-	-		
0.600	91	-	-		
0.425	90	-	-		
0.300	87	-	-		
0.200	82	-	-		
0.150	80	-	-		
0.063	75	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
/	75	19	6	0

D10	D60	Specification
0.063	0.000	
UNIFORMITY COEFFICIENT	**0**	-

Remarks

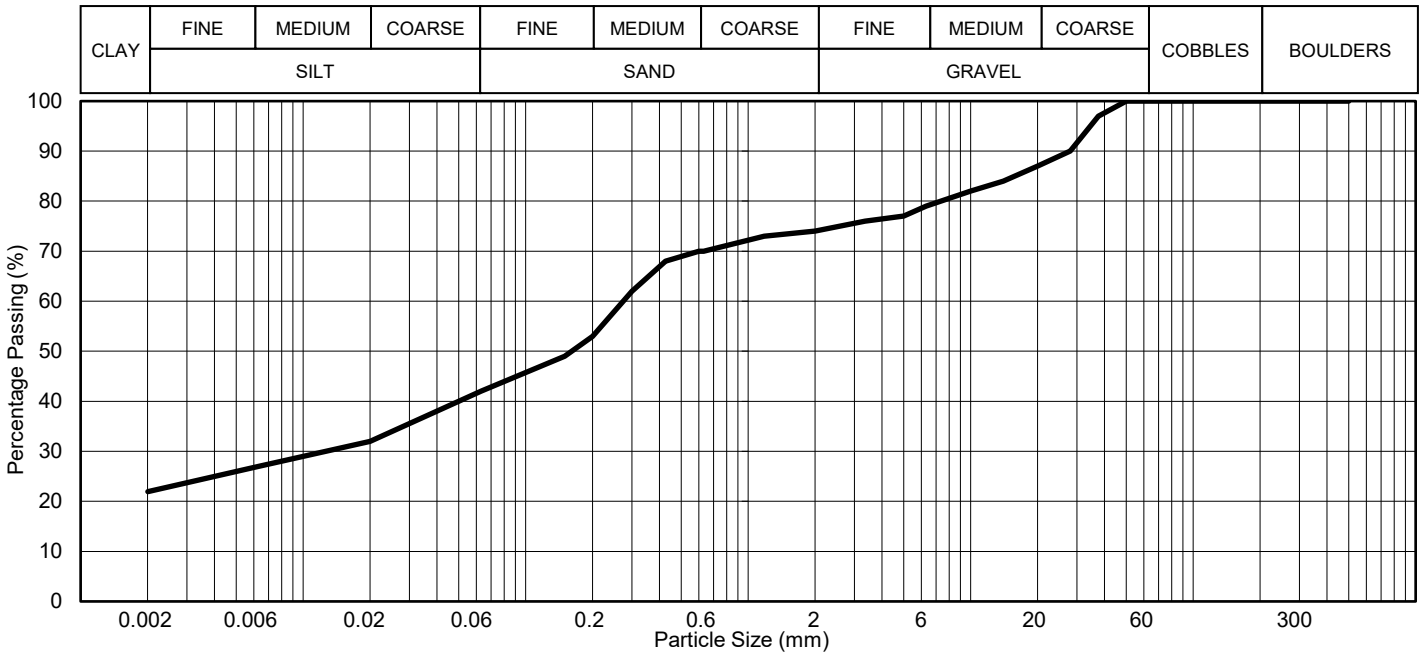
₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Uniformity coefficient calculated using 0.063mm as d10 as no value was available.

PARTICLE SIZE DISTRIBUTION - BS EN ISO 17892-4 : 2016 / BS 1377 - 2 : 2022

MATtest Limited
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Borehole	BH23
Sample	B
Depth (m)	0.50-1.00



SIEVING				SEDIMENTATION (Assumed ρs of 2.65Mg/m³)	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.0200	32
300.0	100	-	-	0.0063	27
125.0	100	-	-	0.0020	22
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	100	-	-	**2C, 7A, 7F,**	
50.0	100	-	-		
37.5	97	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	90	-	-		
20.0	87	-	-		
14.0	84	-	-		
10.0	82	-	-	**PERCENTAGE SOIL TYPES**	
6.3	79	-	-	**CLAY** / **SILT ₸** / **SAND** / **GRAVEL** / **COBBLES**	
5.0	77	-	-		
3.350	76	-	-	22 / 20 / 32 / 26 / 0	
2.000	74	-	-		
1.180	73	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.630	70	-	-	**D10** / **D60** / **Specification**	
0.600	70	-	-		
0.425	68	-	-	0.002 / 0.278	
0.300	62	-	-	**UNIFORMITY COEFFICIENT 139** / **-**	
0.200	53	-	-		
0.150	49	-	-		
0.063	42	-	-		

Remarks

₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

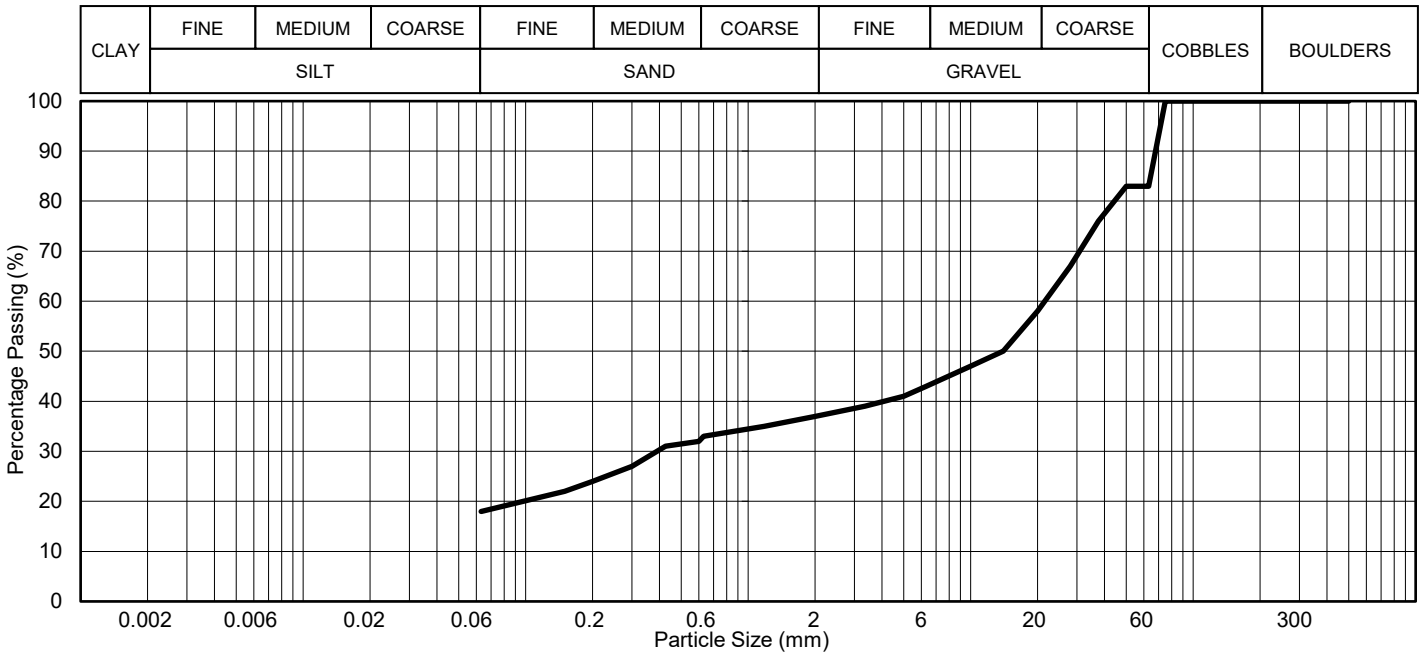
Sample does not meet minimum mass requirement for material type

Uniformity coefficient calculated using 0.002mm as d10 as no value was available.

PARTICLE SIZE DISTRIBUTION - BS EN ISO 17892-4 : 2016 / BS 1377 - 2 : 2022

MATtest Limited
materials testing & consultancy

Borehole	BH24
Sample	B
Depth (m)	0.00-0.50



SIEVING				SEDIMENTATION (Assumed ρs of 2.65Mg/m³)	
Sieve Size (mm)	Percentage Passing (%)	Specification Not Applicable		Particle Size (mm)	Percentage Passing (%)
		Lower %	Upper %		
500.0	100	-	-	0.0200	
300.0	100	-	-	0.0063	
125.0	100	-	-	0.0020	
90.0	100	-	-		
75.0	100	-	-	**GRADING CLASSIFICATION (SHW TABLE 6/2)**	
63.0	83	-	-	**2C, 7A, 7F,**	
50.0	83	-	-		
37.5	76	-	-	Grading classification proves the material has met the relevant grading requirements only. Further testing may be required to assess compliance with SHW.	
28.0	67	-	-		
20.0	58	-	-		
14.0	50	-	-		
10.0	47	-	-	**PERCENTAGE SOIL TYPES**	
6.3	43	-	-		
5.0	41	-	-		
3.350	39	-	-		
2.000	37	-	-		
1.180	35	-	-	**UNIFORMITY COEFFICIENT (SHW TABLE 6/1 NOTE 5)**	
0.630	33	-	-		
0.600	32	-	-		
0.425	31	-	-		
0.300	27	-	-		
0.200	24	-	-		
0.150	22	-	-		
0.063	18	-	-		

CLAY	SILT ₸	SAND	GRAVEL	COBBLES
/	18	19	46	17

D10	D60	Specification
0.063	21.778	
UNIFORMITY COEFFICIENT 346		-

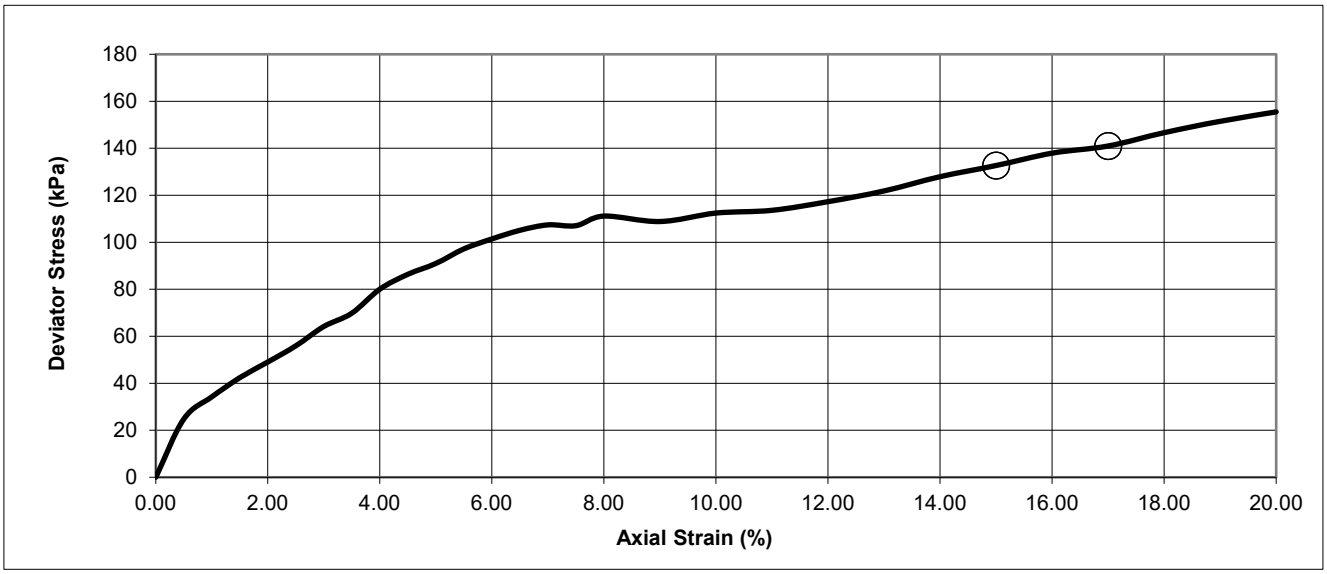
Remarks

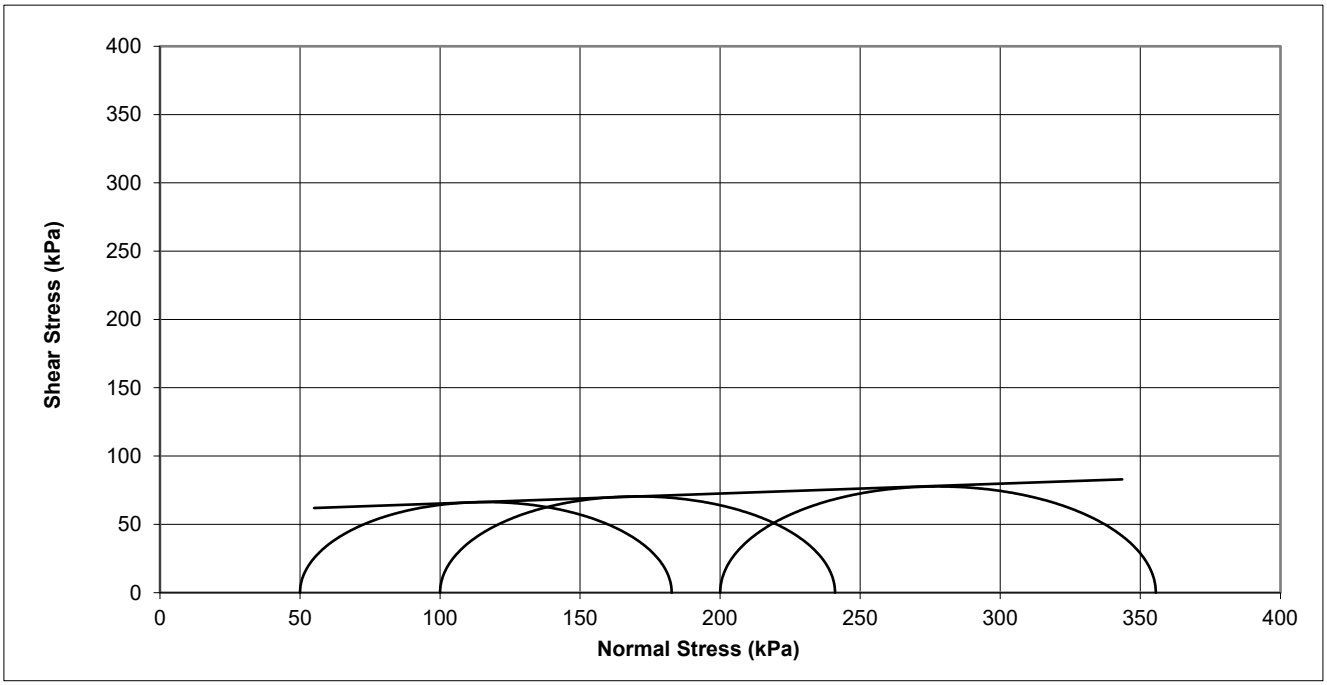
₸ Where a sedimentation test was not carried out, this figure represents total fines, i.e., particles of diameter less than 63 microns

Sample does not meet minimum mass requirement for material type

Uniformity coefficient calculated using 0.063mm as d10 as no value was available.

PARTICLE SIZE DISTRIBUTION - BS EN ISO 17892-4 : 2016 / BS 1377 - 2 : 2022





Failure Conditions				
Cell pressure	kPa	50	100	200
Membrane correction	kPa	1.0	1.1	1.2
Strain at failure	%	15.0	17.0	20.0
Failure Type		Plastic	Plastic	Plastic
Corrected deviator stress	kPa	133	141	155
Undrained shear stress	kPa	66	70	78

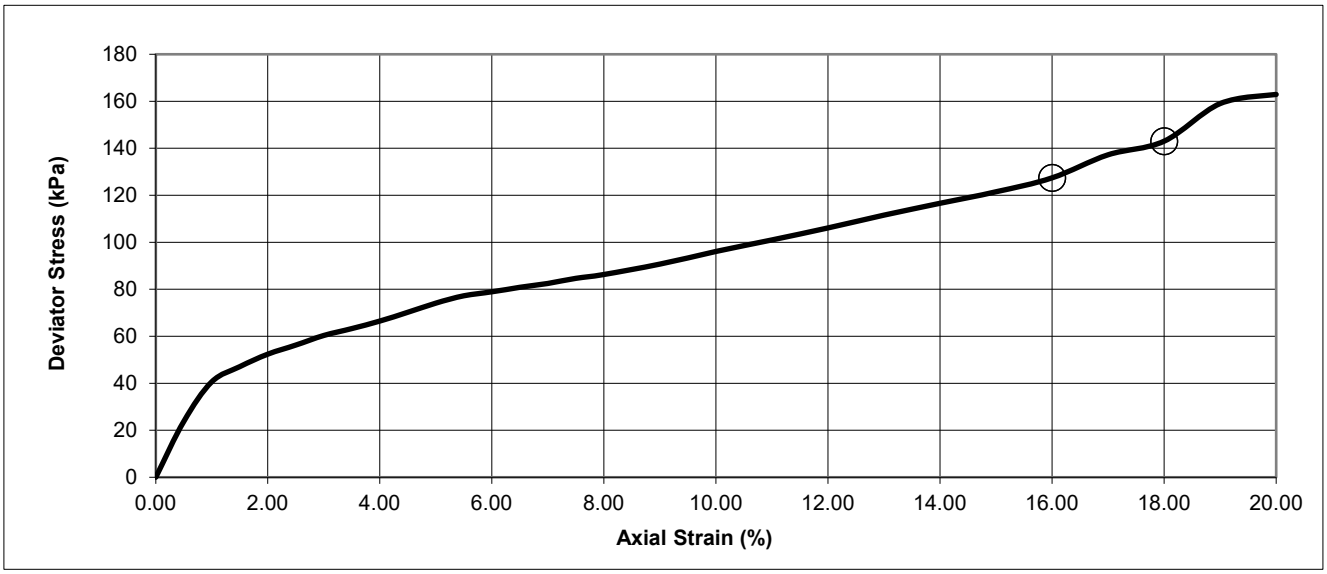
Cohesion	kPa	58.0	Friction Angle	°	4.2

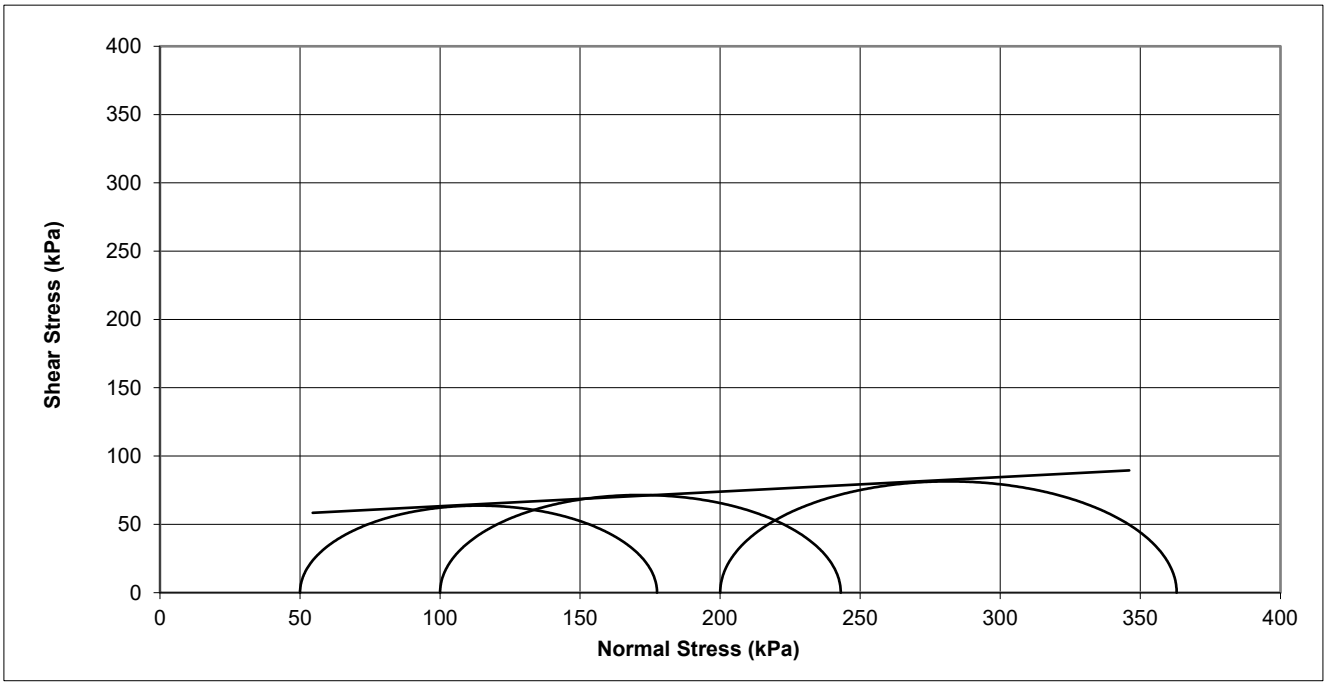
Initial Conditions							
Sample length	mm	131.60	Rate of strain	%/min	2.0	Borehole	BH01
Sample diameter	mm	64.08	Bulk Density	Mg/m^3	2.00	Sample	U
Membrane type		Latex	Dry Density	Mg/m^3	1.70	Depth (m)	4.80
Membrane thickness	mm	0.20	Moisture Content	%	18		

Undisturbed sample, taken directly from the sample tube and retaining axial orientation

DETERMINATION OF MULTI STAGE UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

Tested in accordance with BS 1377-7 : 1990





Failure Conditions				
Cell pressure	kPa	50	100	200
Membrane correction	kPa	1.0	1.1	1.2
Strain at failure	%	16.0	18.0	20.0
Failure Type		Plastic	Plastic	Plastic
Corrected deviator stress	kPa	127	143	163
Undrained shear stress	kPa	64	72	81

Cohesion	kPa	52.7	Friction Angle	°	6.1

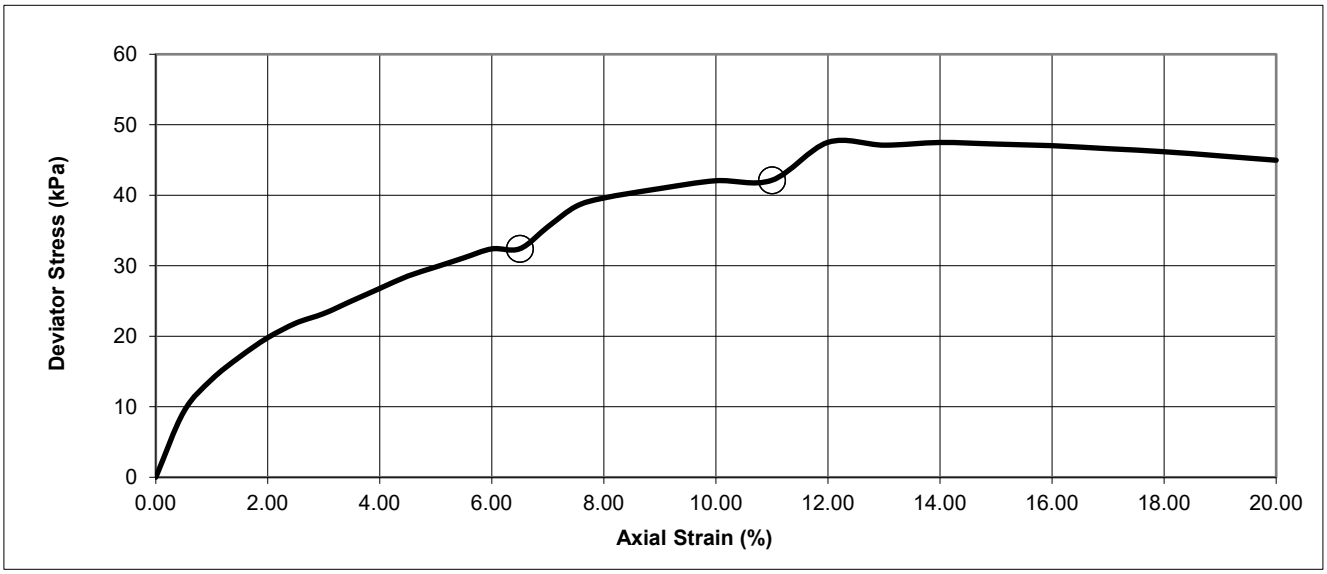
Initial Conditions					
Sample length	mm	126.79	Rate of strain	%/min	2.0
Sample diameter	mm	63.91	Bulk Density	Mg/m^3	2.23
Membrane type		Latex	Dry Density	Mg/m^3	1.88
Membrane thickness	mm	0.20	Moisture Content	%	19

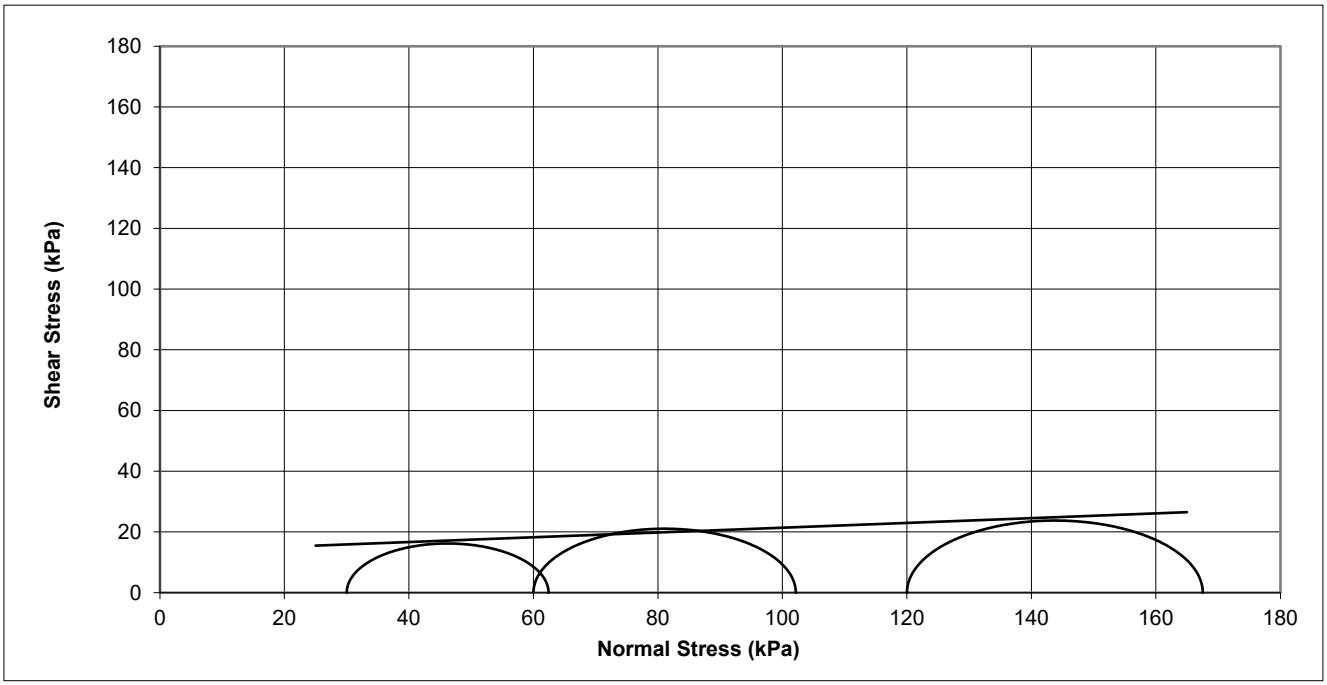
Borehole	BH07
Sample	U
Depth (m)	4.40

Undisturbed sample, taken directly from the sample tube and retaining axial orientation

DETERMINATION OF MULTI STAGE UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

Tested in accordance with BS 1377-7 : 1990





Failure Conditions				
Cell pressure	kPa	30	60	120
Membrane correction	kPa	0.4	0.7	0.7
Strain at failure	%	6.5	11.0	12.0
Failure Type		Intermediate	Intermediate	Intermediate
Corrected deviator stress	kPa	32	42	48
Undrained shear stress	kPa	16	21	24

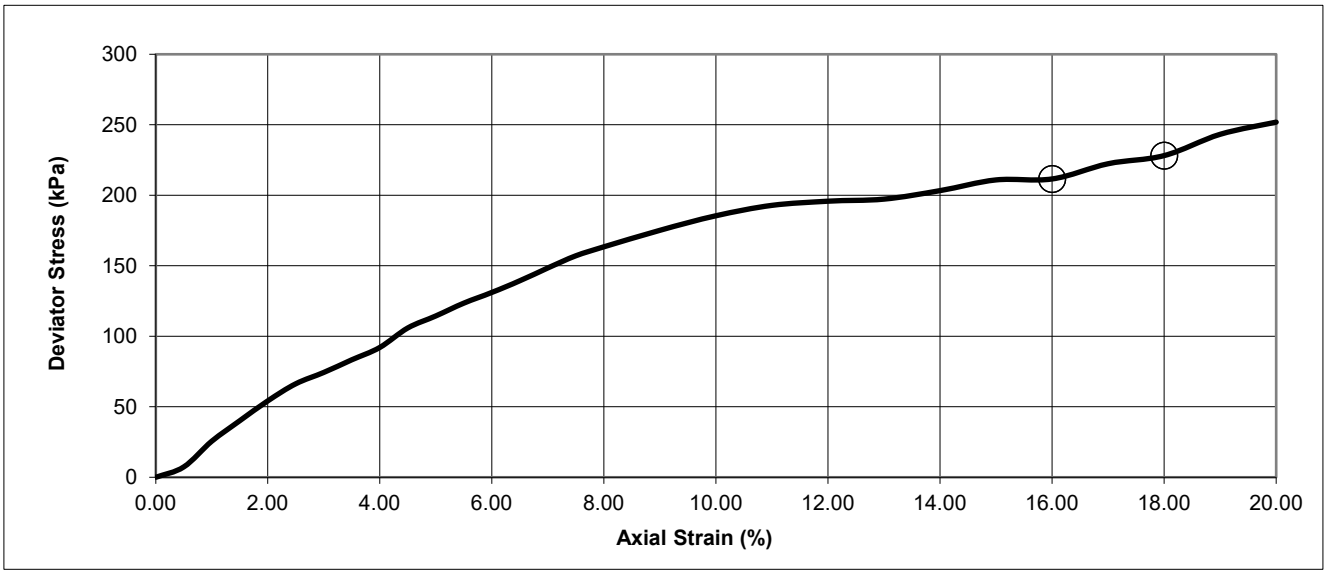
Cohesion	kPa	13.5	Friction Angle	°	4.5

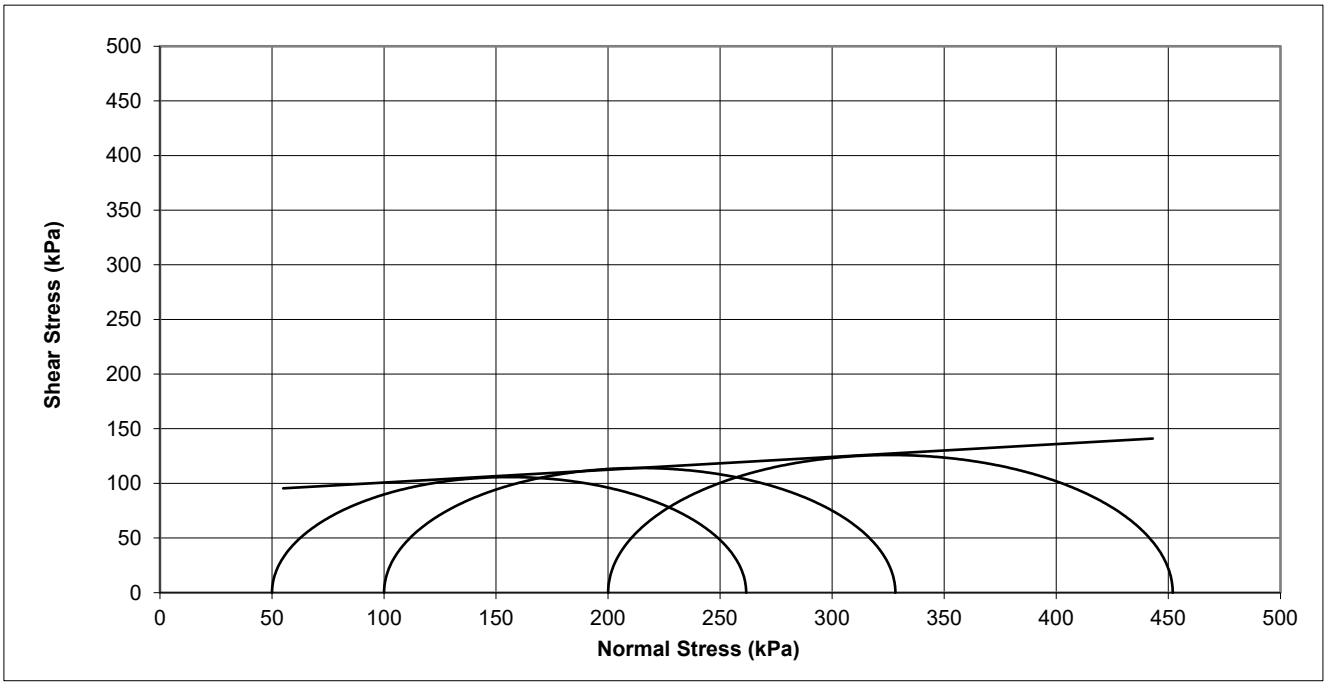
Initial Conditions							
Sample length	mm	149.41	Rate of strain	%/min	2.0	Borehole	BH14
Sample diameter	mm	72.15	Bulk Density	Mg/m^3	2.06	Sample	U
Membrane type		Latex	Dry Density	Mg/m^3	1.70	Depth (m)	2.60
Membrane thickness	mm	0.20	Moisture Content	%	21		

Undisturbed sample, taken directly from the sample tube and retaining axial orientation

DETERMINATION OF MULTI STAGE UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

Tested in accordance with BS 1377-7 : 1990





Failure Conditions				
Cell pressure	kPa	50	100	200
Membrane correction	kPa	1.1	1.2	1.2
Strain at failure	%	16.0	18.0	20.0
Failure Type		Plastic	Plastic	Plastic
Corrected deviator stress	kPa	212	228	252
Undrained shear stress	kPa	106	114	126

Cohesion	kPa	89.1	Friction Angle	°	6.7

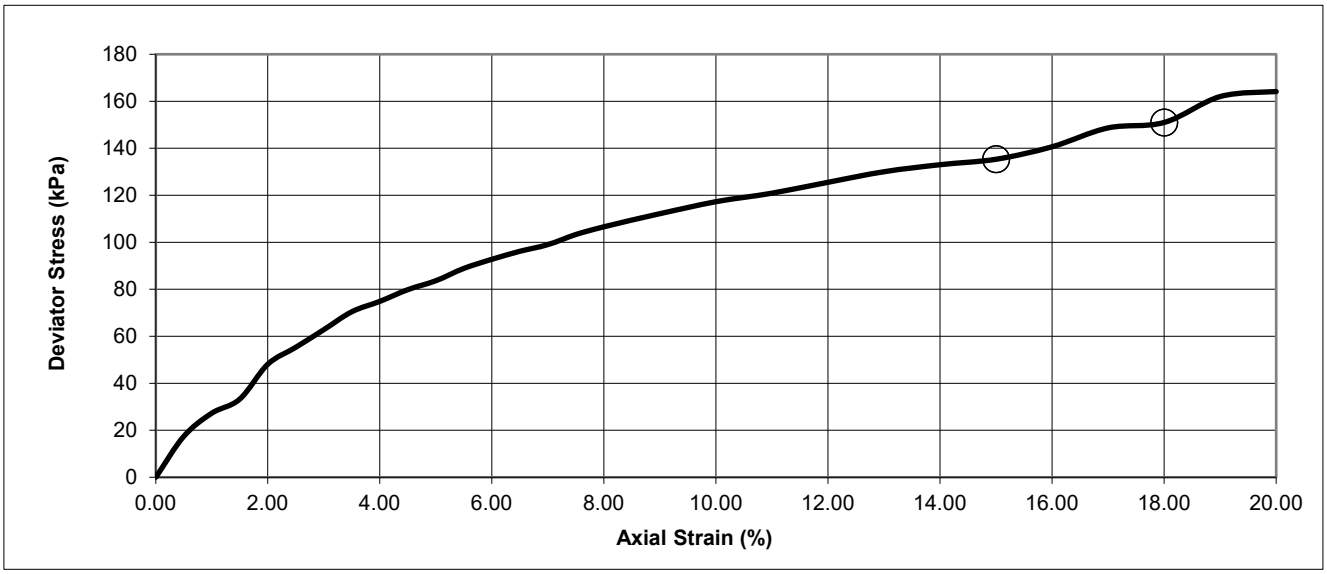
Initial Conditions					
Sample length	mm	126.74	Rate of strain	%/min	2.0
Sample diameter	mm	61.14	Bulk Density	Mg/m^3	2.22
Membrane type		Latex	Dry Density	Mg/m^3	1.94
Membrane thickness	mm	0.20	Moisture Content	%	15

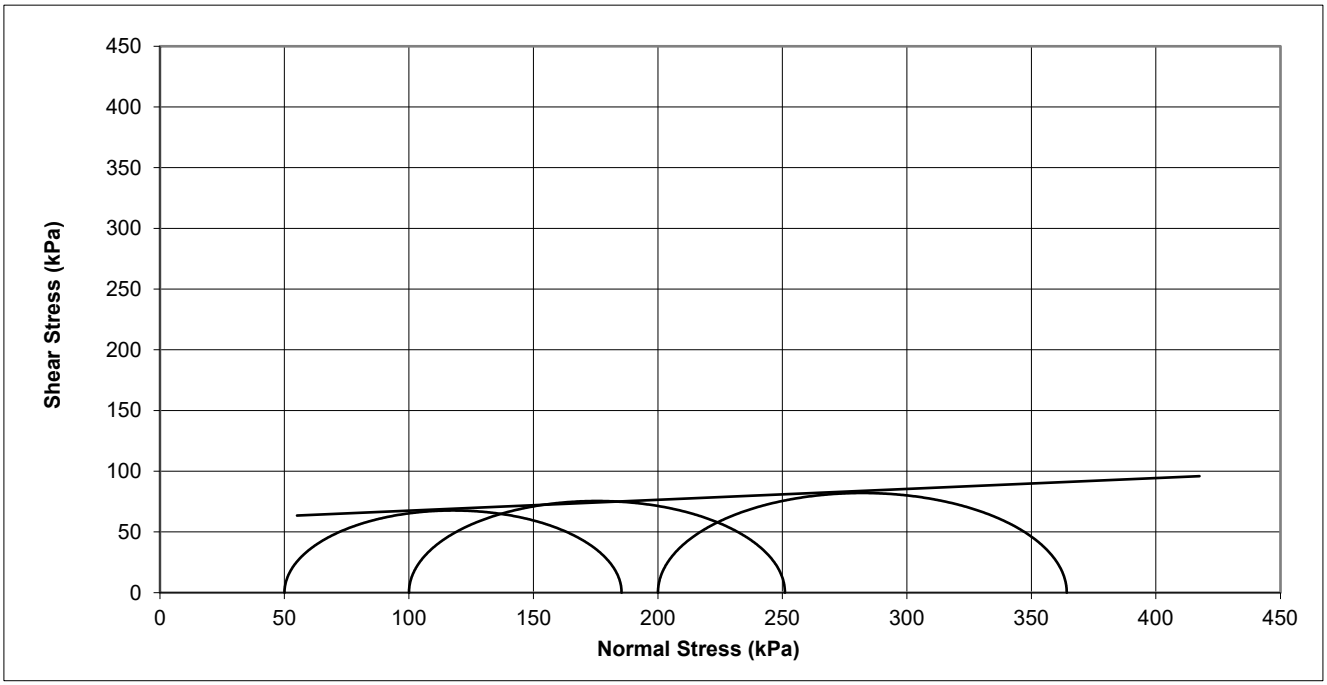
Borehole	BH15
Sample	U
Depth (m)	4.60

Undisturbed sample, taken directly from the sample tube and retaining axial orientation

DETERMINATION OF MULTI STAGE UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

Tested in accordance with BS 1377-7 : 1990





Failure Conditions				
Cell pressure	kPa	50	100	200
Membrane correction	kPa	0.8	0.9	1.0
Strain at failure	%	15.0	18.0	20.0
Failure Type		Plastic	Plastic	Plastic
Corrected deviator stress	kPa	135	151	164
Undrained shear stress	kPa	68	75	82

Cohesion	kPa	58.6	Friction Angle	°	5.1

Initial Conditions							
Sample length	mm	156.94	Rate of strain	%/min	2.0	Borehole	BH19
Sample diameter	mm	75.99	Bulk Density	Mg/m^3	2.12	Sample	U
Membrane type		Latex	Dry Density	Mg/m^3	1.78	Depth (m)	3.30
Membrane thickness	mm	0.20	Moisture Content	%	19		

Undisturbed sample, taken directly from the sample tube and retaining axial orientation

DETERMINATION OF MULTI STAGE UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

Tested in accordance with BS 1377-7 : 1990

BOREHOLE	SAMPLE	DEPTH	VANE TEST (kPa)
BH01	U	2.80	50
BH01	U	3.90	40
BH05	U	1.90	53
BH07	U	1.90	57
BH09	U	2.00	65
BH13	U	1.10	42
BH17	U	1.90	68
BH19	U	1.80	25
BH24	U	1.50	80

SUMMARY OF LABORATORY HAND VANE TEST RESULTS