



LEJ Properties Ltd

Nuralite Industrial Estate

Remediation Options Appraisal and Method Statement

253249-R01(01)

RSK GENERAL NOTES

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Client: LEJ Properties Ltd

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Office: RSK Environment Limited, Abbey Park, Humber Road, Coventry, CV3 4AQ. Tel 02476 505600

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Author Michael Lawson **Technical reviewer** Rowan Brown

Signature

Project manager Michael Lawson **Quality reviewer** Jessica McConnell

Signature

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

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1 INTRODUCTION

1.1 Commissioning

RSK Environment Limited (RSK) were engaged by LEJ Properties Ltd, herein referred to as the 'Client' to update the remedial options appraisal and method statement (ROA and RMS) for the land at Nuralite Industrial Estate, Canal Road, Rochester, ME3 7JA (Original reference 314395-01).

The works were undertaken by means of the revised RSK fee proposal reference 252546-T02 dated 8th May 2025 and recent email correspondence, which forms the appointment between ourselves and the Client.

References in this report to 'we', 'us', or 'our' shall mean RSK Geosciences as a trading name of RSK Environment Limited (company no.SC115530) at registered address 65 Sussex Street, Glasgow, G41 1DX.

The site location is provided in **Figure 1** and the site layout boundary to which this report refers is presented in **Figure 2**.

The report should be read and used in accordance with the limitations and constraints identified in the report text, and at **Appendix A – Service Constraints**.

1.2 Site Description

The site is located at the Nuralite Industrial Estate at National Grid reference 570295E, 173837N, and is shown on Figure 1. The area surrounding the site is as detailed in **Table 1**.

Table 1: Site setting

To the north and north-west:	Beyond the canal are the Shorne Marshes which extend from the edge of the site to the River Thames, which is located over 1km to the north of the site.
To the north-east:	A drainage ditch and Canal Road border the site, beyond which is Beckley Hill Works, a commercial development, and limited woodland.
To the south and south-east:	A mainline and freight railway line runs along the border of the site, with the Hoo railway yard and junction beyond.
To the west:	Queens Farm Road borders the west of the site, with Filborough Marshes beyond.

The site covers approximately 18 hectares (Ha) and owing to the site's historical use, its eastern end is generally flat (the Nuralite Industrial Estate) and at an elevation of approximately 6.0m above Ordnance Datum (aOD), while the west of the site is more uneven, with changes in elevation from as low as 3.4m aOD near to the canal, up to highs of approximately 9.5m aOD within the area of former landfill.

The site in general has the following main attributes (some of which are shown on Figure 2):

- Historic industrial estate first developed as an asbestos works in the early 1900's, which remains active, with businesses occupying the various structures associated with the works,

including automobile repair shops, engineering facilities and material stores. Many of the buildings are in poor condition, with others unused.

- Overgrown scrubland present above former landfill in the west of the site.
- Two ponds present within the scrubland in the west of the site.
- A section of the now disused Thames and Medway canal present along the northern boundary

1.3 Existing reports

The following reports detailing previous works at the site were made available for review:

- WSP Site Investigation Report Phase I and II geo-environmental risk assessment ref.00028689-011, rev.1, dated 22 June 2012.
- Ground & Environmental Services Ltd Site Investigation Report, ref.11606, dated June 2016.
- Lee Remediation Limited Supplementary Site Investigation, Risk Assessment and Outline Remediation Strategy ref.R140186RA-Draft#1, dated 20 October 2017.
- Airtech Analysis Limited Remediation Strategy, (no report reference), dated 27 March 2018.
- GabrielGeo Consulting Preliminary Design Report – Perimeter Retaining Walls, ref.GGC18684/R2, dated 8 May 2018.

A brief summary of the findings in regard to contamination issues is provided within section 1.4 and the CSM for the site is presented in Section 2. The locations of the exploratory holes undertaken during these previous investigations are presented on Figure 2.

Pertinent information from these reports has been summarised in Section 2.

1.4 Summary of Previous Investigations

1.4.1 WSP Site Investigation Report ref.00028689-011, rev.1, dated 2012

The initial site investigation comprised 8 cable percussive boreholes, 19 trial pits and 23 window sampler boreholes, together with ground gas and groundwater monitoring and surface water sampling. The investigation identified widespread asbestos contamination with the made ground at the site, and to a lesser extent within reworked natural soils as well, which could present a risk to human health. In addition Total Petroleum Hydrocarbon (TPH) contamination was identified in soils associated with historic fuel stores in the eastern (industrial area) of the site.

Due to the extent of asbestos contamination at the site, WSP advised against the wholesale removal of the source of contamination due to the potential for unacceptable health risks to arise. WSP recommended site wide encapsulation of the material in order to remove the pathway (inhalation) to end users. Additionally services should be placed within clean service corridors or within the capping material. The report also noted the implications of contamination with regards to foundation solutions and infrastructure proposed for the site.

1.4.2 Ground & Environmental Services Ltd Site Investigation Report, ref.11606, dated 2016

This report comprised an assessment of potential risks associated with the western portion of the site, where vegetation had been cleared potentially allowing asbestos fibre release from dry soils, which has been subsequently been grass seeded to suppress dust. The investigation comprised

water and air monitoring across the area and identified asbestos and hydrocarbon contamination within groundwater, and hydrocarbon contamination within surface water. With regards to previously identified soil contamination, the report recommends a land raise across the site, placing an engineered capping layer in order to sever the potential pathways at the site.

1.4.3 Lee Remediation Limited Supplementary Site Investigation, Risk Assessment and Outline Remediation Strategy ref.R140186RA-Draft#1, dated 2017

This report details the findings of the drilling and installation of 12 monitoring wells to assess groundwater contamination at the site as well as general soil contamination. The report confirmed widespread asbestos containing materials (ACMs) that could present a risk to human health, however the assessment of potential hydrocarbon risks identified relatively limited source areas (around former fuel storage tanks). When considered with the distribution and extents, the absence of mobile fractions of hydrocarbons and low concentrations of hydrocarbons within groundwater, the risk to off-site receptors was considered low. The report recommended the local removal of hydrocarbon hotspots as well as the continuation of groundwater monitoring. Options for the overall redevelopment included a minimal disturbance approach, utilising existing slabs or piling through existing slabs in order to limit exposure to the underlying soils, or the site wide raising of levels to effectively encapsulate the area.

1.4.4 Airtech Analysis Limited Remediation Strategy, (no report ref), dated 2018

Airtech Analysis undertook silt and soil sampling around the two water bodies on site, comprising 15 silt and soil samples, and designed a remediation strategy to break all pathways from the asbestos contamination to the environment at the site. The report gave recommendations for both the pond areas and the partially infilled canal at the site. It recommended that the canal be remediated to a degree by sheet piling the southern side (industrial and landfill side), with the opposite side cut back to a suitable gradient and the subsequent void filled to form a capping layer. The excavated material would be placed in the most easterly pond before being capped. The most westerly pond would remain however its edges would be sheet piled to contain surrounding contaminated soils, as well as around any retained 'islands', with capping placed where appropriate.

1.4.5 GabrielGeo Consulting Preliminary Design Report – Perimeter Retaining Walls, ref.GGC18684/R2, dated 2018

The report notes the above investigation reports recommendations regarding minimal disturbance of soils due to asbestos contamination at the site and takes this into account where retaining features and piling is required, particularly where it details gabions or reinforced soil along the northern bank of the canal and sheet piles along its southern edge, as well as a king-post wall along the southern site boundary to the Hoo Railway Junction.

1.5 Scope and Objectives

This RMS covers the whole of the site, (both the redevelopment of the industrial estate that occupies the east of the site, and the scrubland and ponds that occupy the west), in order to address the risks associated with the identified sources of contamination, specifically asbestos containing made ground and reworked natural soils across the whole site, and limited, localised areas of hydrocarbon contamination within near surface soils.

The objectives of this RMS are to provide:

- confirmation that all requirements of the reports reviewed above will be met and where appropriate include details of how each issue identified in the above reports will be approached and how potential adverse environmental impacts will be mitigated;
- a detailed drawing, at an appropriate scale, of the relevant site boundary;
- sufficient details of the work to be conducted, specifically source areas of contamination to be removed, detailing of the plant, access, site compound and construction methods to be used, including a layout drawing of the works;
- the health, safety and environment risk assessment;
- details of personnel protective equipment (PPE) requirements for the workforce;
- details of monitoring and mitigation measures related to noise, vibration and dust; and
- confirmation of the contents of the validation report.

The principal aim of the remediation in regard to all contaminated soils will be to remove the relevant pollutant linkages either by removal / treatment of the source or by removing the relevant pathway (i.e. cover layers).

1.6 Limitations

This report is subject to the RSK service constraints given in **Appendix A** and limitations that may be described below and throughout this document.

This report was prepared in accordance with good practice guidance and available datasets at the time of issue. Consideration should be considered in the light of changes in legislation, statutory requirements, or industry practices subsequent to the date of issue.

The opinions expressed in this report, and the comments and recommendations given, are based on the information obtained from the desk assessment and the site reconnaissance survey.

The study aims to principally identify and assess the potential risks and liabilities associated with contamination of the ground, on and in the vicinity of the site. While this includes consideration of current operations and housekeeping on the site, the report does not constitute a comprehensive environmental audit of the site, as covered under ISO 14001.

The comments given in this report and the opinions expressed are primarily based on third party data and investigations, while RSK have undertaken a review of the information provided RSK cannot be held liable for the quality of the data provided. There may be conditions pertaining to the site that have not been disclosed by the investigations and therefore could not be taken into account.

In particular, it should be noted that there may be areas of made ground and potential contamination not detected due to the limited nature of the investigations or the thickness and quality of made ground and concentrations of contamination across the site may be variable. In addition, groundwater levels and groundwater concentrations may vary from those reported due to seasonal, or other, effects.

2 CONCEPTUAL SITE MODEL

2.1 Geology

Published geological maps suggest that the site would be initially underlain by superficial deposits of Alluvium and River Terrace Gravels, with solid geology of London Clay below. Below the London Clay is the Lambeth Group (sand silt and clay), and the Thanet Formation (sand, silt and clay). These are in turn underlain by the Seaford Chalk Formation.

2.1.1 Made Ground

Subsequent to the site investigations detailed above, the site was found to be underlain by a variable thickness of made ground noted from surface to depths of between less than 0.10 m bgl, to 5.20 m bgl and comprised clay, sand and gravel with brick, concrete, clinker, ash and asbestos. Significant asbestos contamination prevented the base of made ground being proven in some locations.

2.1.2 Natural Soils

Alluvial or Tidal River Deposits were identified below the made ground to depths of between 0.60 m bgl and 9.30 m bgl. The stratum typically comprised slightly gravelly, sandy clay, with a gravel content of fine to coarse flint.

Below this was the Taplow Gravel, which was proven to depths of between 1.50 m bgl and 17.20 m bgl, and comprised sand and fine to coarse flint gravel.

Bedrock comprising the London Clay Formation was proven below the superficial, and extended to the base of all exploratory holes it was encountered in, to depths of at least 20.00 m bgl. The London Clay was found to comprise a slightly silty, occasionally sandy, blue grey clay.

2.2 Hydrogeology

The site is underlain by a Secondary A Aquifer (the River Terrace Deposits), a Secondary (undifferentiated) Aquifer (the Alluvium). The solid geology of the London Clay Formation is considered unproductive. Additionally the site is not located in a designated Source Protection Zone (SPZ). While two abstraction wells are reported as being listed on site within the WSP report in 2012, only one was still reported in the Lee Remediation report in 2017. These were noted to supply water for the Nuralite Industrial Estate and are being considered for the potential potable water supply of the new development, as such these are considered to be potential receptors. These are understood to draw water from the principal aquifer located in the Thanet Sands and White Chalk (located below the London Clay).

Monitoring undertaken as part of the previous investigations has indicated that the groundwater at the site is generally located at the base of, or below the made ground, within the Alluvium and River Terrace Deposits, and was generally monitored at levels of between 0.96 m bgl and 2.50 m bgl, however two locations exhibited high groundwater levels as shallow as 0.29 m and 0.39 m bgl, which was likely to represent water trapped within the made ground, rather than being reflective of the groundwater table across the site. The on-site boreholes mentioned above are understood to

draw from a deeper groundwater table (within the Thanet Sands and White Chalk) than the water observed within the made ground and shallow alluvial deposits.

2.3 Sources of Contamination

Potential sources and contaminants of concern are summarised in **Table 2**.

Table 2: Potential sources and types of contamination

Potential sources	Contaminants of concern
Site-wide made ground and impacted reworked natural soils associated with former site use as asbestos manufacturing works	Significant asbestos fibre and visible fragments of asbestos containing materials (ACM) have been identified throughout the made ground and at surface. Fibre concentrations identified up to 9.74% w/w, with some waste materials containing 48.81% w/w and 75.75% w/w respectively. Asbestos predominantly identified as cement, debris and loose fibres but included insulation, lagging and board. Asbestos predominantly identified as chrysotile but also included amosite and rarely crocidolite.
Canal banks and silt build-up within disused canal	Limited investigation has identified asbestos fibre and visible fragments of asbestos containing materials (ACM) within the silt. Fibre concentrations were not quantified during the investigations. Subsequent investigation by RSK in July 2025 comprising the testing of ten samples of canal silt for asbestos, nine of which did not encounter asbestos, and one of which identified 0.001% fibres of chrysotile and amosite. No bulk/visible fragments of ACM were encountered around the canal during the July 2025 sampling exercise.
Silt and soil forming the base and banks of the two existing ponds within the west of the site	Investigation has identified asbestos fibre and visible fragments of asbestos containing materials (ACM) within the bank silt. Fibre concentrations identified up to 0.962% w/w and identified as cement and loose fibres of chrysotile.
Limited, localised hydrocarbon hotspots related to locations of former storage tanks, and limited area of fly-tipping.	Principally hydrocarbons associated with storage of fuel and oils at the site, typically identified as heavy end hydrocarbon fractions. Total hydrocarbon concentrations of up to 2,500mg/kg noted.

2.4 Pathways

The plausible pathways are summarised below:

- direct contact (soil, dust and vegetable ingestion, dermal contact, dust and fibre inhalation)
- inhalation (of asbestos fibres)
- inhalation (of hydrocarbon vapours)

The above pathways are applicable to all soil sources as potential contaminants are present at surface and will be present across the site.

2.5 Receptors

2.5.1 End Users

Sensitive receptors at this site include:

- future site users (commercial in east and public open space in west)
- potable water supply pipes

Please note that construction workers have not been identified in the conceptual model as receptors because risks are considered to be managed through health and safety procedures including CDM regulations.

2.5.2 Controlled Waters

Potential sensitive receptors at the site include the principal aquifer within the Thanet Sands and White Chalk, and also the disused section of the Thames and Medway Canal. However these are not considered significant sensitive receptors for the following reasons.

The principal aquifer is located at depth, located below the London Clay. The London Clay comprises extremely low permeability cohesive clay which is at least 20m thick in the area of the site. The London Clay would likely significantly retard or entirely prevent the downward migration of contaminants from the site into the aquifer below. While limited, localised areas of hydrocarbon contamination have been noted it was typically of 'heavy' end hydrocarbons which less mobile than typical. When combined with the thickness of low permeability cover, there is not considered to be a viable pathway between the contamination present at the site and the aquifer.

The Thames and Medway Canal adjacent to the site is currently disused. Canals are generally considered low sensitivity, and the section of canal adjacent to the site would be considered as such as well. The section adjacent to the site is isolated from the wider canal network as it has filled in both east and west of the site and is no longer navigable as it is significantly silted. In addition, the lining of the canal, which should be of low or negligible permeability is likely to prevent any general migration of contaminants into the canal. As noted above, the hydrocarbons noted within near surface soils at the site are considered to be of low mobility, with only one of the six hotspots noted to be within close proximity of the canal. And historic outfalls into the canal would be associated with drainage which is to be removed or isolated as part of the redevelopment of the site. Additionally, the other major contaminant, asbestos, is not soluble and are not migrating along with any groundwater so asbestos contaminated present on the site will not present a risk to the canal.

2.5.3 Ecological

North of the site and beyond the Thames and Medway Canal are the Shorne Marshes, which are designated a RAMSAR and SSSI area. While the Marshes are a sensitive receptor, contaminants arising on the site are not considered to have a pathway to the receptor. Any shallow migration of hydrocarbons will be limited for the reasons stated above in Section 2.5.2, and in addition the canal itself will act as a barrier to the northward migration of water and contaminants. Again, as noted in Section 2.5.2 the asbestos contamination at the site will not migrate with more traditional contaminants along a hydrological gradient as asbestos fibres are not soluble. The asbestos contamination at the site therefore has no pathway to the marshes and like the limited hydrocarbon contamination, is not considered to present a risk to the marshes due to a lack of a viable pathway.

2.6 Constraints to Remediation Techniques

Prior to the assessment of suitable remedial options, an assessment in relation to the possible factors that will affect the type of remedial option selected has been conducted. **Table 3** indicates the likely constraints to any remedial option with respect to the site and the surrounding area.

Table 3: Constraints to Remedial Techniques

Factor	Details
Site Setting	The site can be split into two distinct areas, the east comprising a commercial/industrial estate, and the west, an area of overgrown scrubland in which two ponds are located. The commercial industrial estate is operating out of the remaining buildings of a former asbestos works. The remaining buildings are typically in poor conditions, and some are unused. The scrubland and ponds are located in an area formerly occupied by a landfill which is directly underlain by made ground from surface. Significant disturbance to the occupants of the current commercial/industrial estate will be unavoidable due to the disruptive nature of the work. It is understood that at the point of beginning remedial works, most, if not all commercial operations on the site area will have ceased, however controls should be implemented to reduce the level of disruption as much as is possible to any remaining users and surrounding developments. This could take the form of the following: conducting the remediation within one area at a time; the implementation of security (i.e. fencing and signing) measures and consideration given to minimising traffic movements, and nuisances such as noise, vibration, dust and odours through the use of a construction environmental management plan (CEMP) or other relevant system.
Site Size	The site covers an area of approximately 18 hectares. While hydrocarbon contamination requiring remediation is located in discrete areas, the asbestos impacted made ground underlies the whole site and as such the whole site is considered to require remediation.
Condition of Site	The site appears in a mixed condition, and historic surveys have indicated that ACM's and soils containing asbestos fibres are present at surface in various areas around the site. Once remedial works begin it is anticipated that other commercial operations at the site will have ceased, therefore there will be no need to maintain site access for non-construction traffic. While specific controls for onsite receptors will not be required, consideration may need to be given to utilising road sweepers on a regular basis to minimise the amount of dirt that is spread off site onto the wider road network. RSK undertook a sampling programme of the Canal in the northern portion of site in July 2025. Soil samples taken from the canal backfill were screened against criteria for public open space end-used, with the only contaminant of concern (CoC) identified being asbestos fibres within 1 No. sample of 10 No. samples screened, quantified at 0.001% weight. The remaining nine samples noted no asbestos detected. This indicates the material within canal may be disposed of as non-hazardous waste, although care and vigilance should be maintained to ensure any possible unidentified contamination is identified and separated for suitable disposal.

Factor	Details
Site Access	Access for the development site is gained via Canal Road which runs through the village of Higham to the south-east. There is a manned security hut and barriers at the front access to the site. Access to the canal is via the existing canal towpath. At the time of RSKs July 2025 visit, the stretch of the canal adjacent to the site was almost dry, with large areas of base exposed. Significant areas were also overgrown and inaccessible without some form of vegetation clearance. Access to the remediation areas is relatively open and as such there should be no significant access constraints for any proposed works with the exception of the canal, where temporary access may need to be created in order to complete investigation and undertake the removal of contaminated soils.
Utilities	There are limited electrical, telecommunications and water services at the site. Services are likely to hinder remediation within certain areas, with consideration given to the possible re-routing of services in certain locations, or removal of redundant services if necessary. A high level utilities assessment has been undertaken for the site which outlines the full range of detailed works that need to be undertaken for detailed design, construction and decommissioning. This report should be considered prior to any works being undertaken.
Stakeholder Issues	A constraint on the remedial options will be the requirement that the technology will have a minimal impact on property values of the proposed development at the site and the surrounding area.
Timescale	The timescale should be as such as to remove the risk in the shortest practicable time.
Geology and Hydrogeology	The materials at the site may prove to be a constraint to some remedial techniques but further definition of these is required.
Ecological	The Shorne Marshes RAMSAR and SSSI designations extend into the northern edge of the site and in addition habitat including the scrubland and ponds that are present in the west of the site form part of a local wildlife site. Ecological mitigation during works may need to be considered, as well as the residual impact of the development of the site and the need to off-setting or replacement of habitat.

3 REMEDIATION OBJECTIVES

3.1 General Objectives

The following general objectives have been developed for assessing potential remedial options.

3.1.1 Degree of remediation

The remedial option shall ensure the removal or breaking of complete significant pollutant linkages identified in Section 2.6.

3.1.2 Timescale

Completion of the remediation of all identified significant pollutant linkages shall be completed within an appropriate period of time so that no significant pollutant linkages remain at the site at the commencement of construction of the proposed commercial estate at the site.

3.1.3 Costs

The cost of the remediation should be as low as reasonably possible to achieve the selected remediation end point whilst utilising a proven technique, i.e. utilising the best available technique not entailing excessive cost (BATNEEC).

3.1.4 Practicality for the site

The remedial option should address the constraints identified within Table 3 and prove to be practical for current and future site conditions.

3.1.5 Technical effectiveness

The remedial techniques and strategies used should demonstrate a level of technical effectiveness at removing pollutant linkages and be able to be verified shortly after completion of the site work.

3.1.6 Durability and sustainability

Remedial options shall be of a sufficient quality to ensure that the remedial infrastructure requires minimal maintenance and that a system of service/maintenance is set up to ensure continued operation. The remedial treatment should be of similar lifespan as to that of the overall remediation time scale. The technology is to be sustainable with respect to the local environment and resources as well as to future development proposals.

3.1.7 Legal aspects

The option should fulfil standards set by Gravesham Borough Council and the Environment Agency.

3.1.8 Additional benefits

The remedial technologies selected may provide additional benefits to the surrounding environment and to improve the condition of the site.

3.1.9 Preliminary management objectives

The following management objectives have been developed for potential remedial options.

- To produce a remediation strategy that can be agreed with all key stakeholders
- To meet all regulatory requirements relevant to the installation or operation of remediation options
- To avoid unacceptable health and safety and environmental impacts during remediation
- To minimise long term liabilities
- To avoid long-term monitoring or maintenance obligations where possible
- To demonstrate 'best value' is obtained by carrying out the remediation using contractors on a competitive tendering basis
- To carry out remediation in accordance with good technical practice
- To achieve successful remediation within a particular timescale and budget

4 REMEDIATION OPTIONS APPRAISAL

4.1 Information Requirements

In order to assess remediation options applicable to the site, detailed and current information on the site conditions is required. **Table 4** demonstrates specific information that is required and the information that is available.

Table 4: Typical Parameters Required for Remediation Techniques

Parameter Type	Parameter	Site Information Available
Site Details	Name	Former Nuralite Commercial Estate, Canal Road, Higham, Gravesham, Kent, ME3 7JA.
	Location	Off Canal Road, Higham. Grid ref: 570295E, 173837N.
	Site plan including site boundaries	A plan indicating the site boundaries is presented as Figure 1.
	Size of site	Approximately 18 Ha.
	Current ownership and site occupation	LEJ Properties Ltd.
	Current use and status of site	Redundant commercial/industrial estate occupying some of the buildings that remain from the previous use as an asbestos works. Buildings typically in poor state of repair.
	Presence of on-site sensitive ecological or heritage features	Priority habitat (woodland) present in part of western area of the site which has been assessed as part of ecological studies at the site.
	Access details and way-leaves	Whole site accessed through the single main entrance from Canal Road.
	Security arrangements	Overall site is fenced however entrance consists only a drop barrier, fencing should be considered around unsupervised equipment.
	Surface conditions and topography	The site is generally flat, comprising approximately 2/5 current commercial estate (buildings and hardstanding) and 3/5 scrub and ponds. Scrub area is slightly uneven.
	Buildings and other structures	The eastern half of the site is populated by buildings associated with the former Nuralite Asbestos Works, which have now been repurposed into individual commercial units.
	Below and above ground services	Present, comprising local connections only. See service plans.
Site Settings	Site geology	Made ground and limited areas of reworked natural soil are present overlying Alluvium, Tidal River Deposits and Taplow Gravel, with London Clay below. The made ground contains asbestos fragments and localised hydrocarbon contamination.
	Surrounding land uses	Marshland, railway land and commercial estates.

Parameter Type	Parameter	Site Information Available
	Sensitive ecological, agricultural or heritage features	Thames Estuary and the Marshes to the north of the site are considered RAMSAR and SSSI sites.
	Likely noise restrictions	The Health and Safety at Work Act 1974 and the Noise at Work Regulations 1984. Statutory Nuisance Provisions within Sections 79 to 82 of the Environmental Protection Act 1990.
	Baseline ambient air quality	None available.
Hydrology and Hydrogeology	Surface water features on or close to the site	Disused Thames and Medway canal.
	Direction and rate of flow on surface water bodies	Not relevant.
	Abstraction points or well on or close to the site	Not relevant. One remaining abstraction well on site which (it is assumed) will be decommissioned as part of the demolition at the site.
	Depth to groundwater	Localised perched groundwater is present within the made ground and underlying superficial deposits at typical depths of between 0.96 m bgl and 2.50 m bgl.
	Groundwater vulnerability and aquifer type	Low vulnerability Secondary Aquifer.
	Groundwater chemistry	Groundwater sampling results presented within "Supplementary Site Investigation, Risk Assessment and Outline Remediation Strategy" ref.R140186RA-Draft#1, Lee Remediation Limited, dated 2017.
	Seasonal variations in groundwater table	Perched water within low permeability made ground.
Nature of pollutants	Chemical class	Total petroleum hydrocarbons (TPH) and asbestos have been identified as being the chemical classes posing a risk to the site as indicated in the site investigation reports detailed in Section 1.2 and 1.4.
	Toxicity	Environment Agency Toxicological reports.
	Concentration	Soil sampling results presented within site investigation reports detailed in Section 1.2 and 1.4.
	Amount and distribution	Asbestos throughout made ground and across whole site, TPH in discreet, localised hotspots.
	Physical form	TPH present as sorbed compounds onto soil, with limit concentrations in perched groundwater. Asbestos present as pieces of ACM and as fibres within soils.
	Solubility	Literature values for TPH.
	Volatility	Literature values for TPH.
	Density	Literature values for TPH.
	Biodegradation	Literature values for TPH.
	Partitioning behaviour	Literature values for TPH.

Parameter Type	Parameter	Site Information Available
Nature of Soil / water matrix	Solid	Made ground is generally granular in nature, comprising gravel in a slightly clayey, sandy matrix. Made ground present in-ground at the site also contains variable fractions of clay. No specific geotechnical testing has been undertaken on these soils.
	Distribution laterally and vertically	Made ground is present across the whole site, and together with areas of reworked natural soils that have also been impacted by asbestos, achieved thicknesses of between <0.10 m and at least 5.20 m in former landfill area.
	Physical properties	Made ground is generally granular in nature but does contain variable proportions of cohesive material and was found to comprise demolition rubble and landfilled waste.
	Chemical composition	TOC of made ground ranges between 0.247 and 5.029%. pH of between 6.34 and 12.2. No sulphate content testing was undertaken in made ground. TOC of the canal and pond silt ranges between 0.7 and 2.2%. pH of between 7.3 and 7.7, and sulphate content of between 0.04 and 0.41 g/l
	Stability (Physically and Chemically)	Made ground contains predominantly inert brick and concrete, although it does include variable amounts of organic material. Contaminants of note include TPHs and asbestos
Notes:		

Based on CRL 11 – Figure 3A(c) – Criteria 1 – p98

4.2 Summary of remediation areas

The following assessment of options has been undertaken to mitigate the currently identified pollutant linkages.

The potential risk from asbestos in made ground and localised TPH hotspot within discreet areas of the site have been taken forward as relevant pollutant linkages (RPLs).

Chemical testing undertaken within the canal silt indicates significantly less asbestos contamination than previously anticipated (1 of 10 samples tested positive for loose fibres at 0.001% weight). All other chemical constituents tested from the canal silt were screened against criteria for public open space end use, and all found below their respective screening values.

The made ground is located across the site and is present to depths of between 0.1m and 5.2m bgl, being generally deeper in the west, in the area of former landfill, now ponds and scrubland.

A risk to current site users has been identified from contact, ingestion or inhalation of site soils/dust containing a variety of contaminants including asbestos and TPH from made ground present at surface. These contaminants are located across the whole site, including within the silt present in the disused canal and the ponds in the west of the site.

A rough estimate of the potential area (the whole site) and volumes of impacted materials are provided below. This estimate is based on the thicknesses of impacted made ground encountered during the WSP investigation and is a very high level estimate which would need significant refinement should the volumes need to be relied upon.

The total volume of impacted made ground at the site may be in the region of 453,750 m³. This assumes that made ground is an average of 4.00 m thick across the 8.5 ha western portion of the site, and an average of 1.75 m thick across the 6.5 ha eastern part of the site.

As noted above, impacted made ground is present across the whole site and as such soil that would require treatment within the upper 1.00 m would comprise 150,000 m³ i.e. the whole 15 ha site.

It should be noted that any soil/silt dredged out of the disused canal would be in addition to this, and assuming there is 0.50 m of silt to clear across the 13 m wide and (approximately) 700 m long stretch of the canal, totalling approximately 4,550 m³ of additional material. RSK undertook soil sampling of the canal sediment within July 2025, and tested soil samples against screening criteria for public open space end-use. Of the contaminants tested and screened, the only CoC identified was asbestos loose fibres at 0.001% weight within 1 of 10 samples tested. This indicates made ground material within the canal may be disposed of as non-hazardous waste at an appropriately licenced landfill.

It is recognised that a significant human health risk is associated with the disturbance of the significantly impacted soils at the site, and any opportunity to break linkages with receptors which limit disturbance should be viewed as favourable.

The discreet, localised TPH hotspots are likely to fall within the volumes included above as the same soils will be impacted with asbestos.

Based on perched water testing and recommendations made within the previous site investigations at the site, groundwater does not require any remedial action.

It should be noted that a significant amount of time has past following the investigations these recommendations are based. Contaminant hotspots identified may have migrated within the ground, or new unforeseen contamination may have occurred from the current land use. Additional works may be required to mitigate unforeseen contamination during remedial works should it be encountered.

4.3 Identification of Feasible Remediation Options

A summary matrix of the potential applicability of a range of remediation options to particular contaminant-media type combinations and considering the distribution of contamination identified at the site is provided in **Table 5**.

Table 5: Initial Remediation Options Matrix

Remediation Option	Media	Asbestos	TPH
CIVIL ENGINEERING METHODS			
Excavation & Disposal	Soil	✓	✓
Containment-In-Ground Barriers	Soil	✗	✗
Containment-Cover Systems	Soil	✓	✓
Sorting and Remove	Soil	✓*	✗
Note: * Sort and remove for physical, visible fragments of asbestos only. Not applicable to free fibres in soil.			
BIOLOGICAL METHODS			
Biopiles	Soil	✗	✓
Bioventing	Soil	✗	✗
Biosparging	Soil	✗	✗
Landfarming	Soil	✗	✓
Slurry Phase Biotreatment	Soil	✗	✓
Windrow Turning	Soil	✗	✓
CHEMICAL METHODS			
Chemical Oxidation	Soil	✗	✓
Soil Flushing	Soil	✗	✗
Solvent Extraction	Soil	✗	✓
Surface Amendments	Soil	✗	✗
PHYSICAL METHODS			
Dual Phase SVE	Soil	✗	✗
Soil Vapour Extraction (SVE)	Soil	✗	✗
Soil Washing with surfactants	Soil	✗	✓
STABILISATION & SOLIDIFICATION METHODS			
Hydraulic Binders (e.g. cement)	Soil	✓	✓
Vitrification	Soil	✓ (possible but difficult to undertake insitu on asbestos)	✓
THERMAL METHODS			
Incineration	Soil	✗	✓
Thermal Desorption	Soil	✗	✓

4.4 Detailed Evaluation of Options

For the evaluation of remediation options it is assumed that all areas proposed for soil remediation contain, or have the potential to contain, all of the organic and inorganic contaminants listed in the table above. While some areas are likely to contain only asbestos, areas that contain TPH will also contain asbestos.

As such preference is given to soil remediation options that are capable of treating both organic and inorganic contaminants simultaneously, although a combination of remediation options could be considered appropriate. However, treatment methods which limit the disturbance to existing impacted soils are also given significant preference, based on the potential for increased human health risks posed by the disturbance and potential to spread asbestos contamination.

The total volume of made ground/topsoil requiring treatment within the upper 1.0 m across the site is approximately estimated as 150,000 m³, based on the site investigation data obtained to date, with an additional 4,550 m³ of material from the canal, based on available surveys of the site and general estimations. The volumes above must be treated with caution at this stage.

Of the feasible soil remediation options listed in Table 5 the following have been discounted for the Nuralite site:

- All biological methods – Inability to treat asbestos. Additionally the hydrocarbons identified are typically heavier carbon chains that are difficult to break down;
- Chemical and Physical methods – due to inability to treat organic and inorganic contaminants or asbestos simultaneously;
- Stabilisation & solidification methods – due to the nature of the material (asbestos), vitrification would be extremely difficult within the stockpiles (i.e. very mixed materials) this may prove problematic.
- All thermal methods – due to cost constraints and a lack of nearby hub-site.

The following remediation options are considered to be most applicable to contaminants identified will be ranked through a detailed applicability assessment:

1. Civil Engineering Methods
 - a. Excavation and disposal
 - b. Containment-cover systems
2. Stabilisation & solidification methods
 - c. Hydraulic binder (e.g. cement)

4.5 Selected Remediation Techniques

The applicable remedial options derived in Section 4.4 have been brought forward to be evaluated in more detail. We have described in outline each applicable remedial technology or combination to break each RPL and put these within the context of the site. A number of these applicable technologies have been discounted on the basis of site constraints before taking them onto the more detailed assessment, which has been based upon the criteria described in Section 2.7. Where appropriate a number of these methods are described in detail below (Methods A-C) and within **Table 6**.

1. Civil Engineering Methods
 - a. Excavation and disposal of near surface soils and replacement with suitable break layers and cover materials (**Method A**).

- b. Containment-cover systems of near surface soils (**Method B**). Site levels would be raised to allow containment of soils with minimal disturbance to existing impacted made ground. This system could also double as the formation of a suitable development platform. Containment-cover systems are likely to be more suitable if combined with other civil engineers methods. Can also include sheet pile/king post walls to retain embankments.

2. Stabilisation & Solidification Methods

- c. Hydraulic binder to stabilise and solidify existing contaminated soils (**Method C**). Would comprise mixing with lime and/or cement in order to bind soils and contaminants.

Table 6: Detailed Remediation Options Matrix

Aspect	Max Score	Method A	Method B	Method C	Justification
Effectiveness in achieving remediation objectives within appropriate timescales	50	50	50	50	Methods A, B and C would all effectively break the source/pathway/receptor linkage, with A removing the source, B cutting the pathway by barrier, and C cutting the pathway by locking the contaminants in place.
Practicability of verification	50	50	50	50	Verification of Methods A, B and C comprise simple, visual check and validation sampling/testing if necessary prior to backfilling or re-filling with water.
Stakeholder requirements	50	35	35	30	Stakeholders or nearby land-users require a safe environment to be maintained throughout the work, and for this to be maintained thereafter. Method A has the potential to produce a significant amount of dust if not controlled properly as large areas of impacted material will be exposed and disturbed during the work, although no residual risks will remain. Method B has some limited potential for dust to be produced where areas are cut to allow placement of the cover and impacted soils exposed prior to covering, and the source of contamination is not fully removed and must be considered in the future. Method C would have a limited to moderate potential for dust creation assuming stabilisation was achieved through auger techniques, and the source would remain on site, and would have to be considered in the future.
Operational requirements	25	25	25	20	Methods A and B can both be achieved with traditional construction plant, all of which would be required to be on site for the redevelopment of Nuralite site. Method C would be achieved by widely available auger techniques.
Commercial availability of technique	5	5	5	3	Methods A and B achieved by traditional plant, Method C would require widely available auger and other traditional plant.
Track record of use	5	5	5	5	Methods A, B and C have a track record of achieving aims consistently.

Aspect	Max Score	Method A	Method B	Method C	Justification
Permissions and licenses for installation and/or operation	5	5	5	5	While all works will require consideration of asbestos and whether or not they are licensable activities.
Timescale for implementation	5	5	5	4	Methods A and B are undertaken by plant that is widely available and can be undertaken over a known period of time.
Health and safety impacts	15	5	12	10	Method A has the potential to create significant health and safety risks associated with dust, whereas Method B, with its minimal disturbance policy would only give rise to limited opportunity for dust. Method C does involve some limited disturbance of soils.
Environmental impacts	10	0	8	8	Method A would have significant overall environmental impacts, with significant impact from lorry movements as well as a significant use of finite landfill space. Methods B would negate the items relating to Method A but would still involve some import of materials resulting in increased lorry movement. Method C would involve the import of lime/cement and some increase lorry movements.
Long term monitoring and maintenance implications	25	25	15	20	Method A would completely remove the risk to end users and would not require monitoring or maintenance. Method B would potentially require some maintenance and the potential risks associated with the made ground on site would need to be considered in the future if any breaking of ground for new development or services was required. Method C is similar to Method B, however give that the contaminants are more firmly locked away the generation of dust limited.
Durability over time	50	50	45	45	Method A would be seen as the most durable due to the removal of the source. Method B and C would be considered very durable however if the cover system over them were disturbed (and in the case of Method C the stabilised soils exposed to weathering), this may give rise to risks associated with dust generation.
Compatibility with other site works	5	5	5	3	Methods A and B are undertaken by traditional plant and occur in tandem with other works on a significant number of development sites. Method C would need to be undertaken independently of the main development works however the process is well known and if properly planned should not impact timescales.

Aspect	Max Score	Method A	Method B	Method C	Justification
Costs	50	0	45	20	There is a significant cost associated with Method A, the removal of all made ground soils as hazardous waste, to a point which if it had to happen, the redevelopment of the site would not be viable. Costs associated with the disposal of some soils, and the import of clean cover as part of Method B would be offset by the potential income generated by the acceptance of waste materials to form the regulating layer. Method C would incur relatively high costs in plant and consumables in order to stabilise the required volume of soil at the site.
	Max Score	Method A	Method B	Method C	
Score for all technical attributes	350	270	310	296	
Budget Costs		~£56m*	£1.0m – £5.0m**	£3.5m – £7.7m***	

4.5.1 Summary

A. Method A - Excavate and Disposal

Certainty of achieving objective and easily verifiable, control over import (end quality) of material. However, given the thickness of impacted made ground is in excess of 5.0m in some areas of the site, does not completely satisfy stakeholder objectives as some residual contamination may remain at depth, although it should not be a human health risk. Commercially readily available and with track record; operationally achievable taking into account constraints. Health and Safety controlled by existing legislation; environmental issues include dust and fibre release; odours and noise to be monitored and controlled where practicable. However, given the significance of the asbestos loose fibre content within the made ground, the control of dust release significantly increases in significance during both on site operations and during transit away from the site. Protection of groundworkers would also be of high concern considering the extent of disturbance required as part of this method. No requirement for long term monitoring. Disposal costs of potentially hazardous materials on site is likely to be very high, with rough estimates assuming in excess of £56m – which only considers the removal of the upper 1.0m of impacted soil. The volumes of soil associated with this solution would be extremely high and would have a significant impact on available landfill space which would be considered unsustainable.

B. Method B – Containment (Cover Systems)

As above, certainty of achieving objective and easily verifiable, control over import (end quality) of material. Does not completely satisfy stakeholder objectives as some residual contamination may remain at depth, although it should not be a human health risk. Commercially readily available and with track record; operationally achievable taking into account constraints. Health and Safety controlled by existing legislation; environmental issues include dust and fibre release; odours and noise to be monitored and controlled where practicable. This would also be achieved through the absolute minimal disturbance of existing soils. No requirement for long term monitoring. Unlikely to be suitable without some removal of soils to allow for placement of suitable cover at proposed elevations, however these excavated soils could be placed within the most easterly pond which is to be infilled as part of the final proposals for the site, which would result in there being no need to remove large volumes of material to landfill. Also, not a practical solution to the canal, which stakeholders wish to be retained and rejuvenated where possible, however as above, impacted silt and soil from the canal could potentially be placed within the most easterly pond, reducing potential landfill costs.

C. Method C – Stabilisation and Solidification

As above, certainty of achieving objective and easily verifiable, control over import (end quality) of material, which would still be required over the surface of stabilised material to prevent degradation. Does not completely satisfy stakeholder objectives as some residual contamination may remain at depth, although it should not be a human health risk. Commercially available and with track record; operationally achievable taking into account constraints, however additional consideration of placement of services will need to be undertaken. Health and Safety controlled by existing legislation; environmental issues include dust and fibre release; odours and noise to be monitored and controlled where

practicable. However, given the significance of the asbestos loose fibre content within the made ground, the control of dust release significantly increases in significance during on site operations which will include the mixing of cement and/or lime into the impacted made ground. If dust generation and fibre release cannot be sufficiently controlled this may block the use of this technique. Protection of groundworkers would also be of high concern considering the extent of disturbance required as part of this method. Would not be appropriate for treatment of canal silt in situ. No requirement for long term monitoring. Costs associated with plant and materials to undertake mixing and completion of works, taking into account safeguards that are likely to be required are considered to be relatively high, in the order to £3.5m to £7.7m.

4.5.2 Selected Remediation Techniques

As there are several Relevant Pollutant Linkages (RPL) present at the site (i.e. in relation to asbestos in soil, and other organic and inorganic contaminants within made ground), a combination of remedial options will be required to deal with all linkages to the appropriate standard required by the stakeholders. Based upon the assessment the soils in-ground at the site should be dealt with via Method B, while limited areas of the site subject to Method A such as the hydrocarbon hotspots, which would be disposed of off-site, and asbestos contaminated soils from limited areas of surface soils to allow placement of required thickness of cover system or king-post wall / gabions along slopes where required, which could be re-used as backfill below the cover system within the most easterly pond at the site.

4.6 Constraints and Outstanding Considerations (other costs)

Due to the complex nature of the potential source pathway receptor linkages we have drawn up the following tables to highlight potential site constraints and outstanding considerations. These have been ranked 1 to 10 to give an indication of possible impact to the objectives of the project (1 = low, 10 = high). Please see below **Table 7** and **Table 8**.

These tables should not be considered exhaustive and we would recommend that the details are incorporated into a Constraints Plan and Financial Risk Register for the project that is regularly updated. We consider that the use of such a register would assist in guiding the decision-making process that the Local Authority will have to undertake. This will allow major risk items to be tracked and updated as the project continues.

Table 7: Constraints Table

Constraint	Possible Effect	Constraint	Ranking
Planning permission will be required	Time constraint for decision	Time	3
Below and above ground services	Disruption to local services during works; may re route; remove and replace; or leave adjacent soil in place. Could be significant cost	Cost/time	4
Licensing – demolition; site license for hazardous waste; mobile plant license; discharge license	Time constraint and cost in obtaining all the licences	Cost /time	3

Constraint	Possible Effect	Constraint	Ranking
Licensing – potential re-use and import of waste material to provide uplift for site will require waste recovery permit	Time constraint and cost in obtaining all the licences*	Cost /time	6*
Legal agreements with land owners	Delay in agreeing differing objectives with individuals.	Cost /time	7
Condition survey agreements	Landowners do not agree current condition survey or contest later	Cost /time	7
Note: * - it is noted that Waste Recovery Plan v3 for the site was submitted by RSK in 2022 and subsequently the EA have issued a permit for the reuse of waste material generated on site and for the importation, treatment (if required) and reuse of locally sourced waste materials at the site, under permit reference EPR/KB3008GT			

Table 8: Outstanding Considerations

Outstanding Considerations	Comment	Ranking
Further investigation of both the volume of and the characterisation (asbestos quantification) of the soils in the canal.	This will allow for the assessment of potential human health risks arising from soils within and along the bank of the canal, which are as yet poorly understood. They are known to contain asbestos but as no quantification of this was undertaken no robust assessment of the human health risks has been completed. An accurate risk assessment will allow the refinement of possibilities for re-use and disposal.	8
Are there any TPO's associated with the site	Information required prior to commencing remediation works. Possible time constraint if not obtained.	2

5 REMEDIAL STRATEGY

The remedial strategy outlined below is based on the proposed site development layout as shown on Figure 3. Should the proposed layout change or the site end use be altered, the proposed remedial options may require reassessment. Figure 4 shows the approximate extents proposed remedial action.

Remediation is a form of risk management, which aims to demonstrably disrupt the pollutant linkage between the source, pathway and receptor. Breaking the pollutant linkage can be done in a variety of ways; for example reducing, destroying or otherwise modifying the source of the contamination, managing pathways through barriers or modification boundaries, and receptor protection by restricting or changing the land-use or introducing a cover system.

For the majority of asbestos contamination this will consist of the containment by placement of a cover system over the whole site. In order to limit the disturbance to the highly impacted soils the cover system will be placed on top of the existing soils, raising the site to 7.1 m aOD. This would result in only very limited amounts of excavation of existing soils to make way for the cover. Where appropriate other types of containment will be utilised, specifically king-post walls along the side of the railway line to the southern boundary of the site, gabions along the canal bank, brick wall retainer to Canal Road and retaining walls around the banks of the pond which is to remain on the site.

For other contaminants this would primarily involve removal of the most significant hydrocarbon contamination and asbestos impacted soils where cut is required. Hydrocarbon impacted soils would be removed from site and taken to a suitably licensed disposal facility, while asbestos impacted soils could potentially be placed at the base of infill in the ponds in the west of the site.

If hydrocarbon impacted soils are also impacted with asbestos, then the soil should be segregated, and visible fragments removed. The impacted soil would then be assessed for fibre content and disposed of appropriately.

Treatment of the asbestos impacted canal silt would comprise removal and placement within the most easterly pond as part of infilling proposals. As part of this, visible fragments would be removed in disposed of appropriately in order to provide betterment of the material.

The following preliminary remedial strategy is recommended for the site, subject to final approval from the Regulatory Authorities such as the Environment Agency (EA) and Contaminated Land Officer (CLO) or Environmental Health Officer (EHO).

5.1 Remedial strategy

The basis of the remedial strategy is to break the pollutant linkage between end users and contaminants identified in the made ground and natural soils identified below the site, by cutting the pathway by placing a cover system, or removing the source of the contamination.

a) Relevant Pollutant Linkage

The investigation has indicated there to be a pollutant linkage from asbestos (chrysotile, limited amosite and rare crocidolite), present within the made ground to significant depth across the whole site that may pose a potential risk to end users by inhalation of fibres. (This includes the silt within the canal).

b) Relevant Pollutant Linkage

The investigation has indicated there to be a potential pollutant linkage from elevated concentrations of hydrocarbons within discreet, localised pockets of made ground that may pose a potential risk to end users by ingestion, dust inhalation and dermal contact or vapour inhalation.

5.1.1 Asbestos contaminated soils

Based on current development plans, level changes are to occur at the site in order to allow for minimal disturbance of the asbestos impacted soil and to create a flat development platform and aid in the control of surface water run-off. As such levels will be raised to 7.1 m aOD across the site and some minor earthworks are incorporated into the works to retain embankment areas in the south to the railway, east to Canal Road, and the north to the canal itself. A piled system would also be required to retain the banks of the pond to be retained. All areas requiring a system to retain soils are marked along with the other remedial requirements on Figure 4.

The cover system for the site will differ between the eastern (commercial redevelopment) area of the site and the western (open space) area of the site.

Excavated Soil

Limited excavation will be required to facilitate the installation of the cover systems detailed below and the creation of retaining structures at the site. Any soil or silt excavated from areas impacted by asbestos would be placed at the base of backfill of the most easterly pond in the west of the site, prior to any cover system being positioned on top. Given the limited areas requiring excavation, this is not considered to be a significant volume of material. If suitable areas within the west of the site are not available for the placement of excavated materials at depth, then consideration would need to be given to their removal from site, with the soil being placed directly into haulage wagons and removed to a suitably licensed disposal facility.

Eastern Cover System

In the east it is proposed that an initial barrier layer of 0.50m thick compact soil and stone will be placed directly onto the existing material following limited removal of floor slabs etc that may impact the foundations of propose buildings. This will be compacted to such an extent that it will act as a low permeability layer, preventing downward migration of surface rainwater. This material would be sourced from either crush arising from demolition activities, or imported under the CL:AIRE code of practice, or suitable exemption, or the Environment Agency permit EPR/KB3008GT in place at the site. Above this will be an additional 0.50 m thick, upper layer of soil and stone, lightly compacted to allow construction over the top and the installation of services. Given that the existing site levels in the eastern area are approximately 6.0 m aOD, the initial barrier layer of compact soil and stone may need to be locally thicker to maintain a level development platform. Where necessary, limited cut of the existing material will be undertaken to ensure a minimum 0.50 m thick layer of compact soil and stone can be placed.

Western Cover System

In the west, where site levels are more variable, the resulting cap will be variable in thickness, designed to regulate the flow of surface water and direct it away from the internal low points of the existing landfill, and towards specified infiltration basins in accordance with the site Surface Water Management Plan (SWMP). In this area of the site an initial layer of material will need to be imported in order to regulate the level of the site, allowing for an appropriate cap to be placed over the top.

This 'regulating layer' would comprise inert imported material brought in under permit reference EPR/KB3008GT and placed and suitably compacted to allow the placement of layers above but still allow vertical infiltration of water.

In areas of the proposed SWMP infiltration basins the initial barrier layer will comprise a 0.50 m thick layer of imported soil, stone and gravel, placed to allow the infiltration of rainwater (present to surface). Elsewhere the barrier layer will comprise a 0.50 m thick layer of compact soil and stone, which will be compacted to a minimum density in accordance with the earthworks methodology, again to limit permeability and prevent bioturbation by tree roots and animals.

The barrier layer will be overlain by subsoil and topsoil to provide a suitable growing medium for vegetation in accordance with the landscape plan for the site. The barrier layer, subsoil and topsoil will form a minimum thickness of 0.90 m, with the minimum thickness of topsoil in tree planting areas of 0.60 m, in shrub planting areas of 0.40 m, in managed amenity grass of 0.10 m, with none present in infiltration basins where the barrier layer will be present to surface.

Retaining Structures

It is understood that the retaining of embankments, slopes and banks adjacent to the railway in the south, Canal Road in the east, the Thames and Medway Canal in the north and the pond in the west of the site are required as part of the works. The slope up to the railway line will be retained by a king-post wall, while the slope down to Canal Road will be retained by a brick wall, formed with reclaimed bricks from the site and the embankment from the Thames and Medway Canal up to the site will be retained by gabions. In each case the barrier layer of retaining structures forming the perimeter slopes around the site will incorporate a 0.50 m thick layer of cobbles below a 2.5 mm diameter steel mesh to reduce the risk of bioturbation by mammals.

All the above retaining structures are subject to finalised detailed designs, which may possibly require additional ground investigation or other modification. Should the final design differ significantly from the above then this RMS should be reviewed in order to ensure the designs are suitable.

Additionally, the banks of the pond and any islands within it which is currently present in the west of the site will be retained to prevent mixing of existing soils and the silts within the pond. It is understood that at this stage planting is proposed within a floating margin around the pond, which would allow plant life to grow and provide access/egress from the pond for animals.

As above, this would be subject to finalised designs, and any significant changes reviewed in order to ensure continued suitability.

Canal Works

It is understood that the canal is currently significantly silted, with silt present above the water line in some areas. RSK undertook supplementary chemical testing of ten samples collected from the canal silt, finding asbestos fibres at 0.001% weight concentration within one sample. This indicates asbestos concentrations are significantly lower than originally anticipated within this area, indicating that reuse or disposal of the canal silt may be viable options. Reuse would comprise the removal of any visible fragments of asbestos (with disposal to a suitable facility) and reuse of the resulting silt soil as infill material for the most easterly of the ponds within the west of the site. While asbestos was only detected in limited concentrations, contractors should remain vigilant for asbestos containing material during operations, and consult specialist advice should unforeseen contamination be encountered.

The embankments of the canal will also be cut back to a suitable angle and if necessary gabions placed in order to retain the site from the canal. As above the gabions will be accompanied by a 0.50 m thick layer of cobbles below a 2.5 mm diameter steel mesh to reduce the risk of bioturbation by mammals.

1.1.1.1 *The Control of Asbestos Regulations*

All works on or affecting asbestos containing materials are subject to the Control of Asbestos Regulations 2012¹. Depending on the nature of the works, they may be classed as licensable under the Regulations and therefore must be carried out by a specialist asbestos contractor and licensed by the Health & Safety Executive. This normally applies to most work involving asbestos insulation, spray coatings or insulating board but can apply to work with other materials as well.

The site investigation works has indicated the presence of asbestos materials that are licensable. Where significant screening/processing of the material is undertaken which may cause deterioration of the asbestos the works may require notification to the HSE as notifiable licensed works, as such, for work where significant excavation is required, a licensed contractor brought on board and a 14 day notification put in to the HSE.

Work is only classed as non-licensable if:

- the exposure of employees to asbestos is sporadic and of low intensity (no exposure to asbestos will be sporadic and of low intensity if the concentration of asbestos in the air exceeds or is liable to exceed 0.6 fibres per cubic centimetre (f/cm³), measured over a 10 minute period);
- it is clear from the risk assessment that the exposure of any employee to asbestos will not exceed the control limit (the control limit being 0.1 f/cm³, measured over a period of 4 hours); or
- the work involves:
 - i. *short, non-continuous maintenance activities (works can only be considered short and non-continuous if any one person carries out work for less than one hour in a seven-day period and the total time spent by all workers on the work does not exceed a total of two hours);*
 - ii. *removal of materials in which the asbestos fibres are firmly linked in a matrix (these include asbestos cement, textured decorative coatings and paints and any article of bitumen, resin or rubber which contains asbestos where its thermal or acoustic properties are incidental to its main purpose, e.g. vinyl floor tiles, electric cables, roofing felt. It does not include thermal insulation / lagging, spray coating or asbestos insulating board);*
 - iii. *encapsulation or sealing of asbestos-containing materials which are in good condition; or*
 - iv. *air monitoring and control, and the collection and analysis of samples to ascertain whether a specific material contains asbestos.*

The Code of Asbestos Regulations 2012 provides guidance text for employers about work which disturbs, or is likely to disturb, asbestos, asbestos sampling and laboratory analysis. It also provides guidance on the specific duty to manage asbestos on the owners and/or those responsible for maintenance in non-domestic premises.

The Regulations set out your legal duties and the ACOP and guidance give practical advice on how to comply with those requirements. The Regulations give minimum standards for protecting employees from risks associated with exposure to asbestos.

1.1.1.2 Release of asbestos fibres from soil

It is important to note that if asbestos materials are left undisturbed, they pose only a negligible risk, and it is not necessary to remove all asbestos containing materials.

Laboratory studies carried out on artificial soil samples with homogenous asbestos fibre contamination have shown that concentrations of respirable fibres of asbestos in soil as low as 0.001% by weight may, in loose dry soils, give rise to measurable levels of asbestos fibres if disturbed.

However, the varying conditions encountered outside the laboratory environment will affect the level of fibre release. These include the concentration and dispersal of fibres within the soil, the type of soil, the activities disturbing the soil and the moisture content of the soil. Currently in the UK there is no published data supporting the asbestos in soil and asbestos in air relationship. Guidance developed in the Netherlands illustrates if the weighted asbestos concentration in soil is less than 100 mg/kg based on dry weight of soil (referred to in the Dutch Standard as mg/kg dm) no assessment is necessary.

This concentration is equivalent to 0.01% by weight, an order of magnitude less than the hazardous waste criterion of 0.1%. Thus, the Dutch limiting concentration below which no assessment is necessary is 100 mg/kg (0.01%) for chrysotile. The concentrations quoted in the document are expressed in terms of chrysotile asbestos. To allow for the higher risk posed by amphiboles a weighting factor of 10 is applied, but, using the weighting factor, would only be 10 mg/kg (0.001%) for any of the amphibole asbestos minerals. Whilst the Dutch limiting concentrations are not designed to be in accordance with UK legislation, awareness of these values gives a useful benchmark.

5.1.2 Hydrocarbon contaminated soils

In areas of other contamination, specifically the hydrocarbon hotspots within made ground encountered in discreet localised areas as shown on Figure 4, it is considered that the impacted made ground would be excavated in order to remove the main source of any hydrocarbons, and given that the tanks will have also been removed as part of the demolition no continuing source would exist and any minor residual risk would dissipate over time. Once excavated the material would be placed in covered wagons and removed from site and taken to a suitable disposal facility.

Should the excavated soils contain visible asbestos contamination they should be segregated and where possible the visible asbestos contamination removed. The remaining soils should then be disposed of at a suitable disposal facility.

Once the soil has been excavated and removed, visual inspection of excavations of each face and the base of the excavation will be undertaken to confirm that all the localised contaminants have been removed. Validation samples would then be taken prior to backfilling. Should significant contamination remain then the area will need to be re-excavated and the above process repeated.

6 REMEDIAL TARGET SELECTION

In order to ensure that the remediation of hydrocarbon contamination is undertaken effectively at the site, remediation target concentrations have been calculated using the CLEA Model for human health (Appendix C and D). Considering the CSM it is not considered that any remedial targets are required for controlled waters.

6.1 Calculation of Human Health Targets

Site investigations at the site have indicated a potential risk to residential end users from asbestos and TPH contamination in soils and therefore a need for further assessment or remediation to Tier 2 residential (with plant uptake) end use, or residential public open space end use values, where appropriate. In order to ensure that no human health risk exists Target Concentrations for human health have been calculated for both soils and groundwater.

A set of GACs calculated by RSK Group for a generic commercial end use as well as a public open space end use are presented in Appendix C and Appendix D respectively, have been employed as this situation accurately fits the CSM.

While not included on the GACs presented in Appendix C and D, it should be noted that the presence of asbestos within near surface soils within public open space is not acceptable.

7 REUSE OF MATERIALS

7.1 Reuse of suitable materials

It is proposed that some materials are to be reused on site, this relates to the crushing of building materials as part of the demolition, which may be incorporated into either the proposed barrier layer (to be present across the site), the upper fill layer in the eastern area of the site, or as the permeable fill within the western area of the site.

At this stage volumes of recoverable material are not known and so the following provides relatively generic advice on the reused of suitable materials on site.

Under the Waste Framework Directive, naturally occurring soils are not considered waste if reused on the site of origin for the purposes of development, however it is unlikely that clean, natural soils will be excavated at the site as part of the development works.

In accordance with the definition provided in the Waste Framework Directive, materials are only considered waste if 'they are discarded, intended to be discarded or required to be discarded, by the holder'. Thus, soils that are not of clean and natural origin, i.e. made ground (whether contaminated or not) and other materials such as recycled aggregate, do not become waste until the aforementioned criteria are met.

Any movement of soils onto and around the eastern (industrial estate) area of the site could be undertaken in accordance with the CL:AIRE Code of Practice. *The Definition of Waste: Development Industry Code of Practice* (CL:AIRE, 2011) (CoP) was developed in consultation with the Environment Agency and development industry to enable the re-use of materials under certain scenarios and subject to demonstrating that specific criteria are met. The current reuse scenarios covered by the CoP comprise:

- reuse on the site of origin (with or without treatment)
- direct transfer of clean and natural soils between sites
- use in the development of land other than the site of origin following treatment at an authorised Hub site (including a fixed soil treatment facility).

The importation of made ground soils (irrespective of contamination status) or crushed demolition materials is not permitted currently under the CoP and if the cannot be imported under the agreed Environment Agency permit for the site ref.EPR/KB3008GT, importation may require either a standard rules environmental permit or a U1 waste exemption (see below) which will have specific restrictions on types and volumes of materials that can be imported. Given the proposals for the site however, the volumes involved may prevent the use of standard rules permit and require a bespoke environmental permit.

In the context of excavated materials used on sites undergoing development, four factors are considered to be of particular relevance in determining if the material is a waste or when it ceases to be waste:

- the aim of the Waste Framework Directive is not undermined, i.e. if the use of the material will create an unacceptable risk of pollution of the environment or harm to human health it is likely to be waste
- the material is certain to be used

- the material is suitable for use both chemically and geotechnically
- only the required quantity of material will be used.

The CoP requires the preparation of a materials management plan (MMP) that confirms the above factors will be met. This plan needs to be reviewed by a 'Qualified Person' (QP) who will then issue a declaration form to the EA. As the project progresses, data must be collated and on completion a verification report produced that shows the MMP was followed and describes any changes.

The MMP establishes whether specific materials are classified as waste and how excavated materials will be treated and/or reused in line with the CoP. The MMP is likely to form part of the site waste management plan.

The site has been developed previously and the investigation has confirmed the presence of made ground. Therefore, before any excavation works begin on-site, an MMP will need to be prepared, reviewed by a QP; and a Declaration lodged with the EA. The excavation of the Made Ground soils at the site could be reused in areas of low sensitivity as discussed above and could be reused under proposed roads and other hardstanding, and a suitable MMP could be drawn up in order to document this for the east of the site.

As noted above, under the Waste Framework Directive naturally occurring soils are not considered waste and therefore arisings of clean natural soils, e.g. from foundation and drainage excavations, may be reused on the site. However, it is important that these soils should be stockpiled separately and not become cross-contaminated with made ground / contaminated soils or construction wastes.

If it were proposed to import clean and naturally occurring soils direct from another site, the receiving site's MMP would need to be updated in advance of importation.

7.2 Reuse of waste materials

If material is discarded as waste then its reuse on site may still be possible. Waste soils and recycled aggregate can be reused on site under a standard rules environmental permit or a U1 waste exemption from the Environmental Permitting (England and Wales) Regulations 2010 provided that they are suitable for the proposed use, i.e. not cause harm to human health or the environment. However, it should be noted that these have strict limits on the quantity of material that can be reused. Given the volumes involved in the proposed works relating to the raising of levels at the site, the use of standard rules permit would not be possible and instead the proposed work would require a bespoke environmental permit, which would include a waste recovery plan. The Waste Recovery Plan (v3) produced by RSK in 2022 has subsequently lead to the implementation of Environment Agency permit EPR/KB3008GT, which will allow the reuse of waste material generated on site and the importation, treatment and reuse of locally sourced waste materials.

For more specific tasks, such as the treatment of silt from the canal and / or the screening and sorting of excavated soils from hydrocarbon hotspot removal, a separate standard rules treatment permit could be undertaken.

Should the final soil movements at the site include the use of made ground from within the former landfill area in the west of the site being placed in the eastern area of the site, any bespoke environmental permit would need to be extended across the whole site and the use of an MMP would no longer be appropriate. If this were to be proposed, a site wide bespoke environmental permit would need to be agreed upon with the appropriate regulators.

Additionally, it should be noted that the Environment Agency have produced a Regulatory Position Statement (RPS075) on 'The movement and use of treated asphalt waste containing coal tar', which details a set of requirements that if followed would allow the final use of asphalt waste containing coal tar in certain construction operations without an environmental permit. This may allow the reuse of these materials in locations such as below proposed hardstanding.

7.3 Importing of other materials

It is understood that it is proposed that imported waste materials may be considered for the formation of the 'regulating layer' across the west of the site. The regulating layer is to be used to create a level surface for placement of the barrier and fill layers as that area of the site is currently very uneven and includes hollows and a pond which are to be backfilled. The importing of waste materials for this, and the volumes that would be required, means that this would fall outside of the scope of any MMP, U1 exemption or any standard rules environmental permit and would need to operate under the agreed bespoke Environment Agency, Environmental (Waste Recovery) Permit incorporating a Waste Recovery Plan, ref.EPR/KB3008GT. This recovery plan would cover the reuse of waste materials generated on site and the importation, treatment and reuse of locally sourced waste materials, principally for the placement of material within the western area of the site, and would not be related to the treatment of soils excavated from the hydrocarbon hotspots, nor would it be related to the treatment of any silt from the proposed canal remedial activities.

8 REMEDIATION/CONSTRUCTION CONSIDERATIONS

8.1.1 Storing and stockpiling of asbestos contaminated soils

Ideally, once asbestos contaminated soils have been excavated, they should be immediately removed from site. Should this not be possible it would be preferable to place the soils in lined skips which can be covered and protected from the elements. This would also prevent any excess run-off, should soils also be affected by hydrocarbon contamination.

- The stockpiling of asbestos contaminated soils should be avoided where possible with affected soils being removed from site immediately after excavation. Should stockpiling of these soils be unavoidable then the following precautionary actions should be adhered to:
- The stockpile should be secured with heras fencing around its entire perimeter to prevent unauthorised access,
- In addition to fencing, the stockpile should be clearly signed as asbestos contaminated materials in order to prevent accidental use of the soils,
- The stockpile should be placed on suitable material (i.e. polythene sheeting, lapped up at the edges) to prevent migration or spreading of contaminants to the underlying soils,
- The stockpile should be covered with a polythene sheeting or tarpaulin material in order to suppress any dust which may arise from the soils, and
- While the stockpile is uncovered, for example during the initial stockpiling or during removal, the soils should be constantly wet down through the use of water spraying, although this may not be possible if the soils are also contaminated with hydrocarbons. In this case, a lined skip as described above, should be utilised.

8.1.2 Storing and stockpiling of hydrocarbon contaminated soils

Stockpiling of other contaminated material from will be placed directly into a lined skip or placed on top of heavy duty sheeting. Methods will be employed to keep the stockpile as dry as practicable by covering with impermeable sheeting/tapering the pile to ensure maximum runoff. Stockpiles will be placed as far away as possible from nearby buildings and surrounded with heras fencing.

8.1.3 Drains, Interceptors and Soakaways

Prior to redevelopment, these features, if encountered, should be emptied of all liquids/sludge and chemical analysis should be undertaken to determine an appropriate disposal method. Subject to regulatory authority agreement this may be by foul sewer or, alternatively, by effluent tanker for offsite treatment/disposal. Collected water should not be disposed of via any ground surface, drain or surface watercourse without the appropriate regulatory consents to discharge. Drainage structures should then be broken out and excavated where necessary or grouted and sealed.

8.1.4 Dust Suppression and Wheel/Vehicle Washing

In dry windy weather or during dust generating works (e.g. crushing, stockpiling and soil movements), precautions should be taken to minimise dust generation by the use of water sprays and road sweepers. Haulage vehicles should be sheeted before leaving site. Additional precautions

should be taken to minimise the potential (i.e. such as localised wheel washing) within areas noted as having asbestos fibres/identifiable pieces.

The exterior of the vehicle should be cleaned, paying particular attention to buckets and wheels. Only when the cleaning has been completed and the vehicle has passed a visual inspection should it be allowed to leave the asbestos impact area or site.

In the case of other vehicles which are not coming into contact with the asbestos contaminated soil, a wheel wash prior to leaving site will be sufficient.

Ideally, haulage vehicles should be kept on hardstanding areas where possible. It would be prudent to use road sweepers to ensure that roads to and from the site are also kept clean.

Wetting down of excavated soils during soil movements is essential to prevent the release of asbestos fibres.

All stockpiles of soil should be appropriately placed on hardstanding or suitable soft cover to prevent cross contamination. Soils should be covered with terram to prevent dust generation.

8.1.5 Noise and Vibration

All works should be carried out in accordance with the Environmental Protection Act 1990 (EPA 90) and BS 4142 1990 'Industrial noise affecting residential areas', and BS 5228 'Noise control on construction sites' (where applicable). Site noise and vibration requirements if specified within the planning consent should also be adhered to.

8.1.6 Air quality monitoring

Background air quality monitoring should be undertaken at the site boundaries and in the general vicinity of soil movements to assess the potential for the release of loose asbestos fibres to ambient air. In addition, personal air quality monitors should be supplied to site operatives working in close proximity to earth movements.

Air monitoring for asbestos fibre release should be undertaken daily for the duration of the works in accordance with the recommended health and safety exposure limit, within any areas identified on Figure 4 as potentially asbestos contaminated, and within any areas that during the works are subsequently identified to be contaminated with asbestos. All air monitoring must be carried out by a UKAS accredited laboratory, in accordance with the method set out in HSG248 Asbestos: The Analysts' Guide for Sampling Analysis and Clearance Procedures.

In the event of air monitoring results that are elevated above the clearance limit (0.01 f/ml); work will cease and the reasons will be investigated. Only when sufficient measures have been put in place to reduce the airborne fibre concentration to below the clearance limit, will work recommence. The clearance indicator (0.01 f/ml) is based on air monitoring rates within an enclosure, and as such, should provide a conservative guideline value for the protection of site personnel and nearby residents. It should be noted that this is the only available guidance value for assessment of asbestos in air. This indicator is at the same level as that at which an enclosure in which asbestos has been removed and the area cleaned must be below to pass as clean and fit for reoccupation, as stated in HSG248 Asbestos: The Analysts' Guide for Sampling Analysis and Clearance Procedures.

A measure of 0.12f/ml can be used for personal monitoring, assuming that RPE with a protection factor of 20 is being utilised.

Should concentrations of loose airborne asbestos fibres be encountered above statutory guidance levels, the principal site contractor should postpone work until the Asbestos Consultant has investigated. Works would recommence only after the Asbestos consultant has inspected, sampled and/or analysed to assess the potential risk and recommended additional mitigation to prevent further release of fibres to ambient air.

The results and the air quality monitoring should be provided and included within the validation report.

8.2 Health and safety

8.2.1 Asbestos impacted areas

Asbestos impacted areas will be marked out by the removal contractor, to ensure that all personnel on site are aware of the area and that only competent individuals with the correct PPE enter the area.

8.2.2 Training

All those working within the asbestos impacted zone must have undergone appropriate training. For licensed contractors, their operatives will have undergone operative or supervisor training. All other personnel working in the area must have undergone appropriate asbestos awareness training.

8.2.3 Personal protective equipment

All those entering the asbestos impacted zone must wear appropriate personal protective equipment (PPE) or be within vehicles with positive air pressure cabins.

Disposable type 5/6 coveralls will be worn; the colour depending on the activity taking place. Typically, red coveralls will be worn by the asbestos removal contractor operatives undertaking work with the asbestos containing materials. These operatives will transit to the work area in blue coveralls and work in the area in red coveralls. Blue coveralls will be worn underneath the red coveralls by these same operatives, and once work has finished in the area, the red coveralls will be discarded as asbestos waste, and the operatives will transit back from the work area to the decontamination unit in the blue coveralls. It is understood that some sites may have sensitivity to the colour of coveralls worn, depending on public perception. There are no rules regarding the colour worn for certain activities, but this needs to be made clear in the contractor's method statement.

Blue coveralls will be worn by all those entering the controlled area but who are not directly working with asbestos containing materials.

All personnel will be wearing half face or disposable face masks with a P3 filter, suitable for asbestos fibres, which they will be face fitted for. Correct use of PPE will be covered in the asbestos awareness training.

Coveralls, disposable masks and filters are to be disposed of as asbestos waste.

Safety footwear should be worn at all times. This should be of a design that can be easily decontaminated upon leaving the asbestos impacted area, i.e. no laces.

8.2.4 Asbestos waste

All asbestos waste should be double-bagged in red and clear bags, labelled appropriately and stored in a skip, prior to removal from site. The skip should be lockable and kept locked except when in use. It should also be marked with asbestos warning signs.

All asbestos waste must be disposed of in accordance with the Hazardous Waste Regulations.

8.2.5 Decontamination of plant

Vehicles which enter the respirator zone should be fully decontaminated before leaving the work area.

In the case of excavation equipment and other equipment working on or with the asbestos contaminated soil, the exterior of the vehicle should be cleaned, paying particular attention to the bucket and the wheels. Only when the cleaning has been completed and the vehicle has passed a visual inspection should it be allowed to leave the area.

In the case of other vehicles which are not coming into contact with the asbestos contaminated soil, a wheel wash prior to leaving site will be sufficient.

8.2.6 Decontamination of personnel

Access to the respirator zone will be through one main gate. The decontamination unit will be set up in close proximity to this gate, at a suitable position. All licensed contractors will follow the standard procedure for donning protective equipment prior to entering the zone and decontamination after leaving the zone. Red colour overalls are to be used by the licensed contractors whilst in the respirator zone.

8.2.7 Emergency procedures

Site specific emergency procedures in relation to asbestos should be set up and all operatives must understand the contractors local rules and procedures prior to work on site.

9 DEALING WITH UNFORESEEN CONDITIONS

Should previously unidentified visual or olfactory residues, asbestos, buried drums, drains, interceptors, fuel storage tanks or any other unexpected hazards be discovered during site works, the site contractor should inform immediately the Site Manager and/or contact the appointed Geo-environmental Consultant. Work should be postponed in the immediate area of the discovery and the area cordoned off. The discovery should be inspected, sampled and/or analysed to assess the potential risk and residues may be required to be removed by a specialist contractor. Storage tank contents and free product on collected water not previously detected may have to be removed by suitable plant.

Where asbestos or Man-Made Mineral Fibre insulated pipe work is encountered within the ground from former buildings, or unidentified insulation material is discovered during the remediation and/or redevelopment works, it will be necessary to remove the material under controlled conditions using a licensed Asbestos Removal Contractor. The principal site contractor should inform the Site Manager and contact RSK. The principal site contractor should postpone work in the immediate area of the discovery until the Asbestos Consultant arrives. The area should be cordoned off, though work may continue within other areas of the site, until the discovery has been inspected, sampled and/or analysed to assess the potential risk.

10 WASTE MANAGEMENT

10.1 Classification and disposal

Any excavated excess spoil should always be classified prior to removal from site as required by 'Duty of Care' (Environmental Protection Act 1990) legislation. This means that material has to be given a proper description and waste classification prior to removal; consequently, details of the materials required for disposal, together with certificates of chemical analysis should be sent to a suitably licensed waste disposal contractor for classification and to confirm compliance with their license conditions.

It should be noted that since July 2005 the European Waste Catalogue definition has been required to determine whether hazardous materials are present. Contaminated Made Ground is usually classified as a Mirror Entry "17 05 03* soil and stones containing dangerous substances". Waste Acceptance Criteria (WAC) is then required for any material classified as Inert or Hazardous. There are no WAC limits for Non Hazardous materials.

A waste disposal log should be maintained by the main contractor. Copies of waste transfer logs, waste transfer tickets, waste consignment notes and landfill receipt tickets, should they be generated, should be provided to RSK for inclusion in the validation report. A photographic log of the material excavated along with the base and sides of the excavation once complete should be kept and provided to RSK for the inclusion in the validation report.

As part of the geo-environmental site assessment reports, it was noted that some localised soils designated for removal are contaminated with visible fragments of asbestos (such as the main stockpile in the south of the site and potentially the three smaller stockpiles, as well as soils around WS142). Therefore all soils excavated from these areas would be classified as hazardous.

The testing frequency should be confirmed with the landfill to ensure that their requirements are fulfilled. Depending on the final volume of soil requiring removal from site, further testing may be required.

11 VALIDATION REPORTING

All remedial works carried out on site will need to be validated and reported as highlighted below.

11.1 Excavation validation

The validation of excavations applies to areas of hydrocarbon contamination, and any areas where the full cover system is not proposed.

It is proposed that the base and sides of any excavations completed for the removal of the impacted materials should be visually inspected and sampled by a suitably qualified Geo-environmental Engineer at a rate of 1 sample per 5m per wall and 1 sample per 25m² of base, and that a photographic log is made to ensure that all made ground materials or natural soils remaining appear clear of asbestos contamination and should be included in the validation report.

Each sample from the sides and base of the excavations should be tested for the presence of asbestos and / or TPH as appropriate, depending on the contamination being excavated, to ensure all contaminated soils have been removed.

It is noted that where made ground soils are to be removed, some degree of fill will be required. A visual inspection of the material being used to infill any excavations should be undertaken to ensure that only suitable material is being used for the in-fill. If imported natural material is to be used, then it must be proven to be suitable for use through chemical testing, ideally taken from the source site of the material, see below for details. If imported waste is to be used, then the appropriate testing and licenses / permits and agreements with regulators must be in place.

A photographic record should be kept and material tracking should be undertaken and documented to be included in the validation report.

11.2 Imported soil validation

If imported subsoil and topsoil is required to complete the infill, or indeed elsewhere on site, chemical analysis of the following determinants in soil should be undertaken to ensure that any imported material is suitable for use:

- Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc);
- pH and Soil Organic Matter (SOM);
- BTEX compounds;
- Total Petroleum Hydrocarbons (TPH) split into aliphatic and aromatic carbon bands;
- PAH split into the EPA Priority 16 substances; and
- Asbestos screen;

In line with current guidance, the validation of imported Topsoil should be taken at a frequency of 1 test per 250 m³. Subsoil will be sampled at a frequency of 1 test per 500 m³.

Soil concentrations should be validated against the RSK residential public open space GAC where appropriate for soil SOM concentrations specific to the imported material. In addition there should be no asbestos in the imported material.

Documentation should also be provided to include the name and origin of the supplier of imported materials.

It should be noted that materials reused and imported under the Waste Recovery permit EPR/KB3008GT would be subject to testing as set out within the Waste Recovery Plan (v3) CQA programme, and would be out with the scope of the validation of any clean cover system.

11.3 Validation statement / report

A validation report will be produced by the environmental consultant on completion of the site remedial works and will be issued to the relevant authorities for comment. This document should include the following sections:

- Plans showing the positions and extents of any remediated areas;
- Site Photographs;
- The description of any remedial methods used
- Results of air monitoring conducted;
- Specific details of cover systems employed;
- Details of any waste disposal movements and waste transfer notes;
- The results of soil validation sampling and analysis; and
- Details of consultations with regulatory authorities.

12 MONITORING AND DOCUMENTATION OF REMEDIATION WORKS

12.1 Contractor responsibilities

The Principal Contractor will be responsible for the implementation of this Remediation Methodology, site security and the health and safety of all site workers. The appointed ground works contractor should provide (and be responsible for) all the required equipment, including personal protective equipment, to implement the ground works. Method statements should also be provided for the different phases of site works. The contractor will also be responsible for the specialist air monitoring to be undertaken at the appropriate points during the works, as noted in Section 8.1.6.

Appropriate measures will be taken by the ground works contractor (i.e. in the form of temporary fencing and visual markers) around excavations that are left unattended for any period of time.

12.2 Geo-environmental engineer

Excavation of any identified contaminated material should be monitored and documented by a suitably qualified site Chemist/Geo-environmental Engineer. On-site visual observations should be backed up by the recovery of soil validation samples, in suitable containers, for chemical analysis to determine the suitability of remaining material.

We would therefore recommend that a geo-environmental engineer be appointed to document the following items:

- Removal of any contaminated material and contaminated drainage infrastructure if present;
- Visual validation supported by sampling and testing of any remediated areas;
- Visual validation of infill material;
- Chemical validation of imported material where necessary; and
- Production of a Post-Remediation Validation Report detailing the works carried out.

13 ADDITIONAL RECOMMENDATIONS

13.1 Further groundwater monitoring

As was recommended in the previous site investigation reports, continued monitoring of groundwater quality should be undertaken prior to, and during the development works. Monitoring should be undertaken on a quarterly basis in order to ensure that the redevelopment of the area is not mobilising any significant concentrations of contaminants. Should a significant rise in contaminant concentrations be noted then these should be subject to further risk assessment and if necessary, additional remedial actions be considered.

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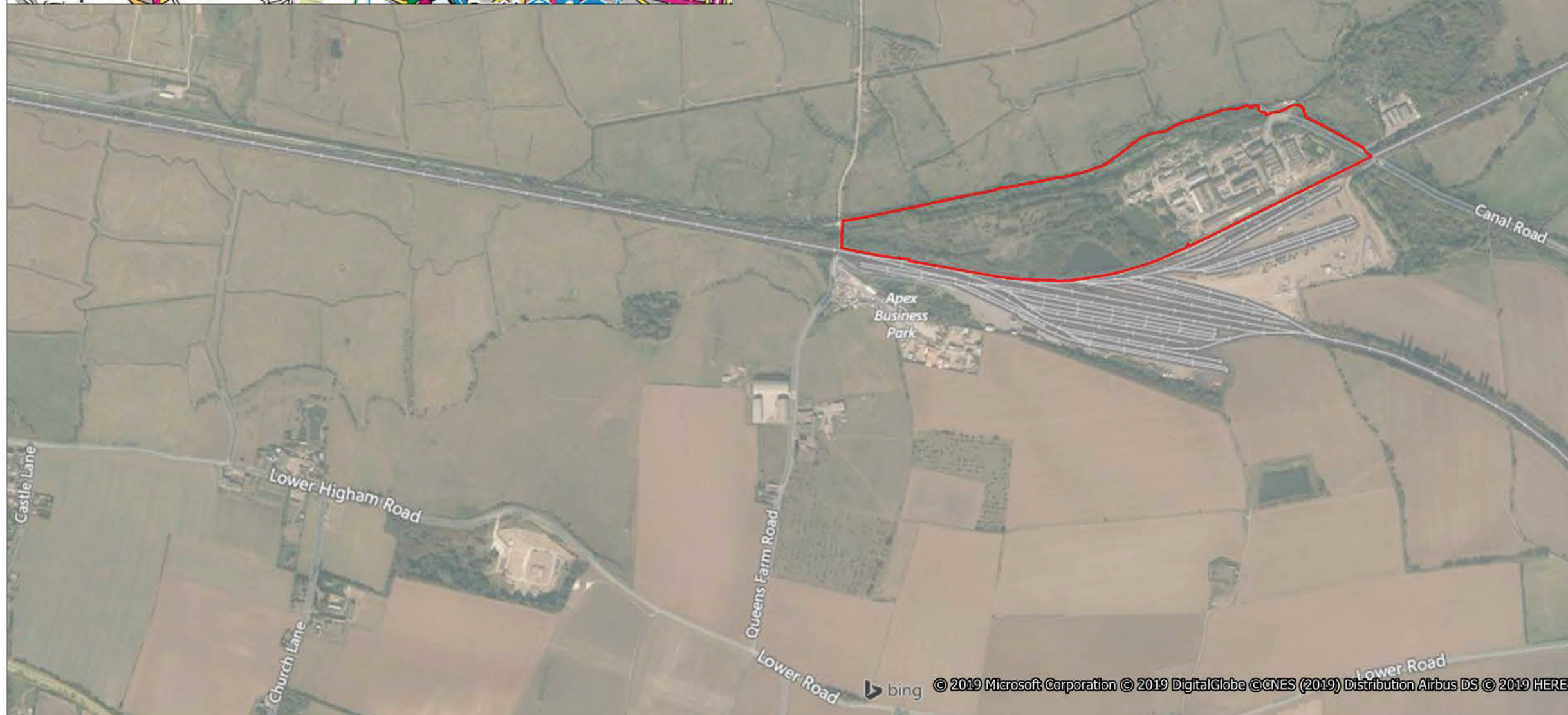
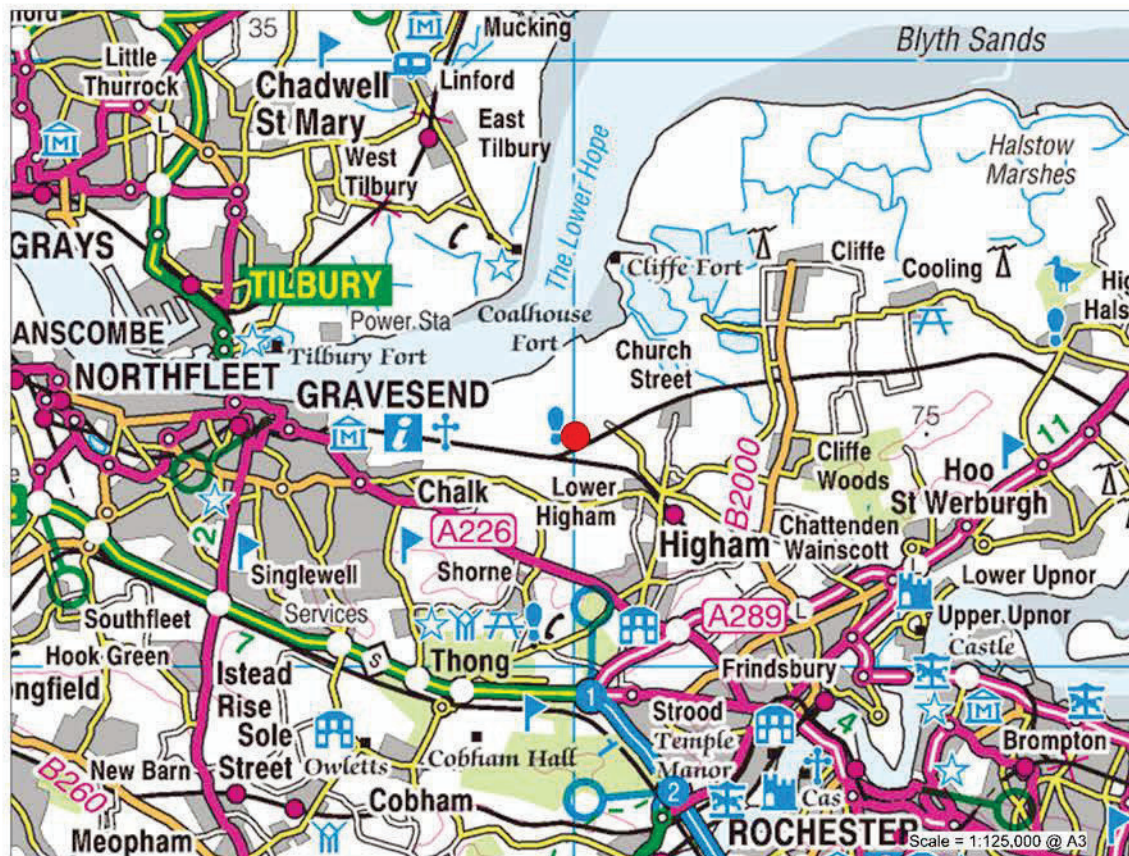
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FIGURES



Site Boundary

00	09.09.25	253249	SP	RG	ML
Rev	Date	Description	Drn	Chk	App
Nuralite					

Figure 1

Site Location Plan

0

300

Metres

Scale = 1:10,000 @ A3

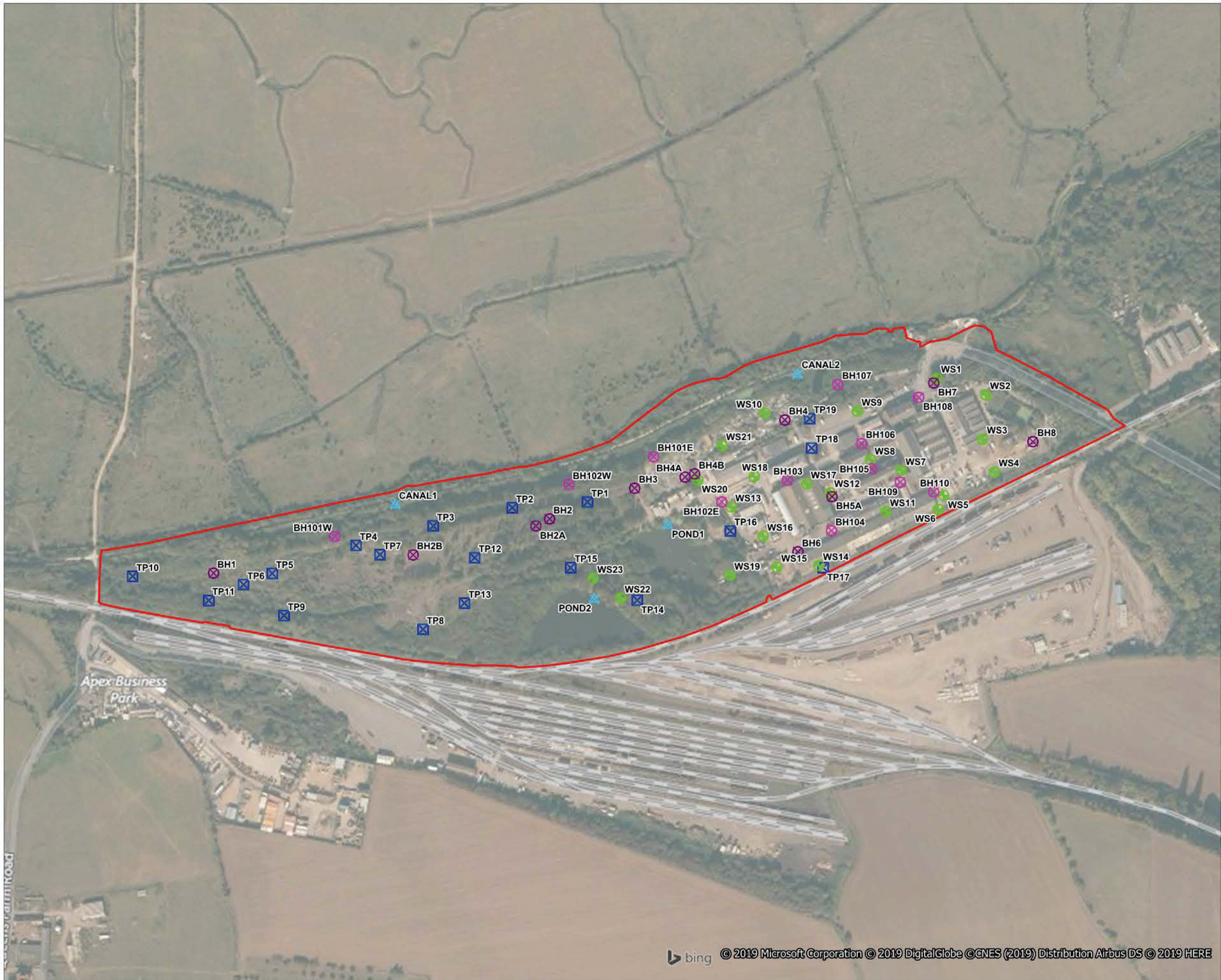
N

E

S

W

REV 00



Site boundary

WSP Exploratory Hole Locations

Borehole (BH)

Surface water sample

Trial Pit (TP)

Window Sample (WS)

Lee Remediation Exploratory Hole Locations

Borehole (BH)

00	09.09.25	253249	SP	RG	ML
Rev	Date	Description	Drn	Chk	App
Nuralite					

Figure 2

Previous Site Investigations Plan

0

120

metres

Scale = 1:4,000 @ A3

REV 00

Contains Ordnance Survey data © Crown copyright and database right 2019

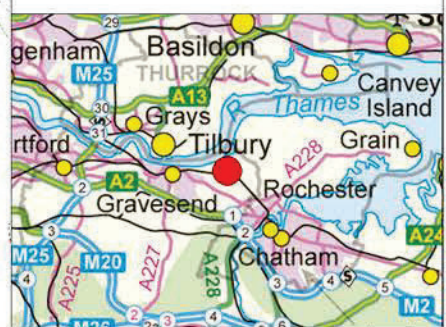
© 2019 Microsoft Corporation © 2019 DigitalGlobe © CNES (2019) Distribution Airbus DS © 2019 HERE

File Name : U:\Geo\314000s\314395 - Nuralite\GIS



- Block A: 300m2
- Block B: 1525m2
- Block C: 2117m2
- Block D: 2260m2
- Block E: 2260m2
- Block F: 2260m2
- Block G: 2202m2
- Block H: 2329m2
- Block I: 2260m2
- Block J: 2260m2
- Block K: 2160m2
- Block L: 2200m2

Site boundary



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Rev	Date	Description	Drn	Chk	App
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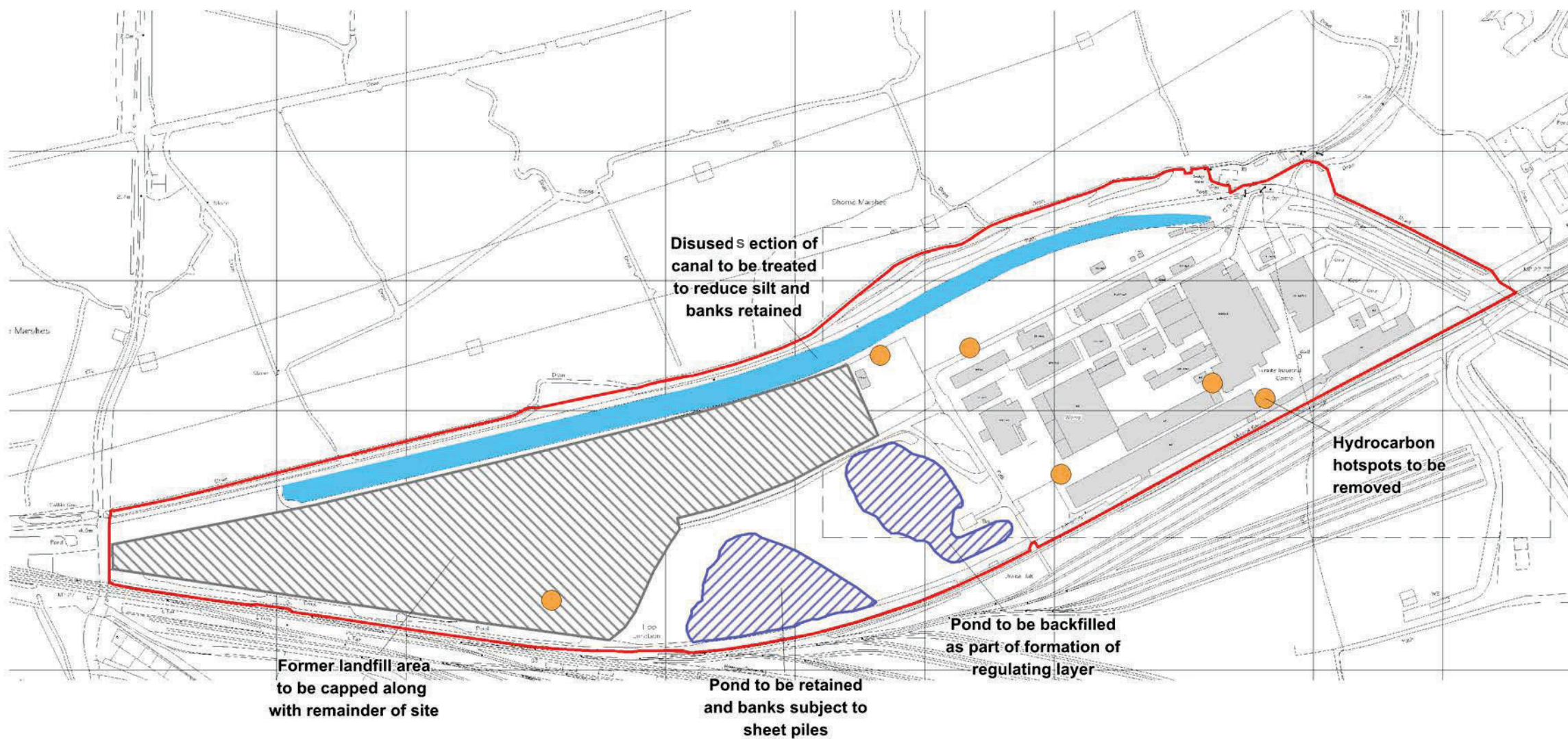
Figure 3
Proposed Development Plan



Not to Scale

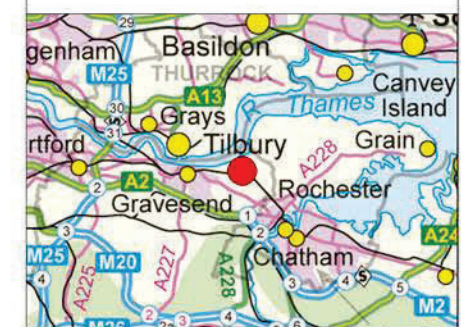


REV 00



- Site boundary
- Disused canal
- Existing pond
- Former landfill
- Hydrocarbon hotspots

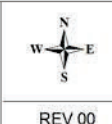
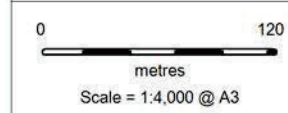
Note:
The whole site is underlain by asbestos impacted made ground and therefore is subject to cover system detailed in the RMS



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Rev	Date	Description	Drn	Chk	App
Nuralite					



Figure 4
Remediation Plan



REV 00

APPENDICES

Appendix A

SERVICE CONSTRAINTS

APPENDIX A

SERVICE CONSTRAINTS

1. Service Constraints

1.1. This Report (the "Report") and any study, inspection, investigation, sampling, testing and or interpretation carried out in connection with the Report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) trading as Leap Environmental or RSK Geosciences, for the Client named in the first paragraph of the Report (the "Client") in accordance with the terms of an RSK Fee Proposal including RSK Environment Standard Terms and Conditions (the "Appointment") between RSK and the Client, unless otherwise stated in the first paragraph of the Report. The Services were performed by RSK with the reasonable skill and care ordinarily exercised by a geo-environmental consultant at the time the Services were performed. Nothing in this Report shall be construed as imposing any fitness for purpose obligation. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the Client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the Client.

1.2 Other than that, expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services. RSK shall not be liable in respect of any action or proceedings arising out of or in connection with this Report whether in contract, in tort, for breach of statutory duty or otherwise after the expiry of six (6) years from either (i) the date of the Report or (ii) such earlier date as prescribed by law, unless varied in the terms of the Appointment.

1.3 Unless otherwise agreed in writing, the Services were performed by RSK exclusively for the purposes of the Client. RSK is not aware of any interest of or reliance by any party other than the Client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent, or condone any party, other than the Client relying upon the Services. Should this Report or any part of this Report, or details of the Services or any part of the Services, be made known to any such party, and such party relies thereon, that party does so wholly at its own and sole risk, and RSK disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent geo-environmental consultant and/or lawyer.

1.4 The Client shall not, without the prior written consent of RSK, assign, transfer, charge, mortgage, subcontract, or deal in any other manner with all or any of the benefits provided in this Report. Unless specified in the Appointment, RSK shall not be obliged to assign the benefit of the Report whether by collateral warranty, third party rights pursuant to the Contracts (Rights of Third Parties) Act 1999, letter of reliance or otherwise. If RSK agrees to any assignment of the benefit of this Report, in whatever form, benefits to third parties through collateral warranties, third party rights or letters of reliance shall not be provided unless a fee for each right, warranty or letter is agreed. The form of wording used in the warranty or letter shall be provided by RSK for agreement by the Client. Any reasonable changes to the form of wording will be implemented by mutual agreement, however the terms in the warranty or letter cannot offer the third party any greater benefit than the Appointment offered to the Client.

1.5 It is the understanding of RSK that this Report is to be used for the purpose described in the introduction to the Report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the Report is used, or the proposed use of the site change, this Report may no longer be valid and any further use of or reliance upon the Report in those circumstances by the Client without the review and advice of RSK shall be at the Client's sole and own risk. RSK shall not be liable for any use of this Report for any purpose other than that for which it was provided.

1.6 The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the Report inaccurate or unreliable. The information and conclusions contained in this Report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the Report in the future shall be at the Client's own and sole risk.

1.7 The observations and conclusions described in this Report are based solely upon the Services which were provided pursuant to the agreement between the Client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out, or required by the Appointment between the Client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this Report, RSK did not seek to evaluate the presence on or off site of asbestos, invasive plants, electromagnetic fields, lead paint, heavy metals, radon gas, fuel storage, persistent bio-accumulative or toxic chemicals (including PFAS and related compounds) or other radioactive or hazardous materials, unless specifically identified in the Services.

1.8 The Services are based upon RSK's observations of existing physical conditions at the Site gained from a visual inspection of the site together with RSK's interpretation of desk based publicly available information, including documentation, obtained from third parties and from the Client on the history and usage of the site, unless specifically identified in the Services and the limitations below:

- a. The Services were based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely.
- b. The Services were limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the visual inspection.
- c. The Services did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the Client or third parties, including laboratories and information services, during the performance of the Services.
- d. The Client has identified in writing to RSK, the information, reports, findings, surveys and preliminary works RSK may not rely upon when providing the Services.

RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK, and including the doing of any independent investigation of the information provided to RSK, save as otherwise provided in the terms of the Appointment between the Client and RSK.

1.9 Any site drawing(s) provided in this Report is (are) not meant to be an accurate base plan for scale measurement but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (intrusive and sample locations etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for accurate setting out and should be considered indicative only.

1.10 Should RSK be requested to review the Report after the date of issue of this Report, RSK shall be entitled to additional payment at the existing rates, or such other terms as agreed between RSK and the Client.

2. Service Constraints where the Report provides an intrusive assessment of ground conditions:

2.1 The intrusive environmental ground investigation aspects of the Services are a limited sampling of soil from the site, at pre-determined locations based on the known historic / operational configuration of the site. The conclusions given in this Report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent

of the limited area depends on the properties of the materials adjacent and local conditions, together with the position of any current structures and underground utilities and facilities, and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters (as stipulated in the scope agreed between the Client and RSK, based on an understanding of the available operational and historical information) and it should not be inferred that other chemical species (not tested) are not present.

2.2 The comments given in this Report and the opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the field and in the laboratory. The extent of the exploratory holes, laboratory testing and monitoring undertaken may have been restricted due to a number of factors including accessibility, the presence of buried or overhead services, current development, site usage, timescales or the Client's specification. The exploratory holes only assess a small proportion of the site area with respect to the site as a whole, and as such may only provide an indicative assessment of ground conditions on site. There may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account. In particular, it should be noted that there may be areas of made ground not detected due to the limited nature of the investigation or the thickness and quality of made ground across the site may be variable. In addition, groundwater levels and ground gas concentrations and flows, may vary from those reported due to seasonal, or other, effects and the limitations stated in the data should be recognised. The presence of hotspots of undisclosed contamination or exceptional and unforeseen ground conditions cannot be discounted.

2.3 Where the Services include Investigation of an exploratory nature or relating to physical ground works, any costings and prices provided in the Report are estimated and provided for guidance purposes only. The actual cost and time quantities shall be remeasured and shall be dependent upon the ground or other conditions, constraints present, and number and depth of the investigation locations, which shall influence the number of samples and tests required, and the quantities of soil being classified.

2.4 Asbestos is often observed to be present in soils in discrete areas. Whilst asbestos-containing materials may have been locally encountered during the fieldworks or supporting laboratory analysis, the history of brownfield and demolition sites indicates that asbestos fibres may be present more widely in soils and aggregates, which could be encountered during more extensive ground works. However, this Report does not constitute an asbestos survey. On this basis, the presence of asbestos on site cannot be discounted and a full asbestos survey should be undertaken.

2.5 Unless stated otherwise, only preliminary geotechnical recommendations are presented in this Report and these should be verified in a Geotechnical Design Report, once proposed construction and structural design proposals are confirmed. Eurocode 7 gives guidance on the type of sampling, sample quality, number and spacing of intrusive investigations, and number of laboratory tests required. It is intended that the Geotechnical Information section of this Report will fulfil the general requirements of the Ground Investigation Report as set out in section 6 of Eurocode7, although this is subject to the restrictions imposed on the investigation, as listed above. For geotechnical design, Eurocode 7 requires the Geotechnical Design Report to address both the geotechnical and structural aspects of the geotechnical design for both the limit and serviceability states. The Geotechnical Appraisal section of this Report will not meet the requirements of a Geotechnical Design Report (GDR) and should therefore be used for preliminary guidance only.

3. Service Constraints where the Report relates to Surface Water Management:

3.1 The Surface Water Management Inspection (SWMI) Report, documents provided, observations, actions, and recommendations, with respect to the management of potential pollution issues to surface waters, made during the site Inspection visit, are those present at the time of the visit, and may not represent those recorded by others on the same day.

3.2 The comments given in this Report and the opinions expressed are based on the weather, ground and ground water conditions encountered during the site work and on the results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by the inspection and therefore could not be taken into account. In addition, groundwater levels and flows, may vary from those Reported due to seasonal, or other, effects and the limitations stated in the data should be recognised.

3.3 RSK places a degree of dependence upon oral information provided by site representatives, which is not readily verifiable through visual inspection, or supported by any available written documentation. RSK shall not be held responsible for conditions or consequences arising from relevant facts that were not fully disclosed by facility or site representatives at the time this Report was prepared.

3.4 This Report is a live document, to be continually reviewed and updated as the development progresses or other changes occur on site. RSK can only maintain the currency of this Report through the Client requesting support with supplementary site visits or attendance at meetings ahead of key stages of the development in relation to surface water management. Our risk rating assesses a number of risk factors in line with the source-pathway- receptor model and is therefore subject to constant change.

3.5 Standard design drawings are indicative. Material types, dimensions and construction details will need to be adjusted by the Client to suit the specific conditions / flows on Site.

3.6 The full responsibility for implementing the site-specific protection and maintenance measures to protect the surface water system as stated in this Report, remains with the Client and their site management team. Additional control measures may be required to achieve the objectives set out in the Surface Water Management Plan to be implemented and financed by the Client.

4. Service Constraints where the Report relates to Waste Management:

4.1 In accordance with the definition provided in the Waste Framework Directive (WFD), materials are only considered waste if 'they are discarded, intended to be discarded or required to be discarded, by the holder'. Naturally occurring soils are not considered waste if re-used on the site of origin for the purposes of development. Soils such as made ground that are not of clean and natural origin (irrespective of whether they are contaminated or not) and other materials such as recycled aggregate, do not necessarily become waste until the criteria above are met. Excavation arisings from the development may therefore be classified as waste if surplus to requirements and/or unsuitable for re-use.

4.2 It is the duty of the waste producer, to ensure that all waste is accurately classified prior to waste disposal. Technical Guidance WM3 (EA, 2018) sets out in its Appendix D requirements for waste sampling. It is a legal requirement to correctly assess and classify waste. The level of sampling should be proportionate to the volume of waste and its heterogeneity. Unless otherwise stated, the waste assessment presented in this Report should be considered as preliminary and further testing and assessment of the waste under the provisions of a Waste Sampling Plan may be required to obtain the necessary level of data required for basic characterisation of the waste in support of disposal.

4.3 Unless stated otherwise in the Report, information relating to historical operations at the site was not reviewed as part of the assessment by RSK. In addition, unless otherwise stated in the Services, RSK was not present during the collection of the samples nor had any input on the chemical testing suite. Therefore, the waste assessment and classification detailed in this Report are based solely on any information that were provided to RSK (e.g., laboratory chemical data, exploratory hole records) and were completed without prejudice for our Client.

4.4 RSK assumes that any ground investigation data, chemical testing results etc., that were provided by the Client to inform the waste assessment and supporting review were carried out in accordance with current best practice and relevant guidance/ standards, where applicable. Thus, the

comments given in this Report and the opinions expressed are based solely on the information provided by the Client. However, it is noted that there may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account as part of the RSK assessment.

5. Service Constraints for Construction Environmental Management Plan Reports:

5.1 This Report should be considered in the light of any changes in legislation, statutory requirement or industry practices that may have occurred subsequent to the date of issue.

5.2 The measures and comments outlined in this Report and any opinions expressed are based on the plans provided at the time and discussions with relevant parties. However, there may be conditions pertaining to the site that have not been disclosed by investigations and therefore could not be taken into account.

5.3 This CEMP is a live document and is subject to change throughout the project, as and when necessary, to ensure management of environmental aspects remains relevant, and to ensure continued compliance with legislation and commitments as they may change. RSK understands that this CEMP will be reviewed by the Client every six months and updated as and when necessary.

5.4 It is the full responsibility of the Principal Contractor/ Client to ensure that their works do not contravene legal requirements, and adherence to this CEMP alone cannot be a full defence regarding legal action against the Principal Contractor.

6. Service Constraints where the Report relates to Ground Gas Membrane Verification:

6.1 This Report is limited to the verification of the gas resistant membrane/vapour membrane/radon barrier after installation and no inspections were undertaken of the substrate (i.e. prepared ground). The Report therefore does not constitute as a full verification of ground gas protection system.

6.2 The comments given in this Report and the opinions expressed, are based on the condition of the ground gas membrane as encountered at the time of inspection by suitably qualified personnel. RSK cannot accept liability for any subsequent change to the status of the gas membrane by follow-on trades or other construction activity.

6.3 Where not designed by RSK, the verification of protection measures is carried out with reference to the gas protection design provided by the Client. RSK assume the scope of gas protection measures as determined by third parties to be correct and to have achieved any required approval from authorities.

6.4 The Ground Gas Design Report/Remediation Strategy and Verification Plan contains details of the procedures to be adopted for inspection and validation of the works. However, it should be noted that responsibility for the correct implementation of the strategy lies with the appointed contractor. RSK cannot be held responsible for any remedial works that are carried out without the agreed procedures involving either direct supervision by RSK, or inspection and validation of the works by a representative from RSK.

7. Service Constraints for Environmental Due Diligence (EDD) Reports:

7.1 The comments given in this Report and the opinions expressed are based on the information obtained and reviewed as part of the desk-based assessment. However, there may be conditions pertaining to the Site that have not been disclosed by the assessment and therefore could not be taken into account. Furthermore, no intrusive investigations, monitoring or sampling have been undertaken to confirm the environmental status of the site, therefore any comments relating to ground conditions and subsurface contamination are based solely on a review of desk-based information.

7.2 This Report describes the results of the EDD exercise. The scope of this EDD Report, where appropriate, covers legal or regulatory compliance with respect to UK or international regulations associated with environmental matters.

7.3 As with any EDD exercise, there is a certain degree of dependence upon information provided by the target company. The EDD does not include a site walkover / visit or liaison with site representatives unless identified in the Services. Therefore, the assessment is based on the available desk study information. Also, there is a certain degree of dependence upon oral information provided by site representatives, which is not readily verifiable through visual inspection, or supported by any available written documentation. RSK shall not be held responsible for conditions or consequences arising from relevant facts that were not fully disclosed by facility or site representatives at the time this EDD exercise was performed.

7.4 This Report, including all supporting data and notes (collectively referred to hereinafter as "information"), was prepared or collected by RSK for the benefit of its Client.

7.5 The comments given in this Report and the opinions expressed are based on the information obtained and reviewed as part of the desk-based assessment and the site inspection visit. However, there may be conditions pertaining to the Site that have not been disclosed by the assessment and therefore could not be taken into account. Furthermore, no intrusive investigations, monitoring or sampling have been undertaken to confirm the environmental status of the Site therefore any comments relating to ground conditions and subsurface contamination are based solely on a review of desk-based information and observations collected during the site inspection visit.

8. Service Constraints for Ground source heat energy Reports:

8.1 It is understood that this is a desktop survey only and that there are no requirements for a site walkover, service utility survey, or provision of service plans. These services can be provided upon request if required.

8.2 At a later stage, it is possible that a thermal response test (TRT) will need to be completed, for which a test borehole will have to be drilled, and these would be costed at the time. RSK can provide all aspects of subsequent site work for a GSHP system if required.

9. Service Constraints for Water Abstraction Borehole Reports:

9.1 The Report aims principally to only identify and assess the suitability of the site for a water abstraction borehole. This Report should be considered in the light of any changes in legislation, statutory requirements, and industry practices, that have occurred subsequent to the date of the Report.

9.2 Unless stated in the Report, the opinions expressed in this Report including all comments and recommendations provided are on the basis of the information obtained from a desk-based assessment.

Appendix B

PROJECT-RELATED SUSTAINABILITY CONSIDERATIONS

As introduced in Section 2.5, sustainability considerations have been taken into account during the design, planning and implementation stages of the project. We manage and monitor this using the RSK Geosciences Sustainable Management Practices (SMP) tool. More detail is provided on this below.

Sustainability-related considerations relevant to the project

The following sustainability-related considerations have been identified to be relevant to this project. Relevant aspects have been included in the appropriate section of the report.

Reuse and disposal of excavated materials

Reuse and disposal of excavated materials is a key issue on many development or construction projects. In accordance with the definition provided in the Waste Framework Directive (WFD), materials are only considered waste if ‘they are discarded, intended to be discarded or required to be discarded, by the holder’. Naturally occurring soils are not considered waste if reused on the site of origin for the purposes of development.

Excavated materials that are not of ‘clean and natural origin’ (irrespective of whether they are contaminated or not), such as made ground and other anthropogenic materials, may be considered waste after excavation. This means that they cannot be reused unless ‘recovered’ through use of waste licensing controls, such as exemptions, or a waste recovery permit. Alternatively, in limited circumstances, the CL:AIRE Definition of Waste Code of Practice (DoWCoP; CL:AIRE, 2011)) can be applied, in specific scenarios, to support suitable reuse on or off-site using materials management plans (MMPs). Otherwise, disposal is required, typically off-site, under an appropriate landfill permit. This has important implications for the assessment, excavation, temporary storage, reuse and disposal of excavated materials.

In accordance with the waste hierarchy (Ref. Defra, 2011) and circular economy principles, there are a range of approaches to reduce the volume of waste materials created from development projects with the following order of preference:

- Prevention – designing out the need for excavation and identifying during the development planning phase the potential for surplus soils to be generated during construction.
- Minimisation – implementing effective segregation, stockpile and materials management during construction.
- Reuse – assessing potential for reuse without treatment, either on or off-site.
- Recycling/ recovery – processing of materials to allow reuse and support waste recovery.
- Disposal – the last resort, either on or off-site.

The potential for the generation of waste materials through land redevelopment must therefore be considered as part of any construction activity. Reuse of excavated materials, including topsoil, subsoil, aggregates and rock, generated through the works may also offer opportunities to reduce the amount of waste created, diverting it away from landfill, resulting in a more sustainable development. The materials may have reuse potential on the site of origin or at other development sites. In some instances, generated waste materials have the potential for beneficial reuse, with some non-waste materials needing to be disposed of to landfill.

Early consideration, planning and effective implementation are all needed to maximise the reuse of materials. As well as reducing cost for off-site disposal, sustainability-related benefits include reducing the volumes of materials for transport and disposal, quality and import of virgin materials and associated carbon emissions.

Assessment of the potential for reuse materials is essential, with information on the soil quality being collected and understood as part of the intrusive investigation phases where relevant.

Soil as a resource

Soil forms an important sub-category of excavated material. Soil contains approximately three times as much carbon as the atmosphere. As well as avoiding the generation of waste, minimising the disturbance of soils on site minimises the loss of carbon during soil handling and storage. Retaining as much soil as possible without damage also reduces flooding, dust and silt management risks, nutrient retention, and supports biodiversity net gain. Soil is therefore a valuable resource in its own right, requiring careful planning at an early stage in the project lifetime to ensure that it can be successfully retained or reused. Defra has published a Code of Practice for the sustainable use of soil on construction sites (Defra, 2009). This is intended to be a practical guide to assist anyone involved in the construction industry to protect the soil resources with which they work, with a focus on England.

Site-won topsoil should, where possible, be left in situ or handled carefully to prevent damage to the soil structure. Where topsoil is to be stripped, stockpiled and re-used such activities should be undertaken during dry weather (generally June to September). Once stockpiled, topsoil should be kept dry. Significant working of topsoil whilst wet can damage the soil structure, reducing the soils' ability to drain and resulting in anaerobic rather than aerobic soil conditions.

Anaerobic soil conditions can have a negative impact on plants and their roots, which will impact the ability of plants to take root once the soil has been placed for its proposed end use. Machinery tracking over recently placed topsoil should be avoided. Should prolonged poor storage result in degradation of the soil some treatment is likely to be required. This may include sand amelioration to improve the soil structure or the addition of composts to reduce nutrient deficiency.

Where site-won topsoil cannot be reused on site, it may then be classed as a waste and consideration should be given to the donation of this material to another construction site where a deficit of topsoil material has been calculated. This would need to be carried out under an MMP. Alternatively, to prevent a valuable resource from going to landfill, consideration could be given to donating topsoil to a Soil Treatment Facility (STF) where it can be treated, processed and reused on other sites, assuming the STF has an appropriate Environmental Permit.

Where relevant, the presence of topsoil and subsoil is considered in site investigation interpretative reports, and how it may be valuable to retain this within the development. By assessing the quality of soils at the investigation phase, together with the anticipated volumes generated from the project, the potential for reuse of excavated soils can also be considered. This may include identifying opportunities for the reuse of surplus soils and minimising the generation of materials classified as waste. Where improvements in soil quality are needed or possible, recommendations can be given to assist in the reuse of this valuable resource.

DoWCoP and MMPs

DoWCoP was developed in consultation with the Environment Agency and the development industry to enable the reuse of materials under certain scenarios subject to demonstrating that specific criteria are met. The current re-use scenarios covered by DoWCoP comprise:

- reuse on the site of origin (with or without treatment)
- direct transfer of clean and natural soils between sites
- use in the development of land other than the site of origin following treatment at an authorised Hub site (including a fixed Soil Treatment Facility).

The importation of made ground soils (irrespective of contamination status) or crushed demolition materials is not permitted under the CoP and requires either a standard rules environmental permit or a U1 waste exemption.

In the context of excavated materials used on sites undergoing development, four factors are considered to be of particular relevance in determining if the material is a waste or when it ceases to be waste:

- The aim of the Waste Framework Directive is not undermined, i.e. if the use of the material will create an unacceptable risk of pollution of the environment or harm to human health it is likely to be waste.
- The material is certain to be used.
- The material is suitable for use both chemically and geotechnically, and
- Only the required quantity of material will be used.

DoWCoP requires the preparation of a MMP that confirms the above factors will be met. This plan needs to be reviewed by a 'Qualified Person' (QP) who will then issue a declaration form to the EA. As the project progresses, data must be collated and on completion a verification report produced that shows the MMP was followed and describes any changes. The MMP establishes whether specific materials are classified as waste and how excavated materials will be treated and/or re-used in line with the CoP. The MMP is likely to form part of the site waste management plan (SWMP), where applicable.

Future climate change considerations

Future global climate change has been numerically modelled by the Intergovernmental Panel on Climate Change (IPCC) to the year 2100 based on potential anthropogenic greenhouse gas emissions scenarios. The modelling output results in projections, which the Met Office has used to determine the potential impacts of climatic change for the UK. 'UKCP18' is the most up to date set of climate projections for the UK and are based on Representative Concentration Pathways (RCP) greenhouse gas emission scenarios. All scenarios project warming with RCP 8.5 being the most extreme scenario with global temperatures increasing by 4.3°C. Typically projections indicate changes will increase in magnitude with time. It is noted that RCPs have been superseded by Shared Socioeconomic Pathways (SSP) which were published by the IPCC in 2021, although the Met Office has yet to publish updated projections based on SSP data.

The Met Office defines climate change as the large-scale, long-term shift in average weather patterns and average temperatures and is assessed by averaging data over a 30-year period. The most recent reference period is 1991-2020. The UKCP18 data indicate that the UK climate is changing resulting in hotter drier summers and warmer wetter winters, with an increase in the frequency and intensity of extreme weather and significant weather events with a higher likelihood of heat waves, flash floods and droughts. Sea level is also rising. Further details on the technical background and data sources are provided in Appendix I.

The key pieces of legislation associated with climate change are the Climate Change Act (2008) and the Climate Change (Scotland) Act 2009. They established the Committee on Climate Change (CCC) and require a UK Climate Change Risk Assessment (CCRA) to be published every five years to assess 'the risks for the UK from the current and predicted impacts of climate change', combined with a National Adaptation Programme. The adaptation programmes place requirements on the planning regime to incorporate the effects of climate change within their decision making. This is implemented through national planning frameworks and planning policy.

The need to incorporate the predicted effects of future climate change and associated extreme weather events (EWE) into qualitative and quantitative land contamination risk assessments is set out within Land Contamination Risk Management (LCRM) LCRM Stage 1 risk assessment (Environment Agency, 2023). BS 21365:2020 'Soil Quality: Conceptual site models for potentially contaminated sites' (BSI, 2020) includes the requirement to identify possible foreseeable events that could affect contaminant impacts or create new exposure pathways including potential for flooding (rivers, sea, groundwater), rising groundwater or seawater levels, extreme weather conditions and change of use. While there is currently no statutory guidance detailing how the effects of future climate change should be considered within land contamination assessments, several industry-led publications have been produced which provide details on how this can be incorporated, including:

- CL:AIRE, March 2007. Climate Change, Pollutant Linkage and Brownfield Regeneration (CL:AIRE, 2007).
- CL:AIRE, October 2021. Good Practice for Risk Assessment for Coal Mine Gas Emissions (CL:AIRE, 2021a).
- SoBRA, August 2022. Guidance on Assessing Risk to Controlled Waters from UK Land Contamination Under Conditions of Future Climate Change" version 1.0, (SoBRA, 2022)
- NHBC, 2023. NF94: Hazardous ground gas – an essential guide for housebuilders (NHBC, 2023).

Climate change-related impacts on the CSM and land contamination risk assessment are considered at each stage of the site assessment as per LCRM.

Climate change and EWE also have substantial implications for future geotechnical ground conditions, influencing the stability and durability of geotechnical structures, such as foundations, retaining walls, slopes and pavements to mention but a few. Therefore climate change will significantly impact the design of land development projects going forward over their lifecycle and beyond. Furthermore, climate change will significantly impact the future performance of existing land development projects that have not been designed taking into account these issues. Relevant standards and guidance are referred to in the relevant sections of the report.

Appendix C
LABORATORY CERTIFICATES OF ANALYSIS – JULY 2025

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 25/07538
Issue Number: 1

Date: 25 July, 2025

Client: RSK Environment Ltd Coventry
Humber Road, Abbey Park
Coventry
UK
CV3 4AQ

Project Manager: Michael Lawson
Project Name: Nuralite
Project Ref: 253249
Order No: N/A
Date Samples Received: 11/07/25
Date Instructions Received: 11/07/25
Date Analysis Completed: 25/07/25

Approved by:



Gemma Berrisford
Deputy Client Services Supervisor

Envirolab Job Number: 25/07538

Client Project Name: Nuralite

Client Project Ref: 253249

Lab Sample ID	25/07538/1	25/07538/2	25/07538/3	25/07538/4	25/07538/5	25/07538/6	25/07538/7	Units	Limit of Detection	Method ref
Client Sample No	1	2	3	4	5	6	7			
Client Sample ID	SS01	SS02	SS03	SS04	SS05	SS06	SS07			
Depth to Top										
Depth To Bottom										
Date Sampled	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25			
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES			
Sample Matrix Code	4E	4E	4E	4E	4E	4E	4E			
% Stones >10mm _A	<0.1	-	<0.1	-	<0.1	-	0.2	% w/w	0.1	A-T-044
pH _D ^{M#}	7.04	-	7.67	-	7.84	-	7.39	pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	1.29	-	0.18	-	0.24	-	0.20	g/l	0.01	A-T-026s
Sulphate (acid soluble) _D ^{M#}	11000	-	1600	-	4400	-	11000	mg/kg	200	A-T-028s
Cyanide (free) _A ^{M#}	<1	-	<1	-	<1	-	<1	mg/kg	1	A-T-042sFCN
Cyanide (total) _A ^{M#}	<1	-	<1	-	<1	-	<1	mg/kg	1	A-T-042sTCN
Total Organic Carbon _D ^{M#}	32	-	3.03	-	23.6	-	29.8	% w/w	0.08	A-T-032s
Arsenic _D ^{M#}	9	-	<1	-	4	-	5	mg/kg	1	A-T-024s
Cadmium _D	<1.0	-	<1.0	-	<1.0	-	<1.0	mg/kg	1	A-T-024s
Copper _D ^{M#}	80	-	19	-	14	-	45	mg/kg	1	A-T-024s
Chromium _D ^{M#}	19	-	15	-	11	-	26	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	-	<1	-	<1	-	<1	mg/kg	1	A-T-040s
Lead _D ^{M#}	56	-	18	-	20	-	90	mg/kg	1	A-T-024s
Mercury _D	<0.17	-	<0.17	-	<0.17	-	<0.17	mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	20	-	5	-	6	-	18	mg/kg	1	A-T-024s
Selenium _D ^{M#}	5	-	<1	-	<1	-	3	mg/kg	1	A-T-024s
Zinc _D ^{M#}	482	-	38	-	55	-	194	mg/kg	1	A-T-024s

Envirolab Job Number: 25/07538

Client Project Name: Nuralite

Client Project Ref: 253249

Lab Sample ID	25/07538/1	25/07538/2	25/07538/3	25/07538/4	25/07538/5	25/07538/6	25/07538/7	Units	Limit of Detection	Method ref
Client Sample No	1	2	3	4	5	6	7			
Client Sample ID	SS01	SS02	SS03	SS04	SS05	SS06	SS07			
Depth to Top										
Depth To Bottom										
Date Sampled	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25			
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES			
Sample Matrix Code	4E	4E	4E	4E	4E	4E	4E			
Asbestos in Soil (inc. matrix) ^										
Asbestos in soil _D #	NAD	NAD	Chrysotile & Amosite	NAD	NAD	NAD	NAD			A-T-045
Asbestos Matrix (visual) _D	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope) _D	-	-	Loose Fibres	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	N/A	N/A	N/A	N/A	N/A	N/A			A-T-045
Asbestos in Soil Quantification % (Hand Picking & Weighing)										
Asbestos in soil % composition (hand picking and weighing) _D	-	-	0.001	-	-	-	-	% w/w	0.001	A-T-054

Envirolab Job Number: 25/07538

Client Project Name: Nuralite

Client Project Ref: 253249

Lab Sample ID	25/07538/1	25/07538/2	25/07538/3	25/07538/4	25/07538/5	25/07538/6	25/07538/7	Units	Limit of Detection	Method ref
Client Sample No	1	2	3	4	5	6	7			
Client Sample ID	SS01	SS02	SS03	SS04	SS05	SS06	SS07			
Depth to Top										
Depth To Bottom										
Date Sampled	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25			
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES			
Sample Matrix Code	4E	4E	4E	4E	4E	4E	4E			
PAH-16MS										
Acenaphthene _A ^{M#}	<0.01	-	<0.01	-	<0.01	-	<0.01	mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	-	<0.01	-	<0.01	-	<0.01	mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	<0.02	-	<0.02	-	<0.02	-	<0.02	mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	-	<0.04	-	<0.04	-	<0.04	mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	-	<0.04	-	<0.04	-	<0.04	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	-	<0.05	-	<0.05	-	<0.05	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	-	<0.05	-	<0.05	-	<0.05	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	-	<0.07	-	<0.07	-	<0.07	mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	<0.06	-	<0.06	-	<0.06	-	<0.06	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	-	<0.04	-	<0.04	-	<0.04	mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	<0.08	-	<0.08	-	<0.08	-	<0.08	mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	<0.01	-	<0.01	-	<0.01	-	<0.01	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	-	<0.03	-	<0.03	-	<0.03	mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03	-	<0.03	-	<0.03	-	<0.03	mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	<0.03	-	<0.03	-	<0.03	-	<0.03	mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	<0.07	-	<0.07	-	<0.07	-	<0.07	mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	<0.08	-	<0.08	-	<0.08	-	<0.08	mg/kg	0.01	A-T-019s

Envirolab Job Number: 25/07538

Client Project Name: Nuralite

Client Project Ref: 253249

Lab Sample ID	25/07538/1	25/07538/2	25/07538/3	25/07538/4	25/07538/5	25/07538/6	25/07538/7	Units	Limit of Detection	Method ref
Client Sample No	1	2	3	4	5	6	7			
Client Sample ID	SS01	SS02	SS03	SS04	SS05	SS06	SS07			
Depth to Top										
Depth To Bottom										
Date Sampled	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25	09-Jul-25			
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES	SOIL - ES			
Sample Matrix Code	4E	4E	4E	4E	4E	4E	4E			
TPH CWG with Clean Up										
Ali >C5-C6 _A	<0.01	-	<0.01	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8 _A	0.14	-	<0.01	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<10	-	<10	-	<10	-	<10	mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<10	-	<10	-	<10	-	<10	mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<10	-	<10	-	<10	-	<10	mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	<10	-	<10	-	<10	-	<10	mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	173	-	151	-	<10	-	<10	mg/kg	1	A-T-055s
Total Aliphatics _A	173	-	151	-	<10	-	<10	mg/kg	1	Calc-As Recd
Aro >C5-C7 _A [#]	<0.01	-	<0.01	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01	-	<0.01	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<10	-	<10	-	<10	-	<10	mg/kg	1	A-T-055s
Aro >C10-C12 _A	<10	-	<10	-	<10	-	<10	mg/kg	1	A-T-055s
Aro >C12-C16 _A	<10	-	<10	-	<10	-	<10	mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	<10	-	<10	-	<10	-	<10	mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	144	-	130	-	<10	-	<10	mg/kg	1	A-T-055s
Total Aromatics _A	144	-	130	-	<10	-	<10	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35) _A	317	-	282	-	<10	-	<10	mg/kg	1	Calc-As Recd
BTEX - Benzene _A [#]	<0.01	-	<0.01	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01	-	<0.01	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	-	<0.01	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	-	<0.01	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01	-	<0.01	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01	-	<0.01	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 25/07538

Client Project Name: Nuralite

Client Project Ref: 253249

Lab Sample ID	25/07538/8	25/07538/9	25/07538/10					Units	Limit of Detection	Method ref
Client Sample No	8	9	10							
Client Sample ID	SS08	SS09	SS10							
Depth to Top										
Depth To Bottom										
Date Sampled	09-Jul-25	09-Jul-25	09-Jul-25							
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES							
Sample Matrix Code	4E	4E	4E							
% Stones >10mm _A	-	0.3	-					% w/w	0.1	A-T-044
pH _D ^{M#}	-	7.51	-					pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	-	3.77	-					g/l	0.01	A-T-026s
Sulphate (acid soluble) _D ^{M#}	-	17000	-					mg/kg	200	A-T-028s
Cyanide (free) _A ^{M#}	-	<1	-					mg/kg	1	A-T-042sFCN
Cyanide (total) _A ^{M#}	-	<1	-					mg/kg	1	A-T-042sTCN
Total Organic Carbon _D ^{M#}	-	30.4	-					% w/w	0.08	A-T-032s
Arsenic _D ^{M#}	-	5	-					mg/kg	1	A-T-024s
Cadmium _D	-	<1.0	-					mg/kg	1	A-T-024s
Copper _D ^{M#}	-	32	-					mg/kg	1	A-T-024s
Chromium _D ^{M#}	-	12	-					mg/kg	1	A-T-024s
Chromium (hexavalent) _D	-	<1	-					mg/kg	1	A-T-040s
Lead _D ^{M#}	-	164	-					mg/kg	1	A-T-024s
Mercury _D	-	<0.17	-					mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	-	13	-					mg/kg	1	A-T-024s
Selenium _D ^{M#}	-	2	-					mg/kg	1	A-T-024s
Zinc _D ^{M#}	-	178	-					mg/kg	1	A-T-024s

Envirolab Job Number: 25/07538

Client Project Name: Nuralite

Client Project Ref: 253249

Lab Sample ID	25/07538/8	25/07538/9	25/07538/10					Units	Limit of Detection	Method ref
Client Sample No	8	9	10							
Client Sample ID	SS08	SS09	SS10							
Depth to Top										
Depth To Bottom										
Date Sampled	09-Jul-25	09-Jul-25	09-Jul-25							
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES							
Sample Matrix Code	4E	4E	4E							
Asbestos in Soil (inc. matrix) ^										
Asbestos in soil _D #	NAD	NAD	NAD							A-T-045
Asbestos Matrix (visual) _D	-	-	-							A-T-045
Asbestos Matrix (microscope) _D	-	-	-							A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	N/A	N/A							A-T-045

Envirolab Job Number: 25/07538

Client Project Name: Nuralite

Client Project Ref: 253249

Lab Sample ID	25/07538/8	25/07538/9	25/07538/10					Units	Limit of Detection	Method ref
Client Sample No	8	9	10							
Client Sample ID	SS08	SS09	SS10							
Depth to Top										
Depth To Bottom										
Date Sampled	09-Jul-25	09-Jul-25	09-Jul-25							
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES							
Sample Matrix Code	4E	4E	4E							
PAH-16MS										
Acenaphthene _A ^{M#}	-	<0.01	-					mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	-	<0.01	-					mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	-	<0.02	-					mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	-	<0.04	-					mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	-	<0.04	-					mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	-	<0.05	-					mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	-	<0.05	-					mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	-	<0.07	-					mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	-	<0.06	-					mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	-	<0.04	-					mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	-	<0.08	-					mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	-	<0.01	-					mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	-	<0.03	-					mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	-	<0.03	-					mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	-	<0.03	-					mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	-	<0.07	-					mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	-	<0.08	-					mg/kg	0.01	A-T-019s

Envirolab Job Number: 25/07538

Client Project Name: Nuralite

Client Project Ref: 253249

Lab Sample ID	25/07538/8	25/07538/9	25/07538/10					Units	Limit of Detection	Method ref
Client Sample No	8	9	10							
Client Sample ID	SS08	SS09	SS10							
Depth to Top										
Depth To Bottom										
Date Sampled	09-Jul-25	09-Jul-25	09-Jul-25							
Sample Type	SOIL - ES	SOIL - ES	SOIL - ES							
Sample Matrix Code	4E	4E	4E							
TPH CWG with Clean Up										
Ali >C5-C6 _A	-	<0.05	-					mg/kg	0.01	A-T-022s
Ali >C6-C8 _A	-	<0.05	-					mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	-	<10	-					mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	-	<10	-					mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	-	<10	-					mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	-	<10	-					mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	-	332	-					mg/kg	1	A-T-055s
Total Aliphatics _A	-	332	-					mg/kg	1	Calc-As Recd
Aro >C5-C7 _A [#]	-	<0.05	-					mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	-	<0.05	-					mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	-	<10	-					mg/kg	1	A-T-055s
Aro >C10-C12 _A	-	<10	-					mg/kg	1	A-T-055s
Aro >C12-C16 _A	-	<10	-					mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	-	<10	-					mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	-	128	-					mg/kg	1	A-T-055s
Total Aromatics _A	-	128	-					mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35) _A	-	460	-					mg/kg	1	Calc-As Recd
BTEX - Benzene _A [#]	-	<0.05	-					mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	-	<0.05	-					mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	-	<0.05	-					mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	-	<0.05	-					mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	-	<0.05	-					mg/kg	0.01	A-T-022s
MTBE _A [#]	-	<0.05	-					mg/kg	0.01	A-T-022s

Report Notes

General

- This report shall not be reproduced, except in full, without written approval from Envirolab.
- The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
- The results reported herein relate only to the material supplied to the laboratory.
- The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
- Analytical results reflect the quality of the sample at the time of analysis only.
- Opinions and Interpretations expressed are outside our scope of accreditation.
- A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
- If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
- Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

Key

Superscript “#”	Accredited to ISO 17025
Superscript “M”	Accredited to MCertS
Superscript “U”	Individual result not accredited
None of the above symbols	Analysis unaccredited
Subscript “A”	Analysis performed on as-received Sample
Subscript “D”	Analysis performed on the dried sample, crushed to pass 2mm sieve.
Subscript “D” on Asbestos	Analysis performed on a dried aliquot of sample provided.
Subscript “A”	Analysis has dependant options against results. Details appear in the comments of your Sample receipt
IS	Insufficient Sample for analysis
US	Unsuitable Sample for analysis
NDP	No Determination Possible
NAD	No Asbestos Detected
Trace	Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh.
N/A	Not applicable

Asbestos

Identification: Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis

“Trace Asbestos Identified” will be reported if there is not enough present to verify the type.

Assigned Matrix Codes

1	SAND	6	CLAY/LOAM	A	Contains Stones
2	LOAM	7	OTHER	B	Contains Construction Rubble
3	CLAY	8	Asbestos Bulk (Only Asbestos ID accredited)	C	Contains visible hydrocarbons
4	LOAM/SAND	9	Incinerator Ash (some Metals accredited)	D	Contains glass / metal
5	SAND/CLAY			E	Contains roots / twigs

Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.

Soil Chemical Analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as “% stones >10mm”.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any “D” subscripts.

TPH by method A-T-007:

For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.

Results “with Clean up” indicates samples cleaned up with Silica during extraction.

EPH CWG (method A-T-055) from TPH CWG:

EPH CWG results have humics mathematically subtracted through instrument calculation.

Where these humic substances have been identified in any IDs from “TPH CWG with clean up” please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

Electrical Conductivity of water by method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client:	RSK Environment Ltd Coventry, Humber Road, Abbey Park, Coventry, UK, CV3	Project No:	25/07538
	4AQ	Date Received:	11/07/2025 (am)
Project:	Nuralite	Cool Box Temperatures (°C):	22.8, 21.9
Clients Project No:	253249		

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	25/07538/1	25/07538/2	25/07538/3	25/07538/4	25/07538/5	25/07538/6	25/07538/7	25/07538/8	25/07538/9	25/07538/10
Client Sample No	1	2	3	4	5	6	7	8	9	10
Client Sample ID/Depth	SS01	SS02	SS03	SS04	SS05	SS06	SS07	SS08	SS09	SS10
Date Sampled	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25
A-T-019s	21/07/2025		21/07/2025		21/07/2025		21/07/2025		21/07/2025	
A-T-022s	21/07/2025		21/07/2025		21/07/2025		21/07/2025		24/07/2025	
A-T-024s	25/07/2025		25/07/2025		25/07/2025		25/07/2025		25/07/2025	
A-T-026s	24/07/2025		24/07/2025		24/07/2025		24/07/2025		24/07/2025	
A-T-028s	24/07/2025		24/07/2025		24/07/2025		24/07/2025		24/07/2025	
A-T-031s	22/07/2025		22/07/2025		22/07/2025		22/07/2025		24/07/2025	
A-T-032s	24/07/2025		22/07/2025		24/07/2025		24/07/2025		24/07/2025	
A-T-040s	24/07/2025		24/07/2025		24/07/2025		24/07/2025		24/07/2025	
A-T-042sFCN	23/07/2025		23/07/2025		23/07/2025		23/07/2025		23/07/2025	
A-T-042sTCN	23/07/2025		23/07/2025		23/07/2025		23/07/2025		23/07/2025	
A-T-044	22/07/2025		22/07/2025		22/07/2025		22/07/2025		22/07/2025	
A-T-045	17/07/2025	17/07/2025	17/07/2025	17/07/2025	17/07/2025	17/07/2025	17/07/2025	17/07/2025	17/07/2025	17/07/2025
A-T-054			24/07/2025							
A-T-055s	22/07/2025		22/07/2025		22/07/2025		22/07/2025		22/07/2025	
Calc-As Recd	22/07/2025		22/07/2025		22/07/2025		22/07/2025		24/07/2025	

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

Appendix D
HUMAN HEALTH GENERIC ASSESSMENT CRITERIA FOR BOTH
COMMERCIAL AND PUBLIC OPEN SPACE END USE

Generic assessment criteria for human health: public open space (public park) scenario

Background

RSK's generic assessment criteria (GAC) were initially prepared following the publication by the Environment Agency (EA) of soil guideline value (SGV) and toxicological (TOX) reports, and associated publications in 2009⁽¹⁾. RSK GAC were updated following the publication of GAC by LQM/CIEH in 2009⁽²⁾. RSK GAC are periodically revised when updated information on toxicological, land use or receptor parameters is published.

Updates to the RSK GAC

In 2014 the publication of Category 4 Screening Levels (C4SL)^(3,4), as part of the Defra-funded research project SP1010, included modifications to certain exposure assumptions documented within EA Science Report SC050221/SR3 (herein after referred to as SR3)⁽⁵⁾ used in the generation of SGVs. The publication of C4SL introduced two new land-use scenarios relating to public open spaces.

C4SL were initially published for six substances (cadmium, arsenic, benzene, benzo(a)pyrene, chromium VI and lead) for a sandy loam soil type with 6% soil organic matter, based on a low level of toxicological concern (LLTC; see Section 2.3 of research project report SP1010⁽³⁾). Further C4SL were published in 2021 for vinyl chloride, tetrachloroethene (PCE) and trichloroethene (TCE). Where a C4SL has been published, the RSK GAC duplicates the C4SL using all input parameters within the SP1010 final project report⁽³⁾ and associated chemical specific reports⁽⁶⁾, and adopts them as GAC for these substances. Due to the use of decimal places rather than significant figures applied to the Contaminated Land Exposure Assessment (CLEA) tool outputs, the GAC presented may be marginally differently to the C4SL values, however any differences between the values are minimal and would not equate to an unacceptable risk.

For all other substances the C4SL exposure modifications have been applied. The RSK GAC have also been produced with updated toxicology published by LQM/CIEH in 2015⁽⁷⁾ or by the USEPA⁽¹⁴⁾, where a C4SL has not been published.

RSK GAC derivation for metals and organic compounds

Model selection

Soil assessment criteria (SAC) were calculated using the CLEA tool v1.071, supporting EA guidance^(5,8,9) and revised exposure scenarios published for the C4SL⁽³⁾.

Conceptual model

This GAC derivation considers POS_{Park} be used for the following scenarios:

- family visits and picnics
- children's play areas
- sporting activities such as football on an informal basis (not considered as a dedicated sports pitch)

- dog walking.

The POS_{Park} scenario considers risk to a child receptor (female) between the ages of 0 and 6 years old. In accordance with Section 3.6.4.3 of the SP1010 project report⁽³⁾, the pathways considered for production of SAC in the POS_{Park} scenario are

- ingestion of soil outdoors
- dermal contact with soil outdoors
- inhalation of dust outdoors
- inhalation of vapours outdoors.

Figure 1 is a conceptual model illustrating these linkages.

In line with guidance in the EA SGV report for cadmium⁽¹⁾, the RSK GAC for cadmium has been derived based on estimates representative of lifetime exposure. Although young children are generally more likely to have higher exposures to soil contaminants, the renal toxicity of cadmium, and the derivation of the TDI_{oral} and TDI_{inh}, are based on considerations of the kidney burden accumulated over 50 years or so. It is therefore reasonable to consider exposure not just in childhood but averaged over a longer period.

With respect to volatilisation, the CLEA model assumes a simple linear partitioning of a chemical in the soil between the sorbed, dissolved and vapour phase⁽⁹⁾. The upper boundaries of this partitioning are represented by the maximum aqueous solubility and pure saturated vapour concentration of the chemical. The CLEA model estimates saturated soil concentrations where these limits are reached⁽⁹⁾. The CLEA software uses a traffic light system to identify when individual and/or combined assessment criteria exceed the lower of either the aqueous- or vapour-based soil saturation limits. Model output cells are flagged red where the saturated soil concentration has been exceeded and the contribution of the indoor and outdoor vapour pathway to total exposure is greater than 10%. In this case, further consideration of the following is required⁽⁹⁾:

- Free phase contamination may be present.
- Exposure from the vapour pathways will be over-predicted by the model, as in reality the vapour phase concentration will not increase at concentrations above saturation limits
- Where the vapour pathway is greater than 90%, it is unlikely the relevant health criteria value (HCV) will be exceeded at soil concentrations at least a factor of ten higher than the relevant HCV.

Where the vapour pathway is the predominant pathway (contributes greater than 90% of exposure) or the only exposure route considered and the cell is highlighted red (SAC exceeds saturation limit), the risk based on the assumed conceptual model is likely to be negligible, as the vapour risk is assumed to be tolerable at maximum possible soil concentrations. In such circumstances the vapour pathway should be considered based on the presence of free phase or non-aqueous phase liquid sources and the measured concentrations of volatile organic compounds (VOC) in the vapour phase. Screening could be considered based on setting the SAC as the modelled soil saturation limits. However, as stated within the CLEA handbook⁽⁹⁾, this is likely to not be practical in many cases because of the very low saturation limits and, in any case, is highly conservative.

It should also be noted that for mixtures of compounds, free phase may be present where soil (or groundwater) concentrations are well below saturation limits for individual compounds.

Where the vapour pathway is only one of the exposure pathways considered, an additional approach can then be utilised as detailed within Section 4.12 of the CLEA model handbook⁽⁹⁾, which explains how to calculate an effective assessment criterion manually.

SR3⁽⁵⁾ states that, as a general rule of thumb, it is recognised that estimating vapour phase concentrations from dissolved and sorbed phase contamination by petroleum hydrocarbons are at least a factor of ten higher than those likely to be measured on-site. RSK has therefore applied an empirical subsurface correction factor of 10 into the CLEA chemical database for all petroleum hydrocarbons (including BTEX, trimethylbenzenes, and the polycyclic aromatic hydrocarbons (PAH) naphthalene, acenaphthene and acenaphthylene) to reduce this conservatism.

Input selection

The most up-to-date published chemical and toxicological data was obtained from EA Report SC050021/SR7⁽¹⁰⁾, the EA TOX⁽¹⁾ reports, the C4SL SP1010 project report and associated chemical specific reports^(3,6), the 2015 LQM/CIEH report⁽⁷⁾ or the USEPA IRIS database⁽¹⁴⁾. Where a LLTC^(3,6) has been published for a substance, RSK has used these input parameters to derive the RSK GAC. Toxicological and specific chemical parameters for 1,2,4-trimethylbenzene, barium and methyl tertiary-butyl ether (MTBE) were obtained from the CL:AIRE Soil Generic Assessment Criteria report⁽¹¹⁾.

For TPH, aromatic hydrocarbons C₅–C₈ were not modelled, as this range comprises benzene (>EC5-EC7) and toluene (>EC7-EC8), which are modelled separately.

Physical parameters

For the POS_{Park} scenario, project report SP1010⁽³⁾ considers there to be no buildings with the public park, the park being a relatively large area (>0.5ha) of predominantly grassed open space with no more than 25% of exposed soil. The input parameters were based on the air dispersion model and the vapour model detailed in SR3⁽⁵⁾. Full details of the land-use scenario are presented in Table 3.7 of project report SP1010⁽³⁾.

The parameters for a sandy loam soil type were used in line with SR3⁽⁵⁾. This includes a value of 6% for the percentage of soil organic matter (SOM) within the soil. In RSK's experience, this is rather high for many sites. To avoid undertaking site-specific risk assessments for this parameter, RSK has produced an additional set of SAC for an SOM of 1% and 2.5%.

The SAC were produced using the input parameters in Table 1 below and Table 3.6 of project report SP1010⁽³⁾. The GAC by pathway are presented in Table 2 and the combined GAC presented in Table 3.

Figure 1: Conceptual model for CLEA public open space (park) scenario

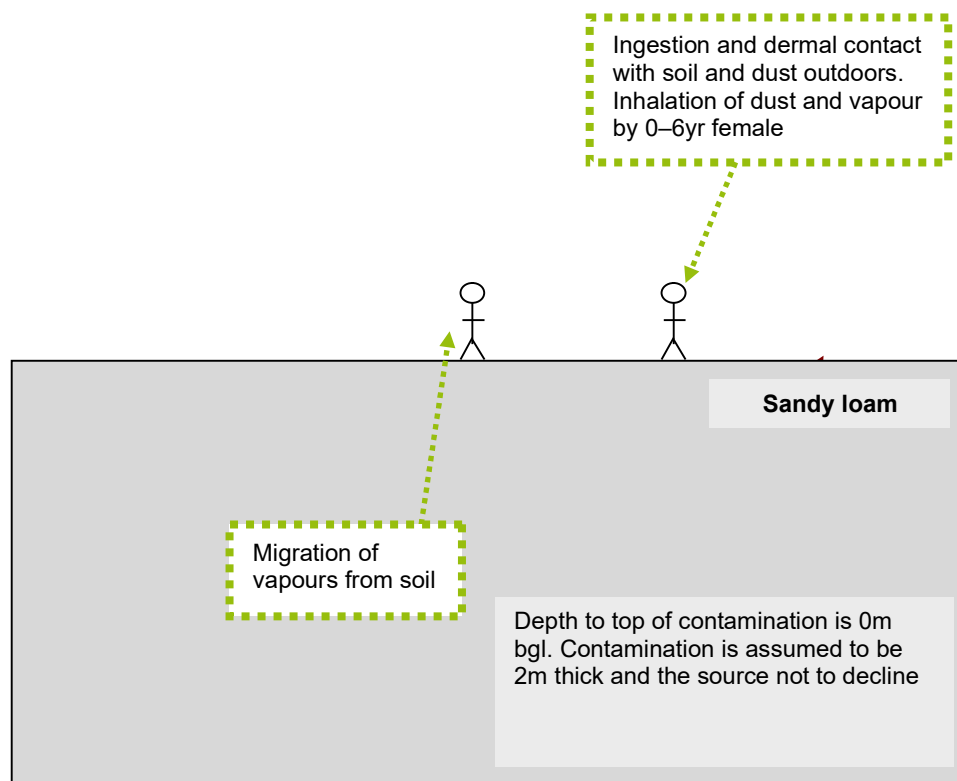


Table 1: Exposure assessment parameters for public open space (park) scenario

Parameter	Value	Justification
Land use	Public open space (park)	Chosen land use. Table 3.7 of SP1010 ⁽³⁾
Receptor	Female child	Taken as female child exposed over 6 years from 0 to 6 years, Table 3.7, SP1010 ⁽³⁾
Soil type	Sandy loam	Most common UK soil type (Section 4.3.1, Table 4.4, SR3 ⁽⁵⁾)
Start age class (AC)	1	Range of AC corresponding to key generic assumption that the critical receptor is a young female child aged 0–6 years. From Table 3.7, SP1010 ⁽³⁾
End AC	6	
SOM (%)	6	Representative of sandy loam according to EA guidance note dated January 2009 entitled 'Changes We Have Made to the CLEA Framework Documents' ⁽¹³⁾
	1	To provide SAC for sites where SOM < 6% as often observed by RSK
	2.5	
pH	7	Model default

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12. USEPA (2011), *Exposure factors handbook*, EPA/600/R-090/052F (Washington DC: Office of Research and Development).
13. Environment Agency (2009), 'Changes made to the CLEA framework documents after the three-month evaluation period in 2008', released January 2009'.



14. USEPA (2010). Hydrogen cyanide and cyanide salts. Integrated Risk Information Systems (IRIS) Chemical Assessment Summary. September 2010. <https://www.epa.gov/iris> (accessed 9 December 2015)

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - PUBLIC OPEN SPACE (PUBLIC PARK)



Table 2

Human Health Generic Assessment Criteria for Public Open Space (public park)

Compound	Notes	SAC Appropriate to Pathway SOM 1% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 2.5% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 6% (mg/kg)			Soil Saturation Limit (mg/kg)
		Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Metals													
Arsenic	(a,b)	1.68E+02	1.91E+04	NR	NR	1.68E+02	1.91E+04	NR	NR	1.68E+02	1.91E+04	NR	NR
Barium	(b)	5.77E+03	NR	NR	NR	5.77E+03	NR	NR	NR	5.77E+03	NR	NR	NR
Beryllium		6.68E+02	6.27E+01	NR	NR	6.68E+02	6.27E+01	NR	NR	6.68E+02	6.27E+01	NR	NR
Boron		4.62E+04	1.89E+08	NR	NR	4.62E+04	1.89E+08	NR	NR	4.62E+04	1.89E+08	NR	NR
Cadmium	(a)	9.13E+02	2.35E+04	8.82E+02	NR	9.13E+02	2.35E+04	8.82E+02	NR	9.13E+02	2.35E+04	8.82E+02	NR
Chromium (III) - trivalent	(c)	8.47E+04	3.30E+04	NR	NR	8.47E+04	3.30E+04	NR	NR	8.47E+04	3.30E+04	NR	NR
Chromium (VI) - hexavalent	(a,d)	2.52E+02	7.48E+02	NR	NR	2.52E+02	7.48E+02	NR	NR	2.52E+02	7.48E+02	NR	NR
Copper		4.62E+04	5.12E+05	4.44E+04	NR	4.62E+04	5.12E+05	4.44E+04	NR	4.62E+04	5.12E+05	4.44E+04	NR
Lead	(a)	1.35E+03	NR	NR	NR	1.35E+03	NR	NR	NR	1.35E+03	NR	NR	NR
Elemental Mercury (Hg ⁰)	(d)	NR	2.63E+01	NR	4.31E+00	NR	2.86E+01	NR	1.07E+01	NR	3.02E+01	NR	2.58E+01
Inorganic Mercury (Hg ²⁺)		2.45E+02	1.32E+05	2.44E+02	NR	2.45E+02	1.32E+05	2.44E+02	NR	2.45E+02	1.32E+05	2.44E+02	NR
Methyl Mercury (Hg ⁴⁺)		7.32E+01	4.59E+02	6.32E+01	7.33E+01	7.32E+01	6.40E+02	6.57E+01	1.42E+02	7.32E+01	9.33E+02	6.79E+01	3.04E+02
Nickel	(d)	8.04E+02	6.60E+03	NR	NR	8.04E+02	6.60E+03	NR	NR	8.04E+02	6.60E+03	NR	NR
Selenium	(b)	1.85E+03	NR	NR	NR	1.85E+03	NR	NR	NR	1.85E+03	NR	NR	NR
Vanadium		5.03E+03	5.32E+04	NR	NR	5.03E+03	5.32E+04	NR	NR	5.03E+03	5.32E+04	NR	NR
Zinc	(b)	1.73E+05	1.32E+09	NR	NR	1.73E+05	1.32E+09	NR	NR	1.73E+05	1.32E+09	NR	NR
Cyanide (free)		1.72E+02	4.98E+05	1.71E+02	NR	1.72E+02	4.98E+05	1.71E+02	NR	1.72E+02	4.98E+05	1.71E+02	NR
Volatile Organic Compounds													
Benzene	(a)	2.99E+02	5.20E+02	1.90E+02	1.22E+03	2.99E+02	7.09E+02	2.11E+02	2.26E+03	2.99E+02	1.02E+03	2.32E+02	4.71E+03
Toluene		1.17E+05	3.44E+05	8.71E+04	8.69E+02	1.17E+05	5.11E+05	9.50E+04	1.92E+03	1.17E+05	7.70E+05	1.01E+05	4.36E+03
Ethylbenzene		5.24E+04	2.41E+04	1.65E+04	5.18E+02	5.24E+04	3.70E+04	2.17E+04	1.22E+03	5.24E+04	5.65E+04	2.72E+04	2.84E+03
Xylene - m		9.43E+04	2.06E+04	1.69E+04	6.25E+02	9.43E+04	3.16E+04	2.37E+04	1.47E+03	9.43E+04	4.84E+04	3.20E+04	3.46E+03
Xylene - o		9.43E+04	2.13E+04	1.74E+04	4.78E+02	9.43E+04	3.27E+04	2.43E+04	1.12E+03	9.43E+04	4.99E+04	3.26E+04	2.62E+03
Xylene - p		9.43E+04	2.02E+04	1.66E+04	5.76E+02	9.43E+04	3.09E+04	2.33E+04	1.35E+03	9.43E+04	4.73E+04	3.15E+04	3.17E+03
Total xylene		9.43E+04	2.02E+04	1.66E+04	6.25E+02	9.43E+04	3.09E+04	2.33E+04	1.47E+03	9.43E+04	4.73E+04	3.15E+04	3.46E+03
Methyl tertiary-Butyl ether (MTBE)		1.58E+05	2.62E+05	9.84E+04	2.04E+04	1.58E+05	3.34E+05	1.07E+05	3.31E+04	1.58E+05	4.60E+05	1.17E+05	6.27E+04
Trichloroethene (TCE)		4.10E+01	2.01E+02	NR	1.54E+03	5.36E+01	2.91E+02	NR	3.22E+03	6.91E+01	4.33E+02	NR	7.14E+03
Tetrachloroethene (PCE)		7.31E+03	1.73E+03	1.40E+03	4.24E+02	7.31E+03	2.58E+03	1.91E+03	9.51E+02	7.31E+03	3.91E+03	2.55E+03	2.18E+03
1,1,1-Trichloroethane		3.15E+05	6.99E+04	5.72E+04	1.43E+03	3.15E+05	1.00E+05	7.59E+04	2.92E+03	3.15E+05	1.48E+05	1.01E+05	6.39E+03
1,1,1,2-Tetrachloroethane		2.99E+03	2.89E+03	1.47E+03	2.60E+03	2.99E+03	4.40E+03	1.78E+03	6.02E+03	2.99E+03	6.71E+03	2.07E+03	1.40E+04
1,1,2,2-Tetrachloroethane		2.99E+03	4.60E+03	1.81E+03	2.67E+03	2.99E+03	6.58E+03	2.06E+03	5.46E+03	2.99E+03	9.75E+03	2.29E+03	1.20E+04
Carbon Tetrachloride		2.10E+03	1.98E+02	1.89E+02	1.52E+03	2.10E+03	2.94E+02	2.73E+02	3.32E+03	2.10E+03	4.42E+02	3.96E+02	7.54E+03
1,2-Dichloroethane		6.31E+01	3.17E+01	2.11E+01	3.41E+03	6.31E+01	3.81E+01	2.37E+01	4.91E+03	6.31E+01	4.98E+01	2.78E+01	8.43E+03
Vinyl Chloride (chloroethene)		1.98E+01	2.68E+02	1.84E+01	1.36E+03	1.98E+01	3.04E+02	1.86E+01	1.76E+03	1.98E+01	3.76E+02	1.88E+01	2.69E+03
1,2,4-Trimethylbenzene		NR	3.09E+02	NR	4.74E+02	NR	3.63E+02	NR	1.16E+03	NR	4.08E+02	NR	2.76E+03
1,3,5-Trimethylbenzene	(e)	NR	NR	NR	2.30E+02	NR	NR	NR	5.52E+02	NR	NR	NR	1.30E+03
Semi-Volatile Organic Compounds													
Acenaphthene		3.07E+04	5.14E+05	2.89E+04	5.70E+01	3.07E+04	8.07E+05	2.95E+04	1.41E+02	3.07E+04	1.24E+06	2.99E+04	3.36E+02
Acenaphthylene		3.07E+04	4.91E+05	2.89E+04	8.61E+01	3.07E+04	7.69E+05	2.95E+04	2.12E+02	3.07E+04	1.18E+06	2.99E+04	5.06E+02
Anthracene		1.53E+05	5.73E+06	1.49E+05	1.17E+00	1.53E+05	8.99E+06	1.51E+05	2.91E+00	1.53E+05	1.38E+07	1.52E+05	6.96E+00
Benzo(a)anthracene		7.93E+01	1.27E+02	4.88E+01	1.71E+00	7.93E+01	1.96E+02	5.65E+01	4.28E+00	7.93E+01	2.94E+02	6.25E+01	1.03E+01
Benzo(a)pyrene	(a)	2.14E+01	7.45E+01	NR	9.11E-01	2.14E+01	1.14E+02	NR	2.28E+00	2.14E+01	1.70E+02	NR	5.46E+00
Benzo(b)fluoranthene		2.00E+01	3.91E+01	1.32E+01	1.22E+00	2.00E+01	6.02E+01	1.50E+01	3.04E+00	2.00E+01	8.97E+01	1.63E+01	7.29E+00
Benzo(g,h,i)perylene		1.76E+03	6.52E+03	1.39E+03	1.54E-02	1.76E+03	9.80E+03	1.49E+03	3.85E-02	1.76E+03	1.41E+04	1.57E+03	9.23E-02
Benzo(k)fluoranthene		5.27E+02	1.21E+03	3.67E+02	6.87E-01	5.27E+02	1.86E+03	4.11E+02	1.72E+00	5.27E+02	2.75E+03	4.42E+02	4.12E+00
Chrysene		1.59E+02	2.22E+02	9.25E+01	4.40E-01	1.59E+02	3.44E+02	1.09E+02	1.10E+00	1.59E+02	5.19E+02	1.21E+02	2.64E+00
Dibenzo(a,h)anthracene		1.59E+00	4.16E+00	1.15E+00	3.93E-03	1.59E+00	6.35E+00	1.27E+00	9.82E-03	1.59E+00	9.34E+00	1.36E+00	2.36E-02

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - PUBLIC OPEN SPACE (PUBLIC PARK)



Table 2
Human Health Generic Assessment Criteria for Public Open Space (public park)

Compound	Notes	SAC Appropriate to Pathway SOM 1% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 2.5% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 6% (mg/kg)			Soil Saturation Limit (mg/kg)
		Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Fluoranthene		6.39E+03	4.87E+05	6.30E+03	1.89E+01	6.39E+03	7.61E+05	6.33E+03	4.73E+01	6.39E+03	1.16E+06	6.35E+03	1.13E+02
Fluorene		2.04E+04	4.57E+05	1.96E+04	3.09E+01	2.04E+04	7.17E+05	1.99E+04	7.65E+01	2.04E+04	1.10E+06	2.01E+04	1.83E+02

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - PUBLIC OPEN SPACE (PUBLIC PARK)



Table 2

Human Health Generic Assessment Criteria for Public Open Space (public park)

Compound	Notes	SAC Appropriate to Pathway SOM 1% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 2.5% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 6% (mg/kg)			Soil Saturation Limit (mg/kg)
		Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Indeno(1,2,3-cd)pyrene		2.27E+02	4.12E+02	1.46E+02	6.13E-02	2.27E+02	6.35E+02	1.67E+02	1.53E-01	2.27E+02	9.48E+02	1.83E+02	3.68E-01
Naphthalene		1.00E+04	1.24E+03	1.10E+03	7.64E+01	1.00E+04	1.92E+03	1.61E+03	1.83E+02	1.00E+04	2.95E+03	2.28E+03	4.32E+02
Phenanthrene		6.35E+03	2.44E+05	6.19E+03	3.60E+01	6.35E+03	3.83E+05	6.25E+03	8.96E+01	6.35E+03	5.88E+05	6.28E+03	2.14E+02
Pyrene		1.53E+04	1.11E+06	1.51E+04	2.20E+00	1.53E+04	1.73E+06	1.52E+04	5.49E+00	1.53E+04	2.64E+06	1.52E+04	1.32E+01
Phenol		2.77E+05	7.78E+03	7.57E+03	2.42E+04	2.77E+05	8.60E+03	8.34E+03	3.81E+04	2.77E+05	9.66E+03	9.34E+03	7.03E+04
Total Petroleum Hydrocarbons													
Aliphatic hydrocarbons EC ₆ -EC ₆		1.31E+06	9.65E+04	9.47E+04	3.04E+02	1.31E+06	1.31E+05	1.27E+05	5.58E+02	1.31E+06	1.88E+05	1.81E+05	1.15E+03
Aliphatic hydrocarbons >EC ₆ -EC ₈		1.31E+06	1.51E+05	1.46E+05	1.44E+02	1.31E+06	2.25E+05	2.15E+05	3.22E+02	1.31E+06	3.41E+05	3.16E+05	7.36E+02
Aliphatic hydrocarbons >EC ₈ -EC ₁₀		2.63E+04	1.85E+04	1.43E+04	7.77E+01	2.63E+04	2.89E+04	1.83E+04	1.90E+02	2.63E+04	4.45E+04	2.14E+04	4.51E+02
Aliphatic hydrocarbons >EC ₁₀ -EC ₁₂		2.63E+04	4.12E+04	2.09E+04	4.75E+01	2.63E+04	6.49E+04	2.31E+04	1.18E+02	2.63E+04	1.00E+05	2.43E+04	2.83E+02
Aliphatic hydrocarbons >EC ₁₂ -EC ₁₆		2.63E+04	1.19E+05	2.47E+04	2.37E+01	2.63E+04	1.88E+05	2.53E+04	5.91E+01	2.63E+04	2.91E+05	2.57E+04	1.42E+02
Aliphatic hydrocarbons >EC ₁₆ -EC ₃₅	(b)	4.55E+05	NR	NR	8.48E+00	4.78E+05	NR	NR	2.12E+01	4.94E+05	NR	NR	5.09E+01
Aliphatic hydrocarbons >EC ₃₅ -EC ₄₄	(b)	4.55E+05	NR	NR	8.48E+00	4.78E+05	NR	NR	2.12E+01	4.94E+05	NR	NR	5.09E+01
Aromatic hydrocarbons >EC ₆ -EC ₁₀		1.05E+04	1.12E+04	7.22E+03	6.13E+02	1.05E+04	1.75E+04	8.50E+03	1.50E+03	1.05E+04	2.70E+04	9.29E+03	3.58E+03
Aromatic hydrocarbons >EC ₁₀ -EC ₁₂		1.05E+04	2.61E+04	9.24E+03	3.64E+02	1.05E+04	4.10E+04	9.75E+03	8.99E+02	1.05E+04	6.33E+04	1.00E+04	2.15E+03
Aromatic hydrocarbons >EC ₁₂ -EC ₁₆		1.05E+04	8.62E+04	1.02E+04	1.69E+02	1.05E+04	1.36E+05	1.03E+04	4.19E+02	1.05E+04	2.10E+05	1.04E+04	1.00E+03
Aromatic hydrocarbons >EC ₁₆ -EC ₂₁	(b)	7.63E+03	NR	NR	5.37E+01	7.72E+03	NR	NR	1.34E+02	7.77E+03	NR	NR	3.21E+02
Aromatic hydrocarbons >EC ₂₁ -EC ₃₅	(b)	7.82E+03	NR	NR	4.83E+00	7.84E+03	NR	NR	1.21E+01	7.85E+03	NR	NR	2.90E+01
Aromatic hydrocarbons >EC ₃₅ -EC ₄₄	(b)	7.82E+03	NR	NR	4.83E+00	7.84E+03	NR	NR	1.21E+01	7.85E+03	NR	NR	2.90E+01

Notes:

Public open space (resi) and (park) GAC are based on the exposure parameters detailed within SP1010 "Development of Category 4 Screening Levels for Assessment of Land affected by Contamination", Final, 20th December 2013

EC - equivalent carbon. GrAC - groundwater assessment criteria. SAC - soil assessment criteria.

The CLEA model output is colour coded depending upon whether the soil saturation limit has been exceeded.

	Calculated SAC exceeds soil saturation limit and may significantly affect the interpretation of any exceedances as the contribution of the indoor and outdoor vapour pathway to total exposure is >10%.
	Calculated SAC exceeds soil saturation limit but the exceedance will not affect the SAC significantly as the contribution of the indoor and outdoor vapour pathway to total exposure is <10%.
	Calculated SAC does not exceed the soil saturation limit.

The SAC for organic compounds are dependant upon soil organic matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58. 1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.

SAC for TPH fractions, PAHs naphthalene, acenaphthene and acenaphthylene, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway (Section 10.1.1, SR3)

(a) SAC for arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead are derived using the C4SL toxicology data.

(b) SAC for barium and selenium should not include the inhalation pathway as no expert group HCV has been derived; aliphatic and aromatic hydrocarbons >EC16 should not include inhalation pathway due to their non-volatile nature and inhalation exposure being minimal (oral, dermal and inhalation exposure is compared to the oral HCV); arsenic should only be based on oral contribution (rather than combined) owing to the relative small contribution from inhalation in accordance with the SGV report. The Oral SAC should be adopted for zinc and benzo(a)pyrene.

(c) SAC for CrIII should be based on the lower of the oral and inhalation SAC (see LQM/CIEH 2015 Section 6.8)

(d) SAC for elemental mercury, chromium VI and nickel should be based on the inhalation pathway only.

(e) SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used.

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - PUBLIC OPEN SPACE (PUBLIC PARK)



Table 3
Human Health Generic Assessment Criteria for Public Open Space (public park)

Compound	SAC for Soil SOM 1% (mg/kg)	SAC for Soil SOM 2.5% (mg/kg)	SAC for Soil SOM 6% (mg/kg)
Metals			
Arsenic	170	170	170
Barium	5,770	5,770	5,770
Beryllium	60	60	60
Boron	46,000	46,000	46,000
Cadmium	880	880	880
Chromium (III) - trivalent	33,000	33,000	33,000
Chromium (VI) - hexavalent	250	250	250
Copper	44,000	44,000	44,000
Lead	1,300	1,300	1,300
Elemental Mercury (Hg ⁰)	30 (4)	30 (11)	30 (26)
Inorganic Mercury (Hg ²⁺)	240	240	240
Methyl Mercury (Hg ⁴⁺)	63	66	68
Nickel	800	800	800
Selenium	1,800	1,800	1,800
Vanadium	5,000	5,000	5,000
Zinc	173,200	173,200	173,200
Cyanide (free)	170	170	170
Volatile Organic Compounds			
Benzene	190	210	230
Toluene	90,000 (869)	90,000 (1,916)	100,000 (4,357)
Ethylbenzene	17,000 (518)	22,000 (1,216)	27,000 (2,844)
Xylene - m	17,000 (625)	24,000 (1,474)	32,000 (3,457)
Xylene - o	17,000 (478)	24,000 (1,120)	33,000 (2,618)
Xylene - p	17,000 (576)	23,000 (1,353)	31,000 (3,167)
Total xylene	17,000 (625)	23,000 (1,474)	31,000 (3,457)
Methyl tertiary-Butyl ether (MTBE)	98,400 (20,400)	107,100 (33,100)	117,400 (62,700)
Trichloroethene (TCE)	41	54	69
Tetrachloroethene (PCE)	1,400 (424)	1,900 (951)	2,500 (2,180)
1,1,1-Trichloroethane	60,000 (1,425)	80,000 (2,915)	100,000 (6,392)
1,1,1,2 Tetrachloroethane	1,500	1,800	2,100
1,1,2,2-Tetrachloroethane	1,800	2,100	2,300
Carbon Tetrachloride	189	273	396
1,2-Dichloroethane	21	24	28
Vinyl Chloride (chloroethene)	18	19	19
1,2,4-Trimethylbenzene	310	360	410
1,3,5-Trimethylbenzene	NR	NR	NR
Semi-Volatile Organic Compounds			
Acenaphthene	29,000	30,000	30,000
Acenaphthylene	29,000	30,000	30,000
Anthracene	149,000	151,000	152,000
Benzo(a)anthracene	49	56	62
Benzo(a)pyrene	21	21	21
Benzo(b)fluoranthene	13	15	16
Benzo(g,h,i)perylene	1,390	1,490	1,570
Benzo(k)fluoranthene	367	411	442
Chrysene	93	109	121
Dibenzo(a,h)anthracene	1.1	1.3	1.4
Fluoranthene	6,300	6,300	6,400
Fluorene	19,600	19,900	20,100
Indeno(1,2,3-cd)pyrene	146	167	183
Naphthalene	1,200 (76)	1,900 (183)	3,000
Phenanthrene	6,200	6,200	6,300
Pyrene	15,000	15,000	15,000
Phenol	440*	690*	1,300*
Total Petroleum Hydrocarbons			
Aliphatic hydrocarbons EC ₅ -EC ₆	90,000 (304)	130,000 (558)	180,000 (1,150)
Aliphatic hydrocarbons >EC ₆ -EC ₈	150,000 (144)	210,000 (322)	320,000 (736)
Aliphatic hydrocarbons >EC ₈ -EC ₁₀	14,000 (78)	18,000 (190)	21,000 (451)
Aliphatic hydrocarbons >EC ₁₀ -EC ₁₂	21,000 (48)	23,000 (118)	24,000 (283)
Aliphatic hydrocarbons >EC ₁₂ -EC ₁₆	25,000 (24)	25,000 (59)	26,000 (142)
Aliphatic hydrocarbons >EC ₁₆ -EC ₃₅	450,000	480,000	490,000
Aliphatic hydrocarbons >EC ₃₅ -EC ₄₄	450,000	480,000	490,000
Aromatic hydrocarbons >EC ₈ -EC ₁₀	7,200 (613)	8,500 (1,503)	9,300 (3,580)
Aromatic hydrocarbons >EC ₁₀ -EC ₁₂	9,200 (364)	9,700 (899)	10,000
Aromatic hydrocarbons >EC ₁₂ -EC ₁₆	10,200	10,300	10,400
Aromatic hydrocarbons >EC ₁₆ -EC ₂₁	7,600	7,700	7,800
Aromatic hydrocarbons >EC ₂₁ -EC ₃₅	7,800	7,800	7,900
Aromatic hydrocarbons >EC ₃₅ -EC ₄₄	7,800	7,800	7,900
Minerals			
Asbestos	Stage 1 test – No asbestos detected with ID; Stage 2 test - <0.001% dry weight (exceedance of either equates to an exceedance of the GAC) ¹		
Notes:			
¹ Generic assessment criteria not calculated owing to low volatility of substance and therefore no pathway, or an absence of toxicological data.			
NR - SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used			
EC - equivalent carbon. GrAC - groundwater assessment criteria. SAC - soil assessment criteria.			
* The GAC for Phenol is based on a threshold which is protective of direct contact (SC050021/Phenol SGV report)			
Public open space (resi) and (park) GAC are based on the exposure parameters detailed within SP1010 "Development of Category 4 Screening Levels for Assessment of Land affected by Contamination", Final, 20th December 2013			
The SAC for organic compounds are dependent on Soil Organic Matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58.			
1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.			
SAC for TPH fractions, PAHs naphthalene, acenaphthene and acenaphthylene,BTEX and trimethyl/benzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway, section 10.1.1, SR3.			
(VALUE IN BRACKETS)	The SAC has been set as the model calculated SAC with the saturation limit shown in brackets.		

Generic assessment criteria for human health: commercial scenario

Background

RSK's generic assessment criteria (GAC) were initially prepared following the publication by the Environment Agency (EA) of soil guideline value (SGV) and toxicological (TOX) reports, and associated publications in 2009⁽¹⁾. RSK GAC were updated following the publication of GAC by LQM/CIEH in 2009⁽²⁾. RSK GAC are periodically revised when updated information on toxicological, land use or receptor parameters is published.

Updates to the RSK GAC

In 2014, the publication of Category 4 Screening Levels (C4SL)^(3,4), as part of the Defra-funded research project SP1010, included modifications to certain exposure assumptions documented within EA Science Report SC050221/SR3 (herein after referred to as SR3)⁽⁵⁾ used in the generation of SGVs.

C4SL were initially published for six substances (cadmium, arsenic, benzene, benzo(a)pyrene, chromium VI and lead) for a sandy loam soil type with 6% soil organic matter, based on a low level of toxicological concern (LLTC; see Section 2.3 of research project report SP1010⁽³⁾). Further C4SL were published in 2021 for vinyl chloride, tetrachloroethene (PCE) and trichloroethene (TCE). Where a C4SL has been published, the RSK GAC duplicates the C4SL using all input parameters within the SP1010 final project report⁽³⁾ and associated chemical specific reports⁽⁶⁾, and adopts them as GAC for these substances. Due to the use of decimal places rather than significant figures applied to the Contaminated Land Exposure Assessment (CLEA) tool outputs, the GAC presented may be marginally differently to the C4SL values, however any differences between the values are minimal and would not equate to an unacceptable risk.

For all other substances the only C4SL exposure modification relevant to a commercial end use are daily inhalation rates.

The RSK GAC have also been revised with updated toxicology published by LQM/CIEH in 2015⁽⁷⁾ or by the USEPA⁽¹⁴⁾, where a C4SL has not been published.

RSK GAC derivation for metals and organic compounds

Model selection

Soil assessment criteria (SAC) were calculated using the CLEA tool v1.071, supporting EA guidance^(5,8,9) and revised exposure scenarios published for the C4SL⁽³⁾. The SAC are also termed GAC.

Pathway selection

In accordance with SR3⁽⁵⁾ the commercial scenario considers risks to a female worker who works from the age of 16 to 65 years. It should be noted that this end use is not suitable for a workplace nursery but may be appropriate for a sports centre or shopping centre where children are present. In accordance with Box 3.5, SR3⁽⁵⁾ the pathways considered for production of the SAC in the commercial scenario are

- direct soil and dust ingestion

- dermal contact with soil both indoors and outdoors
- indoor air inhalation from soil and vapour and outdoor inhalation of soil and vapour.

With respect to volatilisation, the CLEA model assumes a simple linear partitioning of a chemical in the soil between the sorbed, dissolved and vapour phase⁽⁹⁾. The upper boundaries of this partitioning are represented by the maximum aqueous solubility and pure saturated vapour concentration of the chemical. The CLEA model estimates saturated soil concentrations where these limits are reached⁽⁹⁾. The CLEA software uses a traffic light system to identify when individual and/or combined assessment criteria exceed the lower of either the aqueous- or vapour-based soil saturation limits. Model output cells are flagged red where the saturated soil concentration has been exceeded and the contribution of the indoor and outdoor vapour pathway to total exposure is greater than 10%. In this case, further consideration of the following is required⁽⁹⁾:

- Free phase contamination may be present.
- Exposure from the vapour pathways will be over-predicted by the model, as in reality the vapour phase concentration will not increase at concentrations above saturation limits
- Where the vapour pathway contribution is greater than 90%, it is unlikely the relevant health criteria value (HCV) will be exceeded at soil concentrations at least a factor of ten higher than the relevant HCV.

Where the vapour pathway is the predominant pathway (contributes greater than 90% of exposure) or the only exposure route considered and the cell is highlighted red (SAC exceeds saturation limit), the risk based on the assumed conceptual model is likely to be negligible as the vapour risk is assumed to be tolerable at maximum possible soil concentrations. In such circumstances, the vapour pathway exposure should be considered based on the presence of free phase or non-aqueous phase liquid sources and the measured concentrations of volatile organic compounds (VOC) in the vapour phase. Screening could be considered based on setting the SAC as the modelled soil saturation limits. However, as stated within the CLEA handbook⁽⁹⁾, this is likely to not be practical in many cases because of the very low saturation limits and, in any case, is highly conservative.

It should also be noted that for mixtures of compounds, free phase may be present where soil (or groundwater) concentrations are well below saturation limits for individual compounds.

Where the vapour pathway is only one of the exposure pathways considered, an additional approach can then be utilised as detailed within Section 4.12 of the CLEA model handbook⁽⁹⁾, which explains how to calculate an effective assessment criterion manually.

SR3⁽⁵⁾ states that, as a general rule of thumb, it is recognised that estimating vapour phase concentrations from dissolved and sorbed phase contamination by petroleum hydrocarbons are at least a factor of ten higher than those likely to be measured on-site. RSK has therefore applied an empirical subsurface to indoor air correction factor of 10 into the CLEA model chemical database for all petroleum hydrocarbon fractions (including BTEX, trimethylbenzenes and the polycyclic aromatic hydrocarbons (PAH) naphthalene, acenaphthene and acenaphthylene) to reduce this conservatism.

Input selection

The most up-to-date published chemical and toxicological data was obtained from EA Report SC050021/SR7⁽¹⁰⁾, the EA TOX⁽¹⁾ reports, the C4SL SP1010 project report and associated chemical specific reports^(3,6), the 2015 LQM/CIEH report⁽⁷⁾ or the USEPA IRIS database⁽¹⁴⁾. Where a LLTC^(3,6) has been published for a substance, RSK has used these input parameters to derive the RSK GAC. Toxicological and specific chemical parameters for 1,2,4-trimethylbenzene, barium, methyl tertiary-butyl ether (MTBE), 1,1,2-trichloroethane, 1,1-dichloroethene, 1,2-dichloropropane, 2-chloronaphthalene, chloroethane, chloromethane, cis 1,2-dichloroethene, dichloromethane, hexachloroethane and trans 1,2-dichloroethene were obtained from the CL:AIRE Soil Generic Assessment Criteria report⁽¹¹⁾.

For TPH, aromatic hydrocarbons C₅–C₈ were not modelled, as this range comprises benzene (>EC5-EC7) and toluene (>EC7-EC8), which are modelled separately.

Physical parameters

For the commercial end use, the CLEA default pre-1970s three-storey office building was used. SR3⁽⁵⁾ notes this commercial building type to be the most conservative in terms of protection from vapour intrusion. The default input building parameters presented in Table 3.10 of SR3⁽⁵⁾ have been used.

The parameters for a sandy loam soil type were used in line with Table 4.4 of SR3⁽⁵⁾. This includes a value of 6% for the percentage of soil organic matter (SOM) within the soil. In RSK's experience, this is rather high for many sites. To avoid undertaking site-specific risk assessments for this SOM, RSK has produced an additional set of GAC for SOM of 1% and 2.5% for all substances using the CLEA tool.

Summary of modifications to the default CLEA SR3⁽⁵⁾ input parameters for a commercial land use

In summary, the RSK commercial GAC were produced using the default input parameters for soil properties, the air dispersion model, building properties and the vapour model detailed in SR3⁽⁵⁾. Modifications to the default SR3⁽⁵⁾ exposure scenarios based on the C4SL exposure scenarios⁽³⁾ are presented in Table 2 below. The sole modification to the default commercial input parameters is the updated inhalation rate.

The final selected GAC are presented by pathway in Table 3 with the combined GAC in Table 4.

Figure 1: Conceptual model for CLEA commercial scenario

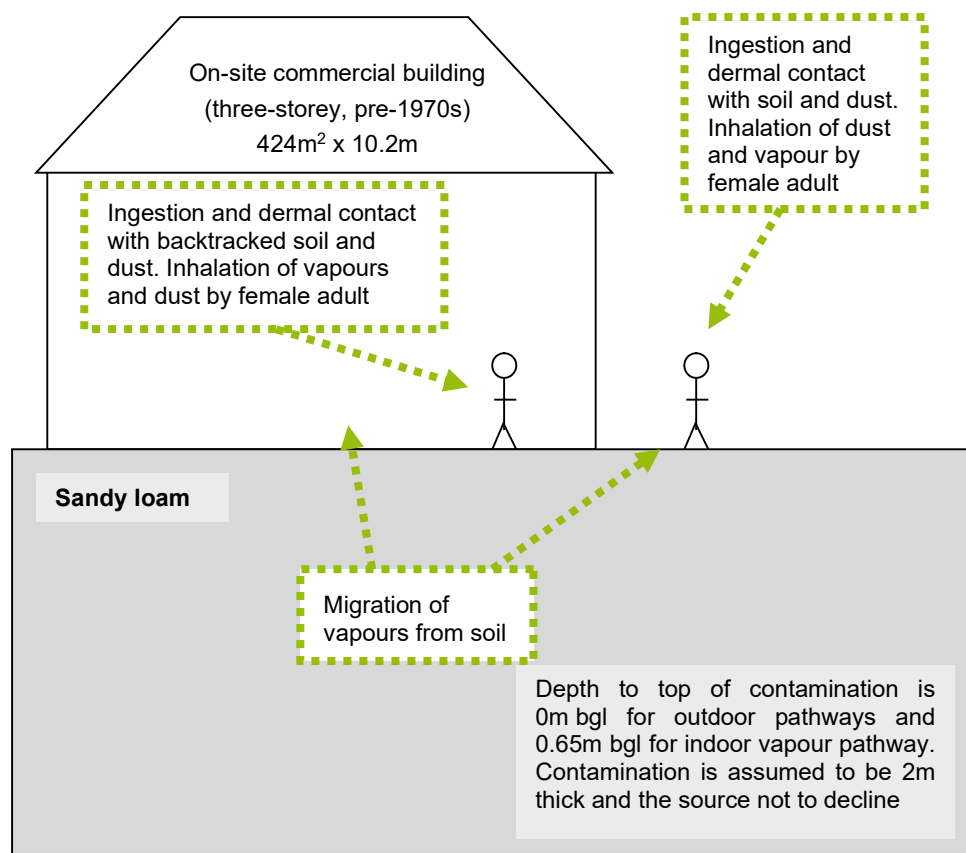


Table 1: Exposure assessment parameters for commercial scenario – inputs for CLEA model

Parameter	Value	Justification
Land use	Commercial	Chosen land use
Receptor	Female worker	Taken as female adult exposed over 49 years from age 16 to 65 years, Box 3.5, SR3 ⁽⁵⁾
Building	Office (pre-1970)	Key generic assumption given in Box 3.5, SR3 ⁽⁵⁾ . Pre-1970s three-storey office building chosen as it is the most conservative in terms of protection from vapour intrusion (Section 3.4.6, SR3 ⁽⁵⁾)
Soil type	Sandy loam	Most common UK soil type (Section 4.3.1, Table 4.4, SR3 ⁽⁵⁾)
Start age class (AC)	17	AC corresponding to key generic assumption that the critical receptor is a working female adult exposed over a 49-year period from age 16 to 65 years. Assumption given in Box 3.5, SR3 ⁽⁵⁾
End AC	17	
SOM (%)	6	Representative of sandy loam according to EA guidance note dated January 2009 entitled 'Changes We Have Made to the CLEA Framework Documents' ⁽¹³⁾
	1	To provide SAC for sites where SOM < 6% as often observed by RSK
	2.5	
pH	7	Model default

Table 2: Commercial – modified receptor inputs

Parameter	Unit	Value	Justification
Inhalation rate (AC17)	m ³ day ⁻¹	15.7	Mean value USEPA, 2011 ⁽¹²⁾ ; Table 3.2, SP1010 ⁽³⁾

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GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL



Table 3

Human health generic assessment criteria by pathway for commercial scenario

Compound	Notes	SAC appropriate to pathway SOM 1% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 2.5% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 6% (mg/kg)			Soil saturation limit (mg/kg)
		Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Metals													
Arsenic	(a,b)	6.35E+02	1.25E+03	NR	NR	6.35E+02	1.25E+03	NR	NR	6.35E+02	1.25E+03	NR	NR
Barium	(b)	2.21E+04	NR	NR	NR	2.21E+04	NR	NR	NR	2.21E+04	NR	NR	NR
Beryllium		3.97E+03	1.17E+01	NR	NR	3.97E+03	1.17E+01	NR	NR	3.97E+03	1.17E+01	NR	NR
Boron		2.38E+05	2.82E+07	NR	NR	2.38E+05	2.82E+07	NR	NR	2.38E+05	2.82E+07	NR	NR
Cadmium	(a)	7.73E+02	8.57E+02	4.10E+02	NR	7.73E+02	8.57E+02	4.10E+02	NR	7.73E+02	8.57E+02	4.10E+02	NR
Chromium (III) - trivalent	(c)	3.31E+05	8.57E+03	NR	NR	3.31E+05	8.57E+03	NR	NR	3.31E+05	8.57E+03	NR	NR
Chromium (VI) - hexavalent	(a,d)	9.62E+02	4.91E+01	NR	NR	9.62E+02	4.91E+01	NR	NR	9.62E+02	4.91E+01	NR	NR
Copper		1.89E+05	8.96E+04	6.83E+04	NR	1.89E+05	8.96E+04	6.83E+04	NR	1.89E+05	8.96E+04	6.83E+04	NR
Lead	(a)	2.32E+03	NR	NR	NR	2.32E+03	NR	NR	NR	2.32E+03	NR	NR	NR
Elemental Mercury (Hg ⁰)	(d)	NR	1.54E+01	NR	4.31E+00	NR	3.26E+01	NR	1.07E+01	NR	5.80E+01	NR	2.58E+01
Inorganic Mercury (Hg ²⁺)		1.18E+03	1.97E+04	1.12E+03	NR	1.18E+03	1.97E+04	1.12E+03	NR	1.18E+03	1.97E+04	1.12E+03	NR
Methyl Mercury (Hg ⁴⁺)		3.38E+02	2.13E+03	2.92E+02	7.33E+01	3.38E+02	3.87E+03	3.11E+02	1.42E+02	3.38E+02	7.33E+03	3.23E+02	3.04E+02
Nickel	(d)	3.06E+03	9.83E+02	NR	NR	3.06E+03	9.83E+02	NR	NR	3.06E+03	9.83E+02	NR	NR
Selenium	(b)	1.23E+04	NR	NR	NR	1.23E+04	NR	NR	NR	1.23E+04	NR	NR	NR
Vanadium		2.15E+04	9.03E+03	NR	NR	2.15E+04	9.03E+03	NR	NR	2.15E+04	9.03E+03	NR	NR
Zinc	(b)	7.35E+05	1.97E+08	NR	NR	7.35E+05	1.97E+08	NR	NR	7.35E+05	1.97E+08	NR	NR
Cyanide (free)		6.56E+02	7.51E+04	6.53E+02	NR	6.56E+02	7.51E+04	6.53E+02	NR	6.56E+02	7.51E+04	6.53E+02	NR
Volatile Organic Compounds													
Benzene	(a)	1.09E+03	2.79E+01	2.72E+01	1.22E+03	1.09E+03	5.19E+01	4.96E+01	2.26E+03	1.09E+03	1.08E+02	9.80E+01	4.71E+03
Toluene		4.24E+05	6.49E+04	5.63E+04	8.69E+02	4.24E+05	1.43E+05	1.07E+05	1.92E+03	4.24E+05	3.24E+05	1.84E+05	4.36E+03
Ethylbenzene		1.91E+05	5.89E+03	5.71E+03	5.18E+02	1.91E+05	1.38E+04	1.28E+04	1.22E+03	1.91E+05	3.21E+04	2.75E+04	2.84E+03
Xylene - m		3.43E+05	6.26E+03	6.15E+03	6.25E+02	3.43E+05	1.47E+04	1.41E+04	1.47E+03	3.43E+05	3.44E+04	3.12E+04	3.46E+03
Xylene - o		3.43E+05	6.73E+03	6.60E+03	4.78E+02	3.43E+05	1.57E+04	1.50E+04	1.12E+03	3.43E+05	3.65E+04	3.30E+04	2.62E+03
Xylene - p		3.43E+05	6.03E+03	5.92E+03	5.76E+02	3.43E+05	1.41E+04	1.36E+04	1.35E+03	3.43E+05	3.28E+04	3.00E+04	3.17E+03
Total xylene		3.43E+05	6.03E+03	5.92E+03	6.25E+02	3.43E+05	1.41E+04	1.36E+04	1.47E+03	3.43E+05	3.28E+04	3.00E+04	3.46E+03
Methyl tertiary-Butyl ether (MTBE)		5.72E+05	7.58E+03	7.48E+03	2.04E+04	5.72E+05	1.23E+04	1.21E+04	3.31E+04	5.72E+05	2.34E+04	2.24E+04	6.27E+04
1,1,1,2-Tetrachloroethane		1.10E+04	1.09E+02	1.08E+02	2.60E+03	1.10E+04	2.53E+02	2.47E+02	6.02E+03	1.10E+04	5.88E+02	5.59E+02	1.40E+04
1,1,2,2-Tetrachloroethane		1.10E+04	2.81E+02	2.74E+02	2.67E+03	1.10E+04	5.75E+02	5.46E+02	5.46E+03	1.10E+04	1.26E+03	1.13E+03	1.20E+04
1,1,1-Trichloroethane		1.14E+06	6.60E+02	6.60E+02	1.43E+03	1.14E+06	1.35E+03	1.35E+03	2.92E+03	1.14E+06	2.96E+03	2.95E+03	6.39E+03
1,1,2 Trichloroethane		7.62E+03	9.02E+01	8.91E+01	4.03E+03	7.62E+03	1.84E+02	1.80E+02	8.21E+03	7.62E+03	4.02E+02	3.82E+02	1.80E+04
1,1-Dichloroethene		8.76E+04	2.43E+01	2.43E+01	2.23E+03	8.76E+04	4.30E+01	4.30E+01	3.94E+03	8.76E+04	8.68E+01	8.67E+01	7.94E+03
1,2-Dichloroethane		2.29E+02	6.73E-01	6.71E-01	3.41E+03	2.29E+02	9.71E-01	9.67E-01	4.91E+03	2.29E+02	1.67E+00	1.65E+00	8.43E+03
1,2,4-Trimethylbenzene		NR	3.29E+02	NR	4.74E+02	NR	6.41E+02	NR	1.16E+03	NR	1.04E+03	NR	2.76E+03
1,3,5-Trimethylbenzene	(e)	NR	NR	NR	2.30E+02	NR	NR	NR	5.52E+02	NR	NR	NR	1.30E+03
1,2-Dichloropropane		2.57E+04	3.14E+00	3.13E+00	1.19E+03	2.57E+04	5.54E+00	5.54E+00	2.11E+03	2.57E+04	1.11E+01	1.11E+01	4.24E+03
Carbon Tetrachloride (tetrachloromethane)		7.62E+03	2.87E+00	2.87E+00	1.52E+03	7.62E+03	6.29E+00	6.28E+00	3.32E+03	7.62E+03	1.43E+01	1.42E+01	7.54E+03
Chloroethane		NR	9.01E+02	NR	2.61E+03	NR	1.22E+03	NR	3.54E+03	NR	1.97E+03	NR	5.71E+03
Chloromethane		NR	9.54E-01	NR	1.91E+03	NR	1.11E+00	NR	2.24E+03	NR	1.49E+00	NR	2.99E+03
Cis 1,2 Dichloroethene		1.36E+01	NR	NR	3.94E+03	2.29E+01	NR	NR	6.61E+03	4.44E+01	NR	NR	1.29E+04
Dichloromethane		9.04E+03	2.63E+02	2.57E+02	7.27E+03	9.04E+03	3.50E+02	3.39E+02	9.68E+03	9.04E+03	5.53E+02	5.26E+02	1.53E+04
Tetrachloroethene (PCE)		2.67E+04	2.45E+01	2.45E+01	4.24E+02	2.67E+04	5.49E+01	5.48E+01	9.51E+02	2.67E+04	1.26E+02	1.25E+02	2.18E+03
Trans 1,2 Dichloroethene		3.23E+04	2.07E+01	NR	3.42E+03	3.23E+04	3.74E+01	NR	6.17E+03	3.23E+04	7.63E+01	NR	1.26E+04
Trichloroethene (TCE)		7.30E-01	2.59E+00	NR	1.54E+03	1.53E+00	5.43E+00	NR	3.22E+03	3.38E+00	1.20E+01	NR	7.14E+03
Vinyl Chloride (chloroethene)		1.19E+02	1.13E+00	1.12E+00	1.36E+03	1.19E+02	1.46E+00	1.45E+00	1.76E+03	1.19E+02	2.24E+00	2.20E+00	2.69E+03
Semi-Volatile Organic Compounds													
2-Chloronaphthalene		1.53E+05	3.71E+02	3.70E+02	1.14E+02	1.53E+05	9.07E+02	9.02E+02	2.80E+02	1.53E+05	2.13E+03	2.10E+03	6.69E+02
Acenaphthene		1.10E+05	2.75E+06	1.06E+05	5.70E+01	1.10E+05	5.38E+06	1.08E+05	1.41E+02	1.10E+05	8.83E+06	1.08E+05	3.36E+02

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL



Table 3

Human health generic assessment criteria by pathway for commercial scenario

Compound	Notes	SAC appropriate to pathway SOM 1% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 2.5% (mg/kg)			Soil saturation limit (mg/kg)	SAC appropriate to pathway SOM 6% (mg/kg)			Soil saturation limit (mg/kg)
		Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Acenaphthylene		1.10E+05	2.68E+06	1.05E+05	8.61E+01	1.10E+05	5.23E+06	1.07E+05	2.12E+02	1.10E+05	8.65E+06	1.08E+05	5.06E+02
Anthracene		5.49E+05	1.13E+07	5.23E+05	1.17E+00	5.49E+05	2.35E+07	5.36E+05	2.91E+00	5.49E+05	4.13E+07	5.42E+05	6.96E+00
Benzo(a)anthracene		2.84E+02	4.08E+02	1.67E+02	1.71E+00	2.84E+02	4.47E+02	1.74E+02	4.28E+00	2.84E+02	4.67E+02	1.76E+02	1.03E+01
Benzo(a)pyrene	(a)	7.68E+01	2.04E+02	5.58E+01	9.11E-01	7.68E+01	2.09E+02	5.61E+01	2.28E+00	7.68E+01	2.11E+02	5.63E+01	5.46E+00
Benzo(b)fluoranthene		7.13E+01	1.17E+02	4.43E+01	1.22E+00	7.13E+01	1.20E+02	4.47E+01	3.04E+00	7.13E+01	1.21E+02	4.49E+01	7.29E+00
Benzo(g,h,i)perylene		6.29E+03	1.05E+04	3.93E+03	1.54E-02	6.29E+03	1.06E+04	3.95E+03	3.85E-02	6.29E+03	1.07E+04	3.96E+03	9.23E-02
Benzo(k)fluoranthene		1.88E+03	3.11E+03	1.17E+03	6.87E-01	1.88E+03	3.17E+03	1.18E+03	1.72E+00	1.88E+03	3.21E+03	1.19E+03	4.12E+00
Chrysene		5.67E+02	8.89E+02	3.46E+02	4.40E-01	5.67E+02	9.25E+02	3.52E+02	1.10E+00	5.67E+02	9.47E+02	3.55E+02	2.64E+00
Dibenzo(a,h)anthracene		5.67E+00	9.32E+00	3.53E+00	3.93E-03	5.67E+00	9.52E+00	3.55E+00	9.82E-03	5.67E+00	9.64E+00	3.57E+00	2.36E-02
Fluoranthene		2.29E+04	1.89E+06	2.26E+04	1.89E+01	2.29E+04	2.72E+06	2.27E+04	4.73E+01	2.29E+04	3.32E+06	2.27E+04	1.13E+02
Fluorene		7.31E+04	4.55E+05	6.30E+04	3.09E+01	7.31E+04	1.06E+06	6.84E+04	7.65E+01	7.31E+04	2.24E+06	7.08E+04	1.83E+02
Hexachloroethane		2.09E+01	NR	NR	8.17E+00	4.98E+01	NR	NR	2.01E+01	1.11E+02	NR	NR	4.81E+01
Indeno(1,2,3-cd)pyrene		8.10E+02	1.31E+03	5.01E+02	6.13E-02	8.10E+02	1.35E+03	5.06E+02	1.53E-01	8.10E+02	1.37E+03	5.09E+02	3.68E-01
Naphthalene		3.64E+04	1.87E+03	1.78E+03	7.64E+01	3.64E+04	4.39E+03	3.92E+03	1.83E+02	3.64E+04	9.94E+03	7.81E+03	4.32E+02
Phenanthrene		2.28E+04	5.35E+05	2.19E+04	3.60E+01	2.28E+04	1.09E+06	2.24E+04	8.96E+01	2.28E+04	1.86E+06	2.25E+04	2.14E+02
Pyrene		5.49E+04	4.47E+06	5.42E+04	2.20E+00	5.49E+04	6.46E+06	5.44E+04	5.49E+00	5.49E+04	7.91E+06	5.45E+04	1.32E+01
Phenol		1.10E+06	2.65E+04	2.59E+04	2.42E+04	1.10E+06	3.04E+04	2.96E+04	3.81E+04	1.10E+06	3.46E+04	3.35E+04	7.03E+04

Total petroleum hydrocarbons

Aliphatic hydrocarbons EC5-EC6		4.77E+06	3.19E+03	3.19E+03	3.04E+02	4.77E+06	5.86E+03	5.86E+03	5.58E+02	4.77E+06	1.21E+04	1.21E+04	1.15E+03
Aliphatic hydrocarbons >EC6-EC8		4.77E+06	7.79E+03	7.78E+03	1.44E+02	4.77E+06	1.74E+04	1.74E+04	3.22E+02	4.77E+06	3.97E+04	3.96E+04	7.36E+02
Aliphatic hydrocarbons >EC8-EC10		9.53E+04	2.02E+03	2.00E+03	7.77E+01	9.53E+04	4.91E+03	4.85E+03	1.90E+02	9.53E+04	1.17E+04	1.13E+04	4.51E+02
Aliphatic hydrocarbons >EC10-EC12		9.53E+04	9.97E+03	9.69E+03	4.75E+01	9.53E+04	2.47E+04	2.29E+04	1.18E+02	9.53E+04	5.89E+04	4.73E+04	2.83E+02
Aliphatic hydrocarbons >EC12-EC16		9.53E+04	8.26E+04	5.88E+04	2.37E+01	9.53E+04	2.04E+05	8.17E+04	5.91E+01	9.53E+04	4.81E+05	9.02E+04	1.42E+02
Aliphatic hydrocarbons >EC16-EC35	(b)	1.58E+06	NR	NR	8.48E+00	1.75E+06	NR	NR	2.12E+01	1.83E+06	NR	NR	5.09E+01
Aliphatic hydrocarbons >EC35-EC44	(b)	1.58E+06	NR	NR	8.48E+00	1.75E+06	NR	NR	2.12E+01	1.83E+06	NR	NR	5.09E+01
Aromatic hydrocarbons >EC8-EC10		3.81E+04	3.55E+03	3.46E+03	6.13E+02	3.81E+04	8.66E+03	8.11E+03	1.50E+03	3.81E+04	2.05E+04	1.70E+04	3.58E+03
Aromatic hydrocarbons >EC10-EC12		3.81E+04	1.92E+04	1.62E+04	3.64E+02	3.81E+04	4.69E+04	2.79E+04	8.99E+02	3.81E+04	1.10E+05	3.42E+04	2.15E+03
Aromatic hydrocarbons >EC12-EC16		3.81E+04	2.02E+05	3.62E+04	1.69E+02	3.81E+04	4.76E+05	3.73E+04	4.19E+02	3.81E+04	1.03E+06	3.78E+04	1.00E+03
Aromatic hydrocarbons >EC16-EC21	(b)	2.82E+04	NR	NR	5.37E+01	2.83E+04	NR	NR	1.34E+02	2.84E+04	NR	NR	3.21E+02
Aromatic hydrocarbons >EC21-EC35	(b)	2.84E+04	NR	NR	4.83E+00	2.84E+04	NR	NR	1.21E+01	2.84E+04	NR	NR	2.90E+01
Aromatic hydrocarbons >EC35-EC44	(b)	2.84E+04	NR	NR	4.83E+00	2.84E+04	NR	NR	1.21E+01	2.84E+04	NR	NR	2.90E+01

Notes:

EC - equivalent carbon. GrAC - groundwater screening value. SAC - soil screening value.

The CLEA model output is colour coded depending upon whether the soil saturation limit has been exceeded.

	Calculated SAC exceeds soil saturation limit and may significantly affect the interpretation of any exceedances as the contribution of the indoor and outdoor vapour pathway to total exposure is >10%.
	Calculated SAC exceeds soil saturation limit but the exceedance will not affect the SAC significantly as the contribution of the indoor and outdoor vapour pathway to total exposure is <10%.
	Calculated SAC does not exceed the soil saturation limit.

The SAC for organic compounds are dependant upon soil organic matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58. 1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.

SAC for TPH fractions, PAHs naphthalene, acenaphthene and acenaphthylene, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway (Section 10.1.1, SR3)

(a) SAC for arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead are derived using the C4SL toxicology data.

(b) SAC for barium and selenium should not include the inhalation pathway as no expert group HCV has been derived; aliphatic and aromatic hydrocarbons >EC16 should not include inhalation pathway due to their non-volatile nature and inhalation exposure being minimal (oral, dermal and inhalation exposure is compared to the oral HCV); arsenic should only be based on oral contribution (rather than combined) owing to the relative small contribution from inhalation in accordance with the SGV report. The Oral SAC should be adopted for zinc and benzo(a)pyrene.

(c) SAC for CrIII should be based on the lower of the oral and inhalation SAC (see LQM/CIEH 2015 Section 6.8)

(d) SAC for elemental mercury, chromium VI and nickel should be based on the inhalation pathway only.

(e) SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used.

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL



Table 4
Human Health Generic Assessment Criteria for Commercial Scenario

Compound	SAC for Soil SOM 1% (mg/kg)	SAC for Soil SOM 2.5% (mg/kg)	SAC for Soil SOM 6% (mg/kg)
Metals			
Arsenic	640	640	640
Barium	22,000	22,000	22,000
Beryllium	12	12	12
Boron	240,000	240,000	240,000
Cadmium	410	410	410
Chromium (III) - trivalent	8,600	8,600	8,600
Chromium (VI) - hexavalent	49	49	49
Copper	68,000	68,000	68,000
Lead	2,300	2,300	2,300
Elemental Mercury (Hg ⁰)	15 (4)	33 (11)	58 (26)
Inorganic Mercury (Hg ²⁺)	1,120	1,120	1,120
Methyl Mercury (Hg ⁴⁺)	290 (73)	310 (142)	320
Nickel	980	980	980
Selenium	12,000	12,000	12,000
Vanadium	9,000	9,000	9,000
Zinc	740,000	740,000	740,000
Cyanide (free)	650	650	650
Volatile Organic Compounds			
Benzene	27	50	98
Toluene	56,000 (869)	107,000 (1,916)	184,000 (4,357)
Ethylbenzene	6,000 (518)	13,000 (1,216)	27,000 (2,844)
Xylene - m	6,200 (625)	14,100 (1,474)	31,200 (3,457)
Xylene - o	6,600 (478)	15,000 (1,120)	33,000 (2,618)
Xylene - p	5,900 (576)	13,600 (1,353)	30,000 (3,167)
Total xylene	5,900 (625)	13,600 (1,474)	30,000 (3,457)
Methyl tertiary-Butyl ether (MTBE)	7,500	12,100	22,400
1,1,1,2 Tetrachloroethane	110	250	560
1,1,2,2-Tetrachloroethane	270	550	1,130
1,1,1-Trichloroethane	700	1,300	3,000
1,1,2 Trichloroethane	89	180	382
1,1-Dichloroethene	24	43	87
1,2-Dichloroethane	0.67	0.97	1.65
1,2,4-Trimethylbenzene	330	640	1,040
1,3,5-Trimethylbenzene	NR	NR	NR
1,2-Dichloropropane	3	6	11
Carbon Tetrachloride (tetrachloromethane)	2.9	6.3	14.2
Chloroethane	901	1,223	1,972
Chloromethane	1.0	1.1	1.5
Cis 1,2 Dichloroethene	14	23	44
Dichloromethane	257	339	526
Tetrachloroethene (PCE)	24	55	125
Trichloroethene (TCE)	0.7	1.5	3.4
Trans 1,2 Dichloroethene	21	37	76
Vinyl Chloride (chloroethene)	1.1	1.4	2.2
Semi-Volatile Organic Compounds			
2-Chloronaphthalene	370 (114)	902 (280)	2,098 (669)
Acenaphthene	110,000	110,000	110,000
Acenaphthylene	110,000	110,000	110,000
Anthracene	520,000	540,000	540,000
Benzo(a)anthracene	170	170	180
Benzo(a)pyrene	77	77	77
Benzo(b)fluoranthene	44	45	45
Benzo(g,h,i)perylene	3,900	3,900	4,000
Benzo(k)fluoranthene	1,200	1,200	1,200
Chrysene	350	350	350
Dibenzo(a,h)anthracene	3.5	3.6	3.6
Fluoranthene	23,000	23,000	23,000
Fluorene	63,000 (31)	68,000	71,000
Hexachloroethane	21 (8)	50 (20)	111 (48)
Indeno(1,2,3-cd)pyrene	500	510	510
Naphthalene	1,800 (76)	3,900 (183)	7,800 (432)
Phenanthrene	22,000	22,000	23,000
Pyrene	54,000	54,000	54,000
Phenol	440*	690*	1,300*
Total Petroleum Hydrocarbons			
Aliphatic hydrocarbons EC ₅ -EC ₆	3,200 (304)	5,900 (558)	12,100 (1,150)
Aliphatic hydrocarbons >EC ₅ -EC ₈	7,800 (144)	17,400 (322)	39,600 (736)
Aliphatic hydrocarbons >EC ₈ -EC ₁₀	2,000 (78)	4,800 (190)	11,300 (451)
Aliphatic hydrocarbons >EC ₁₀ -EC ₁₂	9,700 (48)	22,900 (118)	47,300 (283)
Aliphatic hydrocarbons >EC ₁₂ -EC ₁₆	59,000 (24)	82,000 (59)	90,000 (142)
Aliphatic hydrocarbons >EC ₁₆ -EC ₃₅	1,000,000**	1,000,000**	1,000,000**
Aliphatic hydrocarbons >EC ₃₅ -EC ₄₄	1,000,000**	1,000,000**	1,000,000**
Aromatic hydrocarbons >EC ₅ -EC ₁₀	3,500 (613)	8,100 (1,503)	17,000 (3,580)
Aromatic hydrocarbons >EC ₁₀ -EC ₁₂	16,000 (364)	28,000 (899)	34,000 (2,150)
Aromatic hydrocarbons >EC ₁₂ -EC ₁₆	36,000 (169)	37,000	38,000
Aromatic hydrocarbons >EC ₁₆ -EC ₂₁	28,000	28,000	28,000
Aromatic hydrocarbons >EC ₂₁ -EC ₃₅	28,000	28,000	28,000
Aromatic hydrocarbons >EC ₃₅ -EC ₄₄	28,000	28,000	28,000
Minerals			
Asbestos	Stage 1 test – No asbestos detected with ID; Stage 2 test - <0.001% dry weight (exceedance of either equates to an exceedance of the GAC) ¹		
Notes:			
* Generic assessment criteria not calculated owing to low volatility of substance and therefore no pathway, or an absence of toxicological data.			
NR - SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used			
EC - equivalent carbon. GRAC - groundwater assessment criteria. SAC - soil assessment criteria.			
* The GAC for Phenol is based on a threshold which is protective of direct contact (SC050021/Phenol SGV report)			
** Denoted SAC calculated exceeds 100% contaminant, hence 100% (1,000,000mg/kg) has been taken as SAC			
The SAC for organic compounds are dependent on Soil Organic Matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58. 1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.			
SAC for TPH fractions, PAHs naphthalene, acenaphthene and acenaphthylene, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway, section 10.1.1, SR3.			
(VALUE IN BRACKETS)			
RSK has adopted an approach for petroleum hydrocarbons in accordance with LQM/CIEH whereby the concentration modelled for each petroleum hydrocarbon fraction has been tabulated as the SAC with the corresponding solubility or vapour saturation limits given in brackets.			

Appendix E

GQRA DATA SCREENING ASSESSMENT

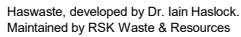
Project name	Nuralite Industrial Estate	Notes	
Project code	253249		
Client name	LEJ Properties Ltd		
Address	Canal Road Rochester ME3 7JA		
NGR	570295E, 173837N		
Land use	Public Open Space public park		
SOM	6%		
GAC version	2021_00		

		Lab sample ID		25/07538/1	25/07538/2	25/07538/3	25/07538/4	25/07538/5	25/07538/6	25/07538/7	25/07538/8	25/07538/9	25/07538/10				
		Client sample ID		SS01	SS02	SS03	SS04	SS05	SS06	SS07	SS08	SS09	SS10				
		Depth to top															
		Depth to bottom															
		Date sampled		09/07/25	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25				
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects									
Metals and Inorganics																	
Arsenic	mg/kg	170		9	<1	5	4	1	9	<1		4	5	5			
Cadmium	mg/kg	880			<1.0	5	0	5	<1.0	<1.0		<1.0		<1.0			
Chromium	mg/kg	33000	250	26	11	5	5	0	19	15		11	26	12			
Chromium (hexavalent)	mg/kg	250			<1	5	0	5	<1	<1		<1		<1			
Copper	mg/kg	44000		80	14	5	5	0	80	19		14	45	32			
Lead	mg/kg	1300		164	18	5	5	0	56	18		20	90	164			
Mercury	mg/kg	240	30		<0.17	5	0	5	<0.17	<0.17		<0.17		<0.17			
Nickel	mg/kg	800		20	5	5	5	0	20	5		6	18	13			
Selenium	mg/kg	1800		5	<1	5	3	2	5	<1		<1	3	2			
Zinc	mg/kg	173000		482	38	5	5	0	482	38		55	194	178			
Cyanide (free)	mg/kg	170	24		<1	5	0	5	<1	<1		<1		<1			
Cyanide (total)	mg/kg		24		<1	5	0	5	<1	<1		<1		<1			
Asbestos																	
Asbestos in soil		Detect				10	1	9	NAD	NAD	Chrysotile & A	NAD	NAD	NAD			
Asbestos Matrix (microscope)		Detect				10	1	9	-	-	Loose Fibres	-	-	-			
Asbestos in soil % composition (hand picking and weighing)	% w/w	0.001		0.001	0.001	1	1	0			0.001						
Petroleum Hydrocarbons																	
Ali >C5-C6	mg/kg	180000	1150		<0.01	5	0	5	<0.01	<0.01		<0.01		<0.05			
Ali >C6-C8	mg/kg	320000	736	0.14	<0.01	5	1	4	0.14	<0.01		<0.01		<0.05			
Ali >C8-C10	mg/kg	21000	451		<10	5	0	5	<10	<10		<10		<10			
Ali >C10-C12	mg/kg	24000	283		<10	5	0	5	<10	<10		<10		<10			
Ali >C12-C16	mg/kg	26000	142		<10	5	0	5	<10	<10		<10		<10			
Ali >C16-C21	mg/kg				<10	5	0	5	<10	<10		<10		<10			
Ali >C21-C35	mg/kg			332	<10	5	3	2	173	151		<10		332			
Ali >C16-C35 calculated	mg/kg	490000		332	<10	5	3	2	173	151		<10		332			
Total Aliphatics	mg/kg			332	<10	5	3	2	173	151		<10		332			
Aro >C5-C7	mg/kg				<0.01	5	0	5	<0.01	<0.01		<0.01		<0.05			
Aro >C7-C8	mg/kg				<0.01	5	0	5	<0.01	<0.01		<0.01		<0.05			
Aro >C8-C10	mg/kg	9300	3580		<10	5	0	5	<10	<10		<10		<10			
Aro >C10-C12	mg/kg	10000			<10	5	0	5	<10	<10		<10		<10			
Aro >C12-C16	mg/kg	10400			<10	5	0	5	<10	<10		<10		<10			
Aro >C16-C21	mg/kg	7800			<10	5	0	5	<10	<10		<10		<10			
Aro >C21-C35	mg/kg	7900		144	<10	5	3	2	144	130		<10		128			
Total Aromatics	mg/kg			144	<10	5	3	2	144	130		<10		128			
TPH (Ali & Aro)	mg/kg			460	<10	5	3	2	317	282		<10		460			
BTEX - Benzene	mg/kg	230			<0.01	5	0	5	<0.01	<0.01		<0.01		<0.05			
BTEX - Toluene	mg/kg	100000	4357		<0.01	5	0	5	<0.01	<0.01		<0.01		<0.05			
BTEX - Ethyl Benzene	mg/kg	27000	2844		<0.01	5	0	5	<0.01	<0.01		<0.01		<0.05			

									Lab sample ID	25/07538/1	25/07538/2	25/07538/3	25/07538/4	25/07538/5	25/07538/6	25/07538/7	25/07538/8	25/07538/9	25/07538/10
									Client sample ID	SS01	SS02	SS03	SS04	SS05	SS06	SS07	SS08	SS09	SS10
									Depth to top										
									Depth to bottom										
									Date sampled	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25	09/07/25
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects											
BTEX - o Xylene	mg/kg	33000	2618		<0.01	5	0	5	<0.01		<0.01		<0.01		<0.01		<0.05		
BTEX - m & p Xylene	mg/kg	31000	3167		<0.01	5	0	5	<0.01		<0.01		<0.01		<0.01		<0.05		
Fuel oxygenates																			
MTBE	mg/kg	117400	62700		<0.01	5	0	5	<0.01		<0.01		<0.01		<0.01		<0.05		
Polycyclic aromatic hydrocarbons																			
Acenaphthene	mg/kg	30000			<0.01	5	0	5	<0.01		<0.01		<0.01		<0.01		<0.01		
Acenaphthylene	mg/kg	30000			<0.01	5	0	5	<0.01		<0.01		<0.01		<0.01		<0.01		
Anthracene	mg/kg	152000			<0.02	5	0	5	<0.02		<0.02		<0.02		<0.02		<0.02		
Benzo(a)anthracene	mg/kg	62			<0.04	5	0	5	<0.04		<0.04		<0.04		<0.04		<0.04		
Benzo(a)pyrene	mg/kg	21			<0.04	5	0	5	<0.04		<0.04		<0.04		<0.04		<0.04		
Benzo(b)fluoranthene	mg/kg	16			<0.05	5	0	5	<0.05		<0.05		<0.05		<0.05		<0.05		
Benzo(ghi)perylene	mg/kg	1570			<0.05	5	0	5	<0.05		<0.05		<0.05		<0.05		<0.05		
Benzo(k)fluoranthene	mg/kg	442			<0.07	5	0	5	<0.07		<0.07		<0.07		<0.07		<0.07		
Chrysene	mg/kg	121			<0.06	5	0	5	<0.06		<0.06		<0.06		<0.06		<0.06		
Dibenzo(ah)anthracene	mg/kg	1.4			<0.04	5	0	5	<0.04		<0.04		<0.04		<0.04		<0.04		
Fluoranthene	mg/kg	6400			<0.08	5	0	5	<0.08		<0.08		<0.08		<0.08		<0.08		
Fluorene	mg/kg	20100			<0.01	5	0	5	<0.01		<0.01		<0.01		<0.01		<0.01		
Indeno(123-cd)pyrene	mg/kg	183			<0.03	5	0	5	<0.03		<0.03		<0.03		<0.03		<0.03		
Naphthalene	mg/kg	3000			<0.03	5	0	5	<0.03		<0.03		<0.03		<0.03		<0.03		
Phenanthrene	mg/kg	6300			<0.03	5	0	5	<0.03		<0.03		<0.03		<0.03		<0.03		
Pyrene	mg/kg	15000			<0.07	5	0	5	<0.07		<0.07		<0.07		<0.07		<0.07		
Total PAH-16MS	mg/kg				<0.08	5	0	5	<0.08		<0.08		<0.08		<0.08		<0.08		
Other analytes																			
% Stones >10mm	% w/w			0.3	<0.1	5	2	3	<0.1		<0.1		<0.1			0.2		0.3	
pH	pH			7.84	7.04	5	5	0	7.04			7.67		7.84		7.39		7.51	
Sulphate (acid soluble)	mg/kg			17000	1600	5	5	0	11000			1600		4400		11000		17000	
Sulphate (water sol 2:1)	g/l			3.77	0.18	5	5	0	1.29			0.18		0.24		0.2		3.77	
Total Organic Carbon	% w/w			32	3.03	5	5	0	32			3.03		23.6		29.8		30.4	
Converted to SOM (x / 0.58)	% w/w			55.17241	5.224138	5	5	0	55.1724138			5.22413793		40.6896552		51.3793103		52.4137931	

Appendix F

HASWASTE WM3 WASTE ASSESSMENT

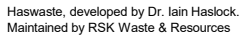


Chemical Testing Laboratory and Report Ref(s):
Envirolab ref. 25/07538

Sample Reference
Depth (m)
Envirolab reference

% Moisture	%
pH (soil)	
pH (leachate)	
Arsenic	mg/kg
Cadmium	mg/kg
Copper	mg/kg
CrVI or Chromium	mg/kg
Lead	mg/kg
Mercury	mg/kg
Nickel	mg/kg
Selenium	mg/kg
Zinc	mg/kg
Barium	mg/kg
Beryllium	mg/kg
Vanadium	mg/kg
Cobalt	mg/kg
Manganese	mg/kg
Molybdenum	mg/kg
Antimony	mg/kg
Aluminum	mg/kg
Bismuth	mg/kg
CrIII	mg/kg
Iron	mg/kg
Strontium	mg/kg
Tellurium	mg/kg
Thallium	mg/kg
Titanium	mg/kg
Tungsten	mg/kg
Ammoniacal N	mg/kg
As Boron	mg/kg

[illegible][illegible][illegible]



Assessment Undertaken by:	Michael Lawson	RSK Project Reference	253249
Assessment Checked by:	Rowan Brown	Site Reference	Nuralite

Chemical Testing Laboratory and Report Ref(s):
Envirolab ref. 25/07538

Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

Sample Reference
Depth (m)
Envirolab reference

SS01	SS02	SS03	SS04	SS05	SS06	SS07	SS08	SS09	SS10
25/07538/1	25/07538/2	25/07538/3	25/07538/4	25/07538/5	25/07538/6	25/07538/7	25/07538/8	25/07538/9	25/07538/10

Cyanide/Sulfur compounds:

Total Sulphide	mg/kg
Complex Cyanide	mg/kg
Free (or Total) Cyanide	mg/kg
Thiocyanate	mg/kg
Elemental/Free Sulphur	mg/kg

[illegible]

Phenols Input Total Phenols HPLC **OR** individual Phenol results.

Phenol	mg/kg
Cresols	mg/kg
Xylenols	mg/kg
Resorcinol	mg/kg
Phenols Total by HPLC	mg/kg

[illegible]

BTEX Input Total BTEX OR individual BTEX results.

BTEX input Total BTEX OR individual BTEX results.	
Benzene	mg/kg
Toluene	mg/kg
Ethylbenzene	mg/kg
Xylenes	mg/kg
Total BTEX	mg/kg

[illegible]

PCBs (POPs)

PCBs Total (eg EC7/WHO12)	mg/kg
---------------------------	-------

[illegible]

PBBs (POPs)

Hexabromobiphenyl (Total or PBB153; 2,2',4,4',5,5'- if only available)	mg/kg

[illegible]

PFOS (POPs)

PFOS and PFOS derivatives	mg/kg
PFOS	0.0001
PFOS derivatives	0.0001

[illegible]

PBDEs (POPs)

PBDEs (sum of concentrations):[illegible]

POPs Dioxins and Furans Input Total Dioxins and Furans OR individual Dioxin and Furan results.

2,3,7,8-TeCCD	mg/kg
1,2,3,7,8-PeCDD	mg/kg
1,2,3,4,7,8-HxCDD	mg/kg
1,2,3,6,7,8-HxCDD	mg/kg
1,2,3,7,8,9-HxCDD	mg/kg
1,2,3,4,6,7,8-HpCDD	mg/kg
OCDD	mg/kg
2,3,7,8-TeCDF	mg/kg
1,2,3,7,8-PeCDF	mg/kg
2,3,4,7,8-PeCDF	mg/kg
1,2,3,4,7,8-HxCDF	mg/kg
1,2,3,6,7,8-HxCDF	mg/kg
2,3,4,6,7,8-HxCDF	mg/kg
1,2,3,7,8,9-HxCDF	mg/kg
1,2,3,4,6,7,8-HpCDF	mg/kg
1,2,3,4,7,8,9-HpCDF	mg/kg
OCDF	mg/kg
Total Dioxins and Furans	mg/kg

[illegible]



Haswaste, developed by Dr. Iain Haslock.
Maintained by RSK Waste & Resources

Assessment Undertaken by:	Michael Lawson	RSK Project Reference	253249
Assessment Checked by:	Rowan Brown	Site Reference	Nuralite

Chemical Testing Laboratory and Report Ref(s):

Envirolab ref. 25/07538

Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

Sample Reference
Depth (m)
Envirolab reference

SS01	SS02	SS03	SS04	SS05	SS06	SS07	SS08	SS09	SS10
25/07538/1	25/07538/2	25/07538/3	25/07538/4	25/07538/5	25/07538/6	25/07538/7	25/07538/8	25/07538/9	25/07538/10

Some Pesticides (POPs unless otherwise stated)

Aldrin	mg/kg
α Hexachlorocyclohexane (alpha-HCH) (leave empty if total HCH results used)	mg/kg
β Hexachlorocyclohexane (beta-HCH) (leave empty if total HCH results used)	mg/kg
α Cis-Chlordane (alpha) OR Total Chlordane	mg/kg
δ Hexachlorocyclohexane (delta-HCH) (leave empty if total HCH results used)	mg/kg
Dieldrin	mg/kg
Endrin	mg/kg
γ Hexachlorocyclohexane (gamma-HCH) (lindane) OR Total HCH	mg/kg
Heptachlor	mg/kg
Hexachlorobenzene	mg/kg
o,p'-DDT (leave empty if total DDT results used)	mg/kg
p,p'-DDT OR Total DDT	mg/kg
γ Trans-Chlordane (gamma) (leave empty if total Chlordane results used)	mg/kg
Chlordecone (kepone)	mg/kg
Pentachlorobenzene	mg/kg
Mirex	mg/kg
Toxaphene (camphechlor)	mg/kg

Tin	
Tin (leave empty if Organotin and Tin excl Organotin results used)	mg/kg

--	--	--	--	--	--	--	--	--	--

Organotin	
Dibutyltin; DiBT	mg/kg
Tributyltin; TriBT	mg/kg
Triphenyltin; TriPT	mg/kg
Tetrabutyltin; TeBT	mg/kg

Tin excluding Organotin	
Tin excl Organotin	mg/kg

--	--	--	--	--	--	--	--	--	--

Asbestos in Soil	
Asbestos detected in Soil (enter Y or N)	

N	N	N	Y	N	N	N	N	N	N
---	---	---	---	---	---	---	---	---	---

Asbestos % Composition in Soil (Matrix Loose Fibres or Microscopic Identifiable Pieces only)	
--	--

			0.001						
--	--	--	-------	--	--	--	--	--	--

Carcinogenic HP7 % Asbestos in Soil (fibres or micro pieces)	
Please be advised, if the calculation cell is "0.00000" DOES NOT MEAN asbestos testing has been undertaken and the result is zero.	

0.00000	0.00000	0.00000	0.00100	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
---------	---------	---------	---------	---------	---------	---------	---------	---------	---------

If Asbestos in Soil above is "Y", but Asbestos % above is "<0.1%", the soil is Non Hazardous Waste. You can only use Asbestos % results where loose fibres or micro pieces are only present. You cannot use Asbestos % results when visual identifiable pieces are present.

Asbestos Identifiable Pieces visible with the naked eye detected in the Soil (enter Y or N)	
---	--

N	N	N	N	N	N	N	N	N	N
---	---	---	---	---	---	---	---	---	---

If visual identifiable pieces of asbestos are present, you cannot use Asbestos % results and the whole soil sample is Hazardous Waste HP5 and HP7 Construction material containing Asbestos 17 06 05. Therefore, if Asbestos in Soil above is "Y", the Asbestos % above is "<0.1%", but the Asbestos Identifiable Pieces visible with the naked eye is "Y", the soil is Hazardous Waste.

Identifiable Pieces are Cement, Fragments, Board, Rope etc. ie anything ACM that is not Loose Fibres.

All visual asbestos pieces need to be removed leaving only fibres (or micro pieces) with an Asbestos % Composition in Soil result of <0.1% for the soil to become non-hazardous waste.



Haswaste, developed by Dr. Iain Haslock.
Maintained by RSK Waste & Resources

Assessment Undertaken by:	Michael Lawson	RSK Project Reference	253249
Assessment Checked by:	Rowan Brown	Site Reference	Nuralite

Chemical Testing Laboratory and Report Ref(s):

Envirolab ref. 25/07538

Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

Sample Reference
Depth (m)
Envirolab reference

SS01	SS02	SS03	SS04	SS05	SS06	SS07	SS08	SS09	SS10
25/07538/1	25/07538/2	25/07538/3	25/07538/4	25/07538/5	25/07538/6	25/07538/7	25/07538/8	25/07538/9	25/07538/10

Hazardous Property Waste Assessment Output

Hazardous Property Waste Assessment Output

Hazardous Property	Cut Off Value
Corrosive HP8	<1%
Irritant HP4	<1%
Irritant HP4	<1%
Specific Target Organ Toxicity HP5	
Specific Target Organ Toxicity HP5	
Specific Target Organ Toxicity HP5	
Specific Target Organ Toxicity HP5	
Specific Target Organ Toxicity HP5	
Specific Target Organ Toxicity HP5	
Aspiration Toxicity HP5	
Acute Toxicity HP6 (Oral)	<0.1%
Acute Toxicity HP6 (Oral)	<0.1%
Acute Toxicity HP6 (Oral)	<1%
Acute Toxicity HP6 (Dermal)	<0.1%
Acute Toxicity HP6 (Dermal)	<0.1%
Acute Toxicity HP6 (Dermal)	<0.1%
Acute Toxicity HP6 (Dermal)	<1%
Acute Toxicity HP6 (Inhal)	<0.1%
Acute Toxicity HP6 (Inhal)	<0.1%
Acute Toxicity HP6 (Inhal)	<0.1%
Carcinogenic HP7	
Carcinogenic HP7	
Carcinogenic HP7 Unknown TPH with ID	
Carcinogenic HP7 b(a)p marker test (Unknown TPH with ID only) Cell only applicable if TPH >1,000mg/kg	
pH Corrosive HP8 pH (soil or leachate)	
pH Corrosive HP8 pH (soil or leachate)	
Toxic for Reproduction HP10	
Toxic for Reproduction HP10	
Mutagenic HP11	
Mutagenic HP11 Unknown TPH with ID	
Mutagenic HP11 b(a)p marker test (Unknown TPH with ID only) Cell only applicable if TPH >1,000mg/kg	
Mutagenic HP11	
Produces Toxic Gases HP12 Sulphide	
Produces Toxic Gases HP12 Cyanide	
Produces Toxic Gases HP12 Thiocyanate	
HP13 Sensitising	

If cells below turn yellow and the text turns red, the samples should be classified as Hazardous Waste.									
0.00138	0.00000	0.00032	0.00000	0.00072	0.00000	0.00085	0.00000	0.00085	0
0.00904	0.00000	0.00215	0.00000	0.00158	0.00000	0.00509	0.00000	0.00362	0
0.00405	0.00000	0.00102	0.00000	0.00123	0.00000	0.00365	0.00000	0.00265	0
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0
0.00001	0.00000	0.00001	0.00000	0.00001	0.00000	0.00001	0.00000	0.00001	0.00000
0.00001	0.00000	0.00001	0.00000	0.00001	0.00000	0.00001	0.00000	0.00001	0.00000
0.00404	0.00000	0.00101	0.00100	0.00121	0.00000	0.00364	0.00000	0.00263	0.00000
0.03170	0.00000	0.02820	0.00000	0.00200	0.00000	0.00900	0.00000	0.04600	0.00000
0.03170	0.00000	0.02820	0.00000	0.00100	0.00000	0.00100	0.00000	0.04602	0.00000
0.00121	0.00000	0.00015	0.00000	0.00055	0.00000	0.00068	0.00000	0.00068	0.00000
0.00090	0.00000	0.00033	0.00000	0.00033	0.00000	0.00062	0.00000	0.00047	0.00000
0.01879	0.00000	0.00507	0.00000	0.00491	0.00000	0.01784	0.00000	0.02276	0.00000
0.00002	0.00000	0.00002	0.00000	0.00002	0.00000	0.00002	0.00000	0.00002	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00019	0.00000	0.00019	0.00000	0.00019	0.00000	0.00019	0.00000	0.00019	0.00000
0.00010	0.00000	0.00010	0.00000	0.00010	0.00000	0.00010	0.00000	0.00011	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00021	0.00000	0.00021	0.00000	0.00021	0.00000	0.00021	0.00000	0.00021	0.00000
0.00071	0.00000	0.00014	0.00000	0.00014	0.00000	0.00042	0.00000	0.00028	0.00000
0.01878	0.00000	0.00506	0.00000	0.00490	0.00000	0.01782	0.00000	0.02275	0.00000
0.03170	0.00000	0.02820	0.00000	0.00200	0.00000	0.00900	0.00000	0.04600	0.00000
0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
7.04	0.00	7.67	0.00	7.84	0.00	7.39	0.00	7.51	0.00
7.04	0.00	7.67	0.00	7.84	0.00	7.39	0.00	7.51	0.00
0.00560	0.00000	0.00180	0.00000	0.00200	0.00000	0.00900	0.00000	0.01640	0.00000
0.03170	0.00000	0.02820	0.00000	0.00100	0.00000	0.00100	0.00000	0.04600	0.00000
0.03170	0.00000	0.02820	0.00000	0.00100	0.00000	0.00100	0.00000	0.04600	0.00000
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0.00404	0.00000	0.00101	0.00000	0.00121	0.00000	0.00364	0.00000	0.00263	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00404	0.00000	0.00101	0.00000	0.00121	0.00000	0.00364	0.00000	0.00263	0.00000



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Assessment Undertaken by:	Michael Lawson	RSK Project Reference	253249
Assessment Checked by:	Rowan Brown	Site Reference	Nuralite

Chemical Testing Laboratory and Report Ref(s):

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Ecotoxic HP14 amended v6	<0.1%
Ecotoxic HP14 amended v6	<0.1% / 1.0%
Ecotoxic HP14 amended v6	<0.1% / 1.0%

0.08119	0.00000	0.01034	0.00000	0.01270	0.00000	0.04342	0.00000	0.04620	0.00000
0.113	0.000	0.039	0.000	0.014	0.000	0.044	0.000	0.092	0.000
8.436	0.000	1.316	0.000	1.280	0.000	4.352	0.000	5.080	0.000

Persistent Organic Pollutant (PCB, PBB, PFOS, & POP Pesticides)
Persistent Organic Pollutant (Total sum of PDBEs)
Persistent Organic Pollutant (Total Dioxins+Furans)
Persistent Organic Pollutant (Individual Dioxins+Furans)

0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000	0.00000000
0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000
0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000	0.0000000000

If other contaminants need adding to Haswaste, please contact RSK Waste and Resources