# MANCHESTER VELODROME

# PHASE 2 GEO-ENVIRONMENTAL INVESTIGATION, RISK ASSESSMENT AND REMEDIATION STRATEGY

**Job Number:** LKC 20 1527
**Date:** June 2021
**Client:** ISG



INCREASING LAND VALUE

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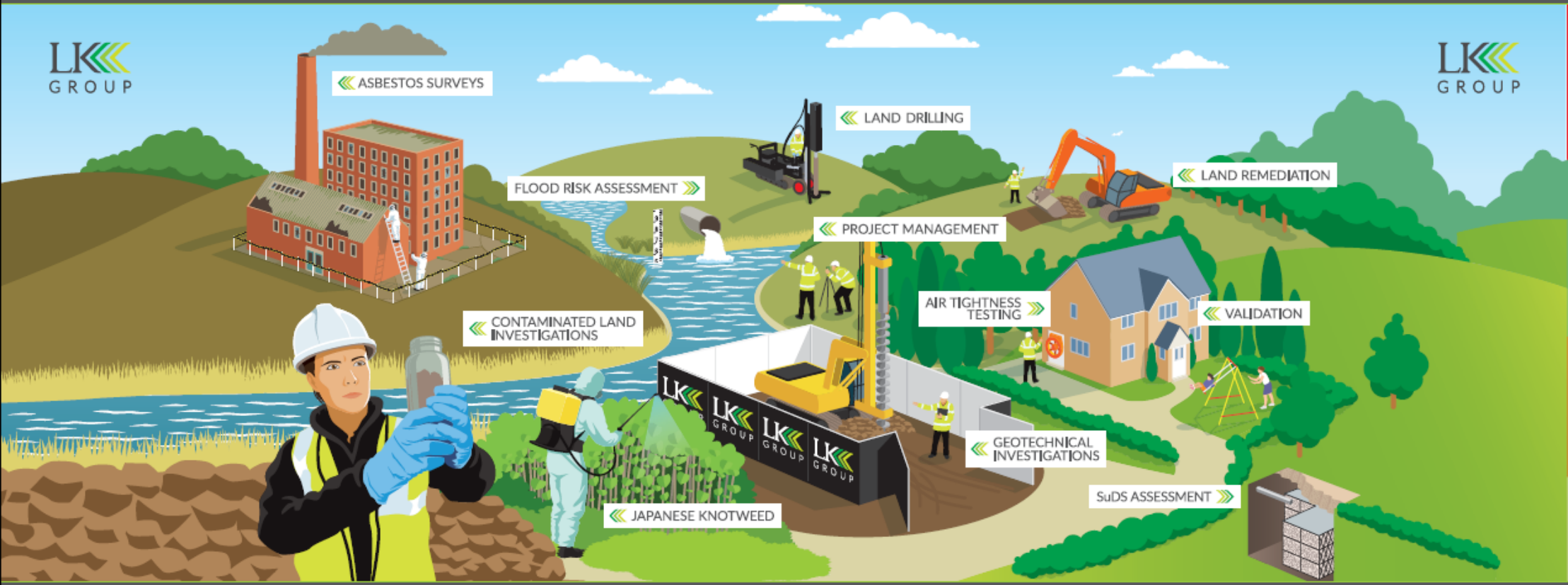
# INCREASING LAND VALUE

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| LK Consult<br>Document Verification | | | |
|---|---|---|---|
| **Site Address** | Manchester Velodrome (Plant Room), National Cycling Centre, Stuart Street Manchester, M11 4DQ | | |
| **Report Title** | Final Phase 2 Geo-Environmental Investigation, Risk Assessment and Remediation Strategy | | |
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# EXECUTIVE SUMMARY

## Site Details

| | |
|---|---|
| Site Location: | East end of Stuart Street, land adjacent to the north of the velodrome at the National Cycling Centre, Manchester, M11 4DQ.<br>Centred at approximate National Grid Reference 387350E, 398840N. |
| Site Area: | 1000m$^2$ |
| Current Land Use: | Service, storage and parking area. |
| Proposed Development: | Plant Room. |
| Purpose of Report: | Contamination and Geotechnical Assessment. |

## Preliminary Risk Assessment

| | |
|---|---|
| PRA Details: | Undertaken by LKC in October 2020. Ref: LKC 20 1527 |
| History: | Pond (1848 only), Electricity Generating Station (1908 to 1987), chimney (1908-1987) parking / stores |
| Geology / Hydrogeology: | Made ground mapped across the entire site. Glacial Till (Secondary Undifferentiated Aquifer) over Pennine Upper Coal Measures (Secondary A Aquifer). |
| Mining: | Within a Development High Risk Area, a shallow coal mining investigation has been carried out and issued under a separate cover. |
| Preliminary Conceptual Model:<br><br>PL=Pollutant Linkage | PL1 Direct Contact (Human Health): No Risk – entire site to be Hardstood.<br>PL2 Inhalation of Vapours: Low to Moderate Risk (volatile contaminants).<br>PL3 Gas: Low Risk (hazardous and ground gas).<br>PL4 Controlled waters: Low to Moderate Risk (mobile contaminants).<br>PL5 Sulphate Attack: Moderate Risk (sulphate).<br>PL6 Water Pipelines: No Risk – no potable water pipe to be included. |
| Recommendations: | Site Investigation was recommended to further assess all the above pollutant linkages. |

## Ground Investigation Work Undertaken

| | |
|---|---|
| Date of Investigation: | 4$^{th}$ to 7$^{th}$ May 2020 |
| Intrusive Investigation Work Undertaken: | 4no. cable percussion borehole (CP101-CP104).<br>4no. rotary open hole boreholes (RBH101A, RBH101B-RBH103).<br>3no. hand excavated foundation pits (FP101-FP103).<br>1no. hand excavated trial pit (HD101). |
| Soil Sampling: | 2no. samples tested for metals, speciated PAHs, pH, sulphate, asbestos and SOM.<br>2no. samples tested for metals, speciated PAHs, cyanide, pH, sulphate, asbestos, phenol, TPHCWG, BTEX, and SOM.<br>2no. samples 2 Stage WAC. |
| Insitu and Laboratory Geotechnical Testing: | SPTs |
| Other Work: | 3no. rotary open hole boreholes carried out as part of the investigation into shallow coal mining. |

## Geotechnical Summary

| | |
|---|---|
| **Proposed Development** | - A steel framed 'plant room' construction adjacent to the existing Manchester Velodrome.<br>- The new structure is positioned around the 'thrust blocks' which form a significant part of the velodromes foundations. |
| **General Ground conditions / Geotechnical Testing** | - Based on CP101-CP104, RBH101A, RBH101B-RBH104 and FP101-FP103 (location of extension).<br>- Maximum investigation depth 6.30mbgl.<br>- Natural ground not encountered. All boreholes terminated on thick re-enforced concrete slab.<br>- All made ground encountered is granular in nature and generally comprises brick, concrete, limestone and mudstone.<br>- Concrete slab(s) encountered across site thought to be related to the former electricity works, likely to include significant reinforcement and could not be penetrated by cable or rotary drilling.<br>- 2 hours chiselling was carried out in each cable borehole before termination.<br>- No bedrock encountered.<br>- No groundwater encountered, water encountered above the concrete slab unlikely to be a true representation of groundwater. |
| **Exposed Existing Foundations** | - FP102 carried out adjacent to the brick wall of the existing velodrome. The brickwork appears to be on a concrete foundation at approximately 0.9mbgl. The foundation was noted to be the same width externally as the brickwork.<br>- FP101 and FP103 carried out adjacent to the concrete thrust blocks were extended to 1.2mbgl in made ground. The sides of the thrust blocks exposed were smooth and no foundation was encountered.<br>- HD101 carried out through the block paving to examine the ground below recorded a granular 'subbase' to 0.3mblg over granular made ground.<br>- Plans provided since the SI indicate that each of the thrust blocks is constructed over a 2.1m and 1.5m diameter pile. |
| **Allowable Bearing Pressure** | Based on SPT 'N' values the granular made ground is likely to be at least medium dense which would indicate a presumed bearing value in excess of 200kN/m$^2$ from 1.2mbgl. While limited variation were observed on site it should be noted that by its nature made ground can be inherently variable therefore there may be locations where lower density, poorly compacted ground may be present. This should be accounted for when designing suitable foundations. |
| **Anticipated Foundation Type** | - Based on the ground conditions encountered and the type of development proposed it may be possible to found within the made ground or to found the proposed new build on the concrete slab(s) present from 2.6-4.8mbgl.<br>- Depending on the loading of the proposed structure pad foundations set within the shallow made ground may be appropriate, alternatively;<br>- If the foundation load were to be transferred to the concrete slab then it is likely that a piled foundation solution would be acceptable.<br>-A suitably qualified structural engineer should be consulted for final foundation design. |
| **Concrete Requirements** | - Based on BRE Digest 2005[1] – DS-1 AC-1 recommended. |
| **Services** | - Services – consideration to the presence of services running through the site. Services may need to re-routed. |
| **Coal Mining** | - A shallow mining investigation has been carried out and issued under separate cover.<br>- The conclusions of the shallow mining investigation report are that no remediation is required with regards to shallow coal mining.. |
| **Temporary support of excavation** | -May be required; however, foundation pits were generally recorded as stable. |

[1] BRE (2005)."Concrete in Aggressive Ground." Special Digest 1.

## Contamination Risk Assessment

The table below shows a summary of the risk assessments undertaken for each pollutant linkage, the revised conceptual model and recommendation for either remediation and / or further investigation.

| Pollutant Linkage | | Risk | Recommendations |
|---|---|---|---|
| 1 | Contaminants posing a risk to site users via dermal contact, ingestion and inhalation (of soil, dust, fibres and vegetables). | **N/A** | - Entire site is below the footprint of the proposed building therefore no direct contact PL will exist. |
| 2 | Volatile contaminants posing a risk to site users via the inhalation of vapours. | **Low** | - No evidence of volatile contaminants identified.<br>- **Recommendations:** No further assessment required. |
| 3 | Gas posing a risk to buildings and site users via the migration of gas into building causing explosion and asphyxiation. | Moderate / **Low** | - Low gas risk due to known ground conditions (inert made ground over a concrete slab) and design of proposed development.<br>- **Recommendations:** No remediation required. |
| 4 | Mobile contamination posing a risk to controlled waters via the migration through permeable strata. | **Low** | - No elevated potentially mobile contaminants identified (material appears inert).<br>- **Recommendations:** No remediation required. |
| 5 | Sulphate posing a risk to building via direct contact (sulphate attack). | **Low** | - No elevated sulphate identified.<br>- **Recommendations:** Concrete meeting specification DS1-AS1 recommended. |
| 6 | Organic contaminants posing a risk to water pipes. | **N/A** | - No new potable water supply is anticipated as part of the new development therefore no pollutant linkage will exist. |

## Recommendations and Remedial Strategy

The table below shows the remediation and validation requirements for the site. This information should be documented in a Site Completion Report for submission to the local authority.

| Phase | PL | Remediation Requirements | Validation Requirements |
|---|---|---|---|
| **Pre-Construction** | **ALL** | Earthworks Inspections / Unexpected Contamination<br>The relevant contractors should be briefed that during development works at the site should any unusual ground conditions and / or visual or olfactory evidence of contamination (including asbestos containing material) be encountered at the site, LKC and the Local Authority should be informed, and further assessment of the material may be required.<br>Should asbestos be identified during groundworks, precautions should be taken to ensure the safety of the construction workers and nearby land users. It would be advisable to introduce an asbestos management strategy in line with CIRIA C733[2]. | Log of work undertaken including photographs.<br><br>Details of any sampling undertaken and validation of any potential additional remedial work. |
| **Build-Phase Constru** | **5** | Sulphate Resistant Concrete<br>Sulphate Resistant Concrete in line with DS-1 AC-1 recommended. | N/A |
| Other Considerations | | Re-use of site won material<br>To ensure material is compliant with appropriate waste regulations, any site won material re-used onsite should be in recourse to appropriate exemptions. A U1 and T5 exemption should be registered.<br><br>This will allow the following to be used onsite or brought in for use onsite (refer to guidance for types of waste that can be used [3]):<br>5,000 tonnes (*c.* 2,500m$^3$) treatment of crushed concrete / stone.<br>1,000 tonnes (*c.* 500[3]) use of non-hazardous soil<br>5,000 tonnes (*c.* 2,500m$^3$) use of clays, sand, gravel, brick, concrete, stone etc.<br>50,000 tonnes (*c.* 25,000m$^3$) use of bitumous material to be used in roadways.<br><br>A Materials Management Plan (MMP) with recourse to the CL:AIRE Code of Practice may be required if volumes exceed exemption limits. This must be registered **before** material movement starts onsite.<br><br>If an MMP is required, this needs to be registered by a Qualified Person (QP) and there must be 'certainty of use' for any material re-used onsite or exported to site to ensure there is no 'sham recovery'. | |
| | | Health and Safety Considerations<br>In working with, removing or treating any contaminating material it is important that any potential risks associated with the actual site works are mitigated by good environmental management of the site during the remedial phases. Standard health and safety precautions (as per HSE guidance[4]) should be adopted by all workers involved with site enabling and construction works. | |

[2] CIRIA (2014). "Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks". C733.
[3] https://www.gov.uk/guidance/waste-exemptions-using-waste
[4] HSE (1991). "Protection of Workers and the General Public During Development of Contaminated Land" London HMSO.

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# 1 Introduction

## 1.1 Background

LK Consult Ltd (LKC) has been commissioned by ISG to carry out a Phase 2 Geo-Environmental Investigation, Risk Assessment and Remediation Strategy for Manchester Velodrome (Plant Room). The investigation was undertaken in support of a planning application to develop a part of the site for commercial.

The following work has previously been undertaken:

- Preliminary Risk Assessment (PRA) report, undertaken by LKC (Ref: LKC 20 1527, dated 20th October 2020).
- Desk Based Coal Mining Risk Assessment, undertaken by LKC (Ref: LKC 20 1527, dated October 2020).
- Report on Coal Mining Related Site Investigative Works undertaken on Land at the Manchester Velodrome (Plant Room), undertaken by The Land Consultancy Limited (Ref: T163 SFK (TLC1134) rep BS LKConsult 01021, dated, June 2021)

This investigation has been undertaken to confirm the ground conditions below the site and to allow a contamination and geotechnical assessment to be undertaken.

The investigation will aim to confirm the risks of the potential pollutant linkages identified in the PRA and recommend further assessment / remediation, as required.

## 1.2 Site Details

A summary of the site details is presented in Table 1-1. Figures 1 and 2 indicate the site location and boundary. Figure 3 indicates the proposed development.

| | |
|---|---|
| **Location** | East end of Stuart Street, land adjacent to the north of the velodrome at the National Cycling Centre, Manchester, M11 4DQ.<br>Centred at approximate National Grid Reference 387350E, 398840N. |
| **Area** | 1,000m$^2$. |
| **Topography** | 72 metres above ordnance datum (AOD).<br>Site is approximately level. |
| **Land Use** | Site<br>Hardstood ground adjacent to the existing velodrome, between and either side of the existing foundation thrust blocks.<br>Surrounding Area<br>North: Carparking and electricity substation.<br>South: Manchester Velodrome.<br>East: Residential housing.<br>West: Residential apartments. |
| **Proposed Development** | An external plant room. |

Table 1-1. Summary of site details.

# 2 Previous Work

## 2.1 Summary of Existing Information

A PRA report (Ref: CL-602-LKC 20 1527-01, dated 20th October 2020) has previously been undertaken by LKC and is summarised in Section 2.2-2.6.

## 2.2 Site History

The site history is summarised in Table 2-1.

| Site Features | Location on Site | Dates Present | | Comments |
|---|---|---|---|---|
| | | From | To | |
| Pond | East | 1848 | 1848 | Elongated (orientated N-S) pond present in the east. Only present offsite (south) from 1893 map. |
| Electricity Generating Station (coal) | Whole Site | 1908 | 1987 | Present across the whole site and on surrounding land. |
| Chimney | SE | 1908 | 1981 | Chimney shown within the above power station building. |
| Car Park/stores | Whole Site | 1995 | 2020 | From Google Street view. |

| Surrounding Area Features | Distance (m) | Direction | Dates Present | | Comments |
|---|---|---|---|---|---|
| | | | From | To | |
| Electricity station (coal) | 0 | S | 1908 | 1987 | Building outline expands and changes. |
| Velodrome | Adjacent | S | 1995 | 2020 | |
| Tank | 15 | NE | 1949 | 1951 | Associated with power station. |
| Chimney | 20 | S | 1908 | 1953 | Within the electricity station building. |
| Pond | 30 | S | 1893 | 1894 | |
| Water coolers | 35 | W | 1932 | 1938 | Associated with power station. |
| Electric substation | 35 | NW | 1985 | 2020 | Google aerial view shows currently part of rectifier yard. |
| Railway | 45 | E | 1908 | 1953 | Railway line shows station coming into the south of electricity station. |
| Chimney | 50 | SE | 1932 | 1985 | Last annotated on 1985 map. |
| Tanks | 50 | NE | 1953 | 1953 | Symbols denotes two tanks. |
| Chimney | 50 | SW | 1908 | 1932 | Associated with power station. |
| Cuttings | 95 | SE | 1893 | 1908 | Last annotated on 1894 map.<br>Possibly associated with chemical works. |
| Embankments | 100 | SW | 1908 | 1951 | Assumed to be associated with football ground.<br>Symbols reduce and associated to be with railway in 1949 map. |
| Pond | 105 | SE | 1893 | 1908 | Last annotated on 1894 map.<br>Possibly associated with chemical works.<br>Potentially filled with cuttings. |
| Ponds/weir | 115 | N/NE | 1893 | 1989 | Last annotated on 1956 map. |
| Pond | 160 | SE | 1893 | 1893 | Possibly associated with chemical works. |
| Brick field/refuse heap | 175 | S | 1890 | 1951 | Symbols change to denote pit/cuttings from 1893.<br>Labelled as 'Chemical works' on 1909 map, symbols remain the same.<br>Labelled as 'refuse heap' from 1949 map. |

Table 2-1: Summary of significant historical features.

## 2.3 Environmental Setting

The environmental setting is summarised in Table 2-2.

| Categories | | | Details |
|---|---|---|---|
| Geology | Artificial | | - Made Ground (Undivided) present across the site. |
| | Superficial | | - Devensian Till (diamicton). |
| | Bedrock | | - Pennine Upper Coal Measures (mudstone, siltstone and sandstone). Coal seam subcrops in the NE corner of the site. Strata dips at 15° to the SW in the wider area. |
| | BGS Logs (<50m) | | - TP Ref: SJ89NE2546, 19m, NW: made ground stone gravel surfacing to 0.20m, made ground compacted stone subbase fill material to 0.50m, made ground dense compact fragmented brick and sandstone blocks with large fragments present (no significant fine grained material present) to 1.10m, concrete slab unknown thickness > 1.10m.<br>- BH Ref: SJ89NE2544, 28m NW: made ground gravel subbase to 0.50m, made ground dense compacted brick and rubble fill to 2.80m, made ground concrete slab/basement to 3.30m, stiff reddish brown fine stoned silty CLAY to >8.0m.<br>- TP Ref: SJ89NE2545, 31m NW: made ground stone gravel surfacing to 0.20m, made ground compact stone subbase fill to 0.50m, made ground dense compact brick and rubble fill with large fragments present and much voiding (no significant fine grain material present) to >1.30m. |
| Hydro-geology | Aquifer Designation | Superficial | - Secondary Undifferentiated Aquifer. |
| | | Bedrock | - Secondary A Aquifer. |
| | Source Protection Zone (SPZ) | | - Site is not within an SPZ. |
| | Groundwater Abstractions (100m) | | - None. |
| Hydrology | Nearest Surface Water (100m) | | - None. |
| | Water Quality Data (100m) | | - No water quality data. |
| | Flooding Risk | | - No risk from rivers or sea. |
| | Surface Water Abstractions | | - One within 500m: 300m south…. |
| | Discharge Consent | | - 2 within 250m: Nearest 100m south…. |
| | Pollution Incidents (100m) | | - None within 100m |
| Minerals / Mining | Coal Mining Development High Risk Area (DHRA) | | - Within DHRA.<br>- A shallow coal mining investigation report has been completed and issued under a different cover which determined that no remedial measures or further works were required. |
| | Surface Extractions | | - No mineral extraction within 500m of the site. |
| | Cheshire Brine Compensation District | | - Not within site area. |
| Ground Stability (on-site) | Collapsible Ground | | - Very low hazard. |
| | Compressible Ground | | - Very low hazard. |
| | Landslide | | - No hazard. |
| | Running Sand | | - Very low hazard. |
| | Shrinking / Swelling Clay | | - Very low hazard. |
| | Ground Dissolution | | - Very low hazard. |
| Landfill sites | Known/Registered | | - None. |
| | - Potential | | - 1no. feature (non-water): 177m S.<br>- 12no. features (water): 7no. 80m+ N, 1no. on site, 2no. 100m+ SE, 2no. streams 105m NE and 100m SE. |
| Radon | | | - <1% of homes above Action Level. No protective measures are necessary in the construction of new dwellings or extensions |

| | |
|---|---|
| Designated Sites (50m) | - None |
| Contemporary Trade Directory (50m) | - None. |
| Fuel Station Entries (50m) | - None. |
| Unexploded Bomb Risk (UXO) | - A detailed UXO study was obtained prior to site works which indicated a low risk and that the works could go ahead without supervision. |

Table 2-2: Summary of the environmental setting.

## 2.4 Site Reconnaissance

A site reconnaissance was carried out on the 22nd October 2020. Hand dug trial holes were not able to be undertaken due to the hardstanding ground on site.

Relevant features identified on site are summarised below:

- Hardstanding ground across all of the site comprising of flagstones, tarmac and bricks. Noted to be in a variable condition.
- Six shipping containers were present in the centre of site blocking access to one side of two large truss blocks.
- General waste bins were also noted to be stored in west area of the site. There was also a vehicle present in this area indicating that it is possibly used as a parking area.
- Multiple manhole covers were observed on site, there is also the presence of street lights along the northern area of site.
- No access restrictions. South west corner is an emergency fire exit.
- No evidence of significant surface contamination identified.

The surrounding area comprises:

- North: Cark park.
- East: Residential housing and National Cycling Centre.
- South: National Cycling Centre.
- West: Residential apartments.
- Northwest: Electric substation.

Relevant photographs are provided in Plate 4-1.

## 2.5 Contamination Sources / Pathways and Receptors

Potential contamination sources are detailed in Table 2-3.

| Source | Contaminants |
|---|---|
| Possible deep Made Ground below the site (former pond in the east, former building and chimney, made ground recorded in BGS mapping and nearby logs) | - Demolition rubble, ash and clinker: Asbestos, heavy metals, sulphates, PAHs[5].<br>- Other fill material sources: Unknown organic / inorganic compounds.<br>- If organic / putrescible material: Hazardous gas (principally carbon dioxide and methane).<br>- Site area small and any contamination contribution minimal. |
| Power station (coal) | - Ancillary activities include coal fired boilers producing large quantities of boiler ash (heavy metals, sulphates and PAHs).<br>- Asbestos may have been used within the building as insulation and lagging or as roofing and cladding.<br>- Associated processes with maintenance and general activities include a range of organic (petroleum hydrocarbons (fuel / oils), degreasing solvents, polychlorinated biphenyls) and inorganic (ammonium salts, |

[5] Defra (2002). "Potential Contaminants for the Assessment of Land". R&D Publication CLR 8.

| | |
|---|---|
| | boron, acids including sulphuric and hydrochloric, sodium hydroxide) compounds[6].<br>- Site area small and any contamination contribution minimal. |
| Car park | - Assuming hardstood surface and no signs of spills / leaks on the site surface: No significant contamination source anticipated. |
| Offsite railway land (including railway line / sidings and goods yard). | - Fuels, oils, PAHs, ethylene gycol (antifreeze), creosote, solvents, herbicides (including atrazine and simazine), heavy metals (such as vanadium), sulphate, phenols and asbestos[7].<br>- Significant contamination not anticipated on site given distance. |
| Offsite landfills / offsite potentially infilled features within 250m | - Given size, distance and age of features, there is considered to be a source of hazardous gas (principally carbon dioxide and methane). However, end use of a Plant Room will have limited occupation except for maintenance and will be ventilated. |

Table 2-3: Potential contamination sources

Potential receptors are detailed in Table 2-4.

| **Receptors** | |
|---|---|
| Human Health | - Future site users (including site workers, maintenance workers and visitors).<br>- Offsite land users. |
| Controlled Waters | - Secondary A Aquifer (bedrock).<br>- Secondary Undifferentiated Aquifer (superficial).<br>- No surface water within influencing distance. |
| Buildings and structures. | |
| Potable water pipes. | |

Table 2-4: Potential receptors

Potential pathways are detailed in Table 2-5.

| **Pathways** | | |
|---|---|---|
| Soil | Human Health[8] (commercial land use with no soft landscaping) | - Inhalation of vapours outside.<br>- Inhalation of vapours inside.<br>- Omitted: ingestion of soil, ingestion of soil-derived indoor dust, dermal contact with soil, dermal contact with soil-derived indoor dust, inhalation of soil-derived outdoor dust, inhalation of soil-derived indoor dust, ingestion of contaminated vegetables and ingestion of soil attached to vegetables . |
| | - Windblown dust / fibres to adjacent receptors. | |
| | - Direct contact with receptors (building foundations, services). | |
| Water | - Surface run-off over impermeable surface.<br>- Site is relatively flat and hardstood; therefore, surface run-off will be likely. | |
| | - Infiltration into the ground, through potentially contaminated material (contamination possibly going into solution).<br>- Site is predominantly hardstood; therefore, infiltration is likely to be limited. | |
| Gas | - Migration through potentially permeable strata and preferential pathways.<br>- Superficial (Till) likely to be low permeability.<br>- Bedrock (mudstone, siltstone, sandstone) likely to variably permeable.<br>- Preferential pathways: services, possible shallow worked coal seams. | |
| | - Migration into buildings (e.g. via services) and accumulation of gases in confined spaces (potentially causing explosion if methane is present). | |

Table 2-5: Potential pathways

[6] Department of the Environment Industry Profile – Power Stations (excluding nuclear power stations). (1995).
[7] Department of the Environment Industry Profile – Railway Land (1995).
[8] EA (2008). "Updated Technical Background to the CLEA Model." Science Report – SC050021/SR3.

## 2.6 LKC Preliminary Contamination Conceptual Model

The preliminary contamination conceptual model using contaminant-pathway-receptor linkages based on guidance in LCRM[9] has been summarised in Table 2-6.

The aim of the conceptual model is to provide a preliminary assessment of the likelihood of a pollutant linkage for each potential combination of contaminant, pathway and receptor. A conceptual model can be used to make an informed decision on the contamination risks associated with the site and determine what site investigation work is required.

The preliminary contamination conceptual model has identified seven generic potential pollutant linkages. Each linkage is described along with an assessment of the risk based upon guidance on probabilities and consequences outlined in CIRIA C552[10].

In order to assess the potential risk for each pollutant linkage, an assessment of the magnitude of the potential consequence (severity) of the risk occurring and the magnitude of the probability (likelihood) of the risk occurring has been considered and classified. This is based on the guidance provided in CIRIA C552 and further details including a risk matrix is provided in Appendix A.

Where LKC identified a low to very low risk, limited intrusive investigation work, a watching brief (during construction work) or no investigation work will be recommended. This will be dependent on the nature of the site and the proposed development.

Where the risk falls into the moderate/low risk, LKC will undertake an assessment to establish what category the pollutant linkage will fall into (i.e. moderate or low risk will be chosen).

Where LKC identifies a moderate or higher risk, intrusive work or precautionary remedial measures will be recommended.

The conceptual model is based on the future use of the site (post development), in line with proposed development scheme.

It should be noted that there may be risk from short term exposure from contaminated soil to site workers during development work. The Preliminary Contamination Conceptual Model deals with long term exposure to key receptors associated with the future use of the site. Acute risks can be easily mitigated by good environmental management of the site during site works. Standard health and safety precautions (as per HSE guidance[11]) should be adopted by all workers involved with site enabling and construction works. Therefore, this receptor is not considered in the contamination conceptual model.

## 2.7 Recommendations

Based upon the Preliminary Contamination Conceptual Model a site investigation was recommended to assess the potential pollutant linkages further.

[9] Land Contamination Risk Management (LCRM) https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm
[10] CIRIA (2001). "Contaminated land risk assessment: A guide to good practice". C552.
[11] HSE (1991). "Protection of Workers and the General Public During Development of Contaminated Land" London HMSO.

| PL | Pathway | Receptor | Contaminants of Concern (CoC) | Probability | Consequence | Risk | Recommendations |
|---|---|---|---|---|---|---|---|
| 1 | - No viable pathways (dermal inhalation, ingestion). | - Future site users.<br>- Offsite receptors. | - ACM, heavy metals, PAHs, other inorganic and organic compounds. | - | - | - | No viable human health pathways as no soft landscaping.<br>No pollutant linkage therefore no further assessment required. |
| 2 | - Inhalation of vapours.<br>- Migration via permeable strata and preferential pathways. | - Future site users.<br>- Offsite receptors. | - Volatile contaminants (petroleum hydrocarbons, SVOC, VOCs). | Low likelihood (given site history, site conditions and proposed end use) | Medium | **Moderate** / Low (moderate assumed until ground conditions confirmed) | Low density intrusive investigation required, to include PID testing.<br>Soil analysis of CoC, subject to ground conditions encountered and PID testing. |
| 3 | - Inhalation of gas.<br>- Migration via permeable strata and preferential pathways.<br>- Explosion in confined spaces.<br>- Exposure to radon. | - Future site users.<br>- Buildings.<br>- Offsite land users. | - Ground / hazardous gas (carbon dioxide, methane). | Unlikely (viable gas source but unoccupied vented structure) | Severe | Moderate / **Low** (Low Risk assumed) | No gas monitoring required as limited access to room accept for maintenance and will be vented. |
| | | | - Radon | Unlikely (as <1% of homes above action level) | Medium | **Low** | (<1%) No protective measures are necessary in the construction of new dwellings or extensions. |
| 4 | - Surface run-off.<br>- Migration via permeable strata and preferential pathways.<br>- Perched waters migration. | - Groundwater (Secondary A / Undifferentiated Aquifer). | - Mobile contaminants such as metals, PAHs, other inorganic and organic compounds. | Low Likelihood (mobile contamination anticipated however anticipated clay should limit migration) | Medium | **Moderate** / Low (moderate assumed until ground conditions confirmed) | Low density intrusive investigation required.<br>Groundwater sampling, subject to ground conditions encountered. Analysis of CoC. |
| 5 | - Sulphate attack on concrete. | - Building structure. | - Sulphate. | Likely (given site history, site conditions, geology and direct contact / pathway) | Mild | **Moderate /** Low (moderate assumed until ground conditions confirmed) | Intrusive investigation required.<br>- Soil analysis of CoC. |
| 6 | - Ingestion of tainted water supply. | - Future site users.<br>- Water pipes. | - Organic contaminants such as petroleum hydrocarbons, naphthalene, volatile compounds. | - | - | - | - No new potable water supply is anticipated as part of the proposed development so no pollutant linkage exists. |

Table 5-4: Preliminary Contamination Conceptual Model.
**Notes:** PL = Pollutant Linkage. Contaminant of Concern (CoC) - See Table 5-1 for contamination sources. Site conditions based on observations during site reconnaissance.

# 3 Ground Investigation

## 3.1 Site Investigation Design and Methodology

In order to assess the ground conditions at the site and to investigate the potential pollutant linkages identified in the preliminary contamination conceptual model an intrusive investigation was undertaken.

The investigation was carried out on 4th to 7th May 2021 and comprised the following:

- 4no. cable percussion boreholes drilled to 3.45-5.30 metres below ground level (mbgl) (ref. CP101 to CP104).
- 4no. rotary boreholes drilled to 3.60-6.30mbgl (ref. RBH101A and RBH101B to RBH103).
- 3no. hand excavated foundation pits (using spades) excavated to 1.2mbgl (ref. FP101 to FP103).
- 1no. hand pit (using hand auger / spade) excavated to 0.6mbgl (ref).

The cable percussion and rotary boreholes encountered made ground and then concrete with metal or metal inclusions (reinforcement bar), which could not be penetrated.

From the initial refusal cable percussion drilling was advanced via chiselling until no further movement was noted for 30minutes drilling.

The rotary boreholes also encountered concrete with metal or metal inclusions (reinforcement bar) at similar depths. Both the rock roller drill bit and core drill bit were unable to advance stalling on the concrete. A further attempt was made to advance the boreholes using the downhole hammer on the rotary rig however the hammer tip sheared off without advancing into the concrete. It assumed that the rock roller bit stalled out after becoming entangled in rebar.

All site investigation locations are shown in Figure 3. The locations were chosen on consultation with the client to allow a good spread across the site.

The number of site investigation points corresponds to approximately one location per 10-15m square centres. This is considered to be a conservative sampling density and is in line with BS10175[12] for a 'main investigation'.

All profile logs are provided in Appendix B and are in line with BS14688-1[13] and BS5930[14].

## 3.2 Well Installations

Due to the ground conditions encountered all boreholes were backfilled on completion and no wells were installed.

[12] British Standard (2017). "Investigation of Potentially Contaminated Sites – Code of Practice." BS10175:2017.
[13] British Standards (2002) Geotechnical investigation and testing – Identification and Classification of Soil. Part 1: Identification and description. BS EN ISO 14688-1:2002.
[14] British Standard (2015). "Code of Practice for Ground Investigations". BS5930:2015.

## 3.3 Sampling Protocol

### *3.3.1 Soil Sampling (Contamination)*

Standard sampling protocol and preservation of samples was undertaken as described in the EA guidance on site investigation[15].

Soil was collected for onsite testing. A plastic zip bag was half filled with soil allowing a suitably sized headspace. The bag was sealed and stored for at least 20 minutes before being tested for total volatile organic compounds (TVOCs) using a PhoCheck Tiger photoionisation detector (PID). Results of the PID readings are presented on the profile logs (Appendix B). The on-site monitoring was carried out in line CIRIA C665[16] to aid in screening samples for volatile analysis.

Soil samples of approximately 500g were recovered in amber jars, amber vials for volatile analysis and plastic tubs. All the samples were labelled and stored in cool boxes prior to being collected by courier at the end of the day for delivery to the Chemtest laboratory in Newmarket for chemical testing. If collection was not possible the same day then samples were stored in the sample storage fridge at the LK Group offices below 4˚C. Samples were tracked using appropriate Chain of Custody forms provided by Chemtest.

Many of the contamination tests are UKAS or MCERTS accredited and further details are given in the Certificate of Analysis presented in Appendix C. Table 3-2 shows the soil testing undertaken.

| Suites and Contaminants | No. Samples | Location & Depth | Justification |
|---|---|---|---|
| Metals / metalloids, pH, water soluble sulphate, speciated PAHs, SOM and asbestos screen. | 2 | CP102 0.3-0.8m<br>CP103 0.3-1.0m | A basic suite with a broad selection of contaminants tested on samples across the site where no significant evidence of contamination was identified (with the exception of occasional ash and coal) and no TVOCs identified from the PID tests. |
| Metals / metalloids, pH, water soluble sulphate, cyanide suite, phenol, TPHCWG, BTEX, MTBE, speciated PAHs, SOM and asbestos screen. | 2 | C101 0.6-1.0m<br>CP104 0.3-1.0m | Detailed suite undertaken along site WAC suite to characterise material should offsite disposal be required. |

Table 3-2. Summary of soil sample testing undertaken.

**Notes**:
If asbestos present during screen identification and quantification will be undertaken.
Metal/metalloids=arsenic, cadmium, chromium, (total and hexavalent), copper, lead, mercury, nickel, selenium, vanadium, zinc and boron; TPHCWG=carbon banded and aromatic/aliphatic split petroleum hydrocarbons; PAH=polycyclic aromatic hydrocarbons, BTEX=benzene, toluene, ethylbenzene and xylenes; MTBE=Methyl tert-butyl ether and SOM=Soil Organic Matter.

### *3.3.2 Water Sampling / Leaching Testing*

Groundwater sampling / leaching testing was not carried out as part of this investigation.

A moderate to low risk was identified in the preliminary contamination conceptual model for controlled waters (pollutant linkage 4) and further action was only recommended if significant soil contamination was identified on site. Based on the

[15] EA (2000). "Technical Aspects of Site Investigation. Volumes 1 & 2 Text Supplements Research and Development Technical Report." P5-065/Tr.
[16] CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665.

ground conditions encountered, LKC did not consider testing to be required. This is discussed further in Section 5.4.

## 3.4 Gas Monitoring

Gas monitoring was not carried out as part of this investigation.

A low risk was identified in the preliminary contamination conceptual model for gas (pollutant linkage 3) due to the design and planned use of the proposed development.

## 3.5 Site Investigation Scope

The scope of the contaminated land investigation was agreed with the local authority prior to undertaking the work. This investigation was generally in line with the scope.

## 3.6 Geotechnical Testing

### *3.6.1 In-situ Onsite Geotechnical Testing*

In-situ geotechnical tests were performed in the boreholes to further characterise the sub-soil conditions. The following tests were undertaken:

- Standard Penetration Tests (SPTs) were performed in the cable percussion boreholes.

The SPT readings are provided within the profile logs (Appendix B).

# 4 Ground Conditions

## 4.1 Geology – Generalised Sequence

The ground conditions beneath the site comprised made ground underlain by a concrete slab that is likely to be significantly reinforced. A summary section of the logs is provided in Plate 4-1, with additional comments below.

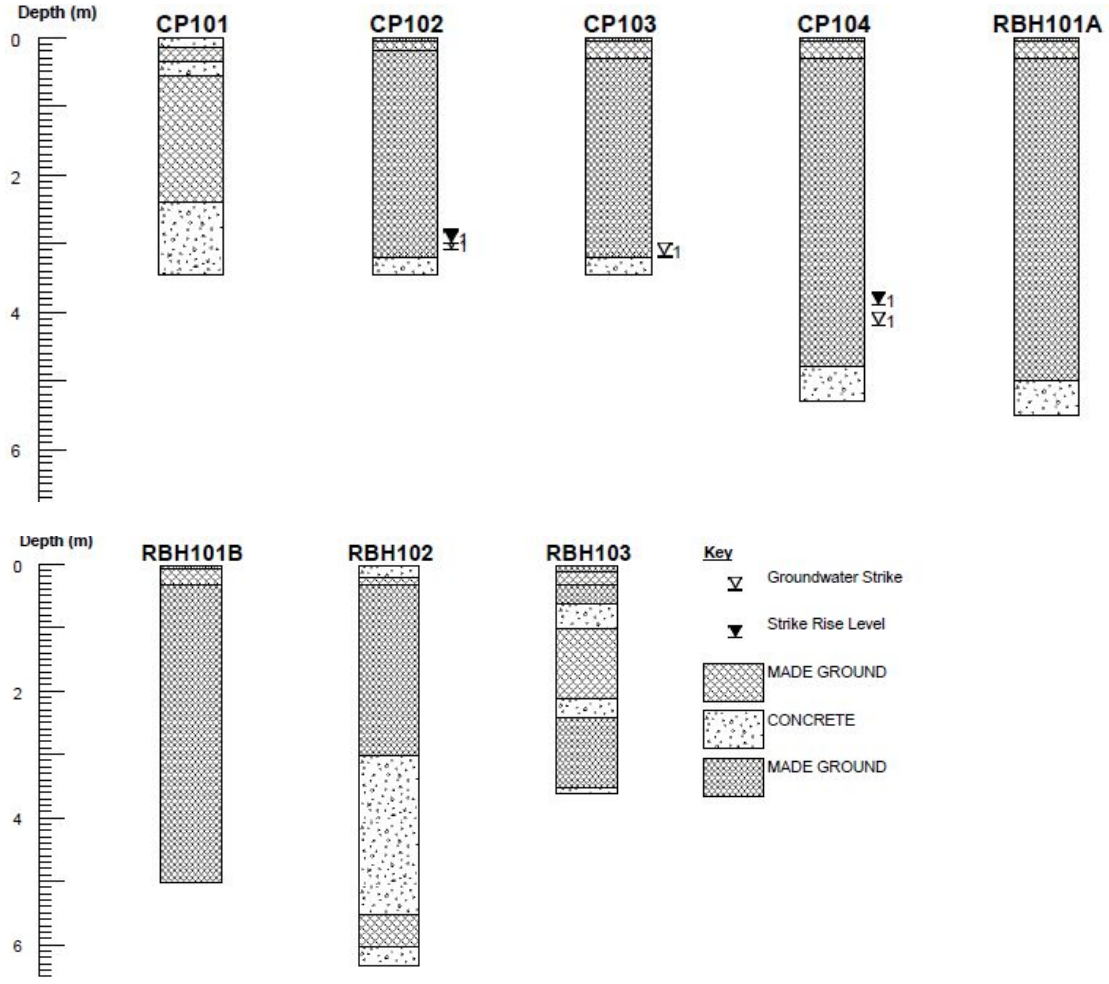



Plate 4-1: Summary of ground conditions.

## 4.2 Groundwater

### *4.2.1 Groundwater Levels*

Groundwater was encountered during the drilling of CP102, CP103 and CP104. Given the volume of water encountered and the proximity of all the boreholes it is considered that these strikes represent isolated perched water tables within the made ground and do not represent the wider ground water regime.

As all investigation locations were backfilled no additional monitoring data could be collected.

## 4.3 In-Situ Geotechnical Testing

### *4.3.1 Standard Penetration Tests*

In-situ standard penetration tests (SPTs) were undertaken, predominantly in the natural ground. The results are summarised in Table 4-1 and provided within the profile logs in Appendix B.

| Approximate Depth (mbgl) | SPT 'N' Values | | | |
|---|---|---|---|---|
| | CP101 | CP102 | CP103 | CP104 |
| **1-2** | 10 (MG) | 17 (MG) | 50 (MG) | 50 (MG) |
| **2-3** | 50 (MG) | 17 (MG) | 16 (MG) | 50 (MG) |
| **3-4** | 50 (MG/C) | 50 (MG/C) | 50 (MG/C) | 50 (MG) |
| **4-5** | - | - | - | 50 (MG/C) |
| **GW Level** | - | 3.1 | 3.2 | 4.2 |

Table 4-1: Summary of SPT (N) values.
**Notes:**
MG = Made Ground, C = Concrete.

### *4.3.2 Sulphate and pH*

Water soluble sulphate and pH tests were carried out on soil samples. Full results are presented in Appendix C (soils) and summarised in Table 4-2.

| Strata | pH | Sulphate (g/l) |
|---|---|---|
| Made Ground | 4.0-11 | 0.02-0.47 |

Table 4-2: Summary of pH and sulphate results.

# 5 Geotechnical Assessment

Final foundation design will need to be confirmed once loadings of proposed buildings are known and details of any ground works are known. A preliminary foundation assessment is summarised in Table 5-1.

| | |
|---|---|
| **Proposed Development** | - A steel framed 'plant room' construction adjacent to the existing Manchester Velodrome.<br>- The new structure is positioned around the 'thrust blocks' which form a significant part of the velodromes foundations. |
| **General Ground conditions / Geotechnical Testing** | - Based on CP101-CP104, RBH101A, RBH101B-RBH104 and FP101-FP103 (location of extension).<br>- Maximum investigation depth 6.30mbgl.<br>- Natural ground not encountered. All boreholes terminated on thick re-enforced concrete slab.<br>- All made ground encountered is granular in nature and generally comprises brick, concrete, limestone and mudstone.<br>- Concrete slab(s) encountered across site thought to be related to the former electricity works and current thrust blocks / velodrome foundations, likely to include significant reinforcement and could not be penetrated by cable or rotary drilling.<br>- 2 hours chiselling was carried out in each cable borehole before termination.<br>- No bedrock encountered.<br>- No groundwater encountered, water encountered above the concrete slab unlikely to be a true representation of groundwater. |
| **Exposed Existing Foundations** | - FP102 carried out adjacent to the brick wall of the existing velodrome. The brickwork appears to be on a concrete foundation at approximately 0.9mbgl. The foundation was noted to be the same width externally as the brickwork.<br>- FP101 and FP103 carried out adjacent to the concrete thrust blocks were extended to 1.2mbgl in made ground. The sides of the thrust blocks exposed were smooth and no foundation was encountered.<br>- HD101 carried out through the block paving to examine the ground below recorded a granular 'subbase' to 0.3mblg over granular made ground.<br>- Plans provided since the SI indicate that each of the thrust blocks is constructed over a 2.1m and 1.5m diameter pile. |
| **Allowable Bearing Pressure** | Based on SPT 'N' values the granular made ground is likely to be at least medium dense which would indicate a presumed bearing value in excess of 200kN/m$^2$ from 1.2mbgl. While limited variation were observed on site it should be noted that by its nature made ground can be inherently variable therefore there may be locations where lower density, poorly compacted ground may be present. This should be accounted for when designing suitable foundations. |
| **Anticipated Foundation Type** | - Based on the ground conditions encountered and the type of development proposed it may be possible to found within the made ground or to found the proposed new build on the concrete slab(s) present from 2.6-4.8mbgl.<br>- Depending on the loading of the proposed structure pad foundations set within the shallow made ground may be appropriate, alternatively;<br>- If the foundation load were to be transferred to the concrete slab then it is likely that a piled foundation solution would be acceptable.<br>-A suitably qualified structural engineer should be consulted for final foundation design. |
| **Concrete Requirements** | - Based on BRE Digest 2005[17] – DS-1 AC-1 recommended. |
| **Services** | - Services – consideration to the presence of services running through the site. Services may need to re-routed. |
| **Coal Mining** | - A shallow mining investigation has been carried out and issued under another cover. |

[17] BRE (2005)."Concrete in Aggressive Ground." Special Digest 1.

| | |
|---|---|
| | - The conclusions of the shallow mining investigation report are that no remediation is required. |
| **Temporary support of excavation** | -May be required; however, foundation pits were generally recorded as stable. |

Table 5-1 Geotechnical Summary.

# 6 Generic Risk Assessment

## 6.1 Introduction

Current good practice requires that the findings from a site investigation should be evaluated on a site-specific basis, using a risk-based approach. Risk assessment involves identification and evaluation of the hazards presented by the concentrations of contaminants measured followed by an evaluation of the risks which are associated with these hazards (LCRM[18]). Information gathered from the risk assessment has been collated in the revised contamination conceptual model in Section 6.6.

## 6.2 Soil Risk Assessment

### *6.2.1 Methodology*

With regards to the soil risk assessment LKC will use the following hierarchy:

- Category 4 Screening Levels (C4SLs).
- LQM Suitable 4 Use Levels (S4ULs).
- ATRISK Soil Screening Values (SSVs) and CL:AIRE Generic Assessment Criteria (GACs).

C4SLs were published in 2013[19,20]. The recent change to the contaminated land guidance has changed the evaluation of risk from 'minimal' (referred to as Health Criteria values (HCVs))[21] used to generate Soil Guideline Values (SGVs) to 'low' (referred to as Lowest Level of Toxicological Concern (LLTCs)). The policy companion document and supporting letter by Defra, dated 3rd September 2014, states that C4SLs *'could be used under the planning regime, as well as within Part 2A'.* Based on these comments LKC considers the justifications and assumptions used to generate 'low' risk are suitable for the planning regime.

Where no C4SLs have been generated LKC will use the LQM S4ULs[22]. Similar assumptions and land uses to C4SLs have been used. However, toxicological information has been based on 'minimal risk' as per previous guidelines and assumptions[23,24,25,26].

If contaminants are not present as C4SLs and S4ULs then LKC will use ATRISK SSVs or CL:AIRE GACs[27]. These follow the 'minimal' risk principle and more stringent exposure parameters and will be conservative.

LKC consider the main risk drivers for PAHs are benzo(a)pyrene (B(a)P) and naphthalene. This is due to B(a)P possibly being a carcinogen and most toxic of the

[18] Land Contamination Risk Management (LCRM) https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm
[19] Defra (2014). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Policy Companion Document."
[20] CL:AIRE (2013). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report."
[21] EA (2008). "Human Health Toxicological Assessment of Contaminants in Soils." Science Report – SC050021/SR2.
[22] LQM (2014). "The LQM/CIEH S4ULs for Human Health Risk Assessment."
[23] EA (2008). "Updated Technical Background to the CLEA Model." Science Report – SC050021/SR3.
[24] EA (2008). "Human Health Toxicological Assessment of Contaminants in Soils." Science Report – SC050021/SR2.
[25] EA (2008). "A Review of Body Weight and Height Data used within the Contaminated Land Exposure Assessment Model (CLEA)." Project SC050021/Technical Review 1.
[26] EA (2009). "Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values." Science report SC050021/SR7.
[27] CL:AIRE (2009). "The Soil Generic Assessment Criteria for Human Health Risk Assessment."

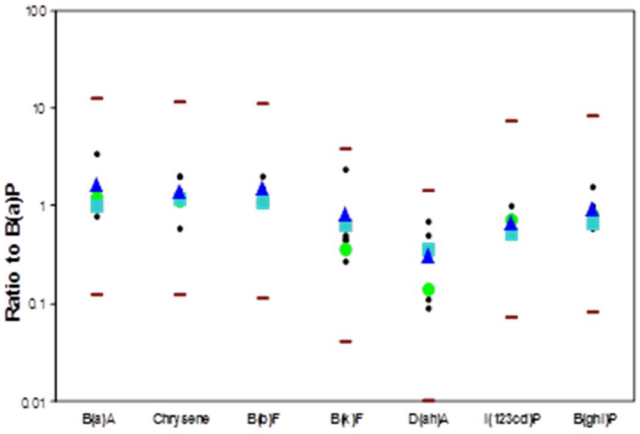
PAHs[28,29] and naphthalene the most volatile and soluble[30]. The new C4SLs indicate B(a)P as a surrogate marker for carcinogenic PAHs, if it falls within appropriate limits, since the risk from other non-carcinogenic PAHs are considered negligible[31]. For B(a)P to be used as a surrogate marker it should follow the profile described by the HPA (2008)[32] and CL:AIRE (2013). Naphthalene will be treated separately using the LQM S4ULs.

The proposed development is for commercial with no soft landscaping, therefore the assessment criteria for commercial uptake will be used. All criteria have been generated using the CLEA V1.06 model[33] based either on 1%, 2.5% and 6% Soil Organic matter (SOM). Results will be compared to the nearest appropriate SOM. A summary of the generic assessment criteria is provided in Appendix D. ATRISK SSVs and CL:AIRE GACs were not required for this dataset and have not been included.

B(a)P as Surrogate Marker

Based on the above assumption for PAHs, LKC undertook an assessment of the data for the site with regards to using B(a)P as a surrogate marker for carcinogenic PAHs as per HPA and CL:AIRE guidelines. The primary toxicological study related to Culp *et.al*[34], which was based on coal tar mixtures (>80,000mg/kg of total PAHs) fed in food to mice over a two-year carcinogenicity study.

Graph 6-1 summarises the study site data with respect to how the ratios of carcinogenic PAHs relate to B(a)P, within the confidence limits provided in the HPA document.




Graph 6-1: The ratio of PAH to B(a)P in soil for all available data at the site based on 4 samples (where values were >LOD to allow the calculation of a ratio).

**Notes:**
B(a)P = Benzo(a)pyrene; D(ah)A = Dibenzo(ah)anthracene; B(a)A = Benzo(a)anthracene; B(b)F = Benzo(b)fluoranthene; B(k)F = benzo(k)fluoranthene; I(123cd)P = Indeno(123cd)pyrene; B(ghi)P = Benzo(ghi)perylen● = Ratio to B(a)P for all data ○ = Mean ratio to B(a)P for Culp data △ = Mean ratio to B(a)P from all data at the site □= Mean ratio to B(a)P for UK data presented by HPA ▬ = Upper and Lower limits (order of magnitude from Culp data)

[28] EA (2002). "Contaminants in Soils: Collation of Toxicological Data and Intake Values for Humans. Benzo[a]pyrene." R&D Publication TOX2.
[29] USEPA (1984). "Health Effects Assessment of Polycyclic Aromatic Hydrocarbons (PAHs). EPA 540/1-86-013."
[30] EA (2003). "Review of the Fate and Transport of Selected Contaminants in the Soil Environment." Draft technical report P5- 079/TR1.
[31] CL:AIRE (2013). "SP1010: Development of Category 4 Screening Levels and Assessment of Land Affected by Contamination – Final project Report."
[32] HPA (2010). "HPA Contaminated Land Information Sheet: Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)." Version 3.
[33] EA (2008). "CLEA Software (Version 1.05) Handbook." Science Report – SC050021/SR4.
[34] Culp, S; Gaylor, D; Sheldon, W; Goldstein, L and Beland, F (1998). " A Comparison of Tumours Induced by Coal Tar and Benzo-a-pyrene in a 2-Year Bioassay." Carcinogenesis. **Vol 19**, no. 1, pp. 117-124.

All the data points that could be used to calculate ratios fall inside the upper or lower limits.

Based on this distribution of data LKC considers B(a)P can be used as a surrogate marker for carcinogenic PAHs and the C4SL criteria is suitable for this dataset.

### *6.2.2 Soil Results Comparison against Assessment Criteria*

As indicated in Section 2, the entire site will be Hardstood with no soft landscaping proposed. The direct contact pollutant linkage (PL1) is therefore incomplete.

### *6.2.3 Direct Contact Risk – Pollutant Linkage 1*

No direct contact Pollutant Linkage has been identified.

### *6.2.4 Risk from Inhalation of Vapours – Pollutant Linkage 2*

No visual / olfactory evidence of volatile contaminants was identified during the investigation. The PID did not detect any TVOCs.

LKC therefore consider the probability of volatile contaminants affecting site users as unlikely. The consequence is expected to be medium, giving a low risk and no remediation is required with respect to pollutant linkage 2.

## 6.3 Gas Risk Assessment

Gas monitoring was not carried out as part of this assessment. The PRA identified a low risk based as the design and end use of the proposed building mitigates the risk from limited potential sources of hazardous and ground gas.

Additionally No organic / putrescible material was encountered on site during investigation works with made ground encountered comprising brick, concrete and metals (likely crush run).

Given the ground conditions encountered, LKC considers the probability of gas posing a risk to site users as unlikely. The consequence is severe, which gives a moderate / low risk. Given the known ground conditions and the design of the proposed development, LKC considers there to be a low risk and no further action is required with respect to pollutant linkage 3.

## 6.4 Controlled Water Assessment

The PRA identified a moderate / low risk with respect to controlled waters as no significant source of mobile contamination was anticipated.

No evidence of potentially significant mobile contamination was identified on the site. Made ground encountered during works generally comprised crushed brick and concrete. The water strikes in 3no. locations were recorded slightly above a concrete slab, as such they are not considered likely true groundwater but an isolated perched water table inhibited by the presence of the concrete slab.

The site investigation did not identify any significant sources of likely mobile contamination within the soils. This confirms an unlikely probability of onsite contamination affecting controlled waters. With a medium consequence the risk is anticipated to be low and no remediation is required.

a true residual or dissolve phase. It is known that heavy end hydrocarbons are considered recalcitrant and hydrophobic in behaviour[35,36].

## 6.5 Additional Risk Assessments

### *6.5.1 Concrete (Pollutant Linkage 5)*

As stated in Section 5, sulphate resistant concrete will not be required at the site. The site was classified as DS-1 AC-1.

Based on the above, the probability of sulphate concentrations affecting buildings is unlikely. Given the consequence is considered to be mild, the risk (pollutant linkage 5) is anticipated to be low and no remediation is required. This should be confirmed with the structural engineer.

### *6.5.2 Potable Water Supply (Pollutant Linkage 6)*

No new potable water supply is anticipated as part of the proposed development. As such no pollutant linkage exists.

[35] Shedeh, J. (2009). "Characteristics of removal of hydrophobic organic carbons from sand / mulch using non-ionic surfactants". Land Contamination and Reclamation, 17 (2) 2009.
[36] EA (2009). "Petroleum Hydrocarbons in Groundwater: Supplementary Guidance for hydrological Risk Assessment."

| PL | Pathway | Receptor | Contaminants of Concern (CoC) | Probability | Consequence | Risk | Recommendations |
|---|---|---|---|---|---|---|---|
| 1 | - No viable pathways (dermal inhalation, ingestion). | - Future site users.<br>- Offsite receptors. | - ACM,<br>- heavy metals,<br>- PAHs, other inorganic and organic - compounds. | - | - | - | No viable human health pathways as no soft landscaping.[1*]<br>No pollutant linkage therefore no further assessment required. |
| 2 | - Inhalation of vapours.<br>- Migration via permeable strata and preferential pathways. | - Future site users.<br>- Offsite receptors. | - Volatile contaminants . | Unlikely | Medium | Low | Unlikely probability as no elevated SVOCs or VOCs identified during investigation works.<br>**Recommendation:** No further works required. |
| 3 | - Inhalation of gas.<br>- Migration via permeable strata and preferential pathways.<br>- Explosion in confined spaces.<br>- Exposure to radon. | - Future site users.<br>- Buildings.<br>- Offsite land users. | - Ground / hazardous gas (carbon dioxide, methane). | Unlikely | Severe | Moderate / **Low** | Low risk due to known ground conditions and limited access to room accept for maintenance, development will also be vented.<br>**Recommendation:** No further works required. |
| | | | - Radon | Unlikely (as <1% of homes above action level) | Medium | **Low** | (<1%) No protective measures are necessary in the construction of new dwellings or extensions. |
| 4 | - Surface run-off.<br>- Migration via permeable strata and preferential pathways.<br>- Perched waters migration. | - Groundwater (Secondary A / Undifferentiated Aquifer). | - Mobile contaminants such as metals, PAHs, other inorganic and organic compounds. | Unlikely | Medium | **Low** | No elevated potentially mobile contaminants detected.<br>**Recommendation:** No remediation required. |
| 5 | - Sulphate attack on concrete. | - Building structure. | - Sulphate. | Unlikely | Mild | **Low** | No elevated sulphate identified in soils or groundwater.<br>**Recommendation:** No remediation required. |
| 6 | - Ingestion of tainted water supply. | - Future site users.<br>- Water pipes. | - Organic contaminants Naphthalene. | - | - | - | No potable water supply is anticipated as part of the proposed development. No pollutant linkage exists and no further assessment is required. |

Table 6-7: Revised Contamination Conceptual Model.

**Notes**

*1 Although no ACM identified, contractors should be vigilant during earthworks of any potential ACM.

# 7 Waste Disposal Assessment

The soil contamination results as presented in Appendix C have been used to help determine the waste classification of material for off-site disposal.

As an initial screen the soil results were inputted into Hazwaste Online™. This is a web-based facility that allows an assessment waste as either hazardous or non-hazardous waste based on relevant guidance and legislation[37, 38 ,39,40 ,41 ,42, 43, 44, 45].

Hazwaste Online™. has been designed to cover, amongst other waste types, the European Waste List of Waste (LoW) code number 17 "Construction and Demolition Waste (Including Excavated Soil from Contaminated Sites)".

Where less than limits of detection (LOD) were recorded, the value of the LOD was inputted.

Where applicable, appropriate metal species based on hazard statements/ molecular weight, site history, ground conditions and likely species present in soils were used (e.g. metal oxides relating to an ash based source).

The results show that all the samples tested are classified as **NON-HAZARDOUS WASTE** and LoW code "17-05-04 - soil and stones other than those mentioned in 17 05 03" is suitable. The Hazwaste Online™ output sheets are provided in Appendix E.

## 7.1 Waste Acceptance Criteria (WAC) Testing

Waste Acceptance Criteria (WAC) testing was also undertaken on 2no. samples representative of material likely to be earmarked for off-site disposal. WAC test results are included in Appendix C.

The WAC limits cannot be used to make an assessment of whether a waste is hazardous. Landfills are classified according to whether they can accept hazardous or non-hazardous wastes. Wastes can only be accepted at a landfill if they meet the WAC for that class of landfill.

With regards to non-hazardous waste, material can only be designated to an inert cell of a non-hazardous landfill based on WAC testing. With regards to hazardous waste, material can only be designated as SNRH cell within a non-hazardous landfill or hazardous landfill from WAC testing.

Both samples of the made ground collected from site are all below the inert waste landfill criteria. This should be confirmed by your designated waste handler as the licenced landfill operator will determine the designation, which may differ to this assessment.

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[37] EA (2018). "Guidance on the Classification and Assessment of Waste (1st Edition v1.1)". Technical Guidance WM3.
[38] CLP Regulation - Regulation 1272/2008/EC of 16 December 2008.
[39] 1st ATP - Regulation 790/2009/EC of 10 August 2009
[40] Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
[41] WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
[42] Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014
[43] 13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
[44] POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004
[45] 2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

# 8 Conclusions

## 8.1 Geotechnical

Natural ground was not encountered during investigation works. Granular made ground generally comprising brick, concrete, limestone and mudstone was encountered from immediately below the current surface finish too depths of between 2.4mbgl and 4.8mbgl. Below the made ground a concrete obstruction was encountered thought likely to be the reinforced base of the former electricity generation station.

Depending on the bearing capacity required either pad foundations within shallow made ground or piled foundations to the concreted slabs encountered at depth may be suitable for the proposed development.

Further advice should be sought from, and detailed design should be carried out by, a suitably qualified structural engineer.

## 8.2 Contamination Assessment

A revised contamination conceptual model has been produced by LKC which is summarised in Table 8-1 below (more detailed model provided in Section 5).

| Pollutant Linkage | | Risk | Recommendations |
|---|---|---|---|
| 1 | Contaminants posing a risk to site users via dermal contact, ingestion and inhalation (of soil, dust, fibres and vegetables). | **N/A** | - Entire site is below the footprint of the proposed building therefore no direct contact PL will exist. |
| 2 | Volatile contaminants posing a risk to site users via the inhalation of vapours. | **Low** | - No evidence of volatile contaminants identified.<br>- **Recommendations:** No further assessment required. |
| 3 | Gas posing a risk to buildings and site users via the migration of gas into building causing explosion and asphyxiation. | Moderate / **Low** | - Low gas risk due to known ground conditions (inert made ground over a concrete slab) and design of proposed development.<br>- **Recommendations:** No remediation required. |
| 4 | Mobile contamination posing a risk to controlled waters via the migration through permeable strata. | **Low** | - No elevated potentially mobile contaminants identified (material appears inert).<br>- **Recommendations:** No remediation required. |
| 5 | Sulphate posing a risk to building via direct contact (sulphate attack). | **Low** | - No elevated sulphate identified.<br>- **Recommendations:** Concrete meeting specification DS1-AS1 recommended. |
| 6 | Organic contaminants posing a risk to water pipes. | **-** | - No new potable water supply is anticipated as part of the proposed development therefore no pollutant linkage exists. |

Table 8-1: Summary Risk Table.

Made ground is designated as NON HAZARDOUS (from the Haz-Waste assessment) and likely the recycling facilities will accept the made ground as INERT.

Remedial recommendations are presented in Section 9.

# 9 Recommendations and Remedial Strategy

The recommendations provided below are considered appropriate for the site based on the site investigation work undertaken. LKC should stress that no remediation, enabling works or designing works should take place until Regulatory approval has been obtained.

## 9.1 Remediation and Validation Recommendations

Table 9-1 details the further works and remedial recommendations / requirements. The table shows work required post-demolition of building(s), pre-construction (i.e. during earthworks) and during / post construction.

| Phase | PL | Remediation Requirements | Validation Requirements |
|---|---|---|---|
| **Pre-Construction** | **ALL** | Earthworks Inspections / Unexpected Contamination<br>The relevant contractors should be briefed that during development works at the site should any unusual ground conditions and / or visual or olfactory evidence of contamination (including asbestos containing material) be encountered at the site, LKC and the Local Authority should be informed, and further assessment of the material may be required.<br>Should asbestos be identified during groundworks, precautions should be taken to ensure the safety of the construction workers and nearby land users. It would be advisable to introduce an asbestos management strategy in line with CIRIA C733[46]. | Log of work undertaken including photographs.<br><br>Details of any sampling undertaken and validation of any potential additional remedial work. |
| **Build-Phase Construction** | **5** | Sulphate Resistant Concrete<br>Sulphate Resistant Concrete in line with DS-1 AC-1 recommended. | N/A |
| Other Considerations | | Re-use of site won material<br>To ensure material is compliant with appropriate waste regulations, any site won material re-used onsite should be in recourse to appropriate exemptions. A U1 and T5 exemption should be registered.<br><br>This will allow the following to be used onsite or brought in for use onsite (refer to guidance for types of waste that can be used [47]):<br>5,000 tonnes (*c.* 2,500m$^3$) treatment of crushed concrete / stone.<br>1,000 tonnes (*c.* 500$^3$) use of non-hazardous soil<br>5,000 tonnes (*c.* 2,500m$^3$) use of clays, sand, gravel, brick, concrete, stone etc.<br>50,000 tonnes (*c.* 25,000m$^3$) use of bitumous material to be used in roadways.<br><br>A Materials Management Plan (MMP) with recourse to the CL:AIRE Code of Practice may be required if volumes exceed exemption limits. This must be registered **before** material movement starts onsite.<br><br>If an MMP is required, this needs to be registered by a Qualified Person (QP) and there must be 'certainty of use' for any material re-used onsite or exported to site to ensure there is no 'sham recovery'.<br><br>For all the above material will need to be tested at the rate and analytical suites presented in Table 9-2. | |

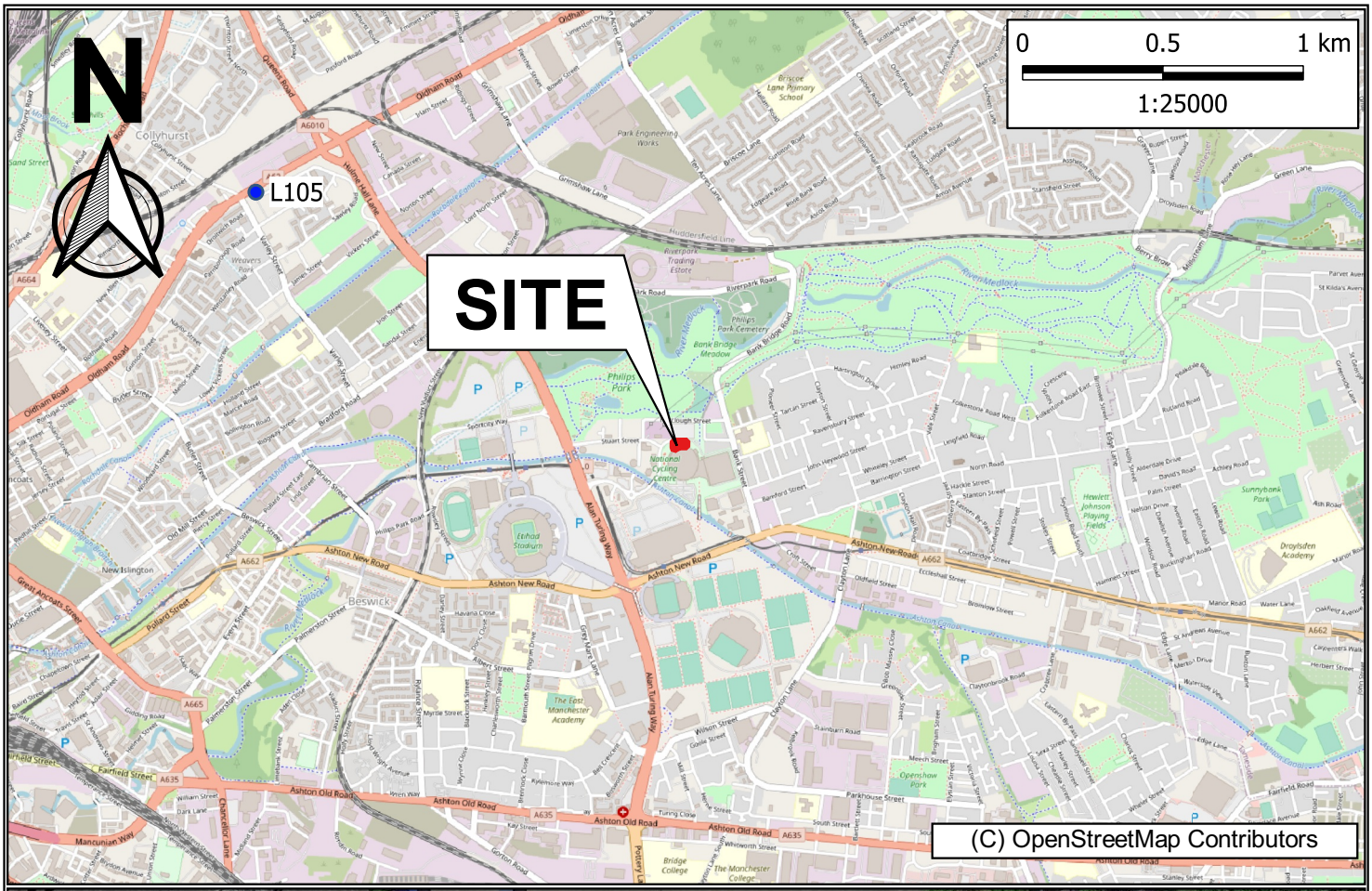
[46] CIRIA (2014). "Asbestos in Soil and Made Ground: A Guide to Understanding and Managing Risks". C733.
[47] https://www.gov.uk/guidance/waste-exemptions-using-waste

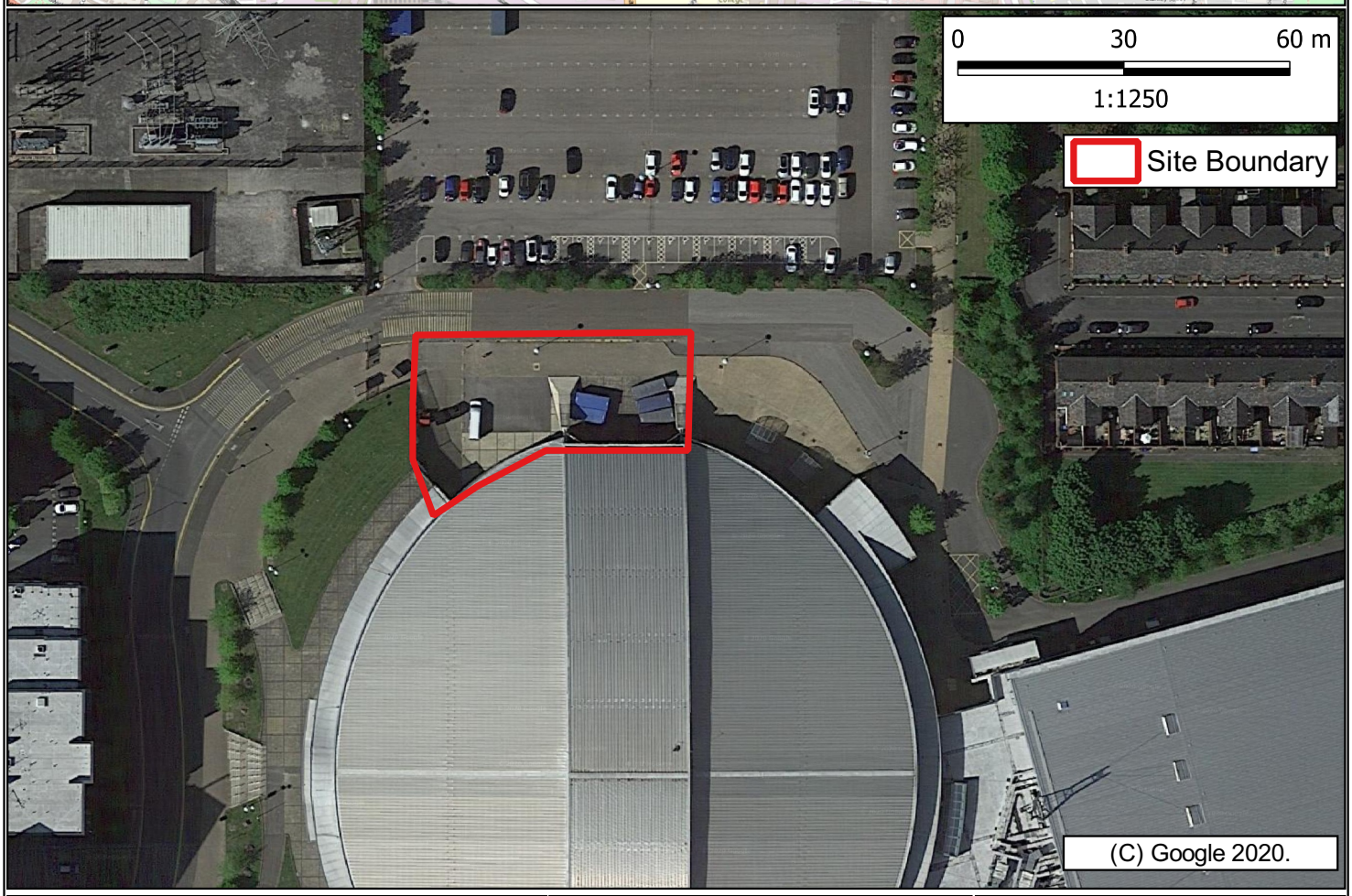
| | |
|---|---|
| | Health and Safety Considerations<br>In working with, removing or treating any contaminating material it is important that any potential risks associated with the actual site works are mitigated by good environmental management of the site during the remedial phases. Standard health and safety precautions (as per HSE guidance[48]) should be adopted by all workers involved with site enabling and construction works. |

Table 9-1: Further work, remediation and validation requirements
**Notes:** See Table 6-1 for pollutant linkage (PL) details.

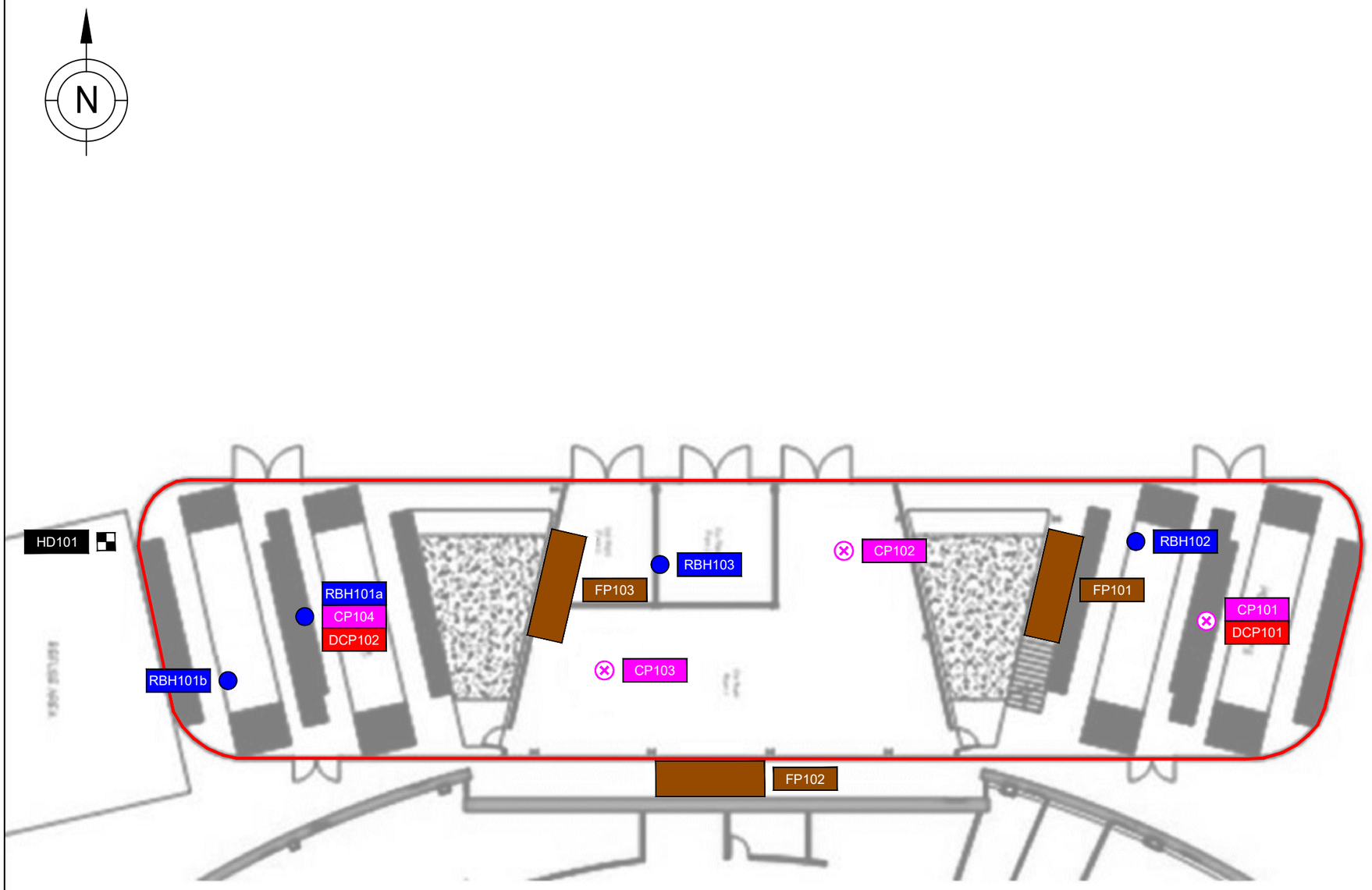
[48] HSE (1991). "Protection of Workers and the General Public During Development of Contaminated Land" London HMSO.

# Figures




| | | | |
|---|---|---|---|
| Client: ISG | | Title: Site Location & Boundary Plan | LK CONSULT |
| Site: Manchester Velodrome (Plant Room) | | | |
| Job No.: LKC 20 1527 | Drawn By: HM / Checked By: PQ / Drawn: Oct 2020 | Scale (see scale bar): 1:25,000 & 1:2,000 @ A4 / Figure: 1 / Revision: | |




## KEY

- Site Boundary
- Hand Dug Trial Pit (HD)
- Rotary Borehole (RBH)
- Cable Percussive Borehole (CP)
- Dynamic Cone Penetrometer Hole (DCP)
- Foundation Pit (FP)

Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.

Extract from: Plan Supplied by Client
Drawing Ref: Manchester Velodrome (Plant Room)

0 10
SCALE (Metres)

LK CONSULT LIMITED

Client: ISG

Site: Manchester Velodrome (Plant Room)

Title: Site Investigation Location Plan

| Job No.: | Scale (See Scale Bar): | Figure: | Revision: |
|---|---|---|---|
| LKC 20 1527 | See Scale Bar | 2 | |

| Drawn By: | Checked By: | Drawn: |
|---|---|---|
| AC | BR | May 2021 |

# Appendix A

# Risk Matrix

## Risk Evaluation

The method for risk evaluation is a qualitative method of interpreting the output from the risk estimation stage of the assessment, based on CIRIA 552[49]. It involves the classification of the:

- Magnitude of the potential consequence (severity) of the risk occurring (Table A).
- Magnitude if the probability (likelihood) of the risk occurring (Table B).

| Consequence (Severity) | | |
|---|---|---|
| **Classification** | **Definition** | **Example** |
| **Severe** | - Short term (acute) risk to human health likely to results in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA.<br>- Short term risk of pollution (note: water Resources Act contains no scope for considering significance of pollution) of sensitive water resource.<br>- Catastrophic damage to buildings/properties.<br>- A short-term risk to a particular ecosystem, or organism forming part of such ecosystem (note: the definition of ecological systems within the Draft Circular on Contaminated Land, DETR, 2000). | - High Concentrations of cyanide on the surface of an informal recreation area.<br>- Major spillage of contaminants from site into controlled waters.<br>- Explosion, causing building collapse (can also equate to short term human health risk if buildings are occupied). |
| **Medium** | - Chronic damage to Human Health ('significant harm' as defined in DETR, 2000).<br>- Pollution of sensitive water resources (note Water Resources Act contains no scope for considering significance of pollution).<br>- A significant change in a particular ecosystem, or organism forming part of such ecosystem. | - Concentrations of a contaminant from site exceed generic, or site-specific assessment criteria.<br>- Leaching of contaminants from a site to a major or minor aquifer (Principal and Secondary).<br>- Death of a species within a designated nature reserve. |
| **Mild** | - Pollution of non-sensitive water resources.<br>- Significant damage to crops, buildings, structures and services ('significant harm' as defined in DETR, 2000).<br>- Damage to sensitive buildings/structures/services or the environment. | - Pollution of non-classified groundwater.<br>- Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability). |
| **Minor** | - Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve.<br>- Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc).<br>- Easily repairable damage to buildings, structures and services. | - The presence of contaminants at such concentrations that protective equipment is required during site works.<br>- The loss of plants in a landscaping scheme.<br>- Discoloration of concrete. |

Table A. Classification of Consequence

| Probability (Likelihood) | |
|---|---|
| **Classification** | **Definition** |
| **High Likelihood** | - There is a pollutant linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution. |
| **Likely** | - There is a pollutant linkage and all the elements are present and in the right place, which means that it is probable that an event will occur.<br>- Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term. |
| **Low Likelihood** | - There is a pollutant linkage and circumstances are possible under which an event could occur.<br>- However, it is by no means certain that even over a longer period such event would take place and is less likely in the shorter term. |
| **Unlikely** | - There is a pollutant linkage, but circumstances are such that it is improbable that an event would occur in the very long term. |

Table B. Classification of Probability.

[49] CIRIA C552 (2001) Contaminated Land Risk Assessment - A Guide to Good Practice.

These classifications are then compared to indicate the risk presented by each pollutant linkage (Table C). It is important that this classification is only applied where there is a possibility (which can range from high likelihood to unlikely) of a pollutant linkage existing.

| | | Consequence | | | |
|---|---|---|---|---|---|
| | | **Severe** | **Medium** | **Mild** | **Minor** |
| **Probability** | **High Likelihood** | Very High Risk | High Risk | Moderate Risk | Moderate / Low Risk |
| | **Likely** | High Risk | Moderate Risk | Moderate / Low Risk | Low Risk |
| | **Low Likelihood** | Moderate Risk | Moderate / Low Risk | Low Risk | Very Low Risk |
| | **Unlikely** | Moderate / Low Risk | Low Risk | Very Low Risk | Very Low Risk |

Table C. Comparison of Consequence against Probability

Once the risk has been determined the corresponding action can be assessed (Table D).

| Risk | Action Required |
|---|---|
| **Very High Risk** | - There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that sever harm to a designated receptor is currently happening.<br>- This risk, if realised, is likely to results in a substantial liability.<br>- Urgent investigation (if not already undertaken) and remediation are likely to be required. |
| **High Risk** | - Harm is likely to arise to a designated receptor from an identified hazard.<br>- Realisation of the risk is likely to present a substantial liability.<br>- Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term. |
| **Moderate Risk** | - It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild.<br>- Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term. |
| **Low Risk** | - It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild. |
| **Very Low Risk** | - There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe. |

Table D. Description of the Classification and Likely Action Required.

Where a very low risk is identified no specific remediation is required.

Where a low risk is identified, some form of remediation may be required depending on the pollutant linkage, the type and concentration of contaminants present and the proposed development.

Where there is a moderate/low risk is identified, an assessment will be undertaken to establish what category the pollutant linkage will fall into.

Where LKC identifies a moderate or higher risk, remediation or further investigation work is recommended.

# Appendix B

# Profile Logs

# Foundation Pits
# Cable Percussion Boreholes
# Rotary Boreholes

# LK CONSULT LTD

Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

| Site | Borehole Number |
|---|---|
| Velodrome ISG | CP101 |

| Boring Method | Casing Diameter | Ground Level (mOD) | Client | Job Number |
|---|---|---|---|---|
| Cable Percussion | 150mm cased to 2.00m | 66.00 | ISG plc | LKC 20 1527 |

| Location (Observed measurements) | Dates | Engineer | Sheet |
|---|---|---|---|
| 387377 E 398847 N | 04/05/2021-05/05/2021 | LKC | 1/1 |

| Depth (m) | Sample / Tests | Casing Depth (m) | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 65.85 | (0.15) 0.15 | CONCRETE with rebar, approximate diameteer 5mm. | | |
| | | | | | 65.65 | (0.20) 0.35 | Yellowish brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising limestone and sandstone. Probable MOT. | | |
| 0.60 | D2 | | | | 65.45 | (0.20) 0.55 | CONCRETE. | | |
| 0.60-1.00 | ES1 PID=0.2ppm | | | | | | MADE GROUND: Brownish grey sandy clayey GRAVEL with low brick and sandstone cobble content, frequent concrete and brick fragments. Sand is fine to coarse. Gravel is fine to coarse, angular comprising limestone and mudstone. | | |
| 1.20-1.65 | SPT N=10 | | | 2,3/3,3,2,2 | | (1.85) | | | |
| 1.20-1.65 | S3 | | | | | | | | |
| 1.50 | D4 | | | | | | | | |
| 2.30-2.70 | SPT 50/250 | | | 2,3/13,26,11 | 63.60 | 2.40 | CONCRETE. | | |
| 2.30-2.70 | S5 | | | | | | | | |
| | | | | | | (1.05) | | | |
| 3.20-3.35 | SPT 25*/60 50/90 | | | 25/50 | 62.55 | 3.45 | Terminated at 3.45m | | |
| 3.20-3.35 | S6 | | | | | | | | |
| 3.40-3.45 | SPT 25*/20 50/30 | | | 25/50 | | | | | |
| 3.40-3.45 | S7 | | | | | | | | |

**Remarks**
Location estimated from https://gridreferencefinder.com/, and is accurate to 3-5m.
Elevation estimated from https://www.freemaptools.com/elevation-finder.htm.
Borehole terminated at 3.45mbgl in concrete, SPT taken between 3.40-3.45mbgl.
Borehole dry and stable.
Chiselling from 2.30m to 3.40m for 1.5 hours.

| Scale (approx) | Logged By |
|---|---|
| 1:50 | BR |

**Figure No.**
LKC 20 1527.CP101

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Tel: 0161 763 7200 web: www.thelkgroup.com

| Site | Borehole Number |
|---|---|
| Velodrome ISG | CP102 |

| Boring Method | Casing Diameter | Ground Level (mOD) | Client | Job Number |
|---|---|---|---|---|
| Cable Percussion | 150mm cased to 3.00m | 66.00 | ISG plc | LKC 20 1527 |

| Location (Observed measurements) | Dates | Engineer | Sheet |
|---|---|---|---|
| 387364 E 398853 N | 04/05/2021-05/05/2021 | LKC | 1/1 |

| Depth (m) | Sample / Tests | Casing Depth (m) | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 65.95 | 0.05 | | | |
| | | | | | 65.80 | (0.15) 0.20 | MADE GROUND: Paving slab. | | |
| 0.30-0.80 | ES1 PID=0.1ppm | | | | | | MADE GROUND: Yellowish brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising limestone and sandstone. | | |
| 1.20-1.65 | SPT N=17 | | | 1,1/2,3,4,8 | | | MADE GROUND: Brownish grey sandy clayey GRAVEL with low brick and sandstone cobble content, occasional brick fragments, clinker, plastic pieces and metal fragments. Sand is fine to coarse. Gravel is fine to coarse, angular comprising limestone and mudstone. | | |
| 1.20-1.65 | S2 | | | | | | | | |
| | | | | | | (3.00) | | | |
| 2.30-2.75 | SPT N=17 | | | 4,4/5,4,4,4 | | | | | |
| 2.30-2.75 | S3 | | | | | | | | ▼1 ▽1 |
| | | | | Water strike(1) at 3.10m, rose to 3.00m in 20 mins. | 62.80 | 3.20 | | | |
| 3.20-3.25 | S4 | | | | | (0.25) | CONCRETE. | | |
| 3.40-3.45 | S5 | | | | 62.55 | 3.45 | | | |
| 3.20-3.25 | SPT 25*/30 50/20 | | | 25/50 | | | Terminated at 3.45m | | |
| 3.40-3.45 | SPT 25*/20 50/30 | | | 25/50 | | | | | |

**Remarks**
Location estimated from https://gridreferencefinder.com/, and is accurate to 3-5m.
Elevation estimated from https://www.freemaptools.com/elevation-finder.htm.
Borehole terminated at 3.45mbgl in concrete, SPT taken between 3.40-3.45mbgl.
Perched groundwater noted at 3.10mbgl.
Borehole stable.
Chiselling from 3.20m to 3.40m for 0.5 hours.

| Scale (approx) | Logged By |
|---|---|
| 1:50 | |

**Figure No.**
LKC 20 1527.CP102

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Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

| Site | Borehole Number |
|---|---|
| Velodrome ISG | CP103 |

| Boring Method | Casing Diameter | Ground Level (mOD) | Client | Job Number |
|---|---|---|---|---|
| Cable Percussion | 150mm cased to 2.50m | 66.00 | ISG plc | LKC 20 1527 |

| Location (Observed measurements) | Dates | Engineer | Sheet |
|---|---|---|---|
| 387356 E 398847 N | 04/05/2021-05/05/2021 | LKC | 1/1 |

| Depth (m) | Sample / Tests | Casing Depth (m) | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 65.95 | 0.05 (0.25) | MADE GROUND: Paving slab. | | |
| 0.30-1.00 | ES1 PID=0.2ppm | | | | 65.70 | 0.30 | MADE GROUND: Yellowish brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising limestone and sandstone. Probable MOT. | | |
| 1.20-1.60<br>1.20-1.60 | SPT 50/250<br>S2 | | | 8,15/15,13,13,9 | | (2.90) | MADE GROUND: Brownish grey sandy clayey GRAVEL with moderate concrete cobble content, low brick cobble content, occasional brick fragments, clinker, plastic pieces and metal fragments. Sand is fine to coarse. Gravel is fine to coarse, angular comprising limestone and mudstone. | | |
| 2.20-2.65<br>2.20-2.65 | SPT N=16<br>S3 | | | 6,5/4,4,4,4 | | | | | |
| | | | | | 62.80 | 3.20 (0.25) | CONCRETE. | | ▽1 |
| 3.20-3.30<br>3.40-3.45<br>3.20-3.30<br>3.40-3.45 | S4<br>S5<br>SPT 25*/70 50/30<br>SPT 25*/30 50/20 | | | Water strike(1) at 3.20m.<br>25/50<br>25/50 | 62.55 | 3.45 | Terminated at 3.45m | | |

**Remarks**
Location estimated from https://gridreferencefinder.com/, and is accurate to 3-5m.
Elevation estimated from https://www.freemaptools.com/elevation-finder.htm.
Borehole terminated at 3.45mbgl in concrete, SPT taken between 3.40-3.45mbgl.
Perched groundwater noted at 3.20mbgl.
Borehole stable.
Chiselling from 1.20m to 2.20m for 0.25 hours. Chiselling from 3.20m to 3.40m for 0.5 hours.

| Scale (approx) | Logged By |
|---|---|
| 1:50 | BR |

**Figure No.**
LKC 20 1527.CP103

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Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

| Site | Borehole Number |
|---|---|
| Velodrome ISG | CP104 |

| Boring Method | Casing Diameter | Ground Level (mOD) | Client | Job Number |
|---|---|---|---|---|
| Cable Percussion | 150mm cased to 4.00m | 66.00 | ISG plc | LKC 20 1527 |

| Location (Observed measurements) | Dates | Engineer | Sheet |
|---|---|---|---|
| 387342 E 398847 N | 04/05/2021-05/05/2021 | LKC | 1/1 |

| Depth (m) | Sample / Tests | Casing Depth (m) | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 65.95 | 0.05 (0.25) | MADE GROUND: Tarmacadam. | | |
| 0.30-1.00 | ES1 PID=0.2ppm | | | | 65.70 | 0.30 | MADE GROUND: Yellowish brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising limestone and sandstone. Probable MOT. | | |
| 1.20-1.65<br>1.20-1.65 | SPT N=50<br>DB2 | | | 25/50 | | | MADE GROUND: Brownish grey sandy clayey GRAVEL with low brick and sandstone cobble content, occasional brick fragments, clinker, plastic pieces and metal fragments. Sand is fine to coarse. Gravel is fine to coarse, angular comprising limestone and mudstone. | | |
| 2.00-2.45<br>2.00-2.45 | SPT N=50<br>DB3 | | | 10,15/50 | | | | | |
| | | | | | | (4.50) | | | |
| 3.00-3.45<br>3.00-3.45 | SPT N=50<br>DB4 | | | 15,10/50 | | | | | |
| 4.00-4.50 | B5 | | | Water strike(1) at 4.20m, rose to 3.90m in 20 mins. | | | | | ▼1 ▽1 |
| | | | | | 61.20 | 4.80 | CONCRETE. | | |
| | | | | | | (0.50) | | | |
| | | | | | 60.70 | 5.30 | Terminated at 5.30m | | |

**Remarks**
Location estimated from https://gridreferencefinder.com/, and is accurate to 3-5m.
Elevation estimated from https://www.freemaptools.com/elevation-finder.htm.
Borehole terminated at 5.30mbgl in possible concrete. Limited recovery.
Groundwater encountered at 4.2mbgl.
Borehole stable.
Possible concrete with steel encountered at 4.80mbgl, given site ground conditions. Limited recovery therefore cannot determine material.
Chiselling from 4.80m to 5.30m for 1 hour.

| Scale (approx) | Logged By |
|---|---|
| 1:50 | BR |

**Figure No.**
LKC 20 1527.CP104

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Tel: 0161 763 7200 web: www.thelkgroup.com

| Site | Borehole Number |
|---|---|
| Velodrome ISG | RBH101A |

| Machine : | Casing Diameter | Ground Level (mOD) | Client | Job Number |
|---|---|---|---|---|
| Flush : Mist | | 66.00 | ISG plc | LKC 20 1527 |
| Core Dia : mm | | | | |
| Method : Rotary Open Hole | Location (Observed measurements) 387342 E 398847 N | Dates 04/05/2021-05/05/2021 | Engineer LKC | Sheet 1/1 |

| Depth (m) | TCR (%) | SCR (%) | RQD (%) | FI | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 65.95 | 0.05 (0.25) | MADE GROUND: Paving slab. | | |
| | | | | | | 65.70 | 0.30 (0.90) | MADE GROUND: Yellowish brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising limestone and sandstone. Probable MOT. | | |
| | | | | | | 64.80 | 1.20 (3.80) | MADE GROUND: Brownish grey sandy clayey GRAVEL with low brick and sandstone cobble content, occasional brick fragments, clinker, plastic pieces and metal fragments. Sand is fine to coarse. Gravel is fine to coarse, angular comprising limestone and mudstone.<br>Rotary hole advanced from CP104, soil descriptions above 1.20mbgl extracted from CP104 log.<br>Material logged from hand dug pits prior to drilling.<br>1. Rotary flush presented MADE GROUND brick and sandstone chippings. Similar to brick made ground material above. | | |
| | | | | | | 61.00 | 5.00 (0.50) | 1. Rotary flush presented CONCRETE chippings. Possible steel reinforcement bar present at depth given density and limited advancement at depth. | | |
| | | | | | | 60.50 | 5.50 | Terminated at 5.50m | | |

**Remarks**
Borehole terminated at 5.50mbgl in possible concrete with steel reinforcement bar.
Rotary borehole terminated shallow of 40.00mbgl due to concrete/steel obstruction at 5.50mbgl.
Elevation estimated from https://www.freemaptools.com/elevation-finder.htm.
Location estimated from https://gridreferencefinder.com/, and is accurate to 3-5m.
Descriptions from drillers logs below 1.20mbgl.
Rotary hole advanced from CP104, soil descriptions above 1.20mbgl extracted from CP104 log.
1. Drillers logs

| Scale (approx) | Logged By |
|---|---|
| 1:50 | BR |

**Figure No.**
LKC 20 1527.RBH101A

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| | | | |
|---|---|---|---|
| **LK CONSULT LTD**<br>Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS<br>Tel: 0161 763 7200 web: www.thelkgroup.com | **Site**<br>Velodrome ISG | **Borehole Number**<br>RBH101B |
| **Machine :**<br>**Flush :** Mist<br>**Core Dia :** mm<br>**Method :** Rotary Open Hole | **Casing Diameter**<br><br>**Location** (Observed measurements)<br>387344 E 398851 N | **Ground Level (mOD)**<br>66.00<br>**Dates**<br>04/05/2021-05/05/2021 | **Client**<br>ISG plc<br>**Engineer**<br>LKC | **Job Number**<br>LKC 20 1527<br>**Sheet**<br>1/1 |

| Depth (m) | TCR (%) | SCR (%) | RQD (%) | FI | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 65.95 | 0.05<br>(0.25) | MADE GROUND: Paving slab. | | |
| | | | | | | 65.70 | 0.30 | MADE GROUND: Yellowish brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising limestone and sandstone. Probable MOT. | | |
| | | | | | | | (0.90) | | | |
| | | | | | | 64.80 | 1.20 | MADE GROUND: Brownish grey sandy clayey GRAVEL with low brick and sandstone cobble content, occasional brick fragments, clinker, plastic pieces and metal fragments. Sand is fine to coarse. Gravel is fine to coarse, angular comprising limestone and mudstone.<br>Material logged from hand dug pits prior to drilling. | | |
| | | | | | | | | 1. Rotary flush presented MADE GROUND brick and sandstone chippings. Similar to made ground brick material above. | | |
| | | | | | | | (3.80) | | | |
| | | | | | | 61.00 | 5.00 | 1. Rotary flush presented CONCRETE chippings. Possible steel reinforcement bar present at depth given density and limited advancement when drilling. | | |
| | | | | | | | (0.50) | | | |
| | | | | | | 60.50 | 5.50 | Termination at the same depth as RBH101a. | | |
| | | | | | | | | Terminated at 5.50m | | |

**Remarks**
Rotary borehole terminated shallow of 40.00mbgl due to possible concrete with steel reinforcement bar at 5.50mbgl
Elevation estimated from https://www.freemaptools.com/elevation-finder.htm.
Borehole terminated at 5.50mbgl in possible concrete with steel reinforcement bar. The same depth at RBH101a.
Location estimated from https://gridreferencefinder.com/, and is accurate to 3-5m.
1. Drillers logs

| Scale (approx) | Logged By |
|---|---|
| 1:50 | BR |

**Figure No.**
LKC 20 1527.RBH101A

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| | | | |
|---|---|---|---|
| **LK CONSULT LTD**<br>Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS<br>Tel: 0161 763 7200 web: www.thelkgroup.com | **Site**<br>Velodrome ISG | **Borehole Number**<br>**RBH102** |
| **Machine :**<br>**Flush :** Mist<br>**Core Dia :** mm<br>**Method :** Rotary Open Hole | **Casing Diameter** | **Ground Level (mOD)**<br>66.00 | **Client**<br>ISG plc | **Job Number**<br>LKC 20 1527 |
| | **Location** (Observed measurements)<br>387376 E 398850 N | **Dates**<br>04/05/2021-<br>05/05/2021 | **Engineer**<br>LKC | **Sheet**<br>1/1 |

| Depth (m) | TCR (%) | SCR (%) | RQD (%) | FI | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 65.80 | (0.20)<br>0.20 | CONCRETE with rebar, approximate diameter 5mm. | | |
| | | | | | | 65.70 | 0.30 | MADE GROUND: Yellowish brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising limestone and sandstone. Probable MOT. | | |
| | | | | | | | (0.90) | | | |
| | | | | | | 64.80 | 1.20 | MADE GROUND: Brownish grey sandy clayey GRAVEL with low brick and sandstone cobble content, frequent concrete and brick fragments. Sand is fine to coarse. Gravel is fine to coarse, angular comprising limestone and mudstone.<br>Materials logged from hand dug pits prior to drilling. | | |
| | | | | | | | | 1. Rotary flush presented MADE GROUND chippings comprising brick and other constituents. Noted to be similar material to 0.3-1.2mbgl. | | |
| | | | | | | | (1.80) | | | |
| | | | | | | 63.00 | 3.00 | 1. Rotary flush presented CONCRETE chippings. | | |
| | | | | | | | (2.50) | | | |
| | | | | | | 60.50 | 5.50 | 1. Rotary flush presented MADE GROUND chippings comprising brick and other constituents. Noted to be similar material to brick made ground above. | | |
| | | | | | | | (0.50) | | | |
| | | | | | | 60.00 | 6.00 | 1. Rotary flush presented CONCRETE chippings with possible steel reinforcement bar given density and limited advancement when drilling. | | |
| | | | | | | 59.70 | (0.30)<br>6.30 | | | |
| | | | | | | | | Terminated at 6.30m | | |

**Remarks**
Rotary borehole terminated shallow of 40.00mbgl due to possible concrete with reinforcement bar at 6.30mbgl.
Elevation estimated from https://www.freemaptools.com/elevation-finder.htm.
Borehole terminated at 6.30mbgl.
Location estimated from https://gridreferencefinder.com/, and is accurate to 3-5m.
1. Drillers Logs

| Scale (approx) | Logged By |
|---|---|
| 1:50 | BR |

**Figure No.**
LKC 20 1527.RBH102

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| | | | |
|---|---|---|---|
| **LK CONSULT LTD**<br>Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS<br>Tel: 0161 763 7200 web: www.thelkgroup.com | **Site**<br>Velodrome ISG | **Borehole Number**<br>**RBH103** |
| **Machine :**<br>**Flush :** Mist<br>**Core Dia :** mm<br>**Method :** Rotary Open Hole | **Casing Diameter** | **Ground Level (mOD)**<br>66.00 | **Client**<br>ISG plc | **Job Number**<br>LKC 20 1527 |
| | **Location** (Observed measurements)<br>387358 E 398850 N | **Dates**<br>04/05/2021-<br>05/05/2021 | **Engineer**<br>LKC | **Sheet**<br>1/1 |

| Depth (m) | TCR (%) | SCR (%) | RQD (%) | FI | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 65.90 | 0.10 (0.20) | MADE GROUND: Paving slab. | | |
| | | | | | | 65.70 | 0.30 (0.30) | MADE GROUND: Yellowish brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising limestone and sandstone. Probable MOT. | | |
| | | | | | | 65.40 | 0.60 (0.40) | MADE GROUND: Brownish grey sandy clayey GRAVEL with occasional brick fragments, concrete fragments and plastic pieces. Sand is fine to coarse. Gravel is fine to coarse, angular comprising limestone and mudstone. Material logged from hand dug pits prior to drilling. | | |
| | | | | | | 65.00 | 1.00 (1.10) | 1. Rotary flush presented CONCRETE chippings. | | |
| | | | | | | | | 1. Rotary flushed presented MADE GROUND chippings, comprising brick fragments, timber, plastic and sandstone. | | |
| | | | | | | 63.90 | 2.10 (0.30) | 1. Rotary flush presented CONCRETE chippings. | | |
| | | | | | | 63.60 | 2.40 (1.10) | 1. Rotary flushed presented MADE GROUND chippings, comprising brick fragments and sandstone. | | |
| | | | | | | 62.50 | 3.50 | | | |
| | | | | | | 62.40 | 3.60 | 1. Rotary flush presented CONCRETE chippings with possible steel reinforcement bar given density and limited advancement when drilling. | | |
| | | | | | | | | Terminated at 3.60m | | |

**Remarks**
Elevation estimated from https://www.freemaptools.com/elevation-finder.htm.
Borehole terminated at 6.30mbgl.
Location estimated from https://gridreferencefinder.com/, and is accurate to 3-5m.
1. Drillers Logs

| Scale (approx) | Logged By |
|---|---|
| 1:50 | BR |

**Figure No.**
LKC 20 1527.RBH103

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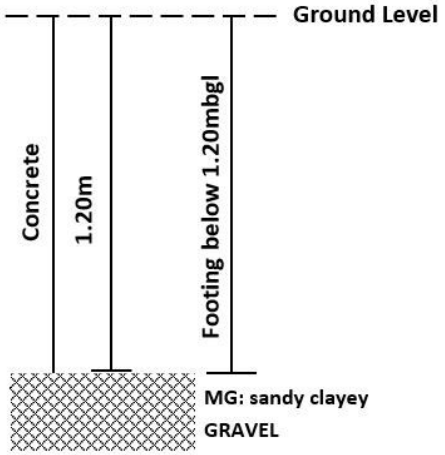
| | | | |
|---|---|---|---|
| **LK CONSULT LTD**<br>Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS<br>Tel: 0161 763 7200 web: www.thelkgroup.com | | **Site**<br>Velodrome ISG | **Trial Pit Number**<br>**FP101** |
| **Excavation Method**<br>Trial Pit | **Dimensions**<br>0.3m x 0.3m x 1.2m | **Ground Level (mOD)**<br>66.00 | **Client**<br>ISG plc | **Job Number**<br>LKC 20 1527 |
| | **Location** (Observed measurements)<br>387374 E 398851 N | **Dates**<br>04/05/2021-<br>07/05/2021 | **Engineer**<br>LKC | **Sheet**<br>1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|---|---|---|---|---|---|---|---|---|
| | | | | | (0.15) | CONCRETE with rebar, approximate diameter 5mm. | | |
| | | | | 65.85 | 0.15 | | | |
| | | | | | (0.15) | MADE GROUND: Yellowish brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising limestone and sandstone. Probable MOT. | | |
| 0.30-1.00 | ES1 PID=0.2ppm | | | 65.70 | 0.30 | | | |
| | | | | | (0.90) | MADE GROUND: Brownish grey sandy clayey GRAVEL with low brick and sandstone cobble content, frequent concrete and brick fragments. Sand is fine to coarse. Gravel is fine to coarse, angular comprising limestone and mudstone. | | |
| | | | | 64.80 | 1.20 | Complete at 1.20m | | |




**Remarks**

No groundwater encountered.
Trial pit stable.
Hand excavated pit undertaken to determine depth and extent of footing.
Pit undertaken adjacent to concrete pillar in the east of site.

| Scale (approx) | Logged By | Figure No. |
|---|---|---|
| 1:25 | BR | LKC 20 1527.FP101 |

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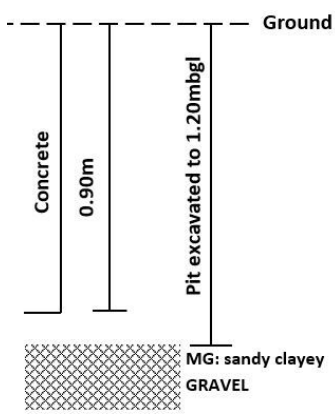
**LK CONSULT LTD**
Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

| Site | Trial Pit Number |
|---|---|
| Velodrome ISG | **FP102** |

| Excavation Method | Dimensions | Ground Level (mOD) | Client | Job Number |
|---|---|---|---|---|
| Trial Pit | 0.3m x 0.3m x 1.2m | 66.00 | ISG plc | LKC 20 1527 |

| Location (Observed measurements) | Dates | Engineer | Sheet |
|---|---|---|---|
| 387359 E 398844 N | 04/05/2021-07/05/2021 | LKC | 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|---|---|---|---|---|---|---|---|---|
| | | | | 65.95 | 0.05 | MADE GROUND: Paving slab. | | |
| | | | | | (0.25) | MADE GROUND: Yellowish brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising limestone and sandstone. Probable MOT. | | |
| 0.30-0.60 | ES1 PID=0.2ppm | | | 65.70 | 0.30 | MADE GROUND: Brownish grey sandy clayey GRAVEL with low brick and concrete cobble content, frequent concrete and brick fragments. Sand is fine to coarse. Gravel is fine to coarse, angular comprising limestone and mudstone. | | |
| | | | | | (0.90) | Damp proof membrane encountered at 0.90mbgl, at base of footing. | | |
| | | | | 64.80 | 1.20 | Complete at 1.20m | | |




**Remarks**

Hand excavated pit undertaken to determine depth and extent of footing.
Pit undertaken adjacent to northern elevation of current velodrome building.
No groundwater encountered.
Footing encountered at 0.90mbgl, does not extent from concrete foundation.
Trial pit stable.

| Scale (approx) | Logged By | Figure No. |
|---|---|---|
| 1:25 | BR | LKC 20 1527.FP103 |

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# LK CONSULT LTD

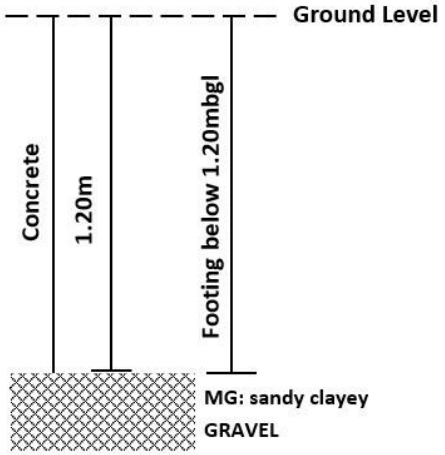
Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS
Tel: 0161 763 7200 web: www.thelkgroup.com

| Site | Trial Pit Number |
|---|---|
| Velodrome ISG | FP103 |

| Excavation Method | Dimensions | Ground Level (mOD) | Client | Job Number |
|---|---|---|---|---|
| Trial Pit | 0.3m x 0.3m x 1.2m | 66.00 | ISG plc | LKC 20 1527 |

| Location (Observed measurements) | Dates | Engineer | Sheet |
|---|---|---|---|
| 387353 E 398852 N | 04/05/2021-07/05/2021 | LKC | 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|---|---|---|---|---|---|---|---|---|
| | | | | 65.95 | 0.05 | MADE GROUND: Paving slab. | | |
| | | | | | (0.25) | MADE GROUND: Yellowish brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising limestone and sandstone. Probable MOT. | | |
| 0.30-1.00 | ES1 PID=0.1ppm | | | 65.70 | 0.30 | MADE GROUND: Brownish grey sandy clayey GRAVEL with low brick and concrete cobble content, frequent concrete and brick fragments. Sand is fine to coarse. Gravel is fine to coarse, angular comprising limestone and mudstone. | | |
| | | | | | (0.90) | | | |
| | | | | 64.80 | 1.20 | Complete at 1.20m | | |




**Remarks**

Hand excavated pit undertaken to determine depth and extent of footing.
Pit undertaken adjacent to concrete pillar in the west of site.
No groundwater encountered.
Trial pit stable.
Footing extends below 1.20mbgl.

| Scale (approx) | Logged By | Figure No. |
|---|---|---|
| 1:25 | BR | LKC 20 1527.FP103 |

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| LK GROUP | **LK CONSULT LTD**<br>Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS<br>Tel: 0161 763 7200 web: www.thelkgroup.com | **Site**<br>Velodrome ISG | **Trial Pit Number**<br>**HD101** |
|---|---|---|---|

| **Excavation Method** | **Dimensions** | **Ground Level (mOD)** | **Client** | **Job Number** |
|---|---|---|---|---|
| Trial Pit | 0.1m x 0.1m x 0.6m | 66.00 | ISG plc | LKC 20 1527 |
| | **Location** (Observed measurements)<br>387332 E 398852 N | **Dates**<br>04/05/2021-<br>05/05/2021 | **Engineer**<br>LKC | **Sheet**<br>1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|---|---|---|---|---|---|---|---|---|
| | | | | 65.90 | (0.10)<br>0.10 | MADE GROUND: Block paving. | | |
| | | | | | (0.20) | MADE GROUND: Yellowish brown gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular comprising limestone. Probable MOT. | | |
| 0.30-0.50 | ES1<br>PID=<0.1ppm | | | 65.70 | 0.30 | | | |
| | | | | | (0.30) | MADE GROUND: Brown sandy clayey GRAVEL with low brick cobble content, occasional brick fragments . Sand is fine to coarse. Gravel is fine to coarse, angular comprising limestone and mudstone. | | |
| | | | | 65.40 | 0.60 | | | |
| | | | | | | Complete at 0.60m | | |



**Remarks**

Hand excavated trial pit undertaken to determine the soil composition within the proposed access road.
Dynamic cone penetrometer undertaken adajcent to determine CBR value (DCP102)
Block paving removed prior to DCP test.
No groundwater encountered.
Trial pit stable.

| **Scale (approx)** | **Logged By** | **Figure No.** |
|---|---|---|
| 1:25 | BR | LKC 20 1527.HD101 |

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# Appendix C

# Certificates of Analysis – Soil

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

# Final Report

| | |
|---|---|
| **Report No.:** | 21-15649-1 |
| **Initial Date of Issue:** | 20-May-2021 |
| **Client** | LK Consult |
| **Client Address:** | Unit 29 Eton Business Park<br>Eton Hill Road<br>Radcliffe<br>Manchester<br>Lancashire<br>M26 2ZS |
| **Contact(s):** | Ben Smith<br>Contaminated Land |
| **Project** | LKC 20 1527 Velodrome ISG |

| | | | |
|---|---|---|---|
| **Quotation No.:** | | **Date Received:** | 12-May-2021 |
| **Order No.:** | 738631 | **Date Instructed:** | 12-May-2021 |
| **No. of Samples:** | 2 | | |
| **Turnaround (Wkdays):** | 7 | **Results Due:** | 20-May-2021 |
| **Date Approved:** | 20-May-2021 | | |

**Approved By:**



**Details:** Glynn Harvey, Technical Manager

# Results - 2 Stage WAC

**Project: LKC 20 1527 Velodrome ISG**

| | | | | | | | Landfill Waste Acceptance Criteria Limits | | |
|---|---|---|---|---|---|---|---|---|---|
| **Chemtest Job No:** | 21-15649 | | | | | | | | |
| **Chemtest Sample ID:** | 1198447 | | | | | | | | |
| **Sample Ref:** | | | | | | | **Inert Waste Landfill** | **Stable, Non-reactive hazardous waste in non-hazardous Landfill** | **Hazardous Waste Landfill** |
| **Sample ID:** | | | | | | | | | |
| **Sample Location:** | FP101/CP101 | | | | | | | | |
| **Top Depth(m):** | 0.30 | | | | | | | | |
| **Bottom Depth(m):** | 1.00 | | | | | | | | |
| **Sampling Date:** | 04-May-2021 | | | | | | | | |
| **Determinand** | **SOP** | **Accred.** | **Units** | | | | | | |
| Total Organic Carbon | 2625 | M | % | | | 0.63 | 3 | 5 | 6 |
| Loss On Ignition | 2610 | M | % | | | 2.7 | -- | -- | 10 |
| Total BTEX | 2760 | M | mg/kg | | | < 0.010 | 6 | -- | -- |
| Total PCBs (7 Congeners) | 2815 | M | mg/kg | | | < 0.10 | 1 | -- | -- |
| TPH Total WAC (Mineral Oil) | 2670 | M | mg/kg | | | 140 | 500 | -- | -- |
| Total (Of 17) PAH's | 2700 | N | mg/kg | | | 27 | 100 | -- | -- |
| pH | 2010 | M | | | | 11.2 | -- | >6 | -- |
| Acid Neutralisation Capacity | 2015 | N | mol/kg | | | 0.018 | -- | To evaluate | To evaluate |
| **Eluate Analysis** | | | **2:1 mg/l** | **8:1 mg/l** | **2:1 mg/kg** | **Cumulative mg/kg 10:1** | **Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg** | | |
| Arsenic | 1455 | U | 0.0012 | 0.0013 | 0.0024 | 0.013 | 0.5 | 2 | 25 |
| Barium | 1455 | U | 0.10 | 0.054 | 0.21 | 0.61 | 20 | 100 | 300 |
| Cadmium | 1455 | U | < 0.00011 | < 0.00011 | < 0.00011 | < 0.00011 | 0.04 | 1 | 5 |
| Chromium | 1455 | U | 0.030 | 0.015 | 0.060 | 0.17 | 0.5 | 10 | 70 |
| Copper | 1455 | U | 0.031 | 0.0059 | 0.062 | 0.042 | 2 | 50 | 100 |
| Mercury | 1455 | U | < 0.00005 | < 0.00005 | < 0.00005 | < 0.00005 | 0.01 | 0.2 | 2 |
| Molybdenum | 1455 | U | 0.022 | 0.0038 | 0.044 | 0.063 | 0.5 | 10 | 30 |
| Nickel | 1455 | U | 0.0068 | 0.0046 | 0.014 | 0.049 | 0.4 | 10 | 40 |
| Lead | 1455 | U | 0.0011 | < 0.0005 | 0.0021 | 0.0014 | 0.5 | 10 | 50 |
| Antimony | 1455 | U | 0.0014 | 0.0018 | 0.0027 | 0.017 | 0.06 | 0.7 | 5 |
| Selenium | 1455 | U | 0.0024 | 0.0007 | 0.0048 | 0.0093 | 0.1 | 0.5 | 7 |
| Zinc | 1455 | U | 0.028 | < 0.003 | 0.056 | 0.038 | 4 | 50 | 200 |
| Chloride | 1220 | U | 25 | 4.0 | 50 | 68 | 800 | 15000 | 25000 |
| Fluoride | 1220 | U | 0.43 | 0.41 | < 1.0 | 4.1 | 10 | 150 | 500 |
| Sulphate | 1220 | U | 49 | 27 | 98 | 300 | 1000 | 20000 | 50000 |
| Total Dissolved Solids | 1020 | N | 850 | 490 | 1700 | 5400 | 4000 | 60000 | 100000 |
| Phenol Index | 1920 | U | < 0.030 | < 0.030 | < 0.30 | < 0.50 | 1 | - | - |
| Dissolved Organic Carbon | 1610 | U | 6.9 | < 2.5 | < 50 | < 50 | 500 | 800 | 1000 |

| **Solid Information** | |
|---|---|
| Dry mass of test portion/kg | 0.175 |
| Moisture (%) | 8.5 |

| **Leachate Test Information** | |
|---|---|
| Leachant volume 1st extract/l | 0.334 |
| Leachant volume 2nd extract/l | 1.400 |
| Eluant recovered from 1st extract/l | 0.237 |

**Waste Acceptance Criteria**

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

# Results - 2 Stage WAC

**Project: LKC 20 1527 Velodrome ISG**

| | | | | | | | Landfill Waste Acceptance Criteria Limits | | |
|---|---|---|---|---|---|---|---|---|---|
| **Chemtest Job No:** | 21-15649 | | | | | | | | |
| **Chemtest Sample ID:** | 1198448 | | | | | | | | |
| **Sample Ref:** | | | | | | | | | |
| **Sample ID:** | | | | | | | | | |
| **Sample Location:** | CP104 | | | | | | | | |
| **Top Depth(m):** | 0.30 | | | | | | | | |
| **Bottom Depth(m):** | 1.00 | | | | | | | | |
| **Sampling Date:** | 04-May-2021 | | | | | | | | |
| **Determinand** | **SOP** | **Accred.** | **Units** | | | | **Inert Waste Landfill** | **Stable, Non-reactive hazardous waste in non-hazardous Landfill** | **Hazardous Waste Landfill** |
| Total Organic Carbon | 2625 | M | % | | | 1.4 | 3 | 5 | 6 |
| Loss On Ignition | 2610 | M | % | | | 3.8 | -- | -- | 10 |
| Total BTEX | 2760 | M | mg/kg | | | < 0.010 | 6 | -- | -- |
| Total PCBs (7 Congeners) | 2815 | M | mg/kg | | | < 0.10 | 1 | -- | -- |
| TPH Total WAC (Mineral Oil) | 2670 | M | mg/kg | | | 1400 | 500 | -- | -- |
| Total (Of 17) PAH's | 2700 | N | mg/kg | | | 34 | 100 | -- | -- |
| pH | 2010 | M | | | | 9.5 | -- | >6 | -- |
| Acid Neutralisation Capacity | 2015 | N | mol/kg | | | 0.042 | -- | To evaluate | To evaluate |
| **Eluate Analysis** | | | **2:1 mg/l** | **8:1 mg/l** | **2:1 mg/kg** | **Cumulative mg/kg 10:1** | **Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg** | | |
| Arsenic | 1455 | U | 0.0079 | 0.011 | 0.016 | 0.10 | 0.5 | 2 | 25 |
| Barium | 1455 | U | 0.037 | 0.036 | 0.074 | 0.36 | 20 | 100 | 300 |
| Cadmium | 1455 | U | < 0.00011 | < 0.00011 | < 0.00011 | < 0.00011 | 0.04 | 1 | 5 |
| Chromium | 1455 | U | 0.012 | 0.011 | 0.023 | 0.11 | 0.5 | 10 | 70 |
| Copper | 1455 | U | 0.0031 | 0.0025 | 0.0062 | 0.0046 | 2 | 50 | 100 |
| Mercury | 1455 | U | < 0.00005 | < 0.00005 | < 0.00005 | < 0.00005 | 0.01 | 0.2 | 2 |
| Molybdenum | 1455 | U | 0.017 | 0.0034 | 0.034 | 0.054 | 0.5 | 10 | 30 |
| Nickel | 1455 | U | 0.0044 | 0.0045 | 0.0088 | 0.045 | 0.4 | 10 | 40 |
| Lead | 1455 | U | < 0.0005 | 0.0020 | < 0.0005 | 0.017 | 0.5 | 10 | 50 |
| Antimony | 1455 | U | 0.015 | 0.0053 | 0.030 | 0.068 | 0.06 | 0.7 | 5 |
| Selenium | 1455 | U | 0.0018 | 0.0013 | 0.0036 | 0.014 | 0.1 | 0.5 | 7 |
| Zinc | 1455 | U | < 0.003 | < 0.003 | < 0.003 | < 0.003 | 4 | 50 | 200 |
| Chloride | 1220 | U | 7.7 | 2.2 | 15 | 30 | 800 | 15000 | 25000 |
| Fluoride | 1220 | U | 0.71 | 0.41 | 1.4 | 4.5 | 10 | 150 | 500 |
| Sulphate | 1220 | U | 88 | 21 | 180 | 310 | 1000 | 20000 | 50000 |
| Total Dissolved Solids | 1020 | N | 200 | 85 | 400 | 1000 | 4000 | 60000 | 100000 |
| Phenol Index | 1920 | U | < 0.030 | < 0.030 | < 0.30 | < 0.50 | 1 | - | - |
| Dissolved Organic Carbon | 1610 | U | 3.9 | 3.2 | < 50 | < 50 | 500 | 800 | 1000 |

| **Solid Information** | |
|---|---|
| Dry mass of test portion/kg | 0.175 |
| Moisture (%) | 11 |

| **Leachate Test Information** | |
|---|---|
| Leachant volume 1st extract/l | 0.329 |
| Leachant volume 2nd extract/l | 1.400 |
| Eluant recovered from 1st extract/l | 0.257 |

**Waste Acceptance Criteria**

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

# Test Methods

| SOP | Title | Parameters included | Method summary |
|---|---|---|---|
| 1020 | Electrical Conductivity and Total Dissolved Solids (TDS) in Waters | Electrical Conductivity and Total Dissolved Solids (TDS) in Waters | Conductivity Meter |
| 1220 | Anions, Alkalinity & Ammonium in Waters | Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium | Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser. |
| 1455 | Metals in Waters by ICP-MS | Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc | Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS). |
| 1610 | Total/Dissolved Organic Carbon in Waters | Organic Carbon | TOC Analyser using Catalytic Oxidation |
| 1920 | Phenols in Waters by HPLC | Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded. | Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection. |
| 2010 | pH Value of Soils | pH | pH Meter |
| 2015 | Acid Neutralisation Capacity | Acid Reserve | Titration |
| 2030 | Moisture and Stone Content of Soils(Requirement of MCERTS) | Moisture content | Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C. |
| 2040 | Soil Description(Requirement of MCERTS) | Soil description | As received soil is described based upon BS5930 |
| 2610 | Loss on Ignition | loss on ignition (LOI) | Determination of the proportion by mass that is lost from a soil by ignition at 550°C. |
| 2625 | Total Organic Carbon in Soils | Total organic Carbon (TOC) | Determined by high temperature combustion under oxygen, using an Eltra elemental analyser. |
| 2670 | Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID | TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40 | Dichloromethane extraction / GC-FID |
| 2700 | Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID | Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene | Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds) |
| 2760 | Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS | Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule | Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds. |
| 2815 | Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS | ICES7 PCB congeners | Acetone/Hexane extraction / GC-MS |
| 640 | Characterisation of Waste (Leaching C10) | Waste material including soil, sludges and granular waste | ComplianceTest for Leaching of Granular Waste Material and Sludge |
| 650 | Characterisation of Waste (Leaching WAC) | Waste material including soil, sludges and granular waste | ComplianceTest for Leaching of Granular Waste Material and Sludge |

## Report Information

**Key**

| | |
|---|---|
| U | UKAS accredited |
| M | MCERTS and UKAS accredited |
| N | Unaccredited |
| S | This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis |
| SN | This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis |
| T | This analysis has been subcontracted to an unaccredited laboratory |
| I/S | Insufficient Sample |
| U/S | Unsuitable Sample |
| N/E | not evaluated |
| < | "less than" |
| > | "greater than" |
| SOP | Standard operating procedure |
| LOD | Limit of detection |

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

**Sample Deviation Codes**

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

**Sample Retention and Disposal**

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

# Final Report

| | |
|---|---|
| **Report No.:** | 21-15328-1 |
| **Initial Date of Issue:** | 18-May-2021 |
| **Client** | LK Consult |
| **Client Address:** | Unit 29 Eton Business Park<br>Eton Hill Road<br>Radcliffe<br>Manchester<br>Lancashire<br>M26 2ZS |
| **Contact(s):** | Ben Smith<br>Contaminated Land |
| **Project** | LKC 20-1523 Velodrome ISG |

| | | | |
|---|---|---|---|
| **Quotation No.:** | | **Date Received:** | 10-May-2021 |
| **Order No.:** | 738631 | **Date Instructed:** | 12-May-2021 |
| **No. of Samples:** | 3 | | |
| **Turnaround (Wkdays):** | 5 | **Results Due:** | 18-May-2021 |
| **Date Approved:** | 18-May-2021 | | |

**Approved By:**



**Details:** Glynn Harvey, Technical Manager

# Results - Soil

**Project: LKC 20-1523 Velodrome ISG**

| **Client: LK Consult** | | **Chemtest Job No.:** | | | 21-15328 | 21-15328 | 21-15328 |
|---|---|---|---|---|---|---|---|
| Quotation No.: | | **Chemtest Sample ID.:** | | | 1197075 | 1197076 | 1197077 |
| | | Client Sample ID.: | | | CP102 | CP103 | CP104 |
| | | Sample Type: | | | SOIL | SOIL | SOIL |
| | | Top Depth (m): | | | 0.30 | 0.30 | 0.30 |
| | | Bottom Depth (m): | | | 0.80 | 1.00 | 1.00 |
| | | Date Sampled: | | | 05-May-2021 | 05-May-2021 | 05-May-2021 |
| | | Asbestos Lab: | | | COVENTRY | COVENTRY | COVENTRY |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | | |
| ACM Type | U | 2192 | | N/A | - | - | - |
| Asbestos Identification | U | 2192 | | N/A | No Asbestos Detected | No Asbestos Detected | No Asbestos Detected |
| ACM Detection Stage | U | 2192 | | N/A | - | - | - |
| Moisture | N | 2030 | % | 0.020 | 15 | 17 | 9.2 |
| Soil Colour | N | 2040 | | N/A | Brown | Brown | Brown |
| Other Material | N | 2040 | | N/A | Stones | Stones and Roots | Stones and Roots |
| Soil Texture | N | 2040 | | N/A | Sand | Sand | Sand |
| Chromatogram (TPH) | N | | | N/A | | | See Attached |
| pH | M | 2010 | | 4.0 | 9.9 | 9.1 | 9.0 |
| Boron (Hot Water Soluble) | M | 2120 | mg/kg | 0.40 | | | < 0.40 |
| Sulphate (2:1 Water Soluble) as SO4 | M | 2120 | g/l | 0.010 | 0.19 | 0.096 | 0.020 |
| Cyanide (Free) | M | 2300 | mg/kg | 0.50 | | | < 0.50 |
| Cyanide (Total) | M | 2300 | mg/kg | 0.50 | | | < 0.50 |
| Arsenic | M | 2450 | mg/kg | 1.0 | 32 | 34 | 33 |
| Cadmium | M | 2450 | mg/kg | 0.10 | 0.54 | 0.87 | 2.2 |
| Chromium | M | 2450 | mg/kg | 1.0 | 31 | 27 | 19 |
| Copper | M | 2450 | mg/kg | 0.50 | 60 | 64 | 40 |
| Mercury | M | 2450 | mg/kg | 0.10 | 0.45 | 0.79 | 0.35 |
| Nickel | M | 2450 | mg/kg | 0.50 | 39 | 36 | 27 |
| Lead | M | 2450 | mg/kg | 0.50 | 150 | 200 | 500 |
| Selenium | M | 2450 | mg/kg | 0.20 | 0.69 | 0.45 | 0.25 |
| Vanadium | U | 2450 | mg/kg | 5.0 | 33 | 33 | 25 |
| Zinc | M | 2450 | mg/kg | 0.50 | 190 | 410 | 280 |
| Chromium (Hexavalent) | N | 2490 | mg/kg | 0.50 | < 0.50 | < 0.50 | < 0.50 |
| Organic Matter | M | 2625 | % | 0.40 | 2.2 | 0.67 | 1.5 |
| Diesel Present | N | 2670 | | N/A | | | False |
| Aliphatic TPH >C5-C6 | N | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aliphatic TPH >C6-C8 | N | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aliphatic TPH >C8-C10 | M | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aliphatic TPH >C10-C12 | M | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aliphatic TPH >C12-C16 | M | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aliphatic TPH >C16-C21 | M | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aliphatic TPH >C21-C35 | M | 2680 | mg/kg | 1.0 | | | 240 |
| Aliphatic TPH >C35-C44 | N | 2680 | mg/kg | 1.0 | | | 57 |
| Total Aliphatic Hydrocarbons | N | 2680 | mg/kg | 5.0 | | | 290 |
| Aromatic TPH >C5-C7 | N | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aromatic TPH >C7-C8 | N | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aromatic TPH >C8-C10 | M | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aromatic TPH >C10-C12 | M | 2680 | mg/kg | 1.0 | | | < 1.0 |

# Results - Soil

**Project: LKC 20-1523 Velodrome ISG**

| **Client: LK Consult** | | **Chemtest Job No.:** | | | 21-15328 | 21-15328 | 21-15328 |
|---|---|---|---|---|---|---|---|
| Quotation No.: | | **Chemtest Sample ID.:** | | | 1197075 | 1197076 | 1197077 |
| | | | | Client Sample ID.: | CP102 | CP103 | CP104 |
| | | | | Sample Type: | SOIL | SOIL | SOIL |
| | | | | Top Depth (m): | 0.30 | 0.30 | 0.30 |
| | | | | Bottom Depth (m): | 0.80 | 1.00 | 1.00 |
| | | | | Date Sampled: | 05-May-2021 | 05-May-2021 | 05-May-2021 |
| | | | | Asbestos Lab: | COVENTRY | COVENTRY | COVENTRY |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | | |
| Aromatic TPH >C12-C16 | M | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aromatic TPH >C16-C21 | U | 2680 | mg/kg | 1.0 | | | 50 |
| Aromatic TPH >C21-C35 | M | 2680 | mg/kg | 1.0 | | | 680 |
| Aromatic TPH >C35-C44 | N | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Total Aromatic Hydrocarbons | N | 2680 | mg/kg | 5.0 | | | 730 |
| Total Petroleum Hydrocarbons | N | 2680 | mg/kg | 10.0 | | | 1000 |
| Benzene | M | 2760 | µg/kg | 1.0 | | | < 1.0 |
| Toluene | M | 2760 | µg/kg | 1.0 | | | < 1.0 |
| Ethylbenzene | M | 2760 | µg/kg | 1.0 | | | < 1.0 |
| m & p-Xylene | M | 2760 | µg/kg | 1.0 | | | < 1.0 |
| o-Xylene | M | 2760 | µg/kg | 1.0 | | | < 1.0 |
| Methyl Tert-Butyl Ether | M | 2760 | µg/kg | 1.0 | | | < 1.0 |
| Naphthalene | M | 2800 | mg/kg | 0.10 | < 0.10 | 0.86 | 0.49 |
| Acenaphthylene | N | 2800 | mg/kg | 0.10 | < 0.10 | 0.19 | 0.19 |
| Acenaphthene | M | 2800 | mg/kg | 0.10 | < 0.10 | 0.18 | 0.76 |
| Fluorene | M | 2800 | mg/kg | 0.10 | < 0.10 | 0.35 | 0.58 |
| Phenanthrene | M | 2800 | mg/kg | 0.10 | 1.7 | 3.2 | 3.7 |
| Anthracene | M | 2800 | mg/kg | 0.10 | 0.42 | 0.54 | 0.82 |
| Fluoranthene | M | 2800 | mg/kg | 0.10 | 2.3 | 4.5 | 4.5 |
| Pyrene | M | 2800 | mg/kg | 0.10 | 2.2 | 4.2 | 4.8 |
| Benzo[a]anthracene | M | 2800 | mg/kg | 0.10 | 1.2 | 1.9 | 2.0 |
| Chrysene | M | 2800 | mg/kg | 0.10 | 0.96 | 2.2 | 2.3 |
| Benzo[b]fluoranthene | M | 2800 | mg/kg | 0.10 | 1.4 | 2.7 | 2.6 |
| Benzo[k]fluoranthene | M | 2800 | mg/kg | 0.10 | 0.53 | 0.92 | 0.75 |
| Benzo[a]pyrene | M | 2800 | mg/kg | 0.10 | 1.1 | 2.2 | 2.2 |
| Indeno(1,2,3-c,d)Pyrene | M | 2800 | mg/kg | 0.10 | 0.85 | 1.5 | 1.6 |
| Dibenz(a,h)Anthracene | N | 2800 | mg/kg | 0.10 | < 0.10 | 0.40 | < 0.10 |
| Benzo[g,h,i]perylene | M | 2800 | mg/kg | 0.10 | 1.3 | 1.6 | 1.7 |
| Total Of 16 PAH's | N | 2800 | mg/kg | 2.0 | 14 | 27 | 29 |
| Total Phenols | M | 2920 | mg/kg | 0.10 | | | < 0.10 |

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

# Final Report

| | |
|---|---|
| **Report No.:** | 21-15649-1 |
| **Initial Date of Issue:** | 20-May-2021 |
| **Client** | LK Consult |
| **Client Address:** | Unit 29 Eton Business Park<br>Eton Hill Road<br>Radcliffe<br>Manchester<br>Lancashire<br>M26 2ZS |
| **Contact(s):** | Ben Smith<br>Contaminated Land |
| **Project** | LKC 20 1527 Velodrome ISG |

| | | | |
|---|---|---|---|
| **Quotation No.:** | | **Date Received:** | 12-May-2021 |
| **Order No.:** | 738631 | **Date Instructed:** | 12-May-2021 |
| **No. of Samples:** | 2 | | |
| **Turnaround (Wkdays):** | 7 | **Results Due:** | 20-May-2021 |
| **Date Approved:** | 20-May-2021 | | |

**Approved By:**



**Details:** Glynn Harvey, Technical Manager

# Results - 2 Stage WAC

**Project: LKC 20 1527 Velodrome ISG**

| | | | | | | | Landfill Waste Acceptance Criteria Limits | | |
|---|---|---|---|---|---|---|---|---|---|
| **Chemtest Job No:** | 21-15649 | | | | | | | | |
| **Chemtest Sample ID:** | 1198447 | | | | | | | | |
| **Sample Ref:** | | | | | | | **Inert Waste Landfill** | **Stable, Non-reactive hazardous waste in non-hazardous Landfill** | **Hazardous Waste Landfill** |
| **Sample ID:** | | | | | | | | | |
| **Sample Location:** | FP101/CP101 | | | | | | | | |
| **Top Depth(m):** | 0.30 | | | | | | | | |
| **Bottom Depth(m):** | 1.00 | | | | | | | | |
| **Sampling Date:** | 04-May-2021 | | | | | | | | |
| **Determinand** | **SOP** | **Accred.** | **Units** | | | | | | |
| Total Organic Carbon | 2625 | M | % | | | 0.63 | 3 | 5 | 6 |
| Loss On Ignition | 2610 | M | % | | | 2.7 | -- | -- | 10 |
| Total BTEX | 2760 | M | mg/kg | | | < 0.010 | 6 | -- | -- |
| Total PCBs (7 Congeners) | 2815 | M | mg/kg | | | < 0.10 | 1 | -- | -- |
| TPH Total WAC (Mineral Oil) | 2670 | M | mg/kg | | | 140 | 500 | -- | -- |
| Total (Of 17) PAH's | 2700 | N | mg/kg | | | 27 | 100 | -- | -- |
| pH | 2010 | M | | | | 11.2 | -- | >6 | -- |
| Acid Neutralisation Capacity | 2015 | N | mol/kg | | | 0.018 | -- | To evaluate | To evaluate |
| **Eluate Analysis** | | | **2:1 mg/l** | **8:1 mg/l** | **2:1 mg/kg** | **Cumulative mg/kg 10:1** | **Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg** | | |
| Arsenic | 1455 | U | 0.0012 | 0.0013 | 0.0024 | 0.013 | 0.5 | 2 | 25 |
| Barium | 1455 | U | 0.10 | 0.054 | 0.21 | 0.61 | 20 | 100 | 300 |
| Cadmium | 1455 | U | < 0.00011 | < 0.00011 | < 0.00011 | < 0.00011 | 0.04 | 1 | 5 |
| Chromium | 1455 | U | 0.030 | 0.015 | 0.060 | 0.17 | 0.5 | 10 | 70 |
| Copper | 1455 | U | 0.031 | 0.0059 | 0.062 | 0.042 | 2 | 50 | 100 |
| Mercury | 1455 | U | < 0.00005 | < 0.00005 | < 0.00005 | < 0.00005 | 0.01 | 0.2 | 2 |
| Molybdenum | 1455 | U | 0.022 | 0.0038 | 0.044 | 0.063 | 0.5 | 10 | 30 |
| Nickel | 1455 | U | 0.0068 | 0.0046 | 0.014 | 0.049 | 0.4 | 10 | 40 |
| Lead | 1455 | U | 0.0011 | < 0.0005 | 0.0021 | 0.0014 | 0.5 | 10 | 50 |
| Antimony | 1455 | U | 0.0014 | 0.0018 | 0.0027 | 0.017 | 0.06 | 0.7 | 5 |
| Selenium | 1455 | U | 0.0024 | 0.0007 | 0.0048 | 0.0093 | 0.1 | 0.5 | 7 |
| Zinc | 1455 | U | 0.028 | < 0.003 | 0.056 | 0.038 | 4 | 50 | 200 |
| Chloride | 1220 | U | 25 | 4.0 | 50 | 68 | 800 | 15000 | 25000 |
| Fluoride | 1220 | U | 0.43 | 0.41 | < 1.0 | 4.1 | 10 | 150 | 500 |
| Sulphate | 1220 | U | 49 | 27 | 98 | 300 | 1000 | 20000 | 50000 |
| Total Dissolved Solids | 1020 | N | 850 | 490 | 1700 | 5400 | 4000 | 60000 | 100000 |
| Phenol Index | 1920 | U | < 0.030 | < 0.030 | < 0.30 | < 0.50 | 1 | - | - |
| Dissolved Organic Carbon | 1610 | U | 6.9 | < 2.5 | < 50 | < 50 | 500 | 800 | 1000 |

| **Solid Information** | |
|---|---|
| Dry mass of test portion/kg | 0.175 |
| Moisture (%) | 8.5 |

| **Leachate Test Information** | |
|---|---|
| Leachant volume 1st extract/l | 0.334 |
| Leachant volume 2nd extract/l | 1.400 |
| Eluant recovered from 1st extract/l | 0.237 |

**Waste Acceptance Criteria**

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

# Results - 2 Stage WAC

**Project: LKC 20 1527 Velodrome ISG**

| | | | | | | | Landfill Waste Acceptance Criteria Limits | | |
|---|---|---|---|---|---|---|---|---|---|
| **Chemtest Job No:** | 21-15649 | | | | | | | | |
| **Chemtest Sample ID:** | 1198448 | | | | | | | | |
| **Sample Ref:** | | | | | | | | | |
| **Sample ID:** | | | | | | | | | |
| **Sample Location:** | CP104 | | | | | | | | |
| **Top Depth(m):** | 0.30 | | | | | | | | |
| **Bottom Depth(m):** | 1.00 | | | | | | | | |
| **Sampling Date:** | 04-May-2021 | | | | | | | | |
| **Determinand** | **SOP** | **Accred.** | **Units** | | | | **Inert Waste Landfill** | **Stable, Non-reactive hazardous waste in non-hazardous Landfill** | **Hazardous Waste Landfill** |
| Total Organic Carbon | 2625 | M | % | | | 1.4 | 3 | 5 | 6 |
| Loss On Ignition | 2610 | M | % | | | 3.8 | -- | -- | 10 |
| Total BTEX | 2760 | M | mg/kg | | | < 0.010 | 6 | -- | -- |
| Total PCBs (7 Congeners) | 2815 | M | mg/kg | | | < 0.10 | 1 | -- | -- |
| TPH Total WAC (Mineral Oil) | 2670 | M | mg/kg | | | 1400 | 500 | -- | -- |
| Total (Of 17) PAH's | 2700 | N | mg/kg | | | 34 | 100 | -- | -- |
| pH | 2010 | M | | | | 9.5 | -- | >6 | -- |
| Acid Neutralisation Capacity | 2015 | N | mol/kg | | | 0.042 | -- | To evaluate | To evaluate |
| **Eluate Analysis** | | | **2:1 mg/l** | **8:1 mg/l** | **2:1 mg/kg** | **Cumulative mg/kg 10:1** | **Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg** | | |
| Arsenic | 1455 | U | 0.0079 | 0.011 | 0.016 | 0.10 | 0.5 | 2 | 25 |
| Barium | 1455 | U | 0.037 | 0.036 | 0.074 | 0.36 | 20 | 100 | 300 |
| Cadmium | 1455 | U | < 0.00011 | < 0.00011 | < 0.00011 | < 0.00011 | 0.04 | 1 | 5 |
| Chromium | 1455 | U | 0.012 | 0.011 | 0.023 | 0.11 | 0.5 | 10 | 70 |
| Copper | 1455 | U | 0.0031 | 0.0025 | 0.0062 | 0.0046 | 2 | 50 | 100 |
| Mercury | 1455 | U | < 0.00005 | < 0.00005 | < 0.00005 | < 0.00005 | 0.01 | 0.2 | 2 |
| Molybdenum | 1455 | U | 0.017 | 0.0034 | 0.034 | 0.054 | 0.5 | 10 | 30 |
| Nickel | 1455 | U | 0.0044 | 0.0045 | 0.0088 | 0.045 | 0.4 | 10 | 40 |
| Lead | 1455 | U | < 0.0005 | 0.0020 | < 0.0005 | 0.017 | 0.5 | 10 | 50 |
| Antimony | 1455 | U | 0.015 | 0.0053 | 0.030 | 0.068 | 0.06 | 0.7 | 5 |
| Selenium | 1455 | U | 0.0018 | 0.0013 | 0.0036 | 0.014 | 0.1 | 0.5 | 7 |
| Zinc | 1455 | U | < 0.003 | < 0.003 | < 0.003 | < 0.003 | 4 | 50 | 200 |
| Chloride | 1220 | U | 7.7 | 2.2 | 15 | 30 | 800 | 15000 | 25000 |
| Fluoride | 1220 | U | 0.71 | 0.41 | 1.4 | 4.5 | 10 | 150 | 500 |
| Sulphate | 1220 | U | 88 | 21 | 180 | 310 | 1000 | 20000 | 50000 |
| Total Dissolved Solids | 1020 | N | 200 | 85 | 400 | 1000 | 4000 | 60000 | 100000 |
| Phenol Index | 1920 | U | < 0.030 | < 0.030 | < 0.30 | < 0.50 | 1 | - | - |
| Dissolved Organic Carbon | 1610 | U | 3.9 | 3.2 | < 50 | < 50 | 500 | 800 | 1000 |

| **Solid Information** | |
|---|---|
| Dry mass of test portion/kg | 0.175 |
| Moisture (%) | 11 |

| **Leachate Test Information** | |
|---|---|
| Leachant volume 1st extract/l | 0.329 |
| Leachant volume 2nd extract/l | 1.400 |
| Eluant recovered from 1st extract/l | 0.257 |

**Waste Acceptance Criteria**

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

# Test Methods

| SOP | Title | Parameters included | Method summary |
|---|---|---|---|
| 1020 | Electrical Conductivity and Total Dissolved Solids (TDS) in Waters | Electrical Conductivity and Total Dissolved Solids (TDS) in Waters | Conductivity Meter |
| 1220 | Anions, Alkalinity & Ammonium in Waters | Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium | Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser. |
| 1455 | Metals in Waters by ICP-MS | Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc | Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS). |
| 1610 | Total/Dissolved Organic Carbon in Waters | Organic Carbon | TOC Analyser using Catalytic Oxidation |
| 1920 | Phenols in Waters by HPLC | Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded. | Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection. |
| 2010 | pH Value of Soils | pH | pH Meter |
| 2015 | Acid Neutralisation Capacity | Acid Reserve | Titration |
| 2030 | Moisture and Stone Content of Soils(Requirement of MCERTS) | Moisture content | Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C. |
| 2040 | Soil Description(Requirement of MCERTS) | Soil description | As received soil is described based upon BS5930 |
| 2610 | Loss on Ignition | loss on ignition (LOI) | Determination of the proportion by mass that is lost from a soil by ignition at 550°C. |
| 2625 | Total Organic Carbon in Soils | Total organic Carbon (TOC) | Determined by high temperature combustion under oxygen, using an Eltra elemental analyser. |
| 2670 | Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID | TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40 | Dichloromethane extraction / GC-FID |
| 2700 | Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID | Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene | Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds) |
| 2760 | Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS | Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule | Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds. |
| 2815 | Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS | ICES7 PCB congeners | Acetone/Hexane extraction / GC-MS |
| 640 | Characterisation of Waste (Leaching C10) | Waste material including soil, sludges and granular waste | ComplianceTest for Leaching of Granular Waste Material and Sludge |
| 650 | Characterisation of Waste (Leaching WAC) | Waste material including soil, sludges and granular waste | ComplianceTest for Leaching of Granular Waste Material and Sludge |

## Report Information

**Key**

| | |
|---|---|
| U | UKAS accredited |
| M | MCERTS and UKAS accredited |
| N | Unaccredited |
| S | This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis |
| SN | This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis |
| T | This analysis has been subcontracted to an unaccredited laboratory |
| I/S | Insufficient Sample |
| U/S | Unsuitable Sample |
| N/E | not evaluated |
| < | "less than" |
| > | "greater than" |
| SOP | Standard operating procedure |
| LOD | Limit of detection |

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

**Sample Deviation Codes**

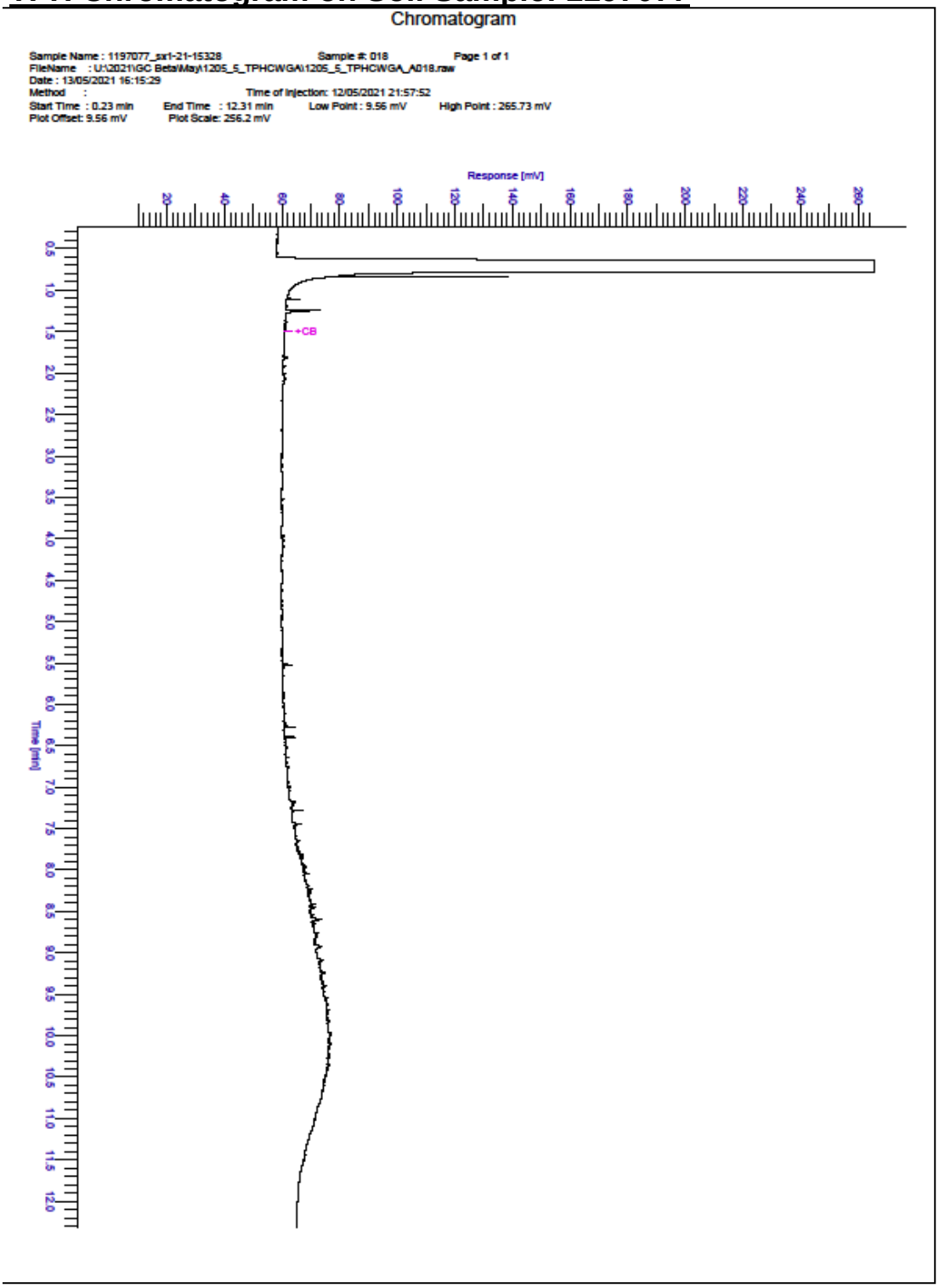
A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

**Sample Retention and Disposal**

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

# TPH Chromatogram on Soil Sample: 1197077



# TPH Interpretation

| Job | Sample | Matrix | Location | Sample Ref | Sample ID | Sample Depth (m) | Gasoline / Diesel Present | TPH Interpretation |
|---|---|---|---|---|---|---|---|---|
| 21-15328 | 1197077 | S | | | CP104 | 0.30 | No | PAH and Heavy Oil |

# Test Methods

| SOP | Title | Parameters included | Method summary |
|---|---|---|---|
| 2010 | pH Value of Soils | pH | pH Meter |
| 2030 | Moisture and Stone Content of Soils(Requirement of MCERTS) | Moisture content | Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C. |
| 2040 | Soil Description(Requirement of MCERTS) | Soil description | As received soil is described based upon BS5930 |
| 2120 | Water Soluble Boron, Sulphate, Magnesium & Chromium | Boron; Sulphate; Magnesium; Chromium | Aqueous extraction / ICP-OES |
| 2192 | Asbestos | Asbestos | Polarised light microscopy / Gravimetry |
| 2300 | Cyanides & Thiocyanate in Soils | Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate | Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser. |
| 2450 | Acid Soluble Metals in Soils | Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc | Acid digestion followed by determination of metals in extract by ICP-MS. |
| 2490 | Hexavalent Chromium in Soils | Chromium [VI] | Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide. |
| 2625 | Total Organic Carbon in Soils | Total organic Carbon (TOC) | Determined by high temperature combustion under oxygen, using an Eltra elemental analyser. |
| 2670 | Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID | TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40 | Dichloromethane extraction / GC-FID |
| 2680 | TPH A/A Split | Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44 | Dichloromethane extraction / GCxGC FID detection |
| 2760 | Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS | Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule | Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds. |
| 2800 | Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS | Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene* | Dichloromethane extraction / GC-MS |
| 2920 | Phenols in Soils by HPLC | Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded. | 60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection. |

## Report Information

**Key**

| | |
|---|---|
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| M | MCERTS and UKAS accredited |
| N | Unaccredited |
| S | This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis |
| SN | This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis |
| T | This analysis has been subcontracted to an unaccredited laboratory |
| I/S | Insufficient Sample |
| U/S | Unsuitable Sample |
| N/E | not evaluated |
| < | "less than" |
| > | "greater than" |
| SOP | Standard operating procedure |
| LOD | Limit of detection |

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The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

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All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

**Sample Deviation Codes**

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
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customerservices@chemtest.com

eurofins | Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

# Final Report

| | |
|---|---|
| **Report No.:** | 21-15328-1 |
| **Initial Date of Issue:** | 18-May-2021 |
| **Client** | LK Consult |
| **Client Address:** | Unit 29 Eton Business Park<br>Eton Hill Road<br>Radcliffe<br>Manchester<br>Lancashire<br>M26 2ZS |
| **Contact(s):** | Ben Smith<br>Contaminated Land |
| **Project** | LKC 20-1523 Velodrome ISG |

| | | | |
|---|---|---|---|
| **Quotation No.:** | | **Date Received:** | 10-May-2021 |
| **Order No.:** | 738631 | **Date Instructed:** | 12-May-2021 |
| **No. of Samples:** | 3 | | |
| **Turnaround (Wkdays):** | 5 | **Results Due:** | 18-May-2021 |
| **Date Approved:** | 18-May-2021 | | |

**Approved By:**



**Details:** Glynn Harvey, Technical Manager

# Results - Soil

**Project: LKC 20-1523 Velodrome ISG**

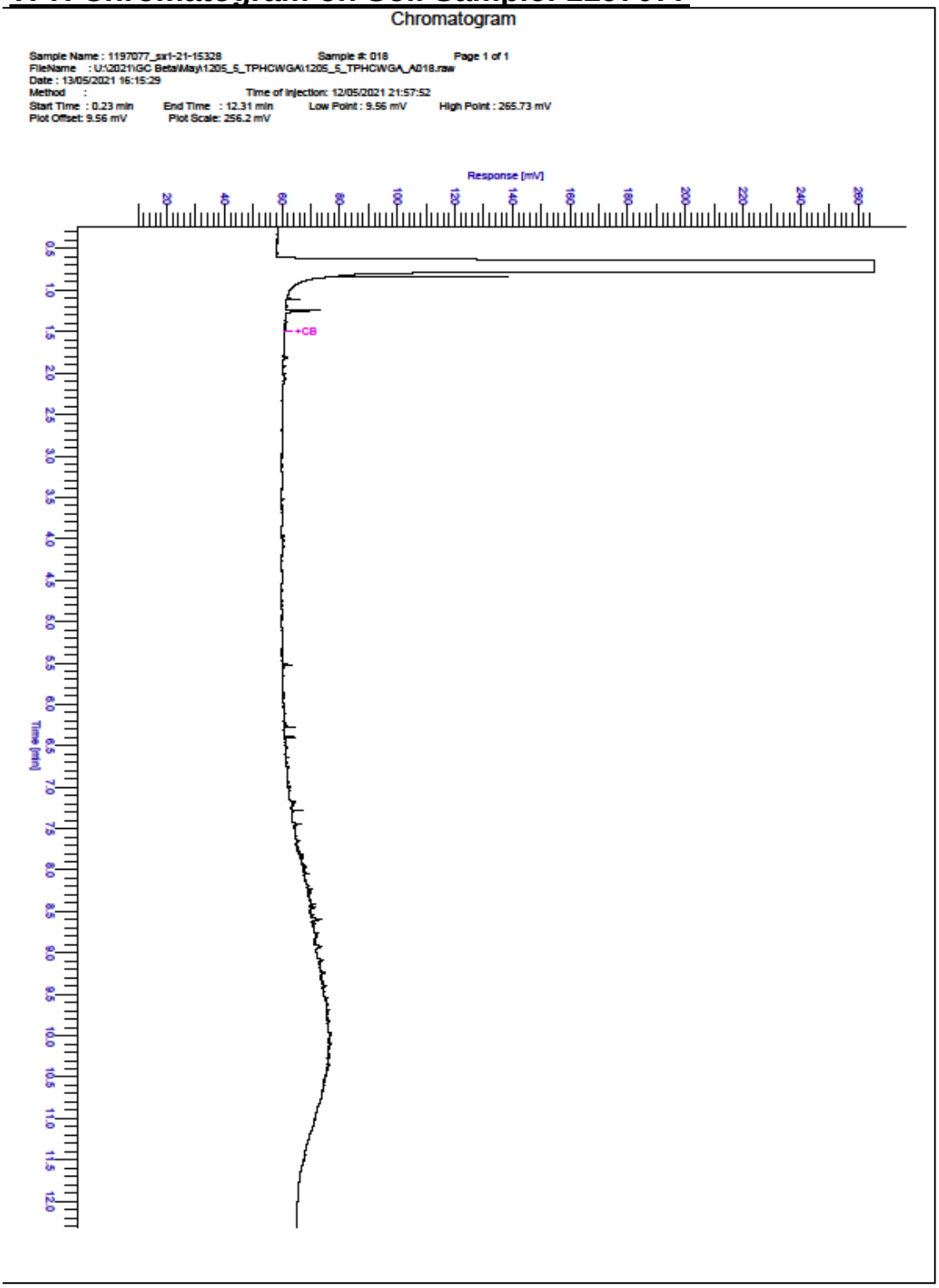
| **Client: LK Consult** | | **Chemtest Job No.:** | | | 21-15328 | 21-15328 | 21-15328 |
|---|---|---|---|---|---|---|---|
| Quotation No.: | | **Chemtest Sample ID.:** | | | 1197075 | 1197076 | 1197077 |
| | | Client Sample ID.: | | | CP102 | CP103 | CP104 |
| | | Sample Type: | | | SOIL | SOIL | SOIL |
| | | Top Depth (m): | | | 0.30 | 0.30 | 0.30 |
| | | Bottom Depth (m): | | | 0.80 | 1.00 | 1.00 |
| | | Date Sampled: | | | 05-May-2021 | 05-May-2021 | 05-May-2021 |
| | | Asbestos Lab: | | | COVENTRY | COVENTRY | COVENTRY |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | | |
| ACM Type | U | 2192 | | N/A | - | - | - |
| Asbestos Identification | U | 2192 | | N/A | No Asbestos Detected | No Asbestos Detected | No Asbestos Detected |
| ACM Detection Stage | U | 2192 | | N/A | - | - | - |
| Moisture | N | 2030 | % | 0.020 | 15 | 17 | 9.2 |
| Soil Colour | N | 2040 | | N/A | Brown | Brown | Brown |
| Other Material | N | 2040 | | N/A | Stones | Stones and Roots | Stones and Roots |
| Soil Texture | N | 2040 | | N/A | Sand | Sand | Sand |
| Chromatogram (TPH) | N | | | N/A | | | See Attached |
| pH | M | 2010 | | 4.0 | 9.9 | 9.1 | 9.0 |
| Boron (Hot Water Soluble) | M | 2120 | mg/kg | 0.40 | | | < 0.40 |
| Sulphate (2:1 Water Soluble) as SO4 | M | 2120 | g/l | 0.010 | 0.19 | 0.096 | 0.020 |
| Cyanide (Free) | M | 2300 | mg/kg | 0.50 | | | < 0.50 |
| Cyanide (Total) | M | 2300 | mg/kg | 0.50 | | | < 0.50 |
| Arsenic | M | 2450 | mg/kg | 1.0 | 32 | 34 | 33 |
| Cadmium | M | 2450 | mg/kg | 0.10 | 0.54 | 0.87 | 2.2 |
| Chromium | M | 2450 | mg/kg | 1.0 | 31 | 27 | 19 |
| Copper | M | 2450 | mg/kg | 0.50 | 60 | 64 | 40 |
| Mercury | M | 2450 | mg/kg | 0.10 | 0.45 | 0.79 | 0.35 |
| Nickel | M | 2450 | mg/kg | 0.50 | 39 | 36 | 27 |
| Lead | M | 2450 | mg/kg | 0.50 | 150 | 200 | 500 |
| Selenium | M | 2450 | mg/kg | 0.20 | 0.69 | 0.45 | 0.25 |
| Vanadium | U | 2450 | mg/kg | 5.0 | 33 | 33 | 25 |
| Zinc | M | 2450 | mg/kg | 0.50 | 190 | 410 | 280 |
| Chromium (Hexavalent) | N | 2490 | mg/kg | 0.50 | < 0.50 | < 0.50 | < 0.50 |
| Organic Matter | M | 2625 | % | 0.40 | 2.2 | 0.67 | 1.5 |
| Diesel Present | N | 2670 | | N/A | | | False |
| Aliphatic TPH >C5-C6 | N | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aliphatic TPH >C6-C8 | N | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aliphatic TPH >C8-C10 | M | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aliphatic TPH >C10-C12 | M | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aliphatic TPH >C12-C16 | M | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aliphatic TPH >C16-C21 | M | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aliphatic TPH >C21-C35 | M | 2680 | mg/kg | 1.0 | | | 240 |
| Aliphatic TPH >C35-C44 | N | 2680 | mg/kg | 1.0 | | | 57 |
| Total Aliphatic Hydrocarbons | N | 2680 | mg/kg | 5.0 | | | 290 |
| Aromatic TPH >C5-C7 | N | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aromatic TPH >C7-C8 | N | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aromatic TPH >C8-C10 | M | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aromatic TPH >C10-C12 | M | 2680 | mg/kg | 1.0 | | | < 1.0 |

# Results - Soil

**Project: LKC 20-1523 Velodrome ISG**

| **Client: LK Consult** | | **Chemtest Job No.:** | | | 21-15328 | 21-15328 | 21-15328 |
|---|---|---|---|---|---|---|---|
| Quotation No.: | | **Chemtest Sample ID.:** | | | 1197075 | 1197076 | 1197077 |
| | | | | Client Sample ID.: | CP102 | CP103 | CP104 |
| | | | | Sample Type: | SOIL | SOIL | SOIL |
| | | | | Top Depth (m): | 0.30 | 0.30 | 0.30 |
| | | | | Bottom Depth (m): | 0.80 | 1.00 | 1.00 |
| | | | | Date Sampled: | 05-May-2021 | 05-May-2021 | 05-May-2021 |
| | | | | Asbestos Lab: | COVENTRY | COVENTRY | COVENTRY |
| **Determinand** | **Accred.** | **SOP** | **Units** | **LOD** | | | |
| Aromatic TPH >C12-C16 | M | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Aromatic TPH >C16-C21 | U | 2680 | mg/kg | 1.0 | | | 50 |
| Aromatic TPH >C21-C35 | M | 2680 | mg/kg | 1.0 | | | 680 |
| Aromatic TPH >C35-C44 | N | 2680 | mg/kg | 1.0 | | | < 1.0 |
| Total Aromatic Hydrocarbons | N | 2680 | mg/kg | 5.0 | | | 730 |
| Total Petroleum Hydrocarbons | N | 2680 | mg/kg | 10.0 | | | 1000 |
| Benzene | M | 2760 | µg/kg | 1.0 | | | < 1.0 |
| Toluene | M | 2760 | µg/kg | 1.0 | | | < 1.0 |
| Ethylbenzene | M | 2760 | µg/kg | 1.0 | | | < 1.0 |
| m & p-Xylene | M | 2760 | µg/kg | 1.0 | | | < 1.0 |
| o-Xylene | M | 2760 | µg/kg | 1.0 | | | < 1.0 |
| Methyl Tert-Butyl Ether | M | 2760 | µg/kg | 1.0 | | | < 1.0 |
| Naphthalene | M | 2800 | mg/kg | 0.10 | < 0.10 | 0.86 | 0.49 |
| Acenaphthylene | N | 2800 | mg/kg | 0.10 | < 0.10 | 0.19 | 0.19 |
| Acenaphthene | M | 2800 | mg/kg | 0.10 | < 0.10 | 0.18 | 0.76 |
| Fluorene | M | 2800 | mg/kg | 0.10 | < 0.10 | 0.35 | 0.58 |
| Phenanthrene | M | 2800 | mg/kg | 0.10 | 1.7 | 3.2 | 3.7 |
| Anthracene | M | 2800 | mg/kg | 0.10 | 0.42 | 0.54 | 0.82 |
| Fluoranthene | M | 2800 | mg/kg | 0.10 | 2.3 | 4.5 | 4.5 |
| Pyrene | M | 2800 | mg/kg | 0.10 | 2.2 | 4.2 | 4.8 |
| Benzo[a]anthracene | M | 2800 | mg/kg | 0.10 | 1.2 | 1.9 | 2.0 |
| Chrysene | M | 2800 | mg/kg | 0.10 | 0.96 | 2.2 | 2.3 |
| Benzo[b]fluoranthene | M | 2800 | mg/kg | 0.10 | 1.4 | 2.7 | 2.6 |
| Benzo[k]fluoranthene | M | 2800 | mg/kg | 0.10 | 0.53 | 0.92 | 0.75 |
| Benzo[a]pyrene | M | 2800 | mg/kg | 0.10 | 1.1 | 2.2 | 2.2 |
| Indeno(1,2,3-c,d)Pyrene | M | 2800 | mg/kg | 0.10 | 0.85 | 1.5 | 1.6 |
| Dibenz(a,h)Anthracene | N | 2800 | mg/kg | 0.10 | < 0.10 | 0.40 | < 0.10 |
| Benzo[g,h,i]perylene | M | 2800 | mg/kg | 0.10 | 1.3 | 1.6 | 1.7 |
| Total Of 16 PAH's | N | 2800 | mg/kg | 2.0 | 14 | 27 | 29 |
| Total Phenols | M | 2920 | mg/kg | 0.10 | | | < 0.10 |

# TPH Chromatogram on Soil Sample: 1197077



# TPH Interpretation

| Job | Sample | Matrix | Location | Sample Ref | Sample ID | Sample Depth (m) | Gasoline / Diesel Present | TPH Interpretation |
|---|---|---|---|---|---|---|---|---|
| 21-15328 | 1197077 | S | | | CP104 | 0.30 | No | PAH and Heavy Oil |

# Test Methods

| SOP | Title | Parameters included | Method summary |
|---|---|---|---|
| 2010 | pH Value of Soils | pH | pH Meter |
| 2030 | Moisture and Stone Content of Soils(Requirement of MCERTS) | Moisture content | Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C. |
| 2040 | Soil Description(Requirement of MCERTS) | Soil description | As received soil is described based upon BS5930 |
| 2120 | Water Soluble Boron, Sulphate, Magnesium & Chromium | Boron; Sulphate; Magnesium; Chromium | Aqueous extraction / ICP-OES |
| 2192 | Asbestos | Asbestos | Polarised light microscopy / Gravimetry |
| 2300 | Cyanides & Thiocyanate in Soils | Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate | Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser. |
| 2450 | Acid Soluble Metals in Soils | Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc | Acid digestion followed by determination of metals in extract by ICP-MS. |
| 2490 | Hexavalent Chromium in Soils | Chromium [VI] | Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide. |
| 2625 | Total Organic Carbon in Soils | Total organic Carbon (TOC) | Determined by high temperature combustion under oxygen, using an Eltra elemental analyser. |
| 2670 | Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID | TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40 | Dichloromethane extraction / GC-FID |
| 2680 | TPH A/A Split | Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44 | Dichloromethane extraction / GCxGC FID detection |
| 2760 | Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS | Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule | Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds. |
| 2800 | Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS | Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene* | Dichloromethane extraction / GC-MS |
| 2920 | Phenols in Soils by HPLC | Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded. | 60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection. |

## Report Information

**Key**

| | |
|---|---|
| U | UKAS accredited |
| M | MCERTS and UKAS accredited |
| N | Unaccredited |
| S | This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis |
| SN | This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis |
| T | This analysis has been subcontracted to an unaccredited laboratory |
| I/S | Insufficient Sample |
| U/S | Unsuitable Sample |
| N/E | not evaluated |
| < | "less than" |
| > | "greater than" |
| SOP | Standard operating procedure |
| LOD | Limit of detection |

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

**Sample Deviation Codes**

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

**Sample Retention and Disposal**

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

# Appendix D

# Generic Assessment Criteria Values

Summary of Category 4 Screening Levels: 2015

| Substance | Residential (with home-grown produce) | Residential (without home-grown produce) | Allotments | Commercial | Public Open Space 1 | Public Open Space 2 |
|---|---|---|---|---|---|---|
| **Arsenic** | 37 mg/kg | 40 mg/kg | 49 mg/kg | 640 mg/kg | 79 mg/kg | 170 mg/kg |
| **Benzene** | 0.87 mg/kg | 3.3 mg/kg | 0.18 mg/kg | 98 mg/kg | 140 mg/kg | 230 mg/kg |
| **Benzo(a)pyrene** | 5.0 mg/kg | 5.3 mg/kg | 5.7 mg/kg | 77 mg/kg | 10 mg/kg | 21 mg/kg |
| **Cadmium** | 22 mg/kg | 150 mg/kg | 3.9 mg/kg | 410 mg/kg | 220 mg/kg | 880 mg/kg |
| **Chromium VI** | 21 mg/kg | 21 mg/kg | 170 mg/kg | 49 mg/kg | 21 mg/kg | 250 mg/kg |
| **Lead** | 200 mg/kg | 310 mg/kg | 80 mg/kg | 2300 mg/kg | 630 mg/kg | 1300 mg/kg |

# Summary Table for the Generic Assessment Criteria for Human Health Risk Assessment Land Quality Management (LQM) S4ULs.

*All GAC are based on sandy loam soils with a pH 7.*

| | Contaminant | SOM | LQM Generic Assessment Criteria (mg/kg) Dry weight soil | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Res + | Res - | Allot. | Comm. | $POS_{resi}$ | $POS_{park}$ |
| Metals | Inorganic Arsenic | 6% | 37 | 40 | 43 | 640 | 79 | 170 |
| | Beryllium | 6% | 1.7 | 1.7 | 35 | 12 | 2.2 | 63 |
| | Boron | 6% | 290 | 11,000 | 45 | 240,000 | 21,000 | 46,000 |
| | Cadmium | 6% | 11 | 85 | 1.9 | 190 | 120 | 532 |
| | Chromium (III) | 6% | 910 | 910 | 18,000 | 8,600 | 1,500 | 33,000 |
| | Chromium (VI) | 6% | 6.0 | 6.0 | 1.8 | 33 | 7.7 | 220 |
| | Copper | 6% | 2,400 | 7,100 | 520 | 68,000 | 12,000 | 44,000 |
| | Elemental Mercury | 6% | 1.2 | 1.2 | 21 | 58 (25.8) $^{vap}$ | 16 | 30 (25.8) $^{vap}$ |
| | Inorganic Mercury | 6% | 40 | 56 | 19 | 1,100 | 120 | 240 |
| | Methylmercury | 6% | 11 | 15 | 6.0 | 320 | 40 | 68 |
| | Nickel | 6% | 180 | 180 | 230 | 980 | 230 | 3,400 |
| | Selenium | 6% | 250 | 430 | 88 | 12,000 | 1,100 | 1,800 |
| | Vanadium | 6% | 410 | 1,200 | 91 | 9,000 | 2,000 | 5,000 |
| | Zinc | 6% | 3,700 | 40,000 | 620 | 730,000 | 81,000 | 170,000 |
| BTEX Compounds | Benzene | 1% | 0.087 | 0.38 | 0.017 | 27 | 72 | 90 |
| | | 2.5% | 0.17 | 0.70 | 0.034 | 47 | 72 | 100 |
| | | 6% | 0.37 | 1.4 | 0.075 | 90 | 73 | 110 |
| | Toluene | 1% | 130 | 880 (869) $^{vap}$ | 22 | 56,000 (869) $^{vap}$ | 56,000 | 87,000 (869) $^{vap}$ |
| | | 2.5% | 290 | 1,900 | 51 | 110,000 (1,920) $^{vap}$ | 56,000 | 95,000 (1,920) $^{vap}$ |
| | | 6% | 660 | 3,900 | 120 | 180,000 (4,360) $^{vap}$ | 56,000 | 100,000 (4,360) $^{vap}$ |
| | Ethylbenzene | 1% | 47 | 83 | 16 | 5,700 (518) $^{vap}$ | 24,000 | 17,000 (518) $^{vap}$ |
| | | 2.5% | 110 | 190 | 39 | 13,000 (1,220) $^{vap}$ | 24,000 | 22,000 (1,220) $^{vap}$ |
| | | 6% | 260 | 440 | 91 | 27,000 (2,840) $^{vap}$ | 25,000 | 27,000 (2,840) $^{vap}$ |
| | o-xylene | 1% | 60 | 88 | 28 | 6,600 (478) $^{sol}$ | 41,000 | 17,000 (478) $^{sol}$ |
| | | 2.5% | 140 | 210 | 67 | 15,000 (1,120) $^{sol}$ | 42,000 | 24,000 (1,120) $^{sol}$ |
| | | 6% | 330 | 480 | 160 | 33,000 (2,620) $^{sol}$ | 43,000 | 33,000 (2,620) $^{sol}$ |
| | m-xylene | 1% | 59 | 82 | 31 | 6,200 (625) $^{vap}$ | 41,000 | 17,000 (625) $^{vap}$ |
| | | 2.5% | 140 | 190 | 74 | 14,000 (1,470) $^{vap}$ | 42,000 | 24,000 (1,470) $^{vap}$ |
| | | 6% | 320 | 450 | 170 | 31,000 (3,460) $^{vap}$ | 43,000 | 32,000 (3,460) $^{vap}$ |
| | p-xylene | 1% | 56 | 79 | 29 | 5,900 (576) $^{sol}$ | 41,000 | 17,000 (576) $^{sol}$ |
| | | 2.5% | 130 | 180 | 69 | 14,000 (1,350) $^{sol}$ | 42,000 | 23,000 (1,350) $^{sol}$ |
| | | 6% | 310 | 430 | 160 | 30,000 (3,170) $^{sol}$ | 43,000 | 31,000 (3,170) $^{sol}$ |

**NOTES**

$^{Sol / vap}$ = solubility / vapour limit (potentially use if free product identified, although highly conservative).

*f* = oral, dermal and inhalation exposures compared to oral HCV.

*All GAC are based on sandy loam soils with a pH 7.*

| | Contaminant | SOM | LQM Generic Assessment Criteria (mg/kg) Dry weight soil | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Res + | Res - | Allot. | Comm. | $POS_{resi}$ | $POS_{park}$ |
| Polycyclic Aromatic Hydrocarbons (PAHs) | Acenaphthene | 1% | 210 | 3,000 (57.1) $^{sol}$ | 34 | 84,000 (57.0) $^{sol}$ | 15,000 | 29,000 |
| | | 2.5% | 510 | 4,700 (141) $^{sol}$ | 85 | 97,000 (141) $^{sol}$ | 15,000 | 30,000 |
| | | 6% | 1,100 | 6,000 (336) $^{sol}$ | 200 | 100,000 | 15,000 | 30,000 |
| | Acenaphthylene | 1% | 170 | 2,900 (86.1) $^{sol}$ | 28 | 83,000 (86.1) $^{sol}$ | 15,000 | 29,000 |
| | | 2.5% | 420 | 4,600 (212) $^{sol}$ | 69 | 97,000 (212) $^{sol}$ | 15,000 | 30,000 |
| | | 6% | 920 | 6,000 (506) $^{sol}$ | 160 | 100,000 | 15,000 | 30,000 |
| | Anthracene | 1% | 2,400 | 31,000 (1.17) $^{vap}$ | 380 | 520,000 | 74,000 | 150,000 |
| | | 2.5% | 5,400 | 35,000 | 950 | 540,000 | 74,000 | 150,000 |
| | | 6% | 11,000 | 37,000 | 2,200 | 540,000 | 74,000 | 150,000 |
| | Benz(a)anthracene | 1% | 7.2 | 11 | 2.9 | 170 | 29 | 49 |
| | | 2.5% | 11 | 14 | 6.5 | 170 | 29 | 56 |
| | | 6% | 13 | 15 | 13 | 180 | 29 | 62 |
| | Benzo(a)pyrene (only) | 1% | 2.2 | 3.2 | 0.97 | 35 | 5.7 | 11 |
| | | 2.5% | 2.7 | 3.2 | 2.0 | 35 | 5.7 | 12 |
| | | 6% | 3.0 | 3.2 | 3.5 | 36 | 5.7 | 13 |
| | Benzo(b)fluoranthene | 1% | 2.6 | 3.9 | 0.99 | 44 | 7.1 | 13 |
| | | 2.5% | 3.3 | 4.0 | 2.1 | 44 | 7.2 | 15 |
| | | 6% | 3.7 | 4.0 | 3.9 | 45 | 7.2 | 16 |
| | Benzo(ghi)perylene | 1% | 320 | 360 | 290 | 3,900 | 640 | 1,400 |
| | | 2.5% | 340 | 360 | 470 | 4,000 | 640 | 1,500 |
| | | 6% | 350 | 360 | 640 | 4,000 | 640 | 1,600 |
| | Benzo(k)fluoranthene | 1% | 77 | 110 | 37 | 1,200 | 190 | 370 |
| | | 2.5% | 93 | 110 | 75 | 1,200 | 190 | 410 |
| | | 6% | 100 | 110 | 130 | 1,200 | 190 | 440 |
| | Chrysene | 1% | 15 | 30 | 4.1 | 350 | 57 | 93 |
| | | 2.5% | 22 | 31 | 9.4 | 350 | 57 | 110 |
| | | 6% | 27 | 32 | 19 | 350 | 57 | 120 |
| | Dibenzo(ah)anthracene | 1% | 0.24 | 0.31 | 0.14 | 3.5 | 0.57 | 1.1 |
| | | 2.5% | 0.28 | 0.32 | 0.27 | 3.6 | 0.58 | 1.3 |
| | | 6% | 0.3 | 0.32 | 0.43 | 3.6 | 0.58 | 1.4 |
| | Fluoranthene | 1% | 280 | 1,500 | 52 | 23,000 | 3,100 | 6,300 |
| | | 2.5% | 560 | 1,600 | 130 | 23,000 | 3,100 | 6,300 |
| | | 6% | 890 | 1,600 | 290 | 23,000 | 3,100 | 6,400 |
| | Fluorene | 1% | 170 | 2,800 (36.0) $^{sol}$ | 27 | 63,000 (30.9) $^{sol}$ | 9,900 | 20,000 |
| | | 2.5% | 400 | 3,800 (76.5) $^{sol}$ | 67 | 68,000 | 9,900 | 20,000 |
| | | 6% | 860 | 4,500 (183) $^{sol}$ | 160 | 71,000 | 9,900 | 20,000 |
| | Indeno(123-cd)pyrene | 1% | 27 | 45 | 9.5 | 500 | 82 | 150 |
| | | 2.5% | 36 | 46 | 21 | 510 | 82 | 170 |
| | | 6% | 41 | 46 | 39 | 510 | 82 | 180 |
| | Naphthalene | 1% | 2.3 $^{f}$ | 2.3 $^{f}$ | 4.1 $^{f}$ | 190 $^{f}$ (76.4) $^{sol}$ | 4,900 $^{f}$ | 1,200 $^{f}$ (76.4) $^{sol}$ |
| | | 2.5% | 5.6 $^{f}$ | 5.6 $^{f}$ | 10 $^{f}$ | 460 $^{f}$ (183) $^{sol}$ | 4,900 $^{f}$ | 1,900 $^{f}$ (183) $^{sol}$ |
| | | 6% | 13 $^{f}$ | 13 $^{f}$ | 24 $^{f}$ | 1,100 $^{f}$ (432) $^{sol}$ | 4,900 $^{f}$ | 3,000 |
| | Phenanthrene | 1% | 95 | 1,300 (36.0) $^{sol}$ | 15 | 22,000 | 3,100 | 6,200 |
| | | 2.5% | 220 | 1,500 | 38 | 22,000 | 3,100 | 6,200 |
| | | 6% | 440 | 1,500 | 90 | 22,000 | 3,100 | 6,300 |
| | Pyrene | 1% | 620 | 3,700 | 110 | 54,000 | 7,400 | 15,000 |
| | | 2.5% | 1,200 | 3,800 | 270 | 54,000 | 7,400 | 15,000 |
| | | 6% | 2,000 | 3,800 | 620 | 54,000 | 7,400 | 15,000 |
| | Coal Tar (B(a)P as surrogate marker) | 1% | 0.79 | 1.2 | 0.32 | 15 | 2.2 | 4.4 |
| | | 2.5% | 0.98 | 1.2 | 0.67 | 15 | 2.2 | 4.7 |
| | | 6% | 1.1 | 1.2 | 1.2 | 15 | 2.2 | 4.8 |

**NOTES**

$^{sol / vap}$ = solubility / vapour limit (potentially use if free product identified, although highly conservative).

*f* = naphthalene is based on comparison of inhalation exposure with $TDI_{inhal}$ for localised effect.

*All GAC are based on sandy loam soils with a pH 7.*

**LQM Generic Assessment Criteria (mg/kg) Dry weight soil**

| | Contaminant | SOM | Res + | Res - | Allot. | Comm. | $POS_{resi}$ | $POS_{park}$ |
|---|---|---|---|---|---|---|---|---|
| Petroleum Hydrocarbons | **Aliphatic** | | | | | | | |
| | EC 5-6 | 1% | 42 | 42 | 730 | 3,200 (304) $^{sol}$ | 570,000(304)$^{sol}$ | 95,000 (304) $^{sol}$ |
| | EC>6-8 | 1% | 100 | 100 | 2,300 | 7,800 (144) $^{sol}$ | 600,000 | 150,000 (144) $^{sol}$ |
| | EC>8-10 | 1% | 27 | 27 | 320 | 2,000 (78) $^{sol}$ | 13,000 | 14,000 (78) $^{vap}$ |
| | EC>10-12 | 1% | 130 (48) $^{vap}$ | 130 (48) $^{vap}$ | 2,200 | 9,700 (48) $^{sol}$ | 13,000 | 21,000 (48) $^{vap}$ |
| | EC>12-16 | 1% | 1,100 (24) $^{sol}$ | 1,100 (24) $^{sol}$ | 11,000 | 59,000 (24) $^{sol}$ | 13,000 | 25,000 (24) $^{sol}$ |
| | EC>16-35 | 1% | 65,000 (8.48) $^{f,sol}$ | 65,000 (8.48) $^{f,sol}$ | 260,000 $^{f}$ | 160,000 $^{f}$ | 250,000 $^{f}$ | 450,000 $^{f}$ |
| | EC>35-44 | 1% | 65,000 (8.48) $^{f,sol}$ | 65,000 (8.48) $^{f,sol}$ | 260,000 $^{f}$ | 160,000 $^{f}$ | 250,000 $^{f}$ | 450,000 $^{f}$ |
| | **Aliphatic** | | | | | | | |
| | EC 5-6 | 2.5% | 78 | 78 | 1,700 | 5,900 (558) $^{sol}$ | 590,000 | 130,000 (558) $^{sol}$ |
| | EC>6-8 | 2.5% | 230 | 230 | 5,600 | 17,000 (322) $^{sol}$ | 610,000 | 220,000 (322) $^{sol}$ |
| | EC>8-10 | 2.5% | 65 | 65 | 770 | 4,800 (190) $^{vap}$ | 13,000 | 18,000 (190) $^{vap}$ |
| | EC>10-12 | 2.5% | 330 (118) $^{vap}$ | 330 (118) $^{vap}$ | 4,400 | 23,000 (118) $^{vap}$ | 13,000 | 23,000 (118) $^{vap}$ |
| | EC>12-16 | 2.5% | 2,400 (59) $^{sol}$ | 2,400 (59) $^{sol}$ | 13,000 | 82,000 (59) $^{sol}$ | 13,000 | 25,000 (59) $^{sol}$ |
| | EC>16-35 | 2.5% | 92,000 (21) $^{f,sol}$ | 92,000 (21) $^{f,sol}$ | 270,000 $^{f}$ | 1,700,000 $^{f}$ | 250,000 $^{f}$ | 480,000 $^{f}$ |
| | EC>35-44 | 2.5% | 92,000 (21) $^{f,sol}$ | 92,000 (21) $^{f,sol}$ | 270,000 $^{f}$ | 1,700,000 $^{f}$ | 250,000 $^{f}$ | 480,000 $^{f}$ |
| | **Aliphatic** | | | | | | | |
| | EC 5-6 | 6% | 160 | 160 | 3,900 | 12,000 (1,150) $^{sol}$ | 600,000 | 180,000 (1,150) $^{sol}$ |
| | EC>6-8 | 6% | 530 | 530 | 13,000 | 40,000 (736) $^{sol}$ | 620,000 | 320,000 (736) $^{sol}$ |
| | EC>8-10 | 6% | 150 | 150 | 1,700 | 11,000 (451) $^{vap}$ | 13,000 | 21,000 (451) $^{vap}$ |
| | EC>10-12 | 6% | 760 (283) $^{vap}$ | 760 (283) $^{vap}$ | 7,300 | 47,000 (283) $^{vap}$ | 13,000 | 24,000 (283) $^{vap}$ |
| | EC>12-16 | 6% | 4,300 (142) $^{sol}$ | 4,400 (142) $^{sol}$ | 13,000 | 90,000 (142) $^{sol}$ | 13,000 | 26,000 (142) $^{sol}$ |
| | EC>16-35 | 6% | 110,000$^{f}$ | 110,000$^{f}$ | 270,000 $^{f}$ | 1,800,000$^{f}$ | 250,000 $^{f}$ | 490,000 $^{f}$ |
| | EC>35-44 | 6% | 110,000$^{f}$ | 110,000$^{f}$ | 270,000 $^{f}$ | 1,800,000$^{f}$ | 250,000 $^{f}$ | 490,000 $^{f}$ |
| | | | | | | | | |
| | **Aromatic** | | | | | | | |
| | EC5-7(benzene as non-threshold) | 1% | 70 | 370 | 13 | 26,000 (1,220) $^{sol}$ | 56,000 | 76,000 (1,220) $^{sol}$ |
| | EC>7-8(toluene) | 1% | 130 | 860 | 22 | 56,000 (869) $^{vap}$ | 56,000 | 87,000 (869) $^{vap}$ |
| | EC>8-10 | 1% | 34 | 47 | 8.6 | 3,500 (613) $^{vap}$ | 5,000 | 7,200 (613) $^{vap}$ |
| | EC>10-12 | 1% | 74 | 250 | 13 | 16,000 (364) $^{sol}$ | 5,000 | 9,200 (364) $^{sol}$ |
| | EC>12-16 | 1% | 140 | 1,800 | 23 | 36,000 (169 ) $^{sol}$ | 5,100 | 10,000 |
| | EC>16-21 | 1% | 260 $^{f}$ | 1,900 $^{f}$ | 46 $^{f}$ | 28,000 $^{f}$ | 3,800 $^{f}$ | 7,600 $^{f}$ |
| | EC>21-35 | 1% | 1,100 $^{f}$ | 1,900 $^{f}$ | 370 $^{f}$ | 28,000 $^{f}$ | 3,800 $^{f}$ | 7,800 $^{f}$ |
| | EC>35-44 | 1% | 1,100 $^{f}$ | 1,900 $^{f}$ | 370$^{f}$ | 28,000 $^{f}$ | 3,800 $^{f}$ | 7,800 $^{f}$ |
| | **Aromatic** | | | | | | | |
| | EC5-7(benzene as non-threshold) | 2.5% | 140 | 690 | 27 | 46,000 (2,260) $^{sol}$ | 56,000 | 84,000 (2,260) $^{sol}$ |
| | EC>7-8(toluene) | 2.5% | 290 | 1,800 | 51 | 110,000 (1,920) $^{sol}$ | 56,000 | 95,000 (1,920) $^{sol}$ |
| | EC>8-10 | 2.5% | 83 | 110 | 21 | 8,100 (1,500) $^{vap}$ | 5,000 | 8,500 (1,500) $^{vap}$ |
| | EC>10-12 | 2.5% | 180 | 590 | 31 | 28,000 (899) $^{sol}$ | 5,000 | 9,700 (899) $^{sol}$ |
| | EC>12-16 | 2.5% | 330 | 2,300 (419) $^{sol}$ | 57 | 37,000 | 5,100 | 10,000 |
| | EC>16-21 | 2.5% | 540 $^{f}$ | 1,900 $^{f}$ | 110 $^{f}$ | 28,000 $^{f}$ | 3,800 $^{f}$ | 7,700 $^{f}$ |
| | EC>21-35 | 2.5% | 1,500 $^{f}$ | 1,900 $^{f}$ | 820 $^{f}$ | 28,000 $^{f}$ | 3,800 $^{f}$ | 7,800 $^{f}$ |
| | EC>35-44 | 2.5% | 1,500 $^{f}$ | 1,900 $^{f}$ | 820 $^{f}$ | 28,000 $^{f}$ | 3,800 $^{f}$ | 7,800 $^{f}$ |
| | **Aromatic** | | | | | | | |
| | EC5-7(benzene as non-threshold) | 6% | 300 | 1,400 | 57 | 86,000 (4,710) $^{sol}$ | 56,000 | 92,000 (4,710) $^{sol}$ |
| | EC>7-8(toluene) | 6% | 660 | 3,900 | 120 | 180,000 (4,360) $^{vap}$ | 56,000 | 100,000 (4,360) $^{vap}$ |
| | EC>8-10 | 6% | 190 | 270 | 51 | 17,000 (3,580) $^{vap}$ | 5,000 | 9,300 (3,580) $^{vap}$ |
| | EC>10-12 | 6% | 380 | 1,200 | 4 | 34,000 (2,150) $^{sol}$ | 5,000 | 10,000 |
| | EC>12-16 | 6% | 660 | 2,500 | 130 | 38,000 | 5,100 | 10,000 |
| | EC>16-21 | 6% | 930$^{f}$ | 1,900 $^{f}$ | 260 $^{f}$ | 28,000 $^{f}$ | 3,800 $^{f}$ | 7,800 $^{f}$ |
| | EC>21-35 | 6% | 1,700 $^{f}$ | 1,900 $^{f}$ | 1,600 $^{f}$ | 28,000 $^{f}$ | 3,800 $^{f}$ | 7,900 $^{f}$ |
| | EC>35-44 | 6% | 1,700 $^{f}$ | 1,900 $^{f}$ | 1,600 $^{f}$ | 28,000 $^{f}$ | 3,800 $^{f}$ | 7,900 $^{f}$ |
| | Aliphatic +Aromatic >EC44 | 1% | 1,600 $^{f}$ | 1,900 $^{f}$ | 1,200 $^{f}$ | 28,000 $^{f}$ | 3,800 $^{f}$ | 7,800 $^{f}$ |
| | | 2.5% | 1,800 $^{f}$ | 1,900 $^{f}$ | 2,100 $^{f}$ | 28,000 $^{f}$ | 3,800 $^{f}$ | 7,800 $^{f}$ |
| | | 6% | 1,900 $^{f}$ | 1,900 $^{f}$ | 3,000 $^{f}$ | 28,000 $^{f}$ | 3,800 $^{f}$ | 7,900 $^{f}$ |

**NOTES**

$^{Sol\ /\ vap}$ = solubility / vapour limit (potentially use if free product identified, although highly conservative).

*f* = oral, dermal and inhalation exposures compared to oral HCV.

*All GAC are based on sandy loam soils with a pH 7.*

| | Contaminant | SOM | LQM Generic Assessment Criteria (mg/kg) Dry weight soil: Res + | Res - | Allot. | Comm. | $POS_{resi}$ | $POS_{park}$ |
|---|---|---|---|---|---|---|---|---|
| Chloalkanes and Alkenes & Explosives | 1,2 Dichloroethane (DCA) | 1% | 7.1E-03 | 9.2E-03 | 4.6E-03 | 0.67 | 29 | 21 |
| | | 2.5% | 1.1E-02 | 1.3E-02 | 8.3E-03 | 0.97 | 29 | 24 |
| | | 6% | 1.9E-02 | 2.3E-02 | 1.6E-02 | 1.7 | 29 | 28 |
| | 1,1,1 Trichloroethane (TCA) | 1% | 8.8 | 9.0 | 48 | 660 | 140,000 | 57,000 (1,425) vap |
| | | 2.5% | 18 | 18 | 110 | 1,300 | 140,000 | 76,000 (2,915) vap |
| | | 6% | 39 | 40 | 240 | 3,000 | 140,000 | 100,000 (6,392) vap |
| | 1,1,2,2-Tetrachloroethanes (PCA) | 1% | 1.6 | 3.9 | 0.41 | 270 | 1,400 | 1,800 |
| | | 2.5% | 3.4 | 8.0 | 0.89 | 550 | 1,400 | 2,100 |
| | | 6% | 7.5 | 17 | 2.0 | 1,100 | 1,400 | 2,300 |
| | 1,1,1,2-Tetrachloroethanes (PCA) | 1% | 1.2 | 1.5 | 0.79 | 110 | 1,400 | 1,500 |
| | | 2.5% | 2.8 | 3.5 | 1.9 | 250 | 1,400 | 1,800 |
| | | 6% | 6.4 | 8.2 | 4.4 | 560 | 1,400 | 2,100 |
| | Tetrachloroethene (PCE) | 1% | 0.18 | 0.18 | 0.65 | 19 | 1,400 | 810 (424) sol |
| | | 2.5% | 0.39 | 0.40 | 1.5 | 42 | 1,400 | 1,100 (951) sol |
| | | 6% | 0.90 | 0.92 | 3.6 | 95 | 1,400 | 1,500 |
| | Tetrachloromethane (carbon tetrachloride) | 1% | 2.6E-02 | 2.6E-02 | 0.45 | 2.9 | 890 | 190 |
| | | 2.5% | 5.6E-02 | 5.6E-02 | 1.0 | 6.3 | 920 | 270 |
| | | 6% | 0.13 | 0.13 | 2.4 | 14 | 950 | 400 |
| | Trichloroethene (TCE) | 1% | 1.6E-02 | 1.7E-02 | 4.1E-02 | 1.2 | 120 | 70 |
| | | 2.5% | 3.4E-02 | 3.6E-02 | 9.1E-02 | 2.6 | 120 | 91 |
| | | 6% | 7.5E-02 | 8.0E-02 | 0.21 | 5.7 | 120 | 120 |
| | Trichloromethane (chloroform) | 1% | 0.91 | 1.2 | 0.42 | 99 | 2,500 | 2,600 |
| | | 2.5% | 1.7 | 2.1 | 0.83 | 170 | 2,500 | 2,800 |
| | | 6% | 3.4 | 4.2 | 1.7 | 350 | 2,500 | 3,100 |
| | Chloroethene (vinyl chloride) | 1% | 6.4E-04 | 7.7E-04 | 5.5E-04 | 5.9E-02 | 3.5 | 4.8 |
| | | 2.5% | 8.7E-04 | 1.0E-03 | 1.0E-03 | 7.7E-02 | 3.5 | 5.0 |
| | | 6% | 1.4E-03 | 1.5E-03 | 1.8E-03 | 0.12 | 3.5 | 5.4 |
| | 2,4,6-Trinitritoluene (TNT) | 1% | 1.6 | 65 | 0.24 | 1,000 | 130 | 260 |
| | | 2.5% | 3.7 | 66 | 0.58 | 1,000 | 130 | 270 |
| | | 6% | 8.1 | 66 | 1.4 | 1,000 | 130 | 270 |
| | RDX | 1% | 120 | 13,000 | 17 | 210,000 | 26,000 | 49,000 (18.7) sol |
| | | 2.5% | 250 | 13,000 | 38 | 210,000 | 26,000 | 51,000 |
| | | 6% | 540 | 13,000 | 85 | 210,000 | 27,000 | 53,000 |
| | HMX | 1% | 5.7 | 6,700 | 0.86 | 110,000 | 13,000 | 23,000 (0.35) vap |
| | | 2.5% | 13 | 6,700 | 1.9 | 110,000 | 13,000 | 23,000 (0.39) vap |
| | | 6% | 26 | 6,700 | 3.9 | 110,000 | 13,000 | 24,000 (0.48) vap |
| Pesticides | Aldrin | 1% | 5.7 | 7.3 | 3.2 | 170 | 18 | 30 |
| | | 2.5% | 6.6 | 7.4 | 6.1 | 170 | 18 | 31 |
| | | 6% | 7.1 | 7.5 | 9.8 | 170 | 18 | 31 |
| | Dieldrin | 1% | 0.97 | 7.0 | 0.17 | 170 | 18 | 30 |
| | | 2.5% | 2.0 | 7.3 | 0.41 | 170 | 18 | 30 |
| | | 6% | 3.5 | 7.4 | 0.96 | 170 | 18 | 31 |
| | Atrazine | 1% | 3.3 | 610 | 0.5 | 9,300 | 1,200 | 2,300 |
| | | 2.5% | 7.8 | 620 | 1.2 | 9,400 | 1,200 | 2,400 |
| | | 6% | 17.4 | 620 | 2.7 | 9,400 | 1,200 | 2,400 |
| | Dichlorvos | 1% | 3.2E-02 | 6.4 | 4.9E-03 | 140 | 16 | 26 |
| | | 2.5% | 6.6E-02 | 6.5 | 1.0E-02 | 140 | 16 | 26 |
| | | 6% | 0.14 | 6.6 | 2.2E-02 | 140 | 16 | 27 |
| | Endosulfanns (2 isomers) | 1% | 7.4 | 160 (3.0E-03) vap | 1.2 | 5,600 (3.0E-03) vap | 1,200 | 2,300 |
| | | 2.5% | 18 | 280 (7.0E-03) vap | 2.9 | 7,400 (7.0E-03) vap | 1,200 | 2,400 |
| | | 6% | 41 | 410 (1.6E-02) vap | 6.8 | 8,400 (1.6E-02) vap | 1,200 | 2,500 |
| | Hexachlorocyclohexane (3 isomers), inc Lindane | 1% | 8.5E-02 | 3.7 | 1.3E-02 | 65 | 8.1 | 15 |
| | | 2.5% | 0.2 | 3.8 | 3.2E-02 | 65 | 8.1 | 15 |
| | | 6% | 0.46 | 3.8 | 7.7E-02 | 65 | 8.1 | 16 |

**NOTES**

Sol / vap = solubility / vapour limit (potentially use if free product identified, although highly conservative).

*All GAC are based on sandy loam soils with a pH 7.*

| | Contaminant | SOM | LQM Generic Assessment Criteria (mg/kg) Dry weight soil | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Res + | Res - | Allot. | Comm. | $POS_{resi}$ | $POS_{park}$ |
| Chlorobenzenes | Chlorobenzene | 1% | 0.46 | 0.46 | 5.9 | 56 | 11,000 | 1,300 (675) $^{sol}$ |
| | | 2.5% | 1.0 | 1.0 | 14 | 130 | 13,000 | 2,000 (1,520) $^{sol}$ |
| | | 6% | 2.4 | 2.4 | 32 | 290 | 14,000 | 2,900 |
| | Dichlorobenzenes (3 isomers) | 1% | 23 | 24 | 94 | 2,000 (571) $^{sol}$ | 90,000 | 24,000 (571) $^{sol}$ |
| | | 2.5% | 55 | 57 | 230 | 4,800 (1,370) $^{sol}$ | 95,000 | 36,000 (1,370) $^{sol}$ |
| | | 6% | 130 | 130 | 540 | 11,000 (3,240) $^{sol}$ | 98,000 | 51,000 (3,270) $^{sol}$ |
| | Trichlorobenzenes (3 isomers) | 1% | 2.6 | 2.6 | 55 | 220 | 15,000 | 1,700 (318) $^{vap}$ |
| | | 2.5% | 6.4 | 6.4 | 140 | 530 | 17,000 | 2,600 (786) $^{vap}$ |
| | | 6% | 15 | 15 | 320 | 1,300 | 19,000 | 4,000 (1,880) $^{vap}$ |
| | Tetrachlorobenzenes (3 isomers) | 1% | 0.66 | 0.75 | 0.38 | 49 (39.4) $^{vap}$ | 78 | 110 (39) $^{vap}$ |
| | | 2.5% | 1.6 | 1.9 | 0.90 | 120 (98.1) $^{vap}$ | 79 | 120 |
| | | 6% | 3.7 | 4.3 | 2.2 | 240 (235) $^{vap}$ | 79 | 130 |
| | Pentachlorobenzene | 1% | 5.8 | 19 | 1.2 | 640 (43.0) $^{sol}$ | 100 | 190 |
| | | 2.5% | 12 | 30 | 3.1 | 770 (107) $^{sol}$ | 100 | 190 |
| | | 6% | 22 | 38 | 7.0 | 830 | 100 | 190 |
| | Hexachlorobenzene | 1% | 1.8 (0.20) $^{vap}$ | 4.1 (0.20) $^{vap}$ | 0.47 | 110 (0.20) $^{vap}$ | 16 | 30 |
| | | 2.5% | 3.3 (0.50) $^{vap}$ | 5.7 (0.50) $^{vap}$ | 1.1 | 120 | 16 | 30 |
| | | 6% | 4.9 | 6.7 (1.2) $^{vap}$ | 2.5 | 120 | 16 | 30 |
| Chlorophenol | Chlorophenols (4 congeners) | 1% | 0.87 $^{g}$ | 94 | 0.13 $^{g}$ | 3,500 | 620 | 1,100 |
| | | 2.5% | 2.0 | 150 | 0.30 | 4,000 | 620 | 1,100 |
| | | 6% | 4.5 | 210 | 0.70 | 4,300 | 620 | 1,100 |
| | Pentachlorophenol | 1% | 0.22 | 27 (16.4) $^{vap}$ | 3.0E-02 | 400 | 60 | 110 |
| | | 2.5% | 0.52 | 29 | 8.0E-02 | 400 | 60 | 120 |
| | | 6% | 1.2 | 31 | 0.19 | 400 | 60 | 120 |
| Others | Carbon Disulphide | 1% | 0.14 | 0.14 | 4.8 | 11 | 11,000 | 1,300 |
| | | 2.5% | 0.29 | 0.29 | 10 | 22 | 11,000 | 1,900 |
| | | 6% | 0.62 | 0.62 | 23 | 47 | 11,000 | 2,700 |
| | Hexachlorobutadiene | 1% | 0.29 | 0.32 | 0.25 | 31 | 25 | 48 |
| | | 2.5% | 0.7 | 0.78 | 0.61 | 66 | 25 | 50 |
| | | 6% | 1.6 | 1.8 | 1.4 | 120 | 25 | 51 |
| | Phenol | 1% | 280 | 750 | 66 | 760 $^{dir}$ (31,000) | 760 $^{dir}$ (11,000) | 760 $^{dir}$ (8,600) |
| | | 2.5% | 550 | 1,300 | 140 | 1,500 $^{dir}$ (35,000) | 1,500 $^{dir}$ (11,000) | 1,500 $^{dir}$ (9,700) |
| | | 6% | 1,100 | 2,300 | 280 | 3,200 $^{dir}$ (37,000) | 3,200 $^{dir}$ (11,000) | 3,200 $^{dir}$ (11,000) |

**NOTES**

$^{Sol / vap}$ = solubility / vapour limit (potentially use if free product identified, although highly conservative).

$^{dir}$ = S4uls based on threshold protective of direct skin contact with phenol (brackets long term exposure for illustration purposes).

$^{g}$ = derived based on 2,3,4,6-tetrachlorophenol.

# Appendix E

# HazWaste Output Sheets

HazWasteOnline™

# Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

82TAC-9GFU3-PRH4Q

## Job name

LKC 20 1527

## Description/Comments

## Project

LKC 20 1527

## Site

Velodrome

## Classified by

Name:
**Colin Crompton**
Date:
**10 Jun 2021 13:16 GMT**
Telephone:
**0161 763 7200**

Company:
**LK Group**
**Unit 29, Eton Business Park**
**Eton Hill Rd, Radcliffe**
**Greater Manchester**
**M26 2ZS**

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

**HazWasteOnline™ Certification:** **CERTIFIED**

| Course | Date |
|---|---|
| Hazardous Waste Classification | 08 Oct 2020 |

Next 3 year Refresher due by Oct 2023

## Job summary

| # | Sample name | Depth [m] | Classification Result | Hazard properties | Page |
|---|---|---|---|---|---|
| 1 | FP101/CP101-04/05/2021-0.30 | 0.30-1.00 | Non Hazardous | | 2 |
| 2 | CP102-05/05/2021-0.30 | 0.30-0.80 | Non Hazardous | | 5 |
| 3 | CP103-05/05/2021-0.30 | 0.30-1.00 | Non Hazardous | | 7 |
| 4 | CP104-05/05/2021-0.30 | 0.30-1.00 | Non Hazardous | | 9 |

## Related documents

| # | Name | Description |
|---|---|---|
| 1 | HWOL_21-15644-20210518 132639.hwol | .hwol file used to create the Job |
| 2 | HWOL_21-15328-20210518 151141.hwol | .hwol file used to create the Job |
| 3 | Example waste stream template for contaminated soils | waste stream template used to create this Job |

## Report

Created by: Colin Crompton

Created date: 10 Jun 2021 13:16 GMT


| Appendices | Page |
|---|---|
| Appendix A: Classifier defined and non CLP determinands | 12 |
| Appendix B: Rationale for selection of metal species | 13 |
| Appendix C: Version | 14 |

## Classification of sample: FP101/CP101-04/05/2021-0.30

**Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

### Sample details

Sample name:
**FP101/CP101-04/05/2021-0.30**
Sample Depth:
**0.30-1.00 m**
Moisture content:
**5.4%**
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

### Hazard properties

None identified

### Determinands

Moisture content: 5.4% Wet Weight Moisture Correction applied (MC)

| # | Determinand | CLP index number | EC Number | CAS Number | CLP Note | User entered data | Conv. Factor | Compound conc. | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | arsenic { arsenic trioxide } | 033-003-00-0 | 215-481-4 | 1327-53-3 | | 25 mg/kg | 1.32 | 31.226 mg/kg | 0.00312 % | ✓ | |
| 2 | boron { diboron trioxide; boric oxide } | 005-008-00-8 | 215-125-8 | 1303-86-2 | | <0.4 mg/kg | 3.22 | <1.288 mg/kg | <0.000129 % | | <LOD |
| 3 | cadmium { cadmium oxide } | 048-002-00-0 | 215-146-2 | 1306-19-0 | | 0.57 mg/kg | 1.142 | 0.616 mg/kg | 0.0000616 % | ✓ | |
| 4 | chromium in chromium(III) compounds { chromium(III) oxide (worst case) } | | 215-160-9 | 1308-38-9 | | 19 mg/kg | 1.462 | 26.27 mg/kg | 0.00263 % | ✓ | |
| 5 | chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex } | 024-017-00-8 | | | | <0.5 mg/kg | 2.27 | <1.135 mg/kg | <0.000113 % | | <LOD |
| 6 | copper { dicopper oxide; copper (I) oxide } | 029-002-00-X | 215-270-7 | 1317-39-1 | | 44 mg/kg | 1.126 | 46.864 mg/kg | 0.00469 % | ✓ | |
| 7 | lead { lead chromate } | 082-004-00-2 | 231-846-0 | 7758-97-6 | 1 | 93 mg/kg | 1.56 | 137.229 mg/kg | 0.0088 % | ✓ | |
| 8 | mercury { mercury dichloride } | 080-010-00-X | 231-299-8 | 7487-94-7 | | 0.35 mg/kg | 1.353 | 0.448 mg/kg | 0.0000448 % | ✓ | |
| 9 | nickel { nickel chromate } | 028-035-00-7 | 238-766-5 | 14721-18-7 | | 24 mg/kg | 2.976 | 67.573 mg/kg | 0.00676 % | ✓ | |
| 10 | selenium { nickel selenate } | 028-031-00-5 | 239-125-2 | 15060-62-5 | | <0.2 mg/kg | 2.554 | <0.511 mg/kg | <0.0000511 % | | <LOD |
| 11 | zinc { zinc chromate } | 024-007-00-3 | 236-878-9 | 13530-65-9 | | 180 mg/kg | 2.774 | 472.382 mg/kg | 0.0472 % | ✓ | |
| 12 | TPH (C6 to C40) petroleum group | | | TPH | | 260 mg/kg | | 245.96 mg/kg | 0.0246 % | ✓ | |
| 13 | confirm TPH has NOT arisen from diesel or petrol | | | | | ☑ | | | | | |
| 14 | tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane | 603-181-00-X | 216-653-1 | 1634-04-4 | | <0.001 mg/kg | | <0.001 mg/kg | <0.0000001 % | | <LOD |
| 15 | benzene | 601-020-00-8 | 200-753-7 | 71-43-2 | | <0.001 mg/kg | | <0.001 mg/kg | <0.0000001 % | | <LOD |
| 16 | toluene | 601-021-00-3 | 203-625-9 | 108-88-3 | | <0.001 mg/kg | | <0.001 mg/kg | <0.0000001 % | | <LOD |

| # | | Determinand | | | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLP index number | EC Number | CAS Number | | | | | | | | | |
| 17 | | ethylbenzene | | | | <0.001 | mg/kg | | <0.001 | mg/kg | <0.0000001 % | | <**LOD** |
| | | 601-023-00-4 | 202-849-4 | 100-41-4 | | | | | | | | | |
| 18 | | xylene | | | | <0.002 | mg/kg | | <0.002 | mg/kg | <0.0000002 % | | <**LOD** |
| | | 601-022-00-9 | 202-422-2 [1]<br>203-396-5 [2]<br>203-576-3 [3]<br>215-535-7 [4] | 95-47-6 [1]<br>106-42-3 [2]<br>108-38-3 [3]<br>1330-20-7 [4] | | | | | | | | | |
| 19 | | cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex } | | | | <0.5 | mg/kg | 1.884 | <0.942 | mg/kg | <0.0000942 % | | <**LOD** |
| | | 006-007-00-5 | | | | | | | | | | | |
| 20 | | pH | | | | 11.1 | pH | | 11.1 | pH | 11.1 pH | | |
| | | | | PH | | | | | | | | | |
| 21 | | naphthalene | | | | 0.53 | mg/kg | | 0.501 | mg/kg | 0.0000501 % | ✓ | |
| | | 601-052-00-2 | 202-049-5 | 91-20-3 | | | | | | | | | |
| 22 | | acenaphthylene | | | | 0.1 | mg/kg | | 0.0946 | mg/kg | 0.00000946 % | ✓ | |
| | | | 205-917-1 | 208-96-8 | | | | | | | | | |
| 23 | | acenaphthene | | | | 0.75 | mg/kg | | 0.709 | mg/kg | 0.0000709 % | ✓ | |
| | | | 201-469-6 | 83-32-9 | | | | | | | | | |
| 24 | | fluorene | | | | 0.67 | mg/kg | | 0.634 | mg/kg | 0.0000634 % | ✓ | |
| | | | 201-695-5 | 86-73-7 | | | | | | | | | |
| 25 | | phenanthrene | | | | 5.9 | mg/kg | | 5.581 | mg/kg | 0.000558 % | ✓ | |
| | | | 201-581-5 | 85-01-8 | | | | | | | | | |
| 26 | | anthracene | | | | 1 | mg/kg | | 0.946 | mg/kg | 0.0000946 % | ✓ | |
| | | | 204-371-1 | 120-12-7 | | | | | | | | | |
| 27 | | fluoranthene | | | | 5.2 | mg/kg | | 4.919 | mg/kg | 0.000492 % | ✓ | |
| | | | 205-912-4 | 206-44-0 | | | | | | | | | |
| 28 | | pyrene | | | | 5.1 | mg/kg | | 4.825 | mg/kg | 0.000482 % | ✓ | |
| | | | 204-927-3 | 129-00-0 | | | | | | | | | |
| 29 | | benzo[a]anthracene | | | | 2.2 | mg/kg | | 2.081 | mg/kg | 0.000208 % | ✓ | |
| | | 601-033-00-9 | 200-280-6 | 56-55-3 | | | | | | | | | |
| 30 | | chrysene | | | | 2.5 | mg/kg | | 2.365 | mg/kg | 0.000237 % | ✓ | |
| | | 601-048-00-0 | 205-923-4 | 218-01-9 | | | | | | | | | |
| 31 | | benzo[b]fluoranthene | | | | 2.1 | mg/kg | | 1.987 | mg/kg | 0.000199 % | ✓ | |
| | | 601-034-00-4 | 205-911-9 | 205-99-2 | | | | | | | | | |
| 32 | | benzo[k]fluoranthene | | | | 0.73 | mg/kg | | 0.691 | mg/kg | 0.0000691 % | ✓ | |
| | | 601-036-00-5 | 205-916-6 | 207-08-9 | | | | | | | | | |
| 33 | | benzo[a]pyrene; benzo[def]chrysene | | | | 2 | mg/kg | | 1.892 | mg/kg | 0.000189 % | ✓ | |
| | | 601-032-00-3 | 200-028-5 | 50-32-8 | | | | | | | | | |
| 34 | | indeno[123-cd]pyrene | | | | 1.1 | mg/kg | | 1.041 | mg/kg | 0.000104 % | ✓ | |
| | | | 205-893-2 | 193-39-5 | | | | | | | | | |
| 35 | | dibenz[a,h]anthracene | | | | 0.23 | mg/kg | | 0.218 | mg/kg | 0.0000218 % | ✓ | |
| | | 601-041-00-2 | 200-181-8 | 53-70-3 | | | | | | | | | |
| 36 | | benzo[ghi]perylene | | | | 1.2 | mg/kg | | 1.135 | mg/kg | 0.000114 % | ✓ | |
| | | | 205-883-8 | 191-24-2 | | | | | | | | | |
| 37 | | vanadium { divanadium pentaoxide; vanadium pentoxide } | | | | 24 | mg/kg | 1.785 | 40.531 | mg/kg | 0.00405 % | ✓ | |
| | | 023-001-00-8 | 215-239-8 | 1314-62-1 | | | | | | | | | |
| 38 | | monohydric phenols | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | <**LOD** |
| | | | | P1186 | | | | | | | | | |
| | | | | | | | | | | Total: | 0.105 % | | |

Key

| | |
|---|---|
| | User supplied data |
| | Determinand values ignored for classification, see column 'Conc. Not Used' for reason |
| | Determinand defined or amended by HazWasteOnline (see Appendix A) |
| | Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration |
| **<LOD** | Below limit of detection |
| **ND** | Not detected |
| CLP: Note 1 | Only the metal concentration has been used for classification |

## Supplementary Hazardous Property Information

**HP 3(i): Flammable** "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because Concentrations at less than 1.0% are "unlikely to be flammable". Flammability of soils is unlikely to result in a hazardous classification in soils (AGS Waste Classification – A Practitioner's Guide).

Hazard Statements hit:

**Flam. Liq. 3; H226** "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0246%)

## Classification of sample: CP102-05/05/2021-0.30

**Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

## Sample details

Sample name:
**CP102-05/05/2021-0.30**
Sample Depth:
**0.30-0.80 m**
Moisture content:
**15%**
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

## Hazard properties

None identified

## Determinands

Moisture content: 15% Wet Weight Moisture Correction applied (MC)

| # | Determinand | CLP index number | EC Number | CAS Number | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | arsenic { arsenic trioxide } | 033-003-00-0 | 215-481-4 | 1327-53-3 | | 32 | mg/kg | 1.32 | 35.913 | mg/kg | 0.00359 % | ✓ | |
| 2 | cadmium { cadmium oxide } | 048-002-00-0 | 215-146-2 | 1306-19-0 | | 0.54 | mg/kg | 1.142 | 0.524 | mg/kg | 0.0000524 % | ✓ | |
| 3 | chromium in chromium(III) compounds { chromium(III) oxide (worst case) } | | 215-160-9 | 1308-38-9 | | 31 | mg/kg | 1.462 | 38.512 | mg/kg | 0.00385 % | ✓ | |
| 4 | chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex } | 024-017-00-8 | | | | <0.5 | mg/kg | 2.27 | <1.135 | mg/kg | <0.000113 % | | <**LOD** |
| 5 | copper { dicopper oxide; copper (I) oxide } | 029-002-00-X | 215-270-7 | 1317-39-1 | | 60 | mg/kg | 1.126 | 57.42 | mg/kg | 0.00574 % | ✓ | |
| 6 | lead { lead chromate } | 082-004-00-2 | 231-846-0 | 7758-97-6 | 1 | 150 | mg/kg | 1.56 | 198.876 | mg/kg | 0.0127 % | ✓ | |
| 7 | mercury { mercury dichloride } | 080-010-00-X | 231-299-8 | 7487-94-7 | | 0.45 | mg/kg | 1.353 | 0.518 | mg/kg | 0.0000518 % | ✓ | |
| 8 | nickel { nickel chromate } | 028-035-00-7 | 238-766-5 | 14721-18-7 | | 39 | mg/kg | 2.976 | 98.663 | mg/kg | 0.00987 % | ✓ | |
| 9 | selenium { nickel selenate } | 028-031-00-5 | 239-125-2 | 15060-62-5 | | 0.69 | mg/kg | 2.554 | 1.498 | mg/kg | 0.00015 % | ✓ | |
| 10 | zinc { zinc chromate } | 024-007-00-3 | 236-878-9 | 13530-65-9 | | 190 | mg/kg | 2.774 | 448.025 | mg/kg | 0.0448 % | ✓ | |
| 11 | pH | | | PH | | 9.9 | pH | | 9.9 | pH | 9.9 pH | | |
| 12 | naphthalene | 601-052-00-2 | 202-049-5 | 91-20-3 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | <**LOD** |
| 13 | acenaphthylene | | 205-917-1 | 208-96-8 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | <**LOD** |
| 14 | acenaphthene | | 201-469-6 | 83-32-9 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | <**LOD** |
| 15 | fluorene | | 201-695-5 | 86-73-7 | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | <**LOD** |
| 16 | phenanthrene | | 201-581-5 | 85-01-8 | | 1.7 | mg/kg | | 1.445 | mg/kg | 0.000145 % | ✓ | |

| # | | Determinand | | | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLP index number | EC Number | CAS Number | | | | | | | | | |
| 17 | | anthracene | | | | 0.42 | mg/kg | | 0.357 | mg/kg | 0.0000357 % | ✓ | |
| | | | 204-371-1 | 120-12-7 | | | | | | | | | |
| 18 | | fluoranthene | | | | 2.3 | mg/kg | | 1.955 | mg/kg | 0.000195 % | ✓ | |
| | | | 205-912-4 | 206-44-0 | | | | | | | | | |
| 19 | | pyrene | | | | 2.2 | mg/kg | | 1.87 | mg/kg | 0.000187 % | ✓ | |
| | | | 204-927-3 | 129-00-0 | | | | | | | | | |
| 20 | | benzo[a]anthracene | | | | 1.2 | mg/kg | | 1.02 | mg/kg | 0.000102 % | ✓ | |
| | | 601-033-00-9 | 200-280-6 | 56-55-3 | | | | | | | | | |
| 21 | | chrysene | | | | 0.96 | mg/kg | | 0.816 | mg/kg | 0.0000816 % | ✓ | |
| | | 601-048-00-0 | 205-923-4 | 218-01-9 | | | | | | | | | |
| 22 | | benzo[b]fluoranthene | | | | 1.4 | mg/kg | | 1.19 | mg/kg | 0.000119 % | ✓ | |
| | | 601-034-00-4 | 205-911-9 | 205-99-2 | | | | | | | | | |
| 23 | | benzo[k]fluoranthene | | | | 0.53 | mg/kg | | 0.451 | mg/kg | 0.0000451 % | ✓ | |
| | | 601-036-00-5 | 205-916-6 | 207-08-9 | | | | | | | | | |
| 24 | | benzo[a]pyrene; benzo[def]chrysene | | | | 1.1 | mg/kg | | 0.935 | mg/kg | 0.0000935 % | ✓ | |
| | | 601-032-00-3 | 200-028-5 | 50-32-8 | | | | | | | | | |
| 25 | | indeno[123-cd]pyrene | | | | 0.85 | mg/kg | | 0.723 | mg/kg | 0.0000723 % | ✓ | |
| | | | 205-893-2 | 193-39-5 | | | | | | | | | |
| 26 | | dibenz[a,h]anthracene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | **<LOD** |
| | | 601-041-00-2 | 200-181-8 | 53-70-3 | | | | | | | | | |
| 27 | | benzo[ghi]perylene | | | | 1.3 | mg/kg | | 1.105 | mg/kg | 0.000111 % | ✓ | |
| | | | 205-883-8 | 191-24-2 | | | | | | | | | |
| 28 | | vanadium { divanadium pentaoxide; vanadium pentoxide } | | | | 33 | mg/kg | 1.785 | 50.074 | mg/kg | 0.00501 % | ✓ | |
| | | 023-001-00-8 | 215-239-8 | 1314-62-1 | | | | | | | | | |
| | | | | | | | | | | Total: | 0.0872 % | | |

Key

| | |
|---|---|
| | User supplied data |
| | Determinand values ignored for classification, see column 'Conc. Not Used' for reason |
| | Determinand defined or amended by HazWasteOnline (see Appendix A) |
| | Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration |
| **<LOD** | Below limit of detection |
| **ND** | Not detected |
| CLP: Note 1 | Only the metal concentration has been used for classification |

## Classification of sample: CP103-05/05/2021-0.30

**Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

## Sample details

Sample name:
**CP103-05/05/2021-0.30**
Sample Depth:
**0.30-1.00 m**
Moisture content:
**17%**
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

## Hazard properties

None identified

## Determinands

Moisture content: 17% Wet Weight Moisture Correction applied (MC)

| # | Determinand | CLP index number | EC Number | CAS Number | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | arsenic { arsenic trioxide } | 033-003-00-0 | 215-481-4 | 1327-53-3 | | 34 | mg/kg | 1.32 | 37.26 | mg/kg | 0.00373 % | ✓ | |
| 2 | cadmium { cadmium oxide } | 048-002-00-0 | 215-146-2 | 1306-19-0 | | 0.87 | mg/kg | 1.142 | 0.825 | mg/kg | 0.0000825 % | ✓ | |
| 3 | chromium in chromium(III) compounds { chromium(III) oxide (worst case) } | | 215-160-9 | 1308-38-9 | | 27 | mg/kg | 1.462 | 32.753 | mg/kg | 0.00328 % | ✓ | |
| 4 | chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex } | 024-017-00-8 | | | | <0.5 | mg/kg | 2.27 | <1.135 | mg/kg | <0.000113 % | | **<LOD** |
| 5 | copper { dicopper oxide; copper (I) oxide } | 029-002-00-X | 215-270-7 | 1317-39-1 | | 64 | mg/kg | 1.126 | 59.807 | mg/kg | 0.00598 % | ✓ | |
| 6 | lead { lead chromate } | 082-004-00-2 | 231-846-0 | 7758-97-6 | 1 | 200 | mg/kg | 1.56 | 258.929 | mg/kg | 0.0166 % | ✓ | |
| 7 | mercury { mercury dichloride } | 080-010-00-X | 231-299-8 | 7487-94-7 | | 0.79 | mg/kg | 1.353 | 0.887 | mg/kg | 0.0000887 % | ✓ | |
| 8 | nickel { nickel chromate } | 028-035-00-7 | 238-766-5 | 14721-18-7 | | 36 | mg/kg | 2.976 | 88.931 | mg/kg | 0.00889 % | ✓ | |
| 9 | selenium { nickel selenate } | 028-031-00-5 | 239-125-2 | 15060-62-5 | | 0.45 | mg/kg | 2.554 | 0.954 | mg/kg | 0.0000954 % | ✓ | |
| 10 | zinc { zinc chromate } | 024-007-00-3 | 236-878-9 | 13530-65-9 | | 410 | mg/kg | 2.774 | 944.042 | mg/kg | 0.0944 % | ✓ | |
| 11 | pH | | | PH | | 9.1 | pH | | 9.1 | pH | 9.1 pH | | |
| 12 | naphthalene | 601-052-00-2 | 202-049-5 | 91-20-3 | | 0.86 | mg/kg | | 0.714 | mg/kg | 0.0000714 % | ✓ | |
| 13 | acenaphthylene | | 205-917-1 | 208-96-8 | | 0.19 | mg/kg | | 0.158 | mg/kg | 0.0000158 % | ✓ | |
| 14 | acenaphthene | | 201-469-6 | 83-32-9 | | 0.18 | mg/kg | | 0.149 | mg/kg | 0.0000149 % | ✓ | |
| 15 | fluorene | | 201-695-5 | 86-73-7 | | 0.35 | mg/kg | | 0.291 | mg/kg | 0.0000291 % | ✓ | |
| 16 | phenanthrene | | 201-581-5 | 85-01-8 | | 3.2 | mg/kg | | 2.656 | mg/kg | 0.000266 % | ✓ | |

| # | | Determinand | | | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLP index number | EC Number | CAS Number | | | | | | | | | |
| 17 | | anthracene | | | | 0.54 | mg/kg | | 0.448 | mg/kg | 0.0000448 % | ✓ | |
| | | | 204-371-1 | 120-12-7 | | | | | | | | | |
| 18 | | fluoranthene | | | | 4.5 | mg/kg | | 3.735 | mg/kg | 0.000373 % | ✓ | |
| | | | 205-912-4 | 206-44-0 | | | | | | | | | |
| 19 | | pyrene | | | | 4.2 | mg/kg | | 3.486 | mg/kg | 0.000349 % | ✓ | |
| | | | 204-927-3 | 129-00-0 | | | | | | | | | |
| 20 | | benzo[a]anthracene | | | | 1.9 | mg/kg | | 1.577 | mg/kg | 0.000158 % | ✓ | |
| | | 601-033-00-9 | 200-280-6 | 56-55-3 | | | | | | | | | |
| 21 | | chrysene | | | | 2.2 | mg/kg | | 1.826 | mg/kg | 0.000183 % | ✓ | |
| | | 601-048-00-0 | 205-923-4 | 218-01-9 | | | | | | | | | |
| 22 | | benzo[b]fluoranthene | | | | 2.7 | mg/kg | | 2.241 | mg/kg | 0.000224 % | ✓ | |
| | | 601-034-00-4 | 205-911-9 | 205-99-2 | | | | | | | | | |
| 23 | | benzo[k]fluoranthene | | | | 0.92 | mg/kg | | 0.764 | mg/kg | 0.0000764 % | ✓ | |
| | | 601-036-00-5 | 205-916-6 | 207-08-9 | | | | | | | | | |
| 24 | | benzo[a]pyrene; benzo[def]chrysene | | | | 2.2 | mg/kg | | 1.826 | mg/kg | 0.000183 % | ✓ | |
| | | 601-032-00-3 | 200-028-5 | 50-32-8 | | | | | | | | | |
| 25 | | indeno[123-cd]pyrene | | | | 1.5 | mg/kg | | 1.245 | mg/kg | 0.000125 % | ✓ | |
| | | | 205-893-2 | 193-39-5 | | | | | | | | | |
| 26 | | dibenz[a,h]anthracene | | | | 0.4 | mg/kg | | 0.332 | mg/kg | 0.0000332 % | ✓ | |
| | | 601-041-00-2 | 200-181-8 | 53-70-3 | | | | | | | | | |
| 27 | | benzo[ghi]perylene | | | | 1.6 | mg/kg | | 1.328 | mg/kg | 0.000133 % | ✓ | |
| | | | 205-883-8 | 191-24-2 | | | | | | | | | |
| 28 | | vanadium { divanadium pentaoxide; vanadium pentoxide } | | | | 33 | mg/kg | 1.785 | 48.896 | mg/kg | 0.00489 % | ✓ | |
| | | 023-001-00-8 | 215-239-8 | 1314-62-1 | | | | | | | | | |
| | | | | | | | | | | Total: | 0.14 % | | |

Key

| | |
|---|---|
| | User supplied data |
| | Determinand values ignored for classification, see column 'Conc. Not Used' for reason |
| | Determinand defined or amended by HazWasteOnline (see Appendix A) |
| | Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration |
| **<LOD** | Below limit of detection |
| **ND** | Not detected |
| CLP: Note 1 | Only the metal concentration has been used for classification |

## Classification of sample: CP104-05/05/2021-0.30

**Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

## Sample details

Sample name:
**CP104-05/05/2021-0.30**
Sample Depth:
**0.30-1.00 m**
Moisture content:
**9.2%**
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

## Hazard properties

None identified

## Determinands

Moisture content: 9.2% Wet Weight Moisture Correction applied (MC)

| # | Determinand | CLP index number | EC Number | CAS Number | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | arsenic { arsenic trioxide } | 033-003-00-0 | 215-481-4 | 1327-53-3 | | 33 | mg/kg | 1.32 | 39.562 | mg/kg | 0.00396 % | ✓ | |
| 2 | boron { diboron trioxide; boric oxide } | 005-008-00-8 | 215-125-8 | 1303-86-2 | | <0.4 | mg/kg | 3.22 | <1.288 | mg/kg | <0.000129 % | | <**LOD** |
| 3 | cadmium { cadmium oxide } | 048-002-00-0 | 215-146-2 | 1306-19-0 | | 2.2 | mg/kg | 1.142 | 2.282 | mg/kg | 0.000228 % | ✓ | |
| 4 | chromium in chromium(III) compounds { chromium(III) oxide (worst case) } | | 215-160-9 | 1308-38-9 | | 19 | mg/kg | 1.462 | 25.215 | mg/kg | 0.00252 % | ✓ | |
| 5 | chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex } | 024-017-00-8 | | | | <0.5 | mg/kg | 2.27 | <1.135 | mg/kg | <0.000113 % | | <**LOD** |
| 6 | copper { dicopper oxide; copper (I) oxide } | 029-002-00-X | 215-270-7 | 1317-39-1 | | 40 | mg/kg | 1.126 | 40.892 | mg/kg | 0.00409 % | ✓ | |
| 7 | lead { lead chromate } | 082-004-00-2 | 231-846-0 | 7758-97-6 | 1 | 500 | mg/kg | 1.56 | 708.156 | mg/kg | 0.0454 % | ✓ | |
| 8 | mercury { mercury dichloride } | 080-010-00-X | 231-299-8 | 7487-94-7 | | 0.35 | mg/kg | 1.353 | 0.43 | mg/kg | 0.000043 % | ✓ | |
| 9 | nickel { nickel chromate } | 028-035-00-7 | 238-766-5 | 14721-18-7 | | 27 | mg/kg | 2.976 | 72.966 | mg/kg | 0.0073 % | ✓ | |
| 10 | selenium { nickel selenate } | 028-031-00-5 | 239-125-2 | 15060-62-5 | | 0.25 | mg/kg | 2.554 | 0.58 | mg/kg | 0.000058 % | ✓ | |
| 11 | zinc { zinc chromate } | 024-007-00-3 | 236-878-9 | 13530-65-9 | | 280 | mg/kg | 2.774 | 705.299 | mg/kg | 0.0705 % | ✓ | |
| 12 | TPH (C6 to C40) petroleum group | | | TPH | | 1000 | mg/kg | | 908 | mg/kg | 0.0908 % | ✓ | |
| 13 | confirm TPH has NOT arisen from diesel or petrol | | | | | ☑ | | | | | | | |
| 14 | tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane | 603-181-00-X | 216-653-1 | 1634-04-4 | | <0.001 | mg/kg | | <0.001 | mg/kg | <0.0000001 % | | <**LOD** |
| 15 | benzene | 601-020-00-8 | 200-753-7 | 71-43-2 | | <0.001 | mg/kg | | <0.001 | mg/kg | <0.0000001 % | | <**LOD** |
| 16 | toluene | 601-021-00-3 | 203-625-9 | 108-88-3 | | <0.001 | mg/kg | | <0.001 | mg/kg | <0.0000001 % | | <**LOD** |

| # | | Determinand | | | CLP Note | User entered data | | Conv. Factor | Compound conc. | | Classification value | MC Applied | Conc. Not Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CLP index number | EC Number | CAS Number | | | | | | | | | |
| 17 | | ethylbenzene | | | | <0.001 | mg/kg | | <0.001 | mg/kg | <0.0000001 % | | <LOD |
| | | 601-023-00-4 | 202-849-4 | 100-41-4 | | | | | | | | | |
| 18 | | xylene | | | | <0.002 | mg/kg | | <0.002 | mg/kg | <0.0000002 % | | <LOD |
| | | 601-022-00-9 | 202-422-2 [1]<br>203-396-5 [2]<br>203-576-3 [3]<br>215-535-7 [4] | 95-47-6 [1]<br>106-42-3 [2]<br>108-38-3 [3]<br>1330-20-7 [4] | | | | | | | | | |
| 19 | | cyanides { salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex } | | | | <0.5 | mg/kg | 1.884 | <0.942 | mg/kg | <0.0000942 % | | <LOD |
| | | 006-007-00-5 | | | | | | | | | | | |
| 20 | | pH | | | | 9 | pH | | 9 | pH | 9pH | | |
| | | | | PH | | | | | | | | | |
| 21 | | naphthalene | | | | 0.49 | mg/kg | | 0.445 | mg/kg | 0.0000445 % | ✓ | |
| | | 601-052-00-2 | 202-049-5 | 91-20-3 | | | | | | | | | |
| 22 | | acenaphthylene | | | | 0.19 | mg/kg | | 0.173 | mg/kg | 0.0000173 % | ✓ | |
| | | | 205-917-1 | 208-96-8 | | | | | | | | | |
| 23 | | acenaphthene | | | | 0.76 | mg/kg | | 0.69 | mg/kg | 0.000069 % | ✓ | |
| | | | 201-469-6 | 83-32-9 | | | | | | | | | |
| 24 | | fluorene | | | | 0.58 | mg/kg | | 0.527 | mg/kg | 0.0000527 % | ✓ | |
| | | | 201-695-5 | 86-73-7 | | | | | | | | | |
| 25 | | phenanthrene | | | | 3.7 | mg/kg | | 3.36 | mg/kg | 0.000336 % | ✓ | |
| | | | 201-581-5 | 85-01-8 | | | | | | | | | |
| 26 | | anthracene | | | | 0.82 | mg/kg | | 0.745 | mg/kg | 0.0000745 % | ✓ | |
| | | | 204-371-1 | 120-12-7 | | | | | | | | | |
| 27 | | fluoranthene | | | | 4.5 | mg/kg | | 4.086 | mg/kg | 0.000409 % | ✓ | |
| | | | 205-912-4 | 206-44-0 | | | | | | | | | |
| 28 | | pyrene | | | | 4.8 | mg/kg | | 4.358 | mg/kg | 0.000436 % | ✓ | |
| | | | 204-927-3 | 129-00-0 | | | | | | | | | |
| 29 | | benzo[a]anthracene | | | | 2 | mg/kg | | 1.816 | mg/kg | 0.000182 % | ✓ | |
| | | 601-033-00-9 | 200-280-6 | 56-55-3 | | | | | | | | | |
| 30 | | chrysene | | | | 2.3 | mg/kg | | 2.088 | mg/kg | 0.000209 % | ✓ | |
| | | 601-048-00-0 | 205-923-4 | 218-01-9 | | | | | | | | | |
| 31 | | benzo[b]fluoranthene | | | | 2.6 | mg/kg | | 2.361 | mg/kg | 0.000236 % | ✓ | |
| | | 601-034-00-4 | 205-911-9 | 205-99-2 | | | | | | | | | |
| 32 | | benzo[k]fluoranthene | | | | 0.75 | mg/kg | | 0.681 | mg/kg | 0.0000681 % | ✓ | |
| | | 601-036-00-5 | 205-916-6 | 207-08-9 | | | | | | | | | |
| 33 | | benzo[a]pyrene; benzo[def]chrysene | | | | 2.2 | mg/kg | | 1.998 | mg/kg | 0.0002 % | ✓ | |
| | | 601-032-00-3 | 200-028-5 | 50-32-8 | | | | | | | | | |
| 34 | | indeno[123-cd]pyrene | | | | 1.6 | mg/kg | | 1.453 | mg/kg | 0.000145 % | ✓ | |
| | | | 205-893-2 | 193-39-5 | | | | | | | | | |
| 35 | | dibenz[a,h]anthracene | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | <LOD |
| | | 601-041-00-2 | 200-181-8 | 53-70-3 | | | | | | | | | |
| 36 | | benzo[ghi]perylene | | | | 1.7 | mg/kg | | 1.544 | mg/kg | 0.000154 % | ✓ | |
| | | | 205-883-8 | 191-24-2 | | | | | | | | | |
| 37 | | vanadium { divanadium pentaoxide; vanadium pentoxide } | | | | 25 | mg/kg | 1.785 | 40.524 | mg/kg | 0.00405 % | ✓ | |
| | | 023-001-00-8 | 215-239-8 | 1314-62-1 | | | | | | | | | |
| 38 | | monohydric phenols | | | | <0.1 | mg/kg | | <0.1 | mg/kg | <0.00001 % | | <LOD |
| | | | | P1186 | | | | | | | | | |
| | | | | | | | | | | Total: | 0.232 % | | |

Key

| | |
|---|---|
| | User supplied data |
| | Determinand values ignored for classification, see column 'Conc. Not Used' for reason |
| | Determinand defined or amended by HazWasteOnline (see Appendix A) |
| | Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration |
| **<LOD** | Below limit of detection |
| **ND** | Not detected |
| CLP: Note 1 | Only the metal concentration has been used for classification |

## Supplementary Hazardous Property Information

**HP 3(i): Flammable** "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because Concentrations at less than 1.0% are "unlikely to be flammable". Flammability of soils is unlikely to result in a hazardous classification in soils (AGS Waste Classification – A Practitioner's Guide).

Hazard Statements hit:

**Flam. Liq. 3; H226** "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0908%)

## Appendix A: Classifier defined and non CLP determinands

- **chromium(III) oxide (worst case)** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4 H332 , Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Resp. Sens. 1 H334 , Skin Sens. 1 H317 , Repr. 1B H360FD , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3 H226 , Asp. Tox. 1 H304 , STOT RE 2 H373 , Muta. 1B H340 , Carc. 1B H350 , Repr. 2 H361d , Aquatic Chronic 2 H411

- **confirm TPH has NOT arisen from diesel or petrol**

Description/Comments: Chapter 3, section 4b requires a positive confirmation for benzo[a]pyrene to be used as a marker in evaluating Carc. 1B; H350 (HP 7) and Muta. 1B; H340 (HP 11)
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

- **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

CLP index number: 601-023-00-4
Description/Comments:
Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)
Additional Hazard Statement(s): Carc. 2 H351
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2B (77) 2000

- **salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex**

CLP index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Data source: Commission Regulation (EC) No 790/2009 - 1st Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP1)
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
14 Dec 2015 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

- **pH** (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

- **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4 H302 , Acute Tox. 1 H330 , Acute Tox. 1 H310 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315

- **acenaphthene** (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Aquatic Chronic 2 H411

- **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Carc. 2 H351 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Skin Irrit. 2 H315

- **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2 H315 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2 H351

- **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **monohydric phenols** (CAS Number: P1186)

Description/Comments: Combined hazards statements from harmonised entries in CLP for phenol, cresols and xylenols (604-001-00-2, 604-004-00-9, 604-006-00-X)
Data source: CLP combined data
Data source date: 26 Mar 2019
Hazard Statements: Acute Tox. 3 H301 , Acute Tox. 3 H311 , Acute Tox. 3 H331 , Skin Corr. 1B H314 , Skin Corr. 1B H314 >= 3 %, Skin Irrit. 2 H315 1 £ conc. < 3 %, Eye Irrit. 2 H319 1 £ conc. < 3 %, Muta. 2 H341 , STOT RE 2 H373 , Aquatic Chronic 2 H411

## Appendix B: Rationale for selection of metal species

**arsenic {arsenic trioxide}**

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds (edit as required)

**boron {diboron trioxide; boric oxide}**

Reasonable case CLP species based on hazard statements/ molecular weight, physical form and low solubility. Industrial sources include: fluxing agent for glass/enamels; additive for fibre optics, borosilicate glass (edit as required)

**cadmium {cadmium oxide}**

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. (edit as required) Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history (edit as required)

**chromium in chromium(III) compounds {chromium(III) oxide (worst case)}**

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass (edit as required)

**chromium in chromium(VI) compounds {chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex}**

Worst case species based on hazard statements/molecular weight (edit as required)

**copper {dicopper oxide; copper (I) oxide}**

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. (edit as required) Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected. (edit as required)

**lead {lead chromate}**

Worst case CLP species based on hazard statements/molecular weight (edit as required)

**mercury {mercury dichloride}**

Worst case CLP species based on hazard statements/molecular weight (edit as required)

**nickel {nickel chromate}**

Worst case CLP species based on hazard statements/molecular weight (edit as required)

**selenium {nickel selenate}**

Worst case CLP species based on hazard statements/molecular weight (edit as required)

**zinc {zinc chromate}**

Worst case CLP species based on hazard statements/molecular weight (edit as required)

**cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}**

Harmonised group entry used as most reasonable case as complex cyanides and those specified elsewhere in the annex are not likely to be present in this soil: [Note conversion factor based on a worst case compound: sodium cyanide] (edit as required)

**vanadium {divanadium pentaoxide; vanadium pentoxide}**

worst case/most likely scenario

## Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1, May 2018
HazWasteOnline Classification Engine Version: 2021.155.4797.9144 (05 Jun 2021)
HazWasteOnline Database: 2021.155.4797.9144 (05 Jun 2021)

This classification utilises the following guidance and legislation:
**WM3 v1.1 - Waste Classification** - 1st Edition v1.1 - May 2018
**CLP Regulation** - Regulation 1272/2008/EC of 16 December 2008
**1st ATP** - Regulation 790/2009/EC of 10 August 2009
**2nd ATP** - Regulation 286/2011/EC of 10 March 2011
**3rd ATP** - Regulation 618/2012/EU of 10 July 2012
**4th ATP** - Regulation 487/2013/EU of 8 May 2013
**Correction to 1st ATP** - Regulation 758/2013/EU of 7 August 2013
**5th ATP** - Regulation 944/2013/EU of 2 October 2013
**6th ATP** - Regulation 605/2014/EU of 5 June 2014
**WFD Annex III replacement** - Regulation 1357/2014/EU of 18 December 2014
**Revised List of Waste 2014** - Decision 2014/955/EU of 18 December 2014
**7th ATP** - Regulation 2015/1221/EU of 24 July 2015
**8th ATP** - Regulation (EU) 2016/918 of 19 May 2016
**9th ATP** - Regulation (EU) 2016/1179 of 19 July 2016
**10th ATP** - Regulation (EU) 2017/776 of 4 May 2017
**HP14 amendment** - Regulation (EU) 2017/997 of 8 June 2017
**13th ATP** - Regulation (EU) 2018/1480 of 4 October 2018
**14th ATP** - Regulation (EU) 2020/217 of 4 October 2019
**15th ATP** - Regulation (EU) 2020/1182 of 19 May 2020
**The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2019** - UK: 2019 No. 720 of 27th March 2019
**The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020** - UK: 2020 No. 1567 of 16th December 2020
**The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020** - UK: 2020 No. 1540 of 16th December 2020
**POPs Regulation 2019** - Regulation (EU) 2019/1021 of 20 June 2019

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