



GRM Development Solutions Ltd
Laurus House
First Avenue
Centrum 100
Burton upon Trent
Staffordshire
DE14 2WH

Tel: 01283 551 249
Web: www.grm-uk.com

Our Ref: GRM/P10197/LR.01 Rev.A
Date: 16th February 2023

Peter Bryan
1 Dale Street
Liverpool
LE 2ET

For the attention of Peter Bryan,

Dear Peter,

Re: Ground Investigation at Christie Extension, The Christie, Wilmslow Road, Manchester

This letter reports the findings of the recent ground investigation conducted within the proposed hospital building extension footprint at The Christie, Manchester.

GRM produced a short form Phase I Desk Study for the proposed development site (report reference GRM/P10197/DS.1RevA), dated December 2022. Previous reports relating to the redevelopment of the Paterson Building and CCU located to the immediate east of the site, have been reviewed and relevant information has been used in the assessment.

- Desk study report titled "Geotechnical and Geoenvironmental desk study" for Interserve Construction Limited, prepared by ARUP, ref: 263083-00, dated August 2018.
- Factual report titled "Ground Investigation Report" for Interserve Construction Limited, prepared by CC Geotechnical Ltd (CCG) commissioned by ARUP, ref: CCG-C-18-10614, dated April 2019.
- "FBC Report – Structural Design" for the CCU TRF2 project prepared by ARUP dated 6th May 2005.

The intrusive works reported within this document detail a preliminary ground investigation to determine existing ground conditions. GRM Standard Limitations of Reporting are provided in Appendix A of this letter report.

Proposed Development

The Client proposes a four-storey extension to the existing Critical Care Unit (CCU). The proposed extension will contain a new stair / lift core that will connect to the existing CCU. A proposed development plan is presented in Appendix B.

Site Setting

The site is located within the southern area of the Christie NHS Foundation Trust hospital complex, Manchester. The national Grid Reference (NGR) for the approximate centre of the site is SJ 848 924.



Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

Site Location and Boundary Plans are presented in Appendix C. The site currently comprises an IHP compound, with cabins and storage facilities recorded across the southern area.

Site History

A review of the available historical Ordnance Survey (OS) maps gives an insight into the development of the site and can highlight potential hazards. Extracts of the maps are included in the Phase I report, Christie Hospital has been recorded by the historical maps within 100m of the site since 1934.

The maps continue to record the extension of the hospital off-site until 1974-1975, when the site itself becomes included in the undeveloped area associated with Christie Hospital. Maps for 2010 show that the site is developed into the new Critical Care Unit.

Based on the recorded history of development, the risk of significant contamination being present across the site is considered to be low.

Previously, four deep boreholes were drilled within the area to the east of the site to a maximum depth of 25.0m begl. The geology was recorded as made ground materials between 0.7m and 2.2m begl underlain by sand and clay superficial deposits. Bedrock sandstone was recorded from depths of 2.2m to 3.5m begl to the full extent of the boreholes. Three boreholes were installed with wells for gas and groundwater monitoring.

The ARUP FBC report makes reference to a previous ground investigation for the CCU building. Whilst the detail is minimal it makes reference to circa. 2m depth of made ground.

GROUND INVESTIGATION

The recent ground investigation fieldwork was carried out on 15th December 2022. Three exploratory holes were planned for the site (WS01, WS02A and WS02B). Due to the potential for services to be present, a hand dug service pit was initially progressed in each location to 0.35m, 0.45m and 0.80m respectively. Due to the presence and extent of services in the hand-dug pits all holes were terminated at shallow depth and the extent of the made ground not proven.

The Exploratory Hole Location Plan and Exploratory Hole Logs are presented in Appendix D and Appendix E.

Ground Conditions

Made Ground was recorded in all positions and comprised either concrete paving slabs or tarmacadam hardstanding at the surface.

A medium dense yellow sand was recorded in WS01 only between 0.05m and 0.15m, representative of sub-base soils.

Made ground comprising dark greyish brown sandy gravel was recorded in each location to depths between 0.10m and 0.55m begl. Locally greyish brown slightly sandy clay was encountered beneath the made ground above in WS02B between 0.55m and 0.80m. The made ground was found to be consistent to previous findings, for the Paterson Building approximately 35m east of the site.

Contamination

Three samples of made ground were analysed for a general suite of contaminants (metals, inorganics and speciated PAH) including banded aliphatic and aromatic hydrocarbons (TPHCWG). The samples were also screened for asbestos.

The results were directly compared against GRM Tier 1 Acceptance Criteria (TAC) for commercial/industrial end-use to represent the end-use as a hospital. The rationale for using TACs is outlined in Appendix A (vi). A Soil Organic Matter (SOM) content of 1% has been used to assess the results as this reflects the lowest SOM recorded. To provide an initial assessment, benzo(a)pyrene has been used as a surrogate marker compound for genotoxic PAHs with the exception of naphthalene.

No contaminant concentrations were recorded above their respective TACs.

The chemical results and GRM TAC are presented in Appendix F and G respectively.

Risk Assessment

Human Health and Controlled Waters

The limited testing conducted on the shallow made ground has not recorded any contamination considered to pose a risk to end-users. In addition, the Phase I Desk Study did not record a significant on-site source of contamination. Based on the proposed development outline, the majority of the site will be covered by hardstanding and the proposed extension.

Therefore, based upon the test results and in the absence of a preferential pathway to receptors the overall risk posed to human health and controlled waters is negligible.

Ground Gas

Made ground was proven beneath the site, however, the generation potential is considered to be very low, with an organic matter content <5%. In addition to this no further significant off-site sources of ground gas have been identified during the Phase I Desk study. CC Geotechnical Ltd installed three wells targeting both the made ground and superficial deposits beneath. The results of the gas monitoring did not record methane above the instrument's limit of detection and carbon dioxide concentrations were consistently recorded below 5%v/v and no gas flow was detected, although a reading of 5.8%v/v was recorded in BH04 (closest to the site).

Taking into account that the ground conditions monitored previously are likely to be similar to the current site conditions, significant gas concentrations and flow rates were not detected. It is considered that the risk posed from ground gas is negligible and the gas regime can be assessed as CS1 for which no gas protection measures are required.

WASTE ASSESSMENT

Based on the Waste Classification Report (Appendix H) it is considered that the made ground may be classified as Hazardous Waste, due to the TPH concentrations. At this stage, we would recommend allowing for the made ground to be disposed of as Hazardous Waste; however, early consultation with the relevant landfill sites over their particular acceptance criteria may produce cost savings. Reference should be made to the relevant notes presented in Appendix A (x). The WAC results are included in Appendix F.

Care should be taken to keep natural arisings separate from the made ground and free from construction materials, as natural soils mixed with made ground and construction materials may attract additional disposal costs.

Although not identified during the site works, visible asbestos containing materials (ACMs) within soils will result in the soils being classified as Hazardous Waste. Visible ACMs should be removed, employing appropriate health and safety protocols and where possible should be undertaken prior to disposal.

It is recommended that any materials to be exported are stockpiled and tested to confirm disposal rates, as this may be more cost effective than using the results contained within this report.

GEOTECHNICAL ASSESSMENT

A geotechnical assessment was unable to be completed due to the limited site investigation possible and reference should be made to the comments and recommendations provided in Section 5 Preliminary Geotechnical Assessment in the GRM Phase I Desk Study report, dated December 2022 (GRM/P10197/DS.1 RevB).

We trust this is suitable for your current requirements, should you require any further information or would like any clarification of the points raised above please do not hesitate to contact us.

Yours Sincerely,
for GRM Development Solutions Ltd



Charlotte Mortimer BSc (Hons)
MIEnvSc
Senior Environmental Scientist



Siobhan Jackson BSc (Hons)
MIEnvSc CEnv
Principal Geo-Environmental
Scientist



Richard Upton MSc CEnv
Director

Appendices

Appendix A	-	GRM Standard Limitations
Appendix B	-	Proposed Development Plan
Appendix C	-	Site Location & Boundary Plan
Appendix D	-	Exploratory Hole Location Plan
Appendix E	-	Exploratory Hole Logs
Appendix F	-	Chemical Test Results
Appendix G	-	GRM Tier 1 Assessment Criteria
Appendix H	-	Waste Assessment Report



A P P E N D I X A

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

GENERAL APPRAISAL COMMENTS

i INFORMATION SOURCES

Where available the following sources have been used for the identification and assessment of potential ground hazards:

- Relevant British Standards
- British Geological Survey (BGS) Geology Map Scale 1:10,000 for local area
- British Geological Survey (BGS) Geology Map Scale 1:50,000/1:63,320
- BGS Memoir
- BGS Borehole Records
- BGS online viewer: <http://www.bgs.ac.uk/data/mapViewers/home.html>
- Environment Agency Groundwater Vulnerability Maps
- Historical Ordnance Survey (OS) Maps
- Environmental Data Report
- Environment Agency Website: <http://www.environment-agency.gov.uk/>
- Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, UKWIR, 2010.
- Coal Authority Records / Coal Mining Report
- DEFRA/Environment Agency Contaminated Land publications and DoE Industry Profiles
- BRE Guide BR211 (2015), 'Radon: Guidance on protective measures for new buildings'
- HPA-RPD-033 (2007), 'Indicative Atlas of Radon in England and Wales'
- PHE-CRCE-032 (PHE, 2017), Radon in Homes in England: 2016 Data Report
- CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings'
- BS8485:2015, 'Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'
- Other technical references used throughout this document are detailed in the text.

ii CONTAMINANTS OF CONCERN

The DoE Industry Profiles are normally used to assess likely contaminants from past land use and potential nearby industrial sources. For land uses where no profile is available, likely contaminants of concern are selected by GRM based on past experience of similar sites, a general screening suite of contaminants covered by CLEA and common contaminants from the Industry Profiles.

- | | | |
|------------|-------------------|--|
| · Arsenic | · Copper | · Water soluble sulphate |
| · Cadmium | · Nickel | · PAH (polycyclic aromatic hydrocarbons) |
| · Chromium | · Zinc | |
| · Lead | · Phenols | |
| · Mercury | · cyanide (total) | |
| · Selenium | · pH | |

Asbestos and PCBs are listed in the vast majority of profiles. PCBs are listed as the profiles expect electricity substations and switch boxes on all industrial sites. There is the potential for asbestos containing material to be mixed up with made ground, following any demolition works.

iii CONCEPTUAL MODEL METHODOLOGY

The consideration of contamination is based upon the principles of risk assessment, using the 'source-pathway-receptor' model in order to establish the presence, or potential presence, of a pollutant linkage.

To create a risk, contamination must have the potential to cause harm to susceptible targets or receptors such as humans, the water environment or the built environment. The potential for harm to occur requires three conditions to be satisfied to form a pollutant linkage:

- The presence of substances that may cause harm (SOURCE).
- The presence of a target which may be harmed (RECEPTOR).
- The existence of a plausible migration route between the source and the receptor (PATHWAY).

In the absence of a plausible pollutant linkage there is no risk. Where a potential linkage is identified in order for it not to pose a risk to the identified receptor it must be broken.

iv INTRUSIVE INVESTIGATION SAMPLING METHODOLOGY

The ground investigation (including fieldwork, sampling, monitoring and laboratory analyses) has been designed to identify and assess potential ground related problems and to allow cost effective solutions to be advised. It has been planned on the basis of the desk study, site inspection and the proposed development layout (where available). All fieldwork and soil descriptions were carried out in general accordance with relevant British Standards.

The exploratory holes have been positioned and advanced to depths to determine the general ground/groundwater/gas conditions below the site. A general grid pattern has been adopted, where possible, to provide sufficient information based on the current proposed layout scheme. Some holes have been targeted at particular hazards identified in the Phase I assessment. The resultant exploratory hole density is considered to be commensurate with the complexity of the site conditions and detail of information required for this phase of the investigation.

v GROUND GAS RISK ASSESSMENT METHODOLOGY

Gas monitoring programmes undertaken by GRM are designed to broadly comply with the recommendations outlined in CIRIA Report C665 'Assessing risks posed by hazardous ground gas to buildings' (2007) and BS8576 'Guidance on Investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs) (2013).

To assess the risks posed by ground gases such as radon, carbon dioxide and methane, the relevant current guidance has been used. For radon the site has been assessed following the guidelines in 'Radon: guidance on protective measures for new dwellings (BR211: 2015)'. For methane and carbon dioxide the primary guidance document used to determine if protection measures are required is *BS8485:2015 Code of practice for the design of protective measures from methane and carbon dioxide ground gases for new buildings*. This uses hazardous gas flow rates (Q_{hg}), which are gas concentrations multiplied by borehole flow rates, to derive a Gas Flow Rate (GSV) for the site. The gas regime is then determined based on the GSV and other limiting factors such as gas concentrations.

Where flow is not recorded during the monitoring a default flow rate of 0.1l/hr will be used in the assessment to produce a positive result.

vi HUMAN HEALTH RISK ASSESSMENT METHODOLOGY

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

Guidance contained in the Environment Agency's CLEA Reports has been used to assess the risks posed to human health.

For residential developments that include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land with plant uptake' are used, i.e. a female with a start age class of one and an end age class of six. All pathways are considered including the consumption of home-grown vegetables.

For residential developments that do not include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land without plant uptake' are used, i.e. a female with a start age class of one and an end age class of six. All pathways are considered except the consumption of home-grown vegetables. For commercial/industrial developments the default Tier 1 Assessment Criteria (TAC) for 'commercial/industrial' are used, i.e. a female with a start age class of sixteen and an end age class of eighteen. All pathways are considered except the consumption of home-grown vegetables.

The TAC used by GRM include Category 4 Screening Levels (C4SLs) published by DEFRA, values calculated by GRM using the CLEA v1.071 risk assessment, and values and Suitable for Use Levels (S4UL) developed by LQM/CIEH. The TAC used in the assessment are selected based on the lowest site specific SOM values returned as part of the chemical analysis.

Where soil chemical analysis results are found to exceed the TAC, Site-Specific Risk Assessments may be undertaken using the CLEA v1.071 risk assessment software using the age classes and pathways described above.

vii RISK TO SITE WORKERS – GENERAL COMMENTS

The risks to site workers are similar to those posed to site end users, although likely to be less severe due to the site workers' shorter exposure to the identified contamination. However, site workers (particularly groundworkers) are more likely to come into direct contact with contaminated soils due to the nature of their work. On this basis ground and construction workers should be provided with basic Personal Protective Equipment based on the site's general health and safety risk assessment, but including as a minimum safety footwear, gloves and overalls.

A site specific risk assessment should be carried out for all hazards identified within the ground investigation in accordance with current health and safety legislation. This assessment should identify any measures required to further reduce risks i.e. providing further Personal Protective Equipment, welfare facilities and if necessary preventing access to certain areas.

Demolition and dismantling of existing structures on the site must be carried out to a safe and acceptable standard, in accordance with current UK guidance and best practice. Whilst not ground related, asbestos and hazardous substances surveys should be conducted prior to any demolition.

Any unusual colours, odours and suspicious ground should be reported immediately to site management and then GRM.

Whilst this appraisal has considered the long-term effects of contamination, GRM can also help during the formulation of Health and Safety documentation, if required.

viii CONTROLLED WATERS RISK ASSESSMENT METHODOLOGY

Where the desk study and fieldwork do not reveal a potential source of contamination no leachate or groundwater testing will be performed. Where a potential source is identified the testing will comprise leachate testing on the material considered most likely to pose a risk, groundwater testing will be undertaken if water is present at shallow depth.

The UK Drinking Water Standards (UKDWS) or Environmental Quality Standards (EQS) are usually adopted for comparison with the leachate/groundwater test results. When the most sensitive receptor is considered to be the aquifer (groundwater) UKDWS will be adopted as the Initial Tier 1 screening values. Where the most sensitive receptor is a surface water feature the EQS values will be used as Initial Tier 1 Screening values.

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

ix CONSTRUCTION MATERIALS RISK ASSESSMENT METHODOLOGY

The 'screening levels' adopted for the assessment of risk to construction materials are taken from the following documents:

- UK Water Industry Research (UKWIR) Contamination thresholds for sub-surface water pipes, for the protection of buried pipes.
- Building Research Establishment (BRE) Special Digest SD1 (2005), 'Concrete in Aggressive Ground', for the protection of buried concrete.

x WASTE DISPOSAL, SITE WASTE MANAGEMENT PLANS AND MATERIAL MANAGEMENT PLANS

Under current Waste Management Regulations, waste soil materials produced from the site will require characterisation to enable it to be disposed of correctly.

The chemical analysis results included in this report should be provided to the relevant landfill operators to establish the characterisation of the waste, confirm its suitability for landfill disposal and provide estimated costings. If material is classified as hazardous, then the site will need to be registered with the Environment Agency prior to the movement of the waste. Depending on the receiving landfill's current permit, further chemical analysis, incorporating Waste Acceptance Criteria (WAC) leachate analysis, may be required.

All materials removed from the site will be classified as 'waste' and therefore must be removed by a suitably licensed carrier of waste. This applies whether or not the waste is contaminated. All waste removed to landfill will attract Landfill Tax.

The developer/builder is likely to be classed as the waste producer and therefore, has a duty of care to ensure that all waste is disposed of appropriately. This includes ensuring the waste carrier is licensed and disposes of the waste to a suitably licensed landfill site. They are also required to keep a paper trail from 'cradle to grave' including copies of the waste disposal tickets.

Efficient materials management on site is recommended as it can lead to significant cost savings when compared to the traditional side casting or single stockpile of arisings. GRM can assist in the production of Material Management Plans under the CL:AIRE Definition of Waste: Code of Practice. The DoWCoP enables:

- The direct transfer and re-use of clean naturally occurring soil materials between sites, and
- The re-use of both contaminated and uncontaminated materials on their site of origin and between sites within defined Cluster projects.

GRM can also undertake the role of Qualified Person and submit the DoW CoP project Declaration.

Likewise making the site as volume neutral as possible will reduce the costs of development. Whilst not a statutory requirement, Site Waste Management Plans allow better waste management practices, help to reduce the amount of waste produced and identify best environmental disposal options. Implementing a Site Waste Management Plan (SWMP) can reduce costs (increasing business profits) and maximise resource efficiency.

xi GEOTECHNICAL ASSESSMENT GENERAL COMMENTS

Where finished floor levels of proposed structures have not been provided by the Client, then for the purposes of initial assessment, GRM will assume that finished levels will not vary appreciably from the existing ground levels. If the depths of any underground engineering works (i.e. sewers, pumping stations

etc.) are unknown they will not be taken in to account in the assessment and it will be assumed that any such works will not compromise foundation or ground stability.

Should the development proposals or finished levels be different from these assumptions then the comments/recommendations in the Geotechnical Assessment may require revising.

It should be noted that the results of window sampling and/or cable percussive boreholes may not give a true indication of a soils actual engineering properties (i.e. stability, mass structure etc). GRM consider that that prior to development trial pitting should be undertaken to confirm the recommendations in the Geotechnical Assessment.

xii GEOTECHNICAL ASSESSMENT – ENGINEERING GROUND TREATMENT

Near surface soils have the potential to be disturbed by weathering and site traffic. Precautions should always be taken to avoid this, as excessive disturbance may leads to more onerous floor slab designs, road cap thickness and increased amounts of off-site disposal etc.

Near surface soils may need treatment or reinforcing to allow safe movement of construction plant and labour. An assessment by the contractor should be undertaken once the type of machinery/plant needed to complete the development is known.

xiii GEOTECHNICAL ASSESSMENT – EXCAVATIONS

Excavation instability (over-break) can result in damage to existing services or structures (e.g. foundations, roads or boundary walls/fences) both on and off-site, as well as increased foundation concrete costs. In order to minimise this, all excavations deeper than 1.2m deep (or any excavation within 1.5m of any existing structure or service) should be supported. Full support should be provided to the full depth of all near vertically sided excavations in made ground, soft and very soft clays and granular soils. A reduction to intermediate support should be acceptable within firm and stiffer natural clays.

Wherever possible, man entry into excavations should be prevented; however, where this is not possible, entry to, and time spent in, excavations should be kept to a minimum.

The build program should be tailored to reflect the impact that deep excavations through potentially unstable strata can have on adjacent properties, so that they are not undermined.

All excavations on site should be in accordance with HSE guidelines and stability should be practically maintained at all times. Reference should be made to HSE construction information sheet No. 8 (Revision 1) 'Safety in Excavations'.

Care should be taken to ensure that falls from excavation faces do not adversely affect the integrity of foundation concrete.

If contaminated water enters excavations it should be removed and transported to an appropriate treatment facility by a suitably licensed carrier before construction begins.

xiv GEOTECHNICAL ASSESSMENT – SUBSTRUCTURES

Where practicable, existing buried construction should be fully removed; however, if this is not practicable all new foundations should be carried down to fully penetrate it and it should be broken well away from all new structures.

There may be existing structures and/or infrastructure in close proximity to the proposed development. New build foundations may be constructed next to pavements with existing underground services beneath them, or excavations may be required near existing footings associated with adjacent properties. These potential hazards need to be taken into consideration when designing foundations and the groundworker needs to be made aware of their potential impact during the redevelopment works. Foundations close to existing underground services or buildings may require alternative foundation techniques (such as piling) to protect the integrity of these structures.

The contractor for the works should carry them out in such a fashion so as to not cause excessive overbreak, concrete usage or undermine existing buildings/roads/ services that are to be retained.

xv GEOTECHNICAL ASSESSMENT – SOAKAWAYS

Soakaway testing in trial pits by GRM is broadly carried out in accordance with BRE DG 365 (2016). The testing comprises the excavation of a test pit to a suitable depth, and the placement of water into the pit. The level of water present is then monitored over time. For borehole installations, the permeability testing (falling head/rising head) is undertaken in accordance with BS5930.

If it is decided to proceed with the use of soakaway drainage, then the following general points should be noted:

- Soakaways should not be placed so that water can be discharged through potentially contaminated made ground.
- The Environment Agency may require soakaways to be sealed systems such that only roof run off falls to soakaway.
- Interceptors are likely to be required for soakaways for highway drainage. The adopting authority for the highways should be consulted at the earliest opportunity regarding the use of soakaways for highways drainage.
- Consideration of site levels and slopes should be taken into account during the design.
- The construction of all soakaways should be in accordance with the current building regulations.
- Soakaways should not be placed within 5m of a proposed building.
- Placement of soakaways needs to be considered so as to avoid ponding of water down slope.
- The base of a soakaway should not be below the highest recorded water level.
- The Environment Agency prefer 1m of dry soil to be present between the base of a soakaway and the water table to provide attenuation for contamination.

xvi GEOTECHNICAL ASSESSMENT – FOUNDATIONS

If soft or hard spots are encountered during foundation excavation then they should be replaced with suitably compacted material or the footings deepened to suitable strata, to avoid differential settlement.

If strata of differing bearing character (e.g. sand and clay) are encountered at foundation levels within the excavations for a single plot then the excavation depths should be altered as appropriate to ensure the foundations rest on a single stratum, or strata that will not induce differential settlement. Where this is impractical then GRM should be contacted to assess a reinforced concrete detail or an alternative foundation solution (e.g. piles or vibro-replacement).

NOTES ON LIMITATIONS

General

GRM Development Solutions Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement had been executed, or with whom an assignment had been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from GRM Development Solutions Limited; a charge may be levied against such approval.

GRM Development Solutions Limited accepts no responsibility or liability for:

- a) the consequences of this document being used for any purpose or project other than for which it was commissioned, and
- b) the consequences of this document being used by any third party with whom an agreement has not been executed.

Phase I Environmental Audits/ Desk Studies

The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, GRM Development Solutions Limited reserves the right to review such information and as considered necessary and appropriate to modify the opinions accordingly. It should be noted that any risks identified in a Phase 1 report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Environmental Audits (Contamination Investigations)

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated with potential human targets, building materials, and controlled waters.

The amount of exploratory work and chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to the areas unoccupied by the building(s) on the site and by buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues need to be resolved.

For these reasons if costs have been included in relation to site remediation these must be considered as provisional only and must, in any event, be confirmed by a commercial adviser.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. Whilst exploratory testing is intended to gain an accurate representation of the site, the very nature of sampling and testing is such that it cannot ensure that all localised conditions are detected.

The risk assessment and opinions provided take in to consideration, inter alia, currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

Phase II Geo-environmental Investigations (Combined Geotechnical and Contamination Investigations)

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions to provide a reasonable assessment of the environment risks together with engineering and development implications. If costs have been included in relation to site development a commercial adviser must confirm these.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site for each of the exploratory holes. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time the site work was conducted. It should be noted that groundwater levels will vary owing to seasonal, tidal and weather related effects. The scope of the investigation was selected on the basis of the specific development proposed by the Client and may be inappropriate to another form of development or scheme.



The risk assessment and opinions provided take in to consideration, inter alia, currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.



A P P E N D I X B

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48



THIS DRAWING (OR ANY PART THEREOF) MAY NOT BE COPIED, TRANSMITTED OR DISCLOSED TO ANY THIRD PARTY OR UNAUTHORISED PERSON WITHOUT THE PRIOR WRITTEN PERMISSION OF GILLING DOD ARCHITECTS.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS PREPARED BY CONSULTANTS AND SUB-CONTRACTORS.

REPORT ANY DISCREPANCIES TO THE ARCHITECT OR REPRESENTATIVES THEREOF.

© ALL RIGHTS RESERVED. NO PART OF THIS DRAWING MAY BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT THE WRITTEN PERMISSIONS OF THE COPYRIGHT HOLDER

ONCE PRINTED AND DISTRIBUTED THIS DOCUMENT IS ASSUMED UNCONTROLLED

DO NOT SCALE FROM THIS DRAWING. WORK ONLY TO PRINTED DIMENSIONS.

P01	CLS	First Issue - For Information Only		24.10.22
Rev	By	Description		Date



The Cruck Barn, Duxbury Park, Chorley, Lancashire. PR7 4AT
t: 01257 260070 f: 01257 260071

Client Name:
The Christie NHS Foundation Trust

Site Name:
The Christie, Wilmslow Road, Manchester

Project Name:
TIF Wards

Drawing Title:
Proposed Ground Floor GA Plan

Project No: 8283-002	Sheet Size: A2	Scale: 1 : 100	
Drawn by: MJC	Checked by: CLS	Approved by: NW	Revision: P01
Suitability: Initial Stage WIP			Status: S0

Drawing Number:
Project Code / Orig / Vol / Level / Type / Disc / System-Number
CHRCW-GDA-V4-00-DR-A-1001

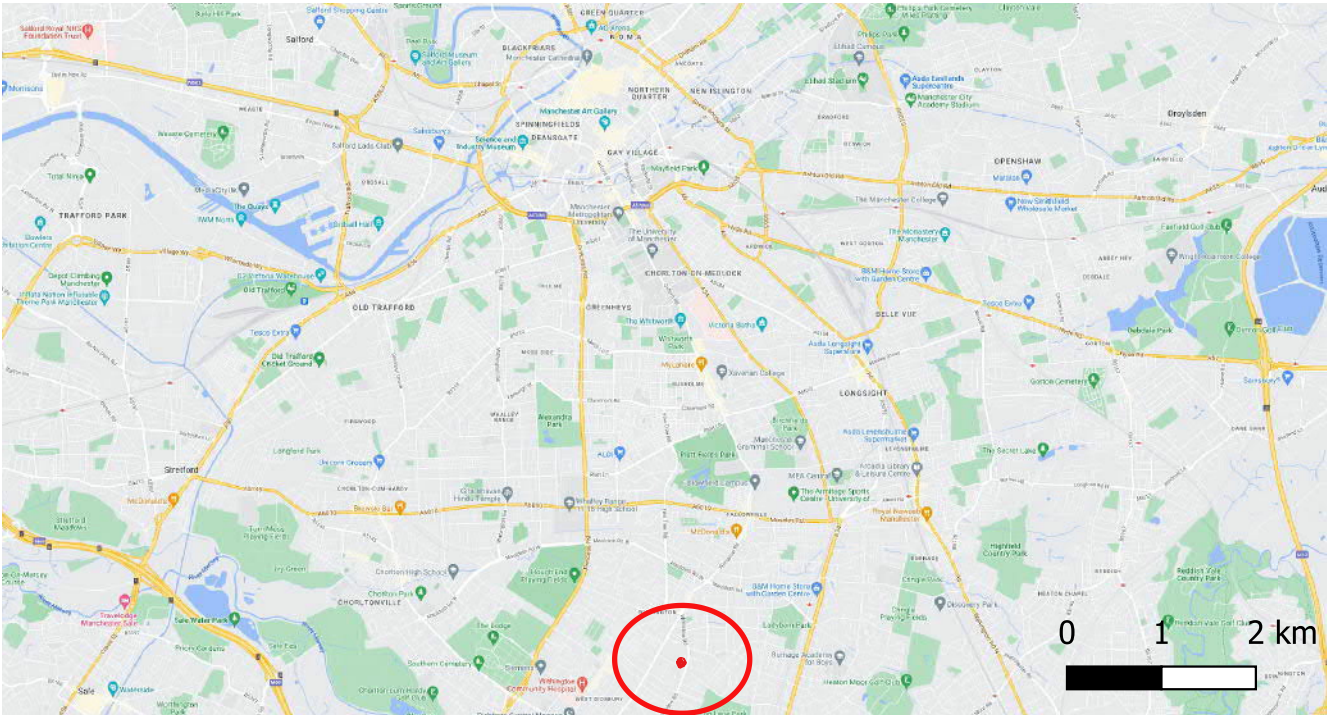
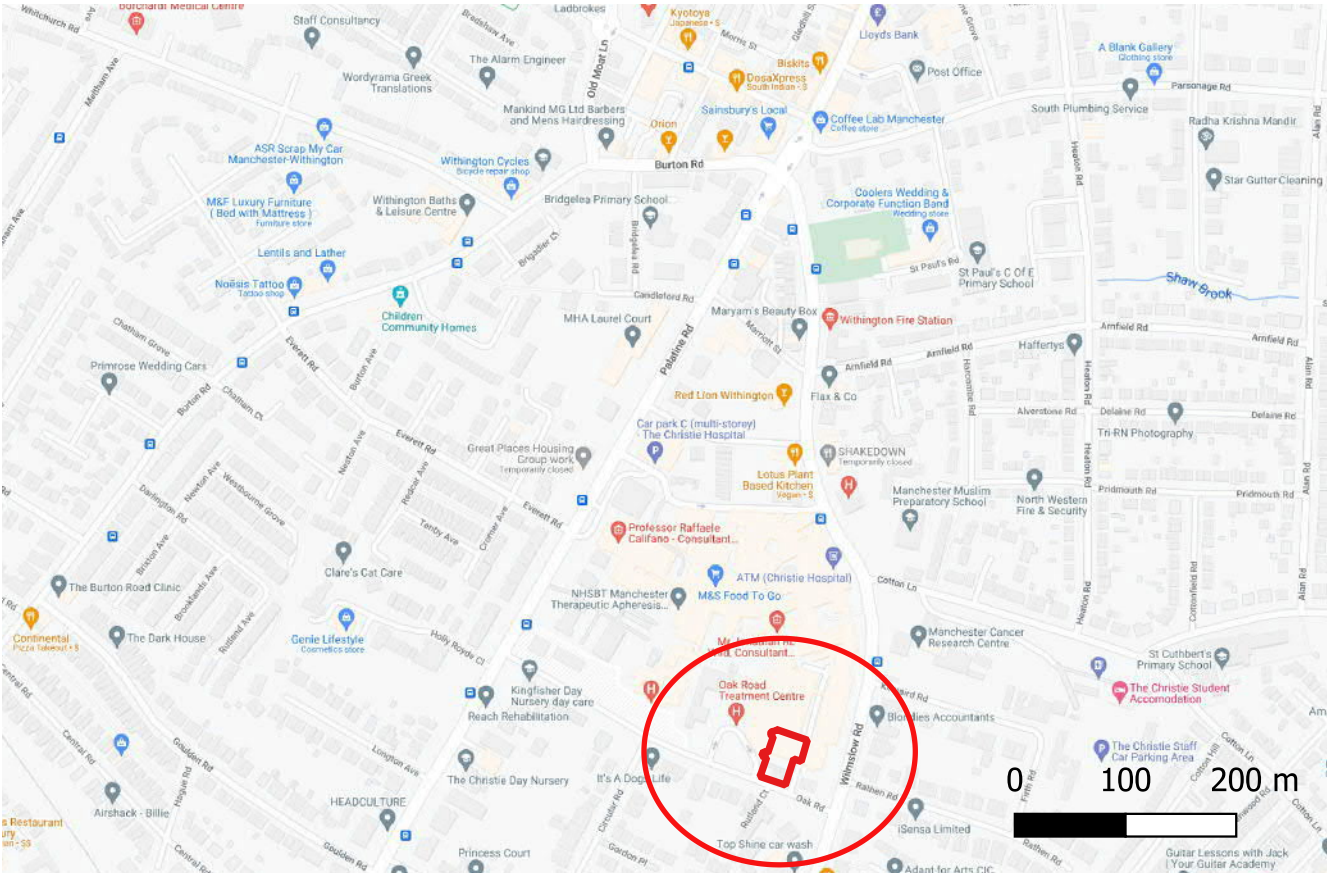
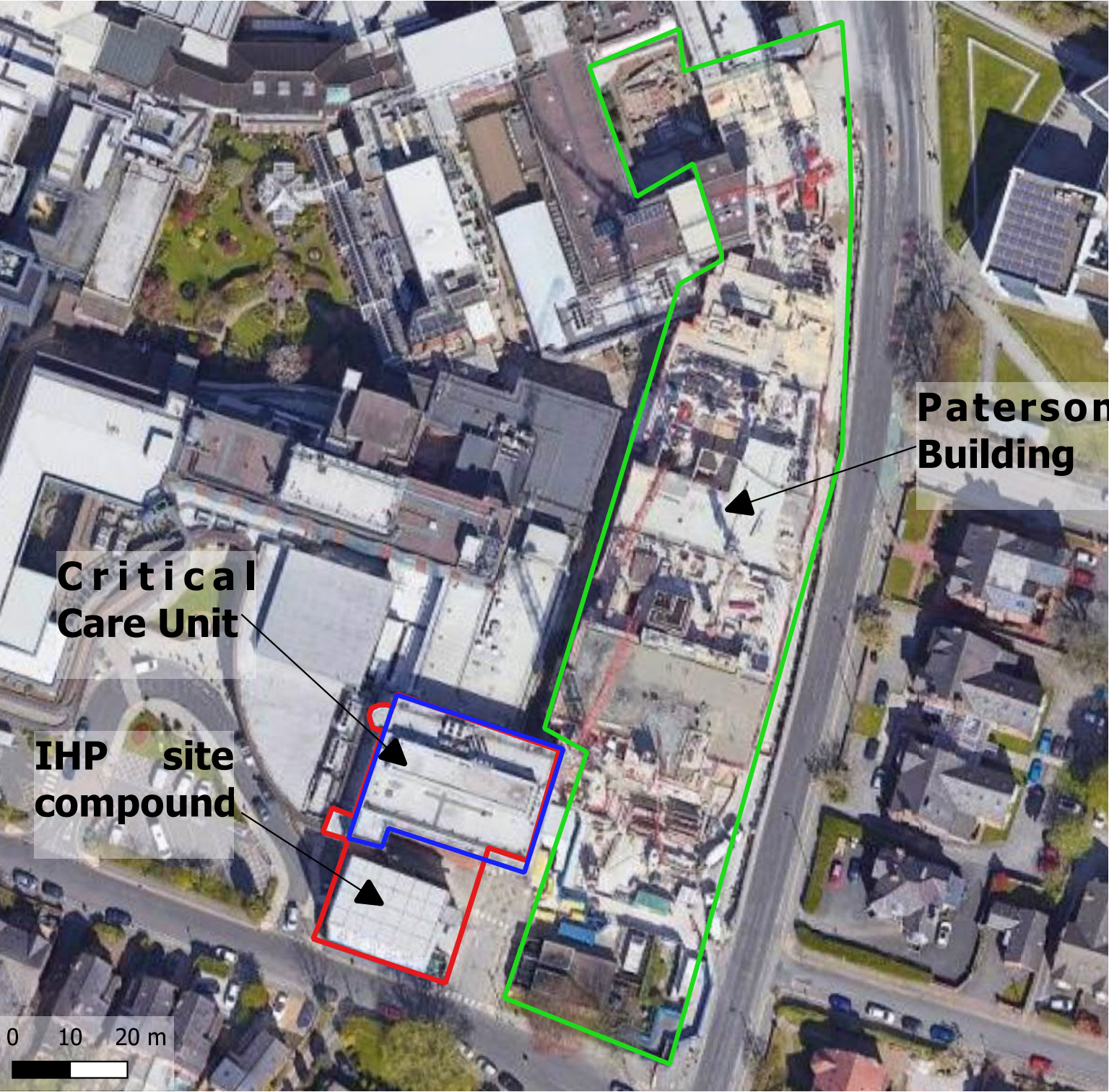


A P P E N D I X C

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

- Legend
- Site Boundary
 - Hospital Buildings
 - Critical Care Unit
 - Paterson Building



NOTES:

CLIENT:	THE CHRISTIE NHS FOUNDATION TRUST C/O AJP
PROJECT:	CHRISTIE EXTENSION, THE CHRISTIE, WILMSLOW ROAD, MANCHESTER
TITLE:	SITE LOCATION AND BOUNDARY PLAN

PROJECT No:	P10197	DATE:	DEC 2022	DESIGN/DRAWN:	SS
DRAWING NUMBER:	01	ISSUE:	FINAL		
© GRM Development Solutions Ltd © Crown Copyright. AL 100014100					



GRM Development Solutions Ltd
Tel: 01283 551 249
mail@grm-uk.com www.grm-uk.com

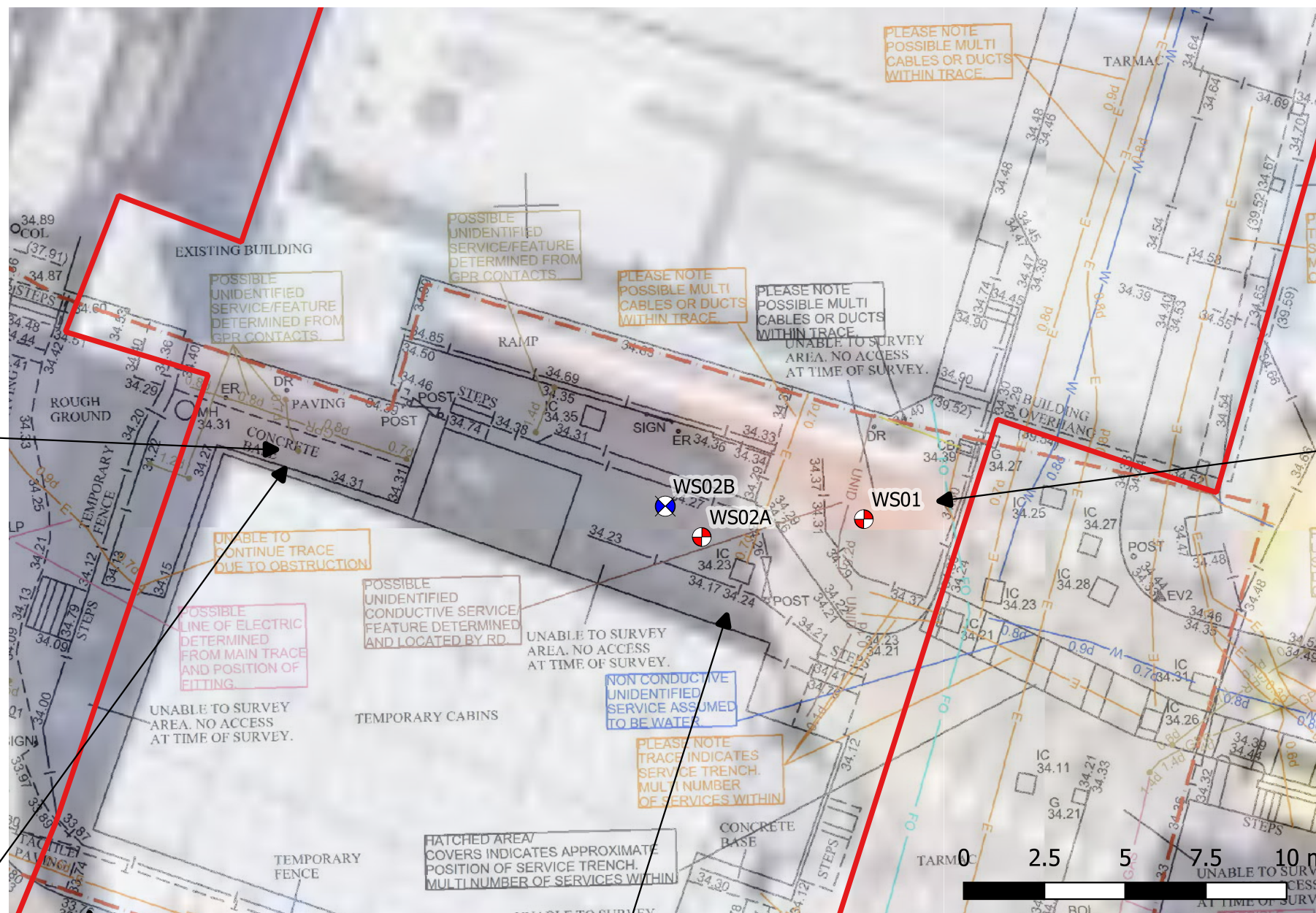


A P P E N D I X D

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

Initial Location for WS01. Service Scan indicated utilities throughout the area with no safe location to drill.



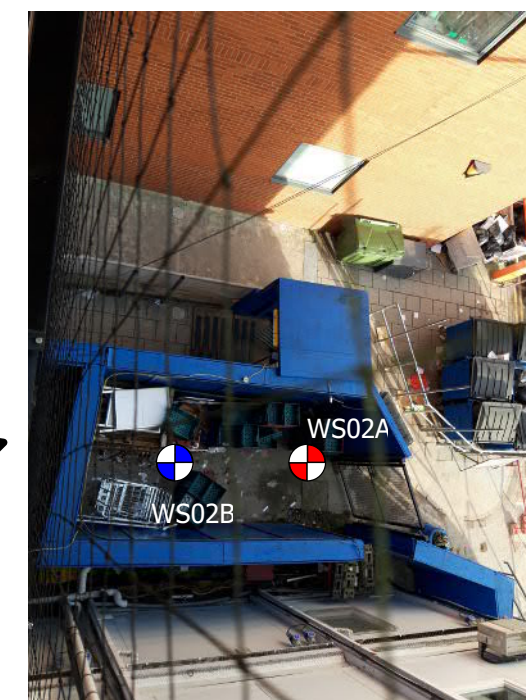
Cabin currently in place.

WS01 was attempted in bin area. Location was initial outside of metal railings, however Vinci stated that this would have blocked turnstile / fire route and location was moved into bin area during brief of works in morning.



Hand dug pits were attempted for both WS02A and WS02B.

Electric cable was encountered in WS02A. Area was cleared in order to attempt WS02B, however gravel service corridor was encountered and no other location could be found to drill



NOTES: Notes	CLIENT: Alan Johnston Partnership	PROJECT No: P10197	DATE: DEC 2022	DESIGN/DRAWN: RS	 GRM Development Solutions Ltd Tel: 01283 551 249 mail@grm-uk.com www.grm-uk.com
	PROJECT: Christie Hospital Units	DRAWING NUMBER: 01	ISSUE: FINAL		
	TITLE: Exploratory Hole Location Plan RevA	© GRM Development Solutions Ltd © Crown Copyright. AL 100014100			

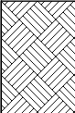
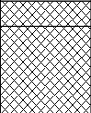


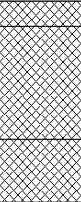
A P P E N D I X E

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole			Borehole No WS01 Sheet 1 of 1		
Site Name: TIF Wards, The Christie, Wilmslow Road, Manchester							Ground Level (mAOD) 37.00		
Client: The Christie NHS Foundation Trust c/o Alan Johnston Foundation					GRM Project Ref: P10197			Coordinates 384893 E 392416 N	
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth	Type	SPT Result					
		0.20 - 0.30	ES		0.05	36.95		Concrete paving slab.	
					0.15	36.85		MADE GROUND	
					0.35	36.65		MADE GROUND	
							Medium dense yellow fine to coarse SAND. MADE GROUND Medium dense, greyish brown sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, sub-angular brick, concrete and sandstone. MADE GROUND <i>... concrete encountered at 0.35m begl.</i> End of Borehole at 0.350m		
Crew: Dynamic Sampling UK Ltd		Logger: RS		Weather: Cold but clear.					
Equipment: Tracked Window Sampling Rig									
Reason for termination of borehole: Hand dug service pit terminated on concrete encountered at 0.35m begl.									
Groundwater Remarks: No groundwater encountered.									
General Remarks:									
Hole Started: 15/12/2022		Hole Complete: 15/12/2022		Version: DRAFT		Scale: 1:31			

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole			Borehole No WS02A Sheet 1 of 1		
Site Name: TIF Wards, The Christie, Wilmslow Road, Manchester							Ground Level (mAOD) 37.00		
Client: The Christie NHS Foundation Trust c/o Alan Johnston Foundation					GRM Project Ref: P10197			Coordinates 384889 E 392415 N	
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth	Type	SPT Result					
		0.00 - 0.10	D		0.10	36.90		Tarmac hardstanding. MADE GROUND Medium dense, dark greyish brown very gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse, sub-angular, brick, concrete, clinker and sandstone. MADE GROUND <i>... electrical cable encountered at 0.45m begl.</i> End of Borehole at 0.450m	1
		0.35 - 0.45	ES		0.45	36.55			
									2
									3
									4
									5
Crew: Dynamic Sampling UK Ltd				Logger: RS			Weather: Cold but clear.		
Equipment: Tracked Window Sampling Rig									
Reason for termination of borehole: Terminated due to electrical cable encountered at 0.45m begl.									
Groundwater Remarks: No groundwater encountered.									
General Remarks:									
Hole Started: 15/12/2022		Hole Complete: 15/12/2022		Version: DRAFT			Scale: 1:31		

		GRM Development Solutions Ltd Laurus House, First Avenue, Centrum 100, Burton-on-Trent, DE14 2WH Tel (HQ): 01283 551249 Email: info@grm-uk.com		Windowless Sample Borehole			Borehole No WS02B Sheet 1 of 1		
Site Name: TIF Wards, The Christie, Wilmslow Road, Manchester							Ground Level (mAOD) 37.00		
Client: The Christie NHS Foundation Trust c/o Alan Johnston Foundation					GRM Project Ref: P10197		Coordinates 384886 E 392416 N		
Installation/ Backfill	Water Strike	Samples/Tests			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth	Type	SPT Result					
		0.65 - 0.75	ES		0.10	36.90		Tarmac hardstanding. MADE GROUND	
					0.55	36.45		Medium dense, dark greyish brown, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, sub-angular brick, concrete, clinker and sandstone. MADE GROUND	
					0.80	36.20		Soft to firm, greyish brown slightly sandy CLAY. Sand is fine to coarse. MADE GROUND <i>Pea gravel service corridor encountered at 0.80m begl.</i> End of Borehole at 0.800m	
Crew: Dynamic Sampling UK Ltd		Logger: RS		Weather: Cold but clear.					
Equipment: Tracked Window Sampling Rig									
Reason for termination of borehole: Terminated due to service corridor encountered at 0.80m begl.									
Groundwater Remarks: No groundwater encountered.									
General Remarks:									
Hole Started: 15/12/2022		Hole Complete: 15/12/2022		Version: DRAFT		Scale: 1:31			



A P P E N D I X F

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48



7 - 11 Harding Street
Leicester
LE1 4DH

GRM Development Solutions

Laurus House
First Avenue
Centrum 100
Burton Upon Trent
DE14 2WH

Analytical Test Report: L22/06412/GRM - 22-31161

Your Project Reference:	P10197 Christie Hospital units		
Your Order Number:	P10197	Samples Received / Instructed:	19/12/2022 / 19/12/2022
Report Issue Number:	1	Sample Tested:	19/12 to 06/01/2023
Samples Analysed:	3 soil samples	Report issued:	06/01/2023

Signed

James Gane
Analytical Services Manager
CTS Group

Notes:

General

Please refer to Methodologies page for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report with the exception of the asbestos test portion which is held for 6 months unless otherwise requested.

Moisture Content was determined in accordance with CTS method statement MS - CL - Sample Prep, oven dried at <30°C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Stone Content was determined in accordance with CTS method statement MS - CL - Sample Prep and refers to the percentage of stones retained on a 10mm BS test sieve.

Where specification limits are included these are for guidance only. Where a measured value has been highlighted this is not implying acceptance or failure and certainty of measurement values have not been taken into account.

Uncertainty of measurement values are available on request.

Samples were supplied by customer, results apply to the samples as received.

Asbestos

Please note: Where further analysis is required samples identified as containing asbestos are screened and tested on an as received basis. No correction is made for moisture content and these results are not covered by our accreditation

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

WAC Testing

Samples were leached in accordance with BS EN 12457-2: 2002.

Eluate Results are reported as L/S 10. These results have been calculated in accordance with BS EN 12457-2:2002.

Comparative values are taken from the Council Decision Annex - CRITERIA AND PROCEDURES FOR THE ACCEPTANCE OF WASTE AT LANDFILLS, (2003/33/EC).

Deviating Samples

On receipt samples are compared against our sample holding and handling protocols, where any deviations have been noted these are reported on our deviating sample page (if present)

Accreditation Key

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited

MCERTS Accreditation only covers the SAND, CLAY and LOAM matrices

Date of issue: 23.09.2022

Issued by: J. Gane

Issue No: 1

Rev No: 1



4161



7 - 11 Harding Street
Leicester
LE1 4DH

L22/06412/GRM - 22-31161

Project Reference - P10197 Christie Hospital units

Analytical Test Results - Soil

Lab Reference			271839	271840	271841
Client Sample ID			WS01	WS02A	WS02B
Client Sample Location			-	-	-
Client Sample Type			-	-	-
Client Sample Number			-	-	-
Depth - Top (m)			0.20	0.35	0.65
Depth - Bottom (m)			0.30	0.45	0.75
Date of Sampling			15/12/2022	15/12/2022	15/12/2022
Time of Sampling			-	-	-
Sample Matrix			Sand	Sand	Clay
Determinant	Units	Accreditation			
Arsenic	(mg/kg)	MCERTS	< 10	< 10	< 10
Cadmium	(mg/kg)	MCERTS	0.9	1.0	0.7
Chromium (Total)	(mg/kg)	UKAS	13	16	25
Copper	(mg/kg)	MCERTS	35	42	24
Lead	(mg/kg)	MCERTS	88	91	21
Mercury	(mg/kg)	UKAS	< 2.5	< 2.5	< 2.5
Nickel	(mg/kg)	MCERTS	18	22	37
Selenium	(mg/kg)	u	< 8.0	< 8.0	< 8.0
Zinc	(mg/kg)	MCERTS	87	100	73
Total Phenols	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0
Cyanide (Total)	(mg/kg)	MCERTS	< 1.0	< 1.0	< 1.0
Chromium (Hexavalent)	(mg/kg)	u	< 1.0	< 1.0	< 1.0
pH	pH Units	MCERTS	10.7	8.8	8.4
Sulphate (Water soluble)	(mg/l)	u	430	72	36
Acenaphthene	(mg/kg)	MCERTS	< 0.20	0.30	< 0.02
Acenaphthylene	(mg/kg)	UKAS	< 0.20	< 0.20	< 0.02
Anthracene	(mg/kg)	UKAS	0.40	0.70	0.03
Benzo (a) anthracene	(mg/kg)	MCERTS	1.8	2.2	0.12
Benzo (a) pyrene	(mg/kg)	MCERTS	1.7	2.8	0.12
Benzo (b) fluoranthene	(mg/kg)	MCERTS	1.7	2.7	0.12
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	1.0	1.9	0.07
Benzo (k) fluoranthene	(mg/kg)	MCERTS	0.70	1.0	0.05
Chrysene	(mg/kg)	MCERTS	2.0	2.5	0.13
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	< 0.20	0.29	< 0.02
Fluoranthene	(mg/kg)	MCERTS	2.6	4.7	0.29
Fluorene	(mg/kg)	MCERTS	< 0.20	0.24	< 0.02
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	0.80	1.4	0.05
Naphthalene	(mg/kg)	MCERTS	< 0.20	< 0.20	< 0.02
Phenanthrene	(mg/kg)	MCERTS	0.97	2.2	0.11
Pyrene	(mg/kg)	MCERTS	3.9	4.5	0.25
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	19	28	1.5
SOM (via TOC)	(%)	UKAS	2.5	4.4	< 1.7
Asbestos	-	UKAS	No asbestos detected	No asbestos detected	No asbestos detected

L22/06412/GRM - 22-31161
Project Reference - P10197 Christie Hospital units
Analytical Test Results - TPH CWG

Lab Reference			271839	271840	271841
Client Sample ID			WS01	WS02A	WS02B
Client Sample Location			-	-	-
Client Sample Type			-	-	-
Client Sample Number			-	-	-
Depth - Top (m)			0.20	0.35	0.65
Depth - Bottom (m)			0.30	0.45	0.75
Date of Sampling			15/12/2022	15/12/2022	15/12/2022
Time of Sampling			-	-	-
Sample Matrix			Sand	Sand	Clay
Determinant	Units	Accreditation			
Aliphatics					
>C ₅ to C ₆ [HS_MS_1D_AL]	(mg/kg)	u	< 0.06	< 0.06	< 0.06
>C ₆ to C ₈ [HS_MS_1D_AL]	(mg/kg)	u	< 0.06	< 0.06	< 0.06
>C ₈ to C ₁₀ [HS_MS_1D_AL]	(mg/kg)	u	< 0.06	< 0.06	< 0.06
>C ₁₀ to C ₁₂ [EH_CU_1D_AL]	(mg/kg)	u	< 10	< 10	< 10
>C ₁₂ to C ₁₆ [EH_CU_1D_AL]	(mg/kg)	u	14	< 10	< 10
>C ₁₆ to C ₂₁ [EH_CU_1D_AL]	(mg/kg)	u	29	25	< 10
>C ₂₁ to C ₃₅ [EH_CU_1D_AL]	(mg/kg)	u	290	550	< 10
Aromatics					
>C ₅ to C ₇ [HS_MS_1D_AR]	(mg/kg)	u	< 0.04	< 0.04	< 0.04
>C ₇ to C ₈ [HS_MS_1D_AR]	(mg/kg)	u	< 0.04	< 0.04	< 0.04
>C ₈ to C ₁₀ [HS_MS_1D_AR]	(mg/kg)	u	< 0.06	< 0.06	< 0.06
>C ₁₀ to C ₁₂ [EH_CU_1D_AR]	(mg/kg)	u	< 10	< 10	< 10
>C ₁₂ to C ₁₆ [EH_CU_1D_AR]	(mg/kg)	u	< 10	< 10	< 10
>C ₁₆ to C ₂₁ [EH_CU_1D_AR]	(mg/kg)	u	31	36	< 10
>C ₂₁ to C ₃₅ [EH_CU_1D_AR]	(mg/kg)	u	450	930	< 10
Total					
>C ₅ to C ₄₀ [EH_CU+HS_1D_Total]	(mg/kg)	u	1100	2100	< 50

L22/06412/GRM - 22-31161

Project Reference - P10197 Christie Hospital units

Certificate Of Analysis - WAC Suite

Lab Reference	271841
---------------	--------

Client Sample ID	WS02B
Client Sample Location	-
Client Sample Type	-
Client Sample Number	-
Depth - Top (m)	0.65
Depth - Bottom (m)	0.75
Date of Sampling	15/12/2022
Time of Sampling	-
Sample Description	Mottled brown grey silty clay
Sample Matrix	Clay
Moisture Content (%)	21
Stone content (%)	< 0.1

	Determined Result	Inert Waste Landfill	Stable non reactive hazardous waste in a non hazardous landfill	Hazardous Waste Landfill
--	-------------------	----------------------	---	--------------------------

Solid Analysis

Total Organic Carbon	%	MCERTS	< 1.0	3.0	5.0	6.0
Loss on Ignition	%	UKAS	3.5	-	-	10.0
BTEX	mg/kg	MCERTS	< 0.30	6.00	-	-
PCB's (7 Congeners)	mg/kg	u	< 0.028	1.00	-	-
Mineral Oil (>C ₁₀ to C ₄₀) (RH_3D_Total)	mg/kg	u	19	500	-	-
PAH	mg/kg	u	1.5	100	-	-
pH	units	MCERTS	8.4	-	> 6	-

Eluate Analysis

Arsenic	mg/kg	u	< 0.03	0.50	2	25
Barium	mg/kg	u	0.15	20	100	300
Cadmium	mg/kg	u	< 0.03	0.04	1	5
Chromium (total)	mg/kg	u	< 0.03	0.5	10	70
Copper	mg/kg	u	0.03	2.0	50	100
Mercury	mg/kg	u	< 0.01	0.01	0.2	2
Molybdenum	mg/kg	u	0.04	0.5	10.0	30
Nickel	mg/kg	u	0.04	0.4	10.0	40
Lead	mg/kg	u	< 0.05	0.5	10.0	50
Antimony	mg/kg	u	< 0.03	0.06	0.7	5
Selenium	mg/kg	u	< 0.01	0.1	0.5	7
Zinc	mg/kg	u	0.06	4	50	200
Chloride	mg/kg	u	11	800	15000	25000
Fluoride	mg/kg	u	12	10	150	500
Sulphate (as SO ₄)	mg/kg	u	74	1000	20000	50000
Total Dissolved Solids	mg/kg	u	830	4000	60000	100000
Phenol Index	mg/kg	u	< 1.0	1	-	-
Dissolved Organic Carbon	mg/kg	u	77.0	500	800	1000



L22/06412/GRM - 22-31161

Project Reference - P10197 Christie Hospital units

Sample Descriptions

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Description	Moisture Content (%)	Stone Content (%)	Passing 2mm test sieve (%)
271839	WS01	-	-	-	Made Ground- greyish brown very gravelly slightly clayey silty sand with rare bituminous material	7.6	38	34
271840	WS02A	-	-	-	Made Ground- greyish brown very gravelly slightly clayey silty sand with rare bituminous material brick fragments	7.6	36	42
271841	WS02B	-	-	-	Mottled brown grey silty clay	21	< 0.1	88



L22/06412/GRM - 22-31161

Project Reference - P10197 Christie Hospital units

Sample Comments

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Comments
271839	WS01	-	-	-	VPH - Sample taken from container with headspace.
271840	WS02A	-	-	-	VPH - Sample taken from container with headspace.
271841	WS02B	-	-	-	

L22/06412/GRM - 22-31161

Project Reference - P10197 Christie Hospital units

Analysis Methodologies

Test Code	Test Name / Reference	Sample condition for analysis	Sample Preparation	Test Details
ANIONSS	MS - CL - Anions by Aquakem (2:1 Extract)	Oven dried	Passing 2mm test sieve	Determination of Anions (inc Sulphate, chloride etc.) in soils by Aquakem. Analysis is based on a 2:1 water to soil extraction ratio
BTEXS	MS - CL - VOC and MBTEX	As received	Passing 10mm test sieve	Determination of BTEX in soils via Headspace-GC-MS
EPHS	MS - CL - EPH in Soil	As received	Passing 10mm test sieve	Determination of Extractable Petroleum Hydrocarbons in soils via GC-MS
PCB7S	MS - CL - PCB Soils	As received	Passing 10mm test sieve	Determination of PCB's (7 congeners) in soils via GC-MS
PAHASRDS	MS - CL - PAH (As Received)	As received	Passing 10mm test sieve	Determination of Polyaromatic hydrocarbons in soil via GC-MS
CWGS	MS - CL - VPH & MS - CL - EPH	As received	Passing 10mm test sieve	Determination of TPH CWG (Volatile Petroleum Hydrocarbons and Extractable Petroleum Hydrocarbons) in soils via Headspace-GC-MS and GC-MS respectively
WACTOCS	MS - CL - TOC Eltra (WAC)	Air dried	Passing 10mm test sieve	Determination of Total Organic Carbon in soil as part of a WAC test
TOCS	MS - CL - TOC Eltra	Air Dried	Passing 10mm test sieve	Determination of Total Organic Carbon in soils
TPHS	MS - CL - TPH (GC-FID)	As received	Passing 10mm test sieve	Determination of Total Petroleum Hydrocarbons in soil using GC-FID
WACSKALAR	MS - CL - Phenols by Skalar (WAC)	As received	BSEN:12457 Leaching	Determination of Total Phenols within leachate as part of a WAC test using a Skalar Segmented flow analyser
VPHS	MS - CL - VPH	As received	Passing 10mm test sieve	Determination of VPH in soils via Headspace-GC-MS
SKALARCNS	MS - CL - Cyanide by Skalar	As received	Passing 10mm test sieve	Determination of cyanide (total / free / complex) in soil using a Skalar segmented flow analyser
WACDOC	MS - CL - DOC (WAC)	As received	BSEN:12457 Leaching	Determination of dissolved organic carbon in a leachate as part of a WAC test
SKALARHCS	MS - CL - Hexavalent Chromium by Skalar	As received	Passing 10mm test sieve	Determination of hexavalent chromium in soil using Skalar segmented flow analyser
WACMETALS	MS - CL - ICP - Metals in Waters (WAC)	As received	BSEN:12457 Leaching	Determination of metals in a leachate as part of a WAC test via ICP
ICPMETS	MS - CL - ICP Metals	Air dried	Passing 10mm test sieve	Determination of metals in soils via ICP
WACPHS	MS - CL - pH in Soils (WAC)	As received	BSEN:12457 Leaching	Determination of pH in soils as part of a WAC test via pH probe
PHS	MS - CL - pH in Soils	As received	Passing 10mm test sieve	Determination of pH in soils using a pH probe (using a 1:3 soil to water extraction)
WACANIONS	MS - CL - Anions by Aquakem (WAC)	As received	BSEN:12457 Leaching	Determination of sulphate, chloride and fluoride in a leachate as part of a WAC test using a Aquakem analyser
TDSL	MS - CL - Conductivity in Water	As received	BSEN:12457 Leaching	Determination of total dissolved solids in leachates (by calculation)
SKALARPHS	MS - CL - Phenols by Skalar	As received	Passing 10mm test sieve	Determination of total phenols in soil using Skalar segmented flow analyser
ASB	MS - AS - Asbestos	-	-	Fibre identification is in accordance with in house documented methods which are based on the procedure documented in the HSE Document HSG 248 "Asbestos: The analysts guide for sampling, analysis and clearance procedures"
ENLEACHP	BS EN 12457-2	As Received	-	Leaching in accordance with BSEN 12457-2 (10:1 Ratio)
SAMPLEPREP	MS - CL - Sample Preparation	-	-	Preparation of samples (including determination of moisture content) to allow for subsequent analysis
1377LOI	BS1377 Loi	Oven dried	Passing 2mm test sieve	Testing was in accordance with BS 1377: Part 3: 2018 + A1 :2021 Clause 6. Determination of the mass loss on ignition. Some information required by BS1377: 2016: Part 1 has not been reported. This information is available on request.



7 - 11 Harding Street
Leicester
LE1 4DH

L22/06412/GRM - 22-31161

Project Reference - P10197 Christie Hospital units

Sample Deviations

Deviations are listed below against each sample and associated test method, where deviation(s) are noted it means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Observations on receipt

A - No date of sampling provided

C - Received in inappropriate container

H - Contains headspace

T - Temperature on receipt exceeds storage temperature

R - Date of sampling to receipt insufficient to allow analysis to be completed without deviation, Please note this is only a deviation if 'X' is also recorded against the sample

Observations whilst in laboratory

X - Exceeds sampling to extraction or analysis timescales

Lab Reference	Client Sample ID	Client Sample Location	Client Sample Type	Client Sample Number	Test	Deviations
271839	WS01	-	-	-	MS - CL - VPH	R
271839	WS01	-	-	-	MS - CL - pH in Soils	R
271840	WS02A	-	-	-	MS - CL - VPH	R
271840	WS02A	-	-	-	MS - CL - pH in Soils	R
271841	WS02B	-	-	-	MS - CL - VOC and MBTEX	R
271841	WS02B	-	-	-	MS - CL - VPH	R
271841	WS02B	-	-	-	MS - CL - pH in Soils	R
271841	WS02B	-	-	-	MS - CL - pH in Soils (WAC)	R



7 - 11 Harding Street
Leicester
LE1 4DH

L22/06412/GRM - 22-31161

Project Reference - P10197 Christie Hospital units

HWOL TPH Acronym Index

Acronym	Description
HS	Headspace Analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
Total	Aliphatics and Aromatics
AL	Aliphatics Only
AR	Aromatics Only
2D	GC-GC - Double Coil Gas Chromatography
#1	EH_Total but with humics mathmatically subtracted
#2	EH_Total but with fatty acids mathmatically subtracted
_	Operator - underscore to separate acronyms (except for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry



A P P E N D I X G

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

	GRM TIER 1 ASSESSMENT CRITERIA		
LAND USE	Commercial Industrial		
CONTAMINANT	1%	2.50%	6%
^a Arsenic	640	640	640
^a Cadmium	410	410	410
^b Chromium III	8600	8600	8600
^a Chromium VI	49	49	49
^a Lead	2330	2330	2330
^{b/c} Mercury	1100	1100	1100
^b Selenium	12000	12000	12000
^b Nickel	980	980	980
^b Phenols	760	1500	3200
^b Copper	68000	68000	68000
^b Zinc	730000	730000	730000
^d Cyanide	280	280	280
^b Benzene	27	47	90
^b Toluene	56000	110000	180000
^b Ethylbenzene	5700	13000	27000
^b <i>o</i> - xylene	6600	15000	33000
^b <i>m</i> - xylene	6200	14000	31000
^b <i>p</i> - xylene	5900	14000	30000
Non Genotoxic PAHs			
^b Acenaphthene	84000	97000	100000
^b Acenaphthylene	83000	97000	100000
^b Anthracene	520000	540000	540000
^b Fluoranthene	23000	23000	23000
^b Fluorene	63000	68400	70800
^b Naphthalene	190	460	1100
^b Phenanthrene	22000	22000	23000
^b Pyrene	54000	54000	54000
Genotoxic PAHs			
^{a/e} Benzo(a)pyrene	76	76	76
ALIPHATIC HYDROCARBONS			
^b C5-C6	3200	5900	12000
^b C6-C8	7800	17000	40000
^b C8-C10	2000	4800	11000
^b C10-C12	9700	23000	47000
^b C12-C16	59000	82000	90000
^b C16-35	1600000	1700000	1800000
AROMATIC HYDROCARBONS			
^b C5-7 (benzene)	26000	46000	86000
^b C7-8 (toluene)	56000	110000	180000
^b C8-C10	3500	8100	17000
^b C10-C12	16000	28000	34000
^b C12-C16	36000	37000	38000
^b C16-C21	28000	28000	28000
^b C21-C35			

Notes

- a C4SL - SP1010 (2014) - Benzene and Benzo(a)pyrene values for 1% and 2.5% SOM have been calculated using default C4SL parameters in CLEA v1.07
- b LQM/CIEH S4UL values (2015).
- c S4UL for inorganic Hg used.
- d Atkins ATRISKsoil Value
- e Benzo(a)pyrene is a surrogate marker for the 8 genotoxic PAHs (Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(ghi)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(ah)anthracene, Ideno(1,2,3-cd)pyrene)

GRM TAC 11-2016



A P P E N D I X H

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

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:

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



EE66W-8CVYF-ML0EP

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

Job name

P10197 - The Christie NHS Hospital Trust

Description/Comments

Assessment based upon chemical data obtained from limited ground investigation.

Project

P10197

Site

Manchester

Classified by

Name: **Charlotte Mortimer** Company: **GRM Development Solutions Ltd**
Date: **31 Jan 2023 13:36 GMT**
Telephone: **01283 551 249**

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
Hazardous Waste Classification
Most recent 3 year Refresher

Date
19 Sep 2017
07 Dec 2021

Next 3 year Refresher due by Dec 2024

Purpose of classification

2 - Material Characterisation

Address of the waste

The Christie NHS Foundation Trust, Wilmslow Rd, Manchester

Post Code M20 4BX

SIC for the process giving rise to the waste

41201 Construction of commercial buildings

Description of industry/producer giving rise to the waste

Construction of hospital building extension.

Description of the specific process, sub-process and/or activity that created the waste

Soils excavated for the construction of hospital building extension.

Description of the waste

Made Ground

**Job summary**

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	WS01	0.2-0.3	Hazardous	HP 7, HP 11	3
2	WS02A	0.35-0.45	Hazardous	HP 7, HP 11	6
3	WS02B	0.65-0.75	Non Hazardous		9

Related documents

#	Name	Description
1	GRM Validation Suite - WM3 V1.2.GB (confirm TPH)	waste stream template used to create this Job

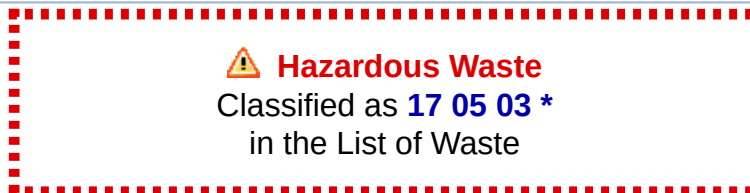
Report

Created by: Charlotte Mortimer

Created date: 31 Jan 2023 13:36 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	11
Appendix B: Rationale for selection of metal species	12
Appendix C: Version	13

Classification of sample: WS01



Sample details

Sample name:	LoW Code:	
WS01	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry:	17 05 03 * (Soil and stones containing hazardous substances)
0.2-0.3 m		
Moisture content:		
7.6%		
(dry weight correction)		

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1B; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.102%)

HP 11: Mutagenic "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

Muta. 1B; H340 "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.102%)

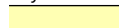
Determinands

Moisture content: 7.6% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	arsenic { arsenic trioxide }				<10 mg/kg	1.32	<13.203 mg/kg	<0.00132 %		<LOD
	033-003-00-0	215-481-4	1327-53-3							
2	cadmium { cadmium sulfide }			1	0.9 mg/kg	1.285	1.075 mg/kg	0.0000836 %	✓	
	048-010-00-4	215-147-8	1306-23-6							
3	chromium { chromium(III) oxide }				13 mg/kg	1.462	17.658 mg/kg	0.00177 %	✓	
		215-160-9	1308-38-9							
4	copper { dicopper oxide; copper (I) oxide }				35 mg/kg	1.126	36.623 mg/kg	0.00366 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
5	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	88 mg/kg		81.784 mg/kg	0.00818 %	✓	
	082-001-00-6									
6	mercury { mercury dichloride }				<2.5 mg/kg	1.353	<3.384 mg/kg	<0.000338 %		<LOD
	080-010-00-X	231-299-8	7487-94-7							
7	nickel { nickel dihydroxide }				18 mg/kg	1.579	26.423 mg/kg	0.00264 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]							

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<8 mg/kg	1.405	<11.24 mg/kg	<0.00112 %			<LOD
	034-002-00-8										
9	zinc { zinc sulphate }				87 mg/kg	2.469	199.655 mg/kg	0.02 %		✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
10	phenol				<1 mg/kg		<1 mg/kg	<0.0001 %			<LOD
	604-001-00-2	203-632-7	108-95-2								
11	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 }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %			<LOD
	006-007-00-5										
12	pH				10.7 pH		10.7 pH	10.7 pH			
			PH								
13	acenaphthene				<0.2 mg/kg		<0.2 mg/kg	<0.00002 %			<LOD
		201-469-6	83-32-9								
14	acenaphthylene				<0.2 mg/kg		<0.2 mg/kg	<0.00002 %			<LOD
		205-917-1	208-96-8								
15	anthracene				0.4 mg/kg		0.372 mg/kg	0.0000372 %		✓	
		204-371-1	120-12-7								
16	benzo[a]anthracene				1.8 mg/kg		1.673 mg/kg	0.000167 %		✓	
	601-033-00-9	200-280-6	56-55-3								
17	benzo[a]pyrene; benzo[def]chrysene				1.7 mg/kg		1.58 mg/kg	0.000158 %		✓	
	601-032-00-3	200-028-5	50-32-8								
18	benzo[b]fluoranthene				1.7 mg/kg		1.58 mg/kg	0.000158 %		✓	
	601-034-00-4	205-911-9	205-99-2								
19	benzo[ghi]perylene				1 mg/kg		0.929 mg/kg	0.0000929 %		✓	
		205-883-8	191-24-2								
20	benzo[k]fluoranthene				0.7 mg/kg		0.651 mg/kg	0.0000651 %		✓	
	601-036-00-5	205-916-6	207-08-9								
21	chrysene				2 mg/kg		1.859 mg/kg	0.000186 %		✓	
	601-048-00-0	205-923-4	218-01-9								
22	dibenz[a,h]anthracene				<0.2 mg/kg		<0.2 mg/kg	<0.00002 %			<LOD
	601-041-00-2	200-181-8	53-70-3								
23	fluoranthene				2.6 mg/kg		2.416 mg/kg	0.000242 %		✓	
		205-912-4	206-44-0								
24	fluorene				<0.2 mg/kg		<0.2 mg/kg	<0.00002 %			<LOD
		201-695-5	86-73-7								
25	indeno[123-cd]pyrene				0.8 mg/kg		0.743 mg/kg	0.0000743 %		✓	
		205-893-2	193-39-5								
26	naphthalene				<0.2 mg/kg		<0.2 mg/kg	<0.00002 %			<LOD
	601-052-00-2	202-049-5	91-20-3								
27	phenanthrene				0.97 mg/kg		0.901 mg/kg	0.0000901 %		✓	
		201-581-5	85-01-8								
28	pyrene				3.9 mg/kg		3.625 mg/kg	0.000362 %		✓	
		204-927-3	129-00-0								
29	TPH (C6 to C40) petroleum group				1100 mg/kg		1022.305 mg/kg	0.102 %		✓	
			TPH								
30	confirm TPH has NOT arisen from diesel or petrol				☒						
Total:									0.143 %		

Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Hazardous result
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - 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 No liquid phase present, therefore threshold adjusted to 10,000mg/kg.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.102%)

Classification of sample: WS02A

 **Hazardous Waste**
Classified as **17 05 03 ***
in the List of Waste

Sample details

Sample name:	LoW Code:
WS02A	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.35-0.45 m	Entry:
Moisture content:	17 05 03 * (Soil and stones containing hazardous substances)
7.6%	
(dry weight correction)	

Hazard properties

HP 7: Carcinogenic "waste which induces cancer or increases its incidence"

Hazard Statements hit:

Carc. 1B; H350 "May cause cancer [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.195%)

HP 11: Mutagenic "waste which may cause a mutation, that is a permanent change in the amount or structure of the genetic material in a cell"

Hazard Statements hit:

Muta. 1B; H340 "May cause genetic defects [state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard]."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.195%)

Determinands

Moisture content: 7.6% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	 arsenic { arsenic trioxide }				<10 mg/kg	1.32	<13.203 mg/kg	<0.00132 %			<LOD
	033-003-00-0	215-481-4	1327-53-3								
2	 cadmium { cadmium sulfide }			1	1 mg/kg	1.285	1.194 mg/kg	0.0000929 %	✓		
	048-010-00-4	215-147-8	1306-23-6								
3	 chromium { chromium(III) oxide }				16 mg/kg	1.462	21.733 mg/kg	0.00217 %	✓		
		215-160-9	1308-38-9								
4	 copper { dicopper oxide; copper (I) oxide }				42 mg/kg	1.126	43.947 mg/kg	0.00439 %	✓		
	029-002-00-X	215-270-7	1317-39-1								
5	 lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	91 mg/kg		84.572 mg/kg	0.00846 %	✓		
	082-001-00-6										
6	 mercury { mercury dichloride }				<2.5 mg/kg	1.353	<3.384 mg/kg	<0.000338 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
7	 nickel { nickel dihydroxide }				22 mg/kg	1.579	32.295 mg/kg	0.00323 %	✓		
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<8 mg/kg	1.405	<11.24 mg/kg	<0.00112 %			<LOD
	034-002-00-8										
9	zinc { zinc sulphate }				100 mg/kg	2.469	229.489 mg/kg	0.0229 %	✓		
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
10	phenol				<1 mg/kg		<1 mg/kg	<0.0001 %			<LOD
	604-001-00-2	203-632-7	108-95-2								
11	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 }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %			<LOD
	006-007-00-5										
12	pH				8.8 pH		8.8 pH	8.8 pH			
			PH								
13	acenaphthene				0.3 mg/kg		0.279 mg/kg	0.0000279 %	✓		
		201-469-6	83-32-9								
14	acenaphthylene				<0.2 mg/kg		<0.2 mg/kg	<0.00002 %			<LOD
		205-917-1	208-96-8								
15	anthracene				0.7 mg/kg		0.651 mg/kg	0.0000651 %	✓		
		204-371-1	120-12-7								
16	benzo[a]anthracene				2.2 mg/kg		2.045 mg/kg	0.000204 %	✓		
	601-033-00-9	200-280-6	56-55-3								
17	benzo[a]pyrene; benzo[def]chrysene				2.8 mg/kg		2.602 mg/kg	0.00026 %	✓		
	601-032-00-3	200-028-5	50-32-8								
18	benzo[b]fluoranthene				2.7 mg/kg		2.509 mg/kg	0.000251 %	✓		
	601-034-00-4	205-911-9	205-99-2								
19	benzo[ghi]perylene				1.9 mg/kg		1.766 mg/kg	0.000177 %	✓		
		205-883-8	191-24-2								
20	benzo[k]fluoranthene				1 mg/kg		0.929 mg/kg	0.0000929 %	✓		
	601-036-00-5	205-916-6	207-08-9								
21	chrysene				2.5 mg/kg		2.323 mg/kg	0.000232 %	✓		
	601-048-00-0	205-923-4	218-01-9								
22	dibenz[a,h]anthracene				0.29 mg/kg		0.27 mg/kg	0.000027 %	✓		
	601-041-00-2	200-181-8	53-70-3								
23	fluoranthene				4.7 mg/kg		4.368 mg/kg	0.000437 %	✓		
		205-912-4	206-44-0								
24	fluorene				0.24 mg/kg		0.223 mg/kg	0.0000223 %	✓		
		201-695-5	86-73-7								
25	indeno[123-cd]pyrene				1.4 mg/kg		1.301 mg/kg	0.00013 %	✓		
		205-893-2	193-39-5								
26	naphthalene				<0.2 mg/kg		<0.2 mg/kg	<0.00002 %			<LOD
	601-052-00-2	202-049-5	91-20-3								
27	phenanthrene				2.2 mg/kg		2.045 mg/kg	0.000204 %	✓		
		201-581-5	85-01-8								
28	pyrene				4.5 mg/kg		4.182 mg/kg	0.000418 %	✓		
		204-927-3	129-00-0								
29	TPH (C6 to C40) petroleum group				2100 mg/kg		1951.673 mg/kg	0.195 %	✓		
			TPH								
30	confirm TPH has NOT arisen from diesel or petrol				☒						
Total:									0.242 %		



Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
	Hazardous result
	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - 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 No liquid phase present, therefore threshold adjusted to 10,000mg/kg.

Hazard Statements hit:

Fam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.195%)

Classification of sample: WS02B

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

Sample details

Sample name:	LoW Code:
WS02B	Chapter:
Sample Depth:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
0.65-0.75 m	Entry:
Moisture content:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
21%	
(dry weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 21% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number								
1	arsenic { arsenic trioxide }				<10 mg/kg	1.32	<13.203 mg/kg	<0.00132 %			<LOD
	033-003-00-0	215-481-4	1327-53-3								
2	cadmium { cadmium sulfide }			1	0.7 mg/kg	1.285	0.744 mg/kg	0.0000579 %	✓		
	048-010-00-4	215-147-8	1306-23-6								
3	chromium { chromium(III) oxide }				25 mg/kg	1.462	30.197 mg/kg	0.00302 %	✓		
		215-160-9	1308-38-9								
4	copper { dicopper oxide; copper (I) oxide }				24 mg/kg	1.126	22.332 mg/kg	0.00223 %	✓		
	029-002-00-X	215-270-7	1317-39-1								
5	lead { lead compounds with the exception of those specified elsewhere in this Annex }			1	21 mg/kg		17.355 mg/kg	0.00174 %	✓		
	082-001-00-6										
6	mercury { mercury dichloride }				<2.5 mg/kg	1.353	<3.384 mg/kg	<0.000338 %			<LOD
	080-010-00-X	231-299-8	7487-94-7								
7	nickel { nickel dihydroxide }				37 mg/kg	1.579	48.299 mg/kg	0.00483 %	✓		
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]								
8	selenium { selenium compounds with the exception of cadmium selenosulfide and those specified elsewhere in this Annex }				<8 mg/kg	1.405	<11.24 mg/kg	<0.00112 %			<LOD
	034-002-00-8										
9	zinc { zinc sulphate }				73 mg/kg	2.469	148.974 mg/kg	0.0149 %	✓		
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]								
10	phenol				<1 mg/kg		<1 mg/kg	<0.0001 %			<LOD
	604-001-00-2	203-632-7	108-95-2								
11	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 }				<1 mg/kg	1.884	<1.884 mg/kg	<0.000188 %			<LOD
	006-007-00-5										
12	pH		PH		8.4 pH		8.4 pH	8.4 pH			
13	acenaphthene				<0.02 mg/kg		<0.02 mg/kg	<0.000002 %			<LOD
		201-469-6	83-32-9								

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
14	acenaphthylene	205-917-1	208-96-8		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
15	anthracene	204-371-1	120-12-7		0.03 mg/kg		0.0248 mg/kg	0.00000248 %	✓	
16	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	0.12 mg/kg		0.0992 mg/kg	0.00000992 %	✓	
17	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	0.12 mg/kg		0.0992 mg/kg	0.00000992 %	✓	
18	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2	0.12 mg/kg		0.0992 mg/kg	0.00000992 %	✓	
19	benzo[ghi]perylene	205-883-8	191-24-2		0.07 mg/kg		0.0579 mg/kg	0.00000579 %	✓	
20	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9	0.05 mg/kg		0.0413 mg/kg	0.00000413 %	✓	
21	chrysene	601-048-00-0	205-923-4	218-01-9	0.13 mg/kg		0.107 mg/kg	0.0000107 %	✓	
22	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
23	fluoranthene	205-912-4	206-44-0		0.29 mg/kg		0.24 mg/kg	0.000024 %	✓	
24	fluorene	201-695-5	86-73-7		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
25	indeno[123-cd]pyrene	205-893-2	193-39-5		0.05 mg/kg		0.0413 mg/kg	0.00000413 %	✓	
26	naphthalene	601-052-00-2	202-049-5	91-20-3	<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
27	phenanthrene	201-581-5	85-01-8		0.11 mg/kg		0.0909 mg/kg	0.00000909 %	✓	
28	pyrene	204-927-3	129-00-0		0.25 mg/kg		0.207 mg/kg	0.0000207 %	✓	
29	TPH (C6 to C40) petroleum group		TPH		<50 mg/kg		<50 mg/kg	<0.005 %		<LOD
Total:								0.035 %		

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 Determinand - 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

Appendix A: Classifier defined and non GB MCL determinands

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

Description/Comments: Data from ECHA's C&L inventory database
Data source: <https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806>
Data source date: 30 Apr 2020
Hazard Statements: Acute Tox. 4; H302 , Skin Sens. 1; H317 , Eye Irrit. 2; H319

• lead compounds with the exception of those specified elsewhere in this Annex

GB MCL index number: 082-001-00-6
Description/Comments: Least-worst case: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following MCL protocols, considers many simple lead compounds to be Carcinogenic category 2
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
20 Nov 2021 - Carc. 2; H351 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html. Review date 29/09/2015

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

GB MCL index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
20 Nov 2021 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

• pH (CAS Number: PH)

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

• 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

• 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

• 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

• 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

• 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

• 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

■ **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

■ **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

■ **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

■ **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.

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Worst case species based on risk phrases

cadmium {cadmium sulfide}

Worst case species based on risk phrases

chromium {chromium(III) oxide}

Cr(VI) concentrations below laboratory LOD.

copper {dicopper oxide; copper (I) oxide}

Most likely common species

lead {lead compounds with the exception of those specified elsewhere in this Annex}

Cr(VI) concentrations below laboratory LOD, most appropriate compound selected.

mercury {mercury dichloride}

Worst case species based on risk phrases

nickel {nickel dihydroxide}

Worst case species based on risk phrases

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Worst case species based on risk phrases

zinc {zinc sulphate}

Cr(VI) concentrations below laboratory LOD, most appropriate compound selected.

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}

Worst case species

Appendix C: Version

HazWasteOnline Classification Engine: **WM3 1st Edition v1.2.GB - Oct 2021**

HazWasteOnline Classification Engine Version: 2023.25.5511.10206 (25 Jan 2023)

HazWasteOnline Database: 2023.25.5511.10206 (25 Jan 2023)

This classification utilises the following guidance and legislation:

WM3 v1.2.GB - Waste Classification - 1st Edition v1.2.GB - Oct 2021

CLP Regulation - Regulation 1272/2008/EC of 16 December 2008

1st ATP - Regulation 790/2009/EC of 10 August 2009

2nd ATP - Regulation 286/2011/EC of 10 March 2011

3rd ATP - Regulation 618/2012/EU of 10 July 2012

4th ATP - Regulation 487/2013/EU of 8 May 2013

Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013

5th ATP - Regulation 944/2013/EU of 2 October 2013

6th ATP - Regulation 605/2014/EU of 5 June 2014

WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014

Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014

7th ATP - Regulation 2015/1221/EU of 24 July 2015

8th ATP - Regulation (EU) 2016/918 of 19 May 2016

9th ATP - Regulation (EU) 2016/1179 of 19 July 2016

10th ATP - Regulation (EU) 2017/776 of 4 May 2017

HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017

13th ATP - Regulation (EU) 2018/1480 of 4 October 2018

14th ATP - Regulation (EU) 2020/217 of 4 October 2019

15th ATP - Regulation (EU) 2020/1182 of 19 May 2020

The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit)

Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020

The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020

GB MCL List - version 1.1 of 09 June 2021



GRM

We understand land

GRM provide specialist ground, environmental, structural and design services for landowners and developers across the UK.

Our experience spans a wide range of sectors including private residential, social housing, healthcare, education, commercial, and industrial. Our sole aim is to maximise the potential of the site and thereby the commercial return for our clients.

Land Appraisal

Phase I Desk Studies | Phase II Site Investigations
Soakaway Testing | Specialist Land Surveys

Environmental

Preliminary Risk Assessments | Detailed Quantitative Risk Assessments
Ground Gas Assessments | Material Management Plans
Environmental Impact Assessments & Reports
Remediation Strategies & Validation | Due Diligence Audits

Geotechnical

Geotechnical Investigations | Earthworks | Slope Stability
Retaining Wall Design | Ground Stability | Vibration Assessments
Value Engineering

Mining

Coal Mining Risk Assessments | Coal Mining Investigations | Treatment of
Mine Workings | Mine Shafts | Subsidence | Mineral Resource Assessments

Site Services

Foundation Inspections | Gas Membrane Verification
Remediation Validation | Structural Inspections

We also work with key partners to deliver a range of other support services and surveys including topographical, ecology, tree, archaeological, flood risk, and utilities.

Please contact us for an informal discussion on how we can save both time and money on your development project:

www.grm-uk.com | 01283 551249 | info@grm-uk.com