

Intended for
Laing O'Rourke

On behalf of
Manchester City Council

Date
June 2023

Project Number
162005164

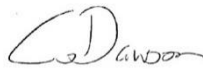
ABRAHAM MOSS LEISURE CENTRE & LIBRARY, MANCHESTER VALIDATION REPORT

Project No. **1620005164**
Issue No. **01**
Date **29 June 2023**
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Version Control Log

Revision	Date	Made by	Checked by	Approved by	Description
01	29/06/2023	VG	CD	PS	For Planning

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1. INTRODUCTION

1.1 Introduction

Ramboll UK Limited (Ramboll) has been appointed by Laing O'Rourke (LOR, the Client and project Principal Contractor, PC) on behalf of Manchester City Council (MCC) to prepare a validation report supporting the discharge of Planning Conditions 5b (of planning application 125033/VO/2019) for the development works at Abraham Moss Library and Leisure Centre (the Site).

The proposed development comprised the demolition of the former library and leisure centre, and the construction of replacement library and leisure facilities within the same site area. This includes the construction of a two-storey building which comprises a gym, sports hall and a library with a semi-basement structure to accommodate a replacement swimming pool and associated plant.

1.2 Planning Condition

In March 2020, Manchester City Council (MCC) granted full planning permission for the development of the new library and leisure centre. The planning condition determination notice (125033/VO/2019) stipulates the following contaminated land related planning conditions, namely Condition 5:

5) Notwithstanding [the] contaminated land desk study prepared by Ramboll dated 14 June 2019 (ref 1620005164) stamped as received by the City Council, as Local Planning Authority, on the 3 October 2019,

(a) the following information shall be submitted for approval in writing by the City Council, as Local Planning Authority following demolition of the building, but prior to the commencement of the development hereby approved:

- Submission of an updated site investigation and risk assessment report once the buildings have been demolished from the site and ground gas monitoring complete;*
- Submission of a remediation strategy.*

In the event of the Preliminary Risk Assessment identifying risks which in the written opinion of the Local Planning Authority require further investigation, the development shall not commence until a scheme for the investigation of the site and the identification of remediation measures (the Site Investigation Proposal) has been submitted to and approved in writing by the City Council as local planning authority.

The measures for investigating the site identified in the Site Investigation Proposal shall be carried out, before the development commences and a report prepared outlining what measures, if any, are required to remediate the land (the Site Investigation Report and/or Remediation Strategy) which shall be submitted to and approved in writing by the City Council as local planning authority.

*b) When the development commences, the development shall be carried out in accordance with the previously agreed Remediation Strategy and a **Completion / Verification Report** shall be submitted for approval in writing by the City Council as local planning authority prior to the first use of the development hereby approved.*

In the event that ground contamination, groundwater contamination and/or ground gas, not previously identified, are found to be present on the site at any time before the development is occupied, then development shall cease and/or the development shall not be occupied until, a report outlining what measures, if any, are required to remediate the land (the Revised Remediation Strategy) is submitted to and approved in writing by the City Council as local planning authority and the development shall be carried out in accordance with the Revised Remediation Strategy, which shall take precedence over any Remediation Strategy or earlier Revised Remediation Strategy.

Condition 5 part (a) has been addressed in the previous investigations, as listed in Section 1.3 below. This report has been prepared in support of discharging condition 5 part (b).

1.3 Previous Reports

The following reports have been prepared for the site which should be read in conjunction with this report:

- Ramboll (2019) Abraham Moss Library & Leisure Centre, Manchester – **Contaminated Land and Geotechnical Desk Study Report**. Issue 1, Ramboll UK Ltd, June 2019;
- Ramboll (2019) Abraham Moss Library & Leisure Centre, Manchester – **Ground Investigation Factual Report**, Issue 1, Ramboll UK Ltd, June 2019;
- Ramboll (2019) Abraham Moss Library & Leisure Centre, Manchester – **Ground Investigation Contaminated Land Interpretive Report**. Issue 2, Ramboll UK Ltd, October 2019;
- Ramboll (2021) Abraham Moss Library & Leisure Centre, Manchester – **Land Quality Technical Note 1: Demolition Phase Ground Investigation**. Issue 1, Ramboll UK Ltd, September 2021; and
- Ramboll (2021): Abraham Moss Library & Leisure Centre, Manchester – **Remedial Strategy**. Issue 3, Ramboll Ltd, October 2021.

A number of additional reports have been prepared by Ramboll in relation to the formation of the temporary library and sports hall facilities on adjacent land. These reports are not considered relevant to this Remediation Strategy. These reports are available to MCC via the Planning Portal under Application No. 125033/VO/2019 and 14955/VO/2019.

1.4 General Limitations and Reliance

This report has been prepared by Ramboll exclusively for the intended use by the client in accordance with the agreement between Ramboll and the client defining, among others, the purpose, the scope and the terms and conditions for the services. No other warranty, expressed or implied, is made as to the professional advice included in this report or in respect of any matters outside the agreed scope of the services or the purpose for which the report and the associated agreed scope were intended or any other services provided by Ramboll.

In preparation of the report and performance of any other services, Ramboll has relied upon publicly available information, information provided by the client and information provided by third parties. Accordingly, the conclusions in this report are valid only to the extent that the information provided to Ramboll was accurate, complete and available to Ramboll within the reporting schedule.

Ramboll's services are not intended as legal advice, nor an exhaustive review of site conditions and / or compliance. This report and accompanying documents are initial and intended solely for the use and benefit of the client for this purpose only and may not be used by or disclosed to, in whole or in part, any other person without the express written consent of Ramboll. Ramboll neither owes nor accepts any duty to any third party, unless formally agreed by Ramboll through that party entering into, at Ramboll's sole discretion, a written reliance agreement.

Unless otherwise stated in this report, the scope of services, assessment and conclusions made assume that the site will continue to be used for its current purpose and end-use without significant changes either on-site or off-site.

2. PROJECT BACKGROUND

2.1 Site Location and Description

The site is located off Crescent Road in Crumpsall, approximately 4 km north of Manchester city centre, at the National Grid reference SD 84577 01640. The closest postcode is M8 5UF. The site lies in an area characterised primarily by sub-urban residential development, although it also includes mixed use of residential, commercial, allotment gardens and open space areas.

The Abraham Moss Leisure Centre and Library development area occupies approximately 0.98 Ha (hectares) of the wider site area (of approximately 7.67 Ha in total). The development area is located in the south-west of the wider site area.

A Site Location Plan and Site Layout Plan are presented as Drawings 1620005164/E/01 and LP44107-EWA-XXX-XX-DR-A-91010 P02 at the end of the report.

The development area lies immediately south and west of the Abraham Moss Primary and Secondary Schools, respectively. The Abraham Moss Secondary School lies partly within an area of historical landfilling. See the Ramboll 2019 Desk Study and Interpretative Report(s) for further details relating to the former ICI Chemical Landfill to the east of the development area.

As reported within the Ramboll 2019 Contaminated Land Interpretative Report and 2021 Demolition Phase Investigations Technical Note, the proposed development area does not lie within any areas of landfilling relating to the former ICI landfill. Nor have the adjacent temporary sports hall or library developments encountered such landfill materials within their development areas.

2.2 Proposed Development

The proposed development consists of demolition of the existing library and leisure centre; and the erection of a new two-storey library and leisure centre which incorporates two swimming pools, sports hall, gyms, squash courts, dance and community space with associated wet and dry changing facilities and plant rooms. Car parking bays, entrance plaza and soft landscaped areas are also proposed in the development plans.

A site plan showing the general arrangement of the site is appended to this report as Drawing LP44107-EWA-XXX-XX-DR-A-91010, P02 (Ellis Williams Architects Ltd, February 2020).

Drawings LP44107-EWA-B01-GF-DR-A-04000, P07 and LP44107-EWA-B01-01-DR-A-04001, P06 (Ellis Williams Architects Ltd, March 2019) illustrate the internal features of the development and arrangement of the facilities over the two floors.

2.3 Summary of Previous Ground Investigation and Recommendations

A combined environmental and geotechnical ground investigation was undertaken in April 2019 at the wider site area which included the subject development area of the site in April 2019. The ground investigation was undertaken by Central Alliance Ltd under the supervision of Ramboll. The relevant reports pertaining to the ground investigation are referenced in Section 1.3 of the report.

2.3.1 Ground Conditions

The summary of the ground conditions encountered during the ground investigation is presented in Table 2.1 below. An exploratory hole location plan is included for reference as 1620005164/E/04 at the end of the report.

Table 2.1: Summary of the inferred geological strata within the development area

Stratum	Typical description	Range of depth encountered [top surface] (mbgl)	Range thickness (m)
Made Ground	Dark brown slightly clayey SAND with frequent rootlets. [Topsoil] <i>Encountered in boreholes WS03-WS06 only.</i>	Ground level	0.1 – 0.6
	Hardstanding comprising predominantly tarmac or rarely of block paving.	Ground level	0.05 – 0.2
	Light grey sandy GRAVEL of limestone. [Sub-base]	0.09 – 0.7	0.15 – 0.6
	Grey brown slightly silty sandy GRAVEL and gravelly SAND of limestone, brick, concrete, slate, sandstone, coal and ash. Rare to occasional gravel and cobbles of clinker. <i>Encountered across the whole site, typical thickness up to 2m.</i>	0.2 – 0.6	0.5 – 4.2
	Greyish brown silty SAND with pockets of sandy CLAY. [Suspected reworked ground] <i>Encountered in boreholes WS03, BH05 and BH06 only</i>	0.9 – 2.4	0.15 – 0.8
Glaciofluvial Sheet Deposits [East of site only]	Orange brown occasionally silty SAND and stiff greyish brown silty CLAY. <i>Typically encountered within the eastern boreholes only. including: BH01, 05, and 06 and WS01, 07 and 08.</i>	1.2-2.60	3.9 -11.7
Upper Glacial Till [West of site only]	Unit highly variable and includes; grey and brown sand silty CLAY, silty SAND, soft to firm SILT/CLAY. <i>Typically encountered within the western boreholes including BH02-04 and WS02-04.</i>	1.1-1.9	11.0- 12.2
Lower Glacial Till	Stiff brownish grey sandy slightly silty CLAY. Rare to slight gravel of mudstone, shale and coal At depth: discontinuous lens' of silty sand up to 3.0m in thickness. (in BH03 unit water bearing). <i>Unit present across whole of site area albeit at shallower depths to the east of the site [approximately 52 mAOD in the west verses 61 mAOD in the east].</i>	12.2 – 14.3 [west] 5.1 – 8.3m [east]	12m+ [base not proven]
Bedrock	Not encountered during ground investigation phase.	>25.00	Unknown

As reported within the Ramboll 2019 Interpretative Report bedrock is expected to be encountered at depths greater than 30mbgl. Based on the ground conditions encountered within the ground investigation, the cohesive Lower Glacial Till deposits overlying solid geology are expected to be in

the order of at least 5 to 10 m in thickness below the base on the deepest boreholes (i.e., >25mbgl).

Reported visual evidence of suspected contamination during the 2019 ground investigation included the presence of tar, coal, ash, clinker and asbestos containing insulation board / tile. Mild to medium hydrocarbon odour was noted within the soils of four (of 14) boreholes. All visual and olfactory evidence of contamination was recorded within the Made Ground materials.

As reported within the Ramboll 2021 Land Technical Note, between June and September 2021 an additional phase of ground investigation was undertaken by Ramboll during the demolition of the main building. The ground conditions identified within the building footprint broadly corresponded to the 2019 investigation, with the exception of an area of hydrocarbon impacted soils being identified within an isolated area below the former pool basement. Section 4.1 of this report further details the identified contamination and the implemented remediation works of the area.

2.3.2 Groundwater

The underlying Glaciofluvial Sheet deposits are classified as a Secondary A Aquifer; and the Collyhurst and Chester Pebble Bed Formation are classified as a Principal Aquifers. The site is not located within a groundwater source protection zone and there are no active groundwater abstraction licences listed within 1 km of the site.

As reported within the Ramboll 2019 Factual Report, during the drilling works no groundwater strikes or wet strata were recorded shallower than 5.00 m bgl (below ground level).

During monitoring, shallow groundwater was only encountered within WS04 in the north of the development area; indicating the possible presence of a localised perched groundwater body. It should be noted that WS04 is located immediately adjacent to a flat roof drainage outlet which is likely to be artificially altering local groundwater conditions.

Due to the presence of a significant thicknesses of underlying cohesive Glacial Till, it is considered unlikely that the observed groundwater body on site is in hydrogeological continuity with the underlying Bedrock Aquifer.

Deeper groundwater unit was encountered within the superficial deposits during drilling between 17.20 mbgl (47.8 mAOD) and 5.00 mbgl (59.31 mAOD) with significant rise to an average level of 4.0 to 5.0 mbgl (59-61 mbgl).

Post-investigation monitoring indicated the presence of a piezometric surface at approximately 1.3 to 1.8 mbgl (62.9 - 63.6 mbgl). The groundwater encountered within the mixed cohesive and granular superficial deposits is likely to be localised pockets of groundwater water held under hydrostatic pressure confined within more granular deposits.

It is considered unlikely that the observed deeper groundwater unit is in hydrogeological continuity with underlying bedrock Principal aquifer.

During the 2021 post-demolition ground investigation phase no significant groundwater sources of contamination were identified.

2.3.3 Ground Gas

As reported within the Ramboll 2019 Interpretative Report, six rounds of ground gas monitoring have been undertaken over a three-month period under a range of atmospheric conditions.

A peak concentration of 6.6 % carbon dioxide and 0.1 % methane were recorded with a steady flow rate of 3.3 l/hr (*Note: instantaneous peak flow rates linked to high water table were discounted – see 2019 Interpretative Report for further details*). A gas screening value of 0.22 l/hr indicated a Characteristic Situation 2 (CS2) is applicable to the development area.

In accordance with industry standards, a CS2 classification requires the implementation of ground gas protection measures – as outlined within Section 5.10 of the Abraham Moss Library & Leisure Centre, Manchester Remedial Strategy for details.

During the additional (2021) ground investigation, no ground conditions were encountered which are considered sufficiently different to that previously identified, or significant enough as to warrant a re-assessment of the Characteristic Situation classification.

2.3.4 Significant Pollutant Linkages

Within the Ramboll 2019 Interpretative Report and the Ramboll 2021 Demolition Phase Technical Note, the following pollutant linkages (provided within Table 2.2 below) were identified which required further consideration and potential remedial action.

Table 2.2: Summary of significant pollutant linkages (modified from Ramboll 2019 Interpretative Report & 2021 Demolition Phase Technical Note)

Pollutant linkage	Additional Actions Required
Concentrations of amosite asbestos fibres at or below the limit of quantification ($\leq 0.001\%$ w/w) within shallow Made Ground soils and one fragment of ACM (asbestos containing material) amosite insulation board/tile.	Appropriate asbestos management measures will be required during construction works to mitigate risks to construction workers, future site users and adjacent site users, in particular the adjacent Abraham Moss schools.
Moderate to low potential risks to human health via inhalation of asbestos fibres to construction workers, future and adjacent site users.	Due to the presence of asbestos the shallow re-use of soils is to be restricted to low sensitivity areas.
Potential site wide impact of benzo(a)pyrene PAHs within coal and ash rich gravel Made Ground soils.	If PAH containing soils are required to be re-used on-site at shallow depth, additional risk management measures are required.
Low to moderate potential risks to human health via direct contact future site users.	
Based on six rounds of monitoring a ground gas regime of Characteristic Situation 2 has been identified.	Ground gas protection measures consummate with Characteristic Situation 2 are required (in accordance with BS 8485). Further details of protection measures required are provided within the Remedial Strategy.
As yet unquantified risks to water supply pipes.	Soil assessment indicates that PE pipes are unlikely to be suitable for use in the development. Consultations with the local water authority should be undertaken by the PC to determine their requirements for new water supply pipe connections.
Hydrocarbon impacted soil impacts within former basement area.	The hydrocarbon impact recorded within the Ramboll 2021 Technical Note has been risk assessed and confirm that the soils do not present a significant risk to human health or the local water environment.

Pollutant linkage	Additional Actions Required
<i>[Soil concentrations below commercial industrial end-use assessment criteria but present with hydrocarbon odour.]</i> Low to low/moderate risk to shallow groundwater receptors from areas of hydrocarbon impacted yet to be full identified [basement area only].	In line with industry best practice and to improve the general water environmental quality in the local area, a programme of localised source removal is recommended.
Potential areas of unexpected contamination which may be identified during construction works present risks to all receptors. Low to moderate potential risks to all receptors via all pathway in the absence of additional information.	Protocol to be developed for managing any unexpected contamination encountered during construction works. Following the 2021 Investigation, the likelihood of encountering any areas of unexpected contamination (outside of the basement area) is considered low.

2.4 Ground Contamination – Proposed Risk Mitigation Measures

These following general mitigation measures were recommended to be incorporated into the redevelopment of the site to allow for safe development.

- Procedure of managing the excavation of the hydrocarbon impacted soils within the former pool basement area including Watching Brief and validation sampling;
- Procedures for dealing with previously unidentified contamination or the presence of asbestos if encountered;
- Confirmation and installation of suitable pipe specification for the potable water supply pipes;
- Installation of ground gas protection measures which are suitable for a CS2 gas risk classification;
- Where required, re-use of site won material under the CL:AIRE Definition of Waste: Code of Practice protocol. *Note: Site won Made Ground soils are not considered suitable for use in landscaped areas at depths <0.6m bgl;*
- Confirmation of suitability for use of imported materials;
- Procedures for export of materials surplus to requirements; and
- Validation Works: A final validation report has been completed which includes verification actions during the works intended to confirm that all risk mitigation actions required have been completed to facilitate the safe redevelopment of the site.

3. VERIFICATION REQUIREMENTS

The following lines of evidence were recommended to be collated as the development works progressed to demonstrate that the mitigation measures proposed within the Remedial Statement were being adhered to.

Table 3.1: Validation Requirements

Item	Potential Risk	Risk Mitigation	Method of Validation
V1	Risk from hydrocarbon impacted soils located within former basement area.	Localised source removal works under Environmental Watching Brief	PEC to undertake environmental watching brief, field screening of soils with PID and boundary laboratory analysis of represented soil samples. Analysis of results and site works to be collated and reported within Verification Report.
V2	Asbestos fibres in Made Ground – risk to construction workers and neighbouring residents/site user during construction. Risk from asbestos to future site user within soft landscaping area.	Minimise risk of any asbestos fibres being released during construction and ensure H&S precautions are in place. Use of cover layer system (V4)	Contractor to provide copy of site mitigation measures (e.g., dampening down, wheel washing etc) and comment on their effectiveness. If visible asbestos is identified or asbestos identified within any additional laboratory analysis, the contractor is to provide plans detailing their location. Where undertaken, the contractor is to provide details of any hand picking of asbestos or other measures to segregate asbestos impacted waste streams. PEC to supplement the above with information recorded during environmental watching brief. For cover layer system see V4.
V3	Re-use of soils (if required)	Strategy for reuse of soils on site.	Details of where the material was excavated from on-site, including volumes. Where material was placed, thickness of material placed, temporarily and permanently. Details of capping of the material in soft landscaping areas. Adherence to the capping guidance for minimum 600mm of chemical suitable material landscaped areas. Details of site working methods, including how stockpiles have been managed.
V4	Exposure to shallow soils considered unsuitable for use in soft landscaping area	Use of cover layer system.	Made Ground soils within the site boundary are not permitted to be utilised in soft landscaped area at depths less than 600mm below the surface. Contractor to provide photographic evidence of the installation and material used. PEC to undertake further verification post placement. Chemical suitability of cover layer system addressed below.

Item	Potential Risk	Risk Mitigation	Method of Validation
V5	Introduction of contamination from soils imported to the site	Checks made to ensure soils brought to site are suitable for use based on the acceptance criteria in Appendix C. Imported soils must be accompanied by chemical testing data. Imported soils should not contravene waste legislation.	Where materials imported to the site could be considered a 'waste', details to demonstrate that the material is not a 'waste' or that waste legislation has been complied with. Details of source of imported material and, where necessary, chemical testing certificates to demonstrate suitability for use against criteria in Appendix C. Volumes of imported material. Plans of where it was temporarily stored, and where it was finally placed, including thickness. For imported topsoil, certificates required to demonstrate it complied with BS3882:2015 and does not exceed the re-use criteria in Appendix C. Testing frequency to be in accordance with MCC guidance.
V6	Contamination being identified which was not anticipated	Dealing with unexpected contamination appropriately, i.e., the unexpected contamination protocol, and under liaison with the PEC.	Records relating to any unexpected contamination identified and actions taken to address this, together with regulator liaison where necessary.
V7	Contamination of water supply through supply pipes	Installation of barrier type water supply pipe. PC led liaison with water supplier to seek approval.	PC to ensure photographic records are provided during installation of barrier type pipe. PC to ensure pipework is not laid within any area where visible hydrocarbon are present and provide supporting photographic records.
V8	Ingress of gas to proposed development buildings	Gas protection measures, as specified in Section 5.10 of the Remedial Strategy.	Records of the credentials of the approved installer for the gas remediation measures. Records of the gas protection measures installation process, including photographs. Independent inspection / validation of the installed gas protection measures.

4. VERIFICATION

Ramboll Site Solutions team undertook multiple site visits which are summarised in Table 4.1 below.

Table 4.1: Summary of site visits undertaken by Ramboll for site development

Visit(s)	Date	Purpose
1-10*	18 th October 2021 to 10 th November 2021*	Watching brief for excavation works of encountered unexpected contamination within the basement area, and subsequent validation sampling
11	6 th December 2021	Ground gas protection membrane installation within the former basement area
12	17 th February 2022	Ground gas protection membrane installation around the service penetrations on the ground floor
13	6 th April 2022	Barrier water supply pipe installation
14	8 th June 2023	Imported topsoil placement and sampling
Notes: *The watching brief during the excavation works was documented within the Ramboll 2021 Land Quality Technical Note 02.		

Additional site visits were undertaken by Ramboll between June and September 2021 to provide a watching brief and undertake soil sampling of the ground material beneath the former building footprint and to record the ground conditions. The findings are reported within the Ramboll 2021 Technical Note 01 and are not repeated herein.

In addition to the site visits, the Principal Contractor (L'OR) provided Ramboll with aerial drone imagery to illustrate the site work progress.

Records and photographs of site visits are provided within the relevant supporting documents for the verification items detailed below.

4.1 Verification V1: Hydrocarbon Impacted Soils

Verification Reference V1 relates to the encountered localised hydrocarbon impacted soils which were encountered directly beneath the concrete slab within the basement area. Ramboll undertook a watching brief between 18th October and 10th November 2021, which included sampling of the impacted and residual soils in the impacted area. The findings of the watching brief, the results of the impacted soils and the disposal records have been recorded in the referenced document below, a copy of which is included within Appendix A:

- Ramboll (2021) Abraham Moss Library & Leisure Centre, Manchester – **Land Quality Technical Note 02: Watching Brief During Excavation**. Version P01. Ramboll UK Ltd, December 2021.

The area of the unexpected contamination was found to be localised in nature. The soil samples of the impacted soils which were analysed did not indicate high concentrations of speciated Total Petroleum Hydrocarbons (TPHs), and the results did not exceed the Generic Assessment Criteria (GAC) for commercial end-use.

The residual soils were also sampled and analysed for speciated TPHs and no elevated concentrations were recorded in the residual soils.

The excavated materials were removed from site as both 'hazardous' and 'non-hazardous' under Duty of Care to a suitably permitted waste facility – the details of which are discussed further within Section 7 of the Technical Note 2.

No other areas of unexpected contamination were identified during the construction phase of the works.

Based on the data collected, Ramboll consider the V1 remediation and verification item to be completed and no further actions are required.

4.2 Verification V2: Asbestos Fibres in the Made Ground

Verification Reference V2 relates to presence of asbestos fibres in the Made Ground to minimise risk of asbestos fibres being released during construction and to ensure that the H&S precautions are in place.

In terms of asbestos fibres posing a risk to the neighbouring site users and residents, a post-demolition ground investigation was carried out to provide to assess the ground conditions beneath the building footprint for the presence of asbestos. The ground investigation included recovery of soil samples across the site between June and September 2021, which is detailed within the following document:

- Ramboll (2021), Land Quality: Abraham Moss Library & Leisure Centre, Manchester – **Technical Note 01: Post-Demolition Ground Investigation**. Version P01. Reference: LP44107-RAM-ZZZ-XX-RP-Y-00008, dated 28th September 2021.

A copy of the Technical Note is included within Appendix B of the report.

As part of the ground investigation, 20 Made Ground and natural soil samples were analysed for a range of determinands which included asbestos. The analytical results from the post-demolition ground investigation have not identified asbestos in any of the soil samples.

It is also noted that during all the watching brief visits carried out by Ramboll, no visible asbestos had been observed or identified; and no potential asbestos was recorded by the Contractor during the earthworks.

Ramboll had observed the use of dust suppression systems during the excavation and earthwork watching brief visits, which comprised of dampening of liberated soils.

A copy of the Construction Environmental Management Plan (outlining the risk mitigation measures utilised on site), is included within Appendix C of the report for reference.

Ramboll considers that V2 remediation and verification item has been completed and no further action are required.

4.3 Verification V3: Reuse of Materials

The information contained herein represents the available verification works documentation for the site and is considered sufficient to demonstrate that the risks identified within the previous phases of assessment have been addressed in such a manner as to facilitate the safe development of the site.

No further verification works in relation to the development is recommended by Ramboll.

4.4 Verification V4: Import of Topsoil for Soft Landscape Areas

Verification Reference V6 relates to the importation of soils for use as topsoil.

As detailed within the Remediation Strategy report, newly formed landscaped areas were recommended to be formed with the use of imported topsoil materials which conform to British Standard for Topsoil (BS 3882:2015), be free of man-made ameliorants and with concentrations within the contaminant thresholds provided within the Remediation Strategy. Ramboll has recommended a minimum cover layer thickness of 600 mm, however, taking into consideration the reduced risk afforded by diminished exposure to human health within the leisure centre and library development use, a minimum of 450 mm of total depth for fill materials at the site is deemed suitable (as outlined within the Manchester City Council Technical Guidance , 2021) .

Drawing LP44107-EWL-ZZZ-ZZ-DR-94000 (P08) illustrates the areas of the new soft landscaping where imported topsoil was installed. The areas comprised of a strip of land along the south-eastern perimeter of the site, a small patch in the west of the site, and an area in the north-west of the site, as well as planters and RootSpace tree pit systems. Topsoil compliance certificates (BS 3882:2015) for the imported topsoil and root soil are given within Appendix D.

The estimated volume of topsoil material imported for the formation of soft landscaped areas was approximately 130 m³. The topsoil was split between the formed landscaped areas and the planters. The topsoil has been imported from Landgate Farm, Landgate Lane, Bryn, Wigan (WN4 0EJ).

Ramboll has attended the site on 8th June 2023 to verify the suitability and thickness of the imported topsoil and the capping layer. A total of six topsoil samples were recovered across the landscaped areas, and these were sent for laboratory analysis as outlined within the remedial strategy at an appropriately certified and accredited laboratory (Element Materials Technology).

The topsoil was described as brown slightly gravelly fine to coarse sand with fine to medium sub-rounded to sub-angular gravel of natural lithologies (such as limestone, mudstone and sandstone), with occasional rootlets. No visual or olfactory evidence of contamination or man-made ameliorants were observed within the topsoil.

The results have been screened against both residential without plant uptake and commercial / industrial end use; and no exceedances have been identified against human health.

The topsoil thickness ranged between 120 and 220 mm (0.12 – 0.22 m), and it was confirmed by Laing O'Rourke that the topsoil material is underlain by 150 mm (0.15 m) of Type 1 sub-base and further 200 – 300 mm of class 6F5 fill (Limestone), which have been imported from the Tunstead Quarry. As such, the overall cover system at the site ranges between 470 mm and 650 mm and it is within minimum thickness requirement.

It is noted that at the time of the site visit, Ramboll was not able to sample the north-western soft landscaped area due to ongoing paving works in the area. However, it was confirmed by Laing O'Rourke that the imported topsoil is from the supplier and source as the sampled materials.

Copies of the site visit notes, topsoil laboratory certificates and the screening sheet are provided in Appendix D of the report.

Based on the above, Ramboll consider the V4 remediation and verification item to be completed and no further actions are required.

4.5 Verification V5: Import of Materials

Verification Reference V5 relates to imported fill material.

Laing O'Rourke confirmed that the following imported materials were utilised on site in the following quantities:

- 3,676.4 m³ of capping limestone (Class 6F5) supplied by Tarmac Trading Limited, and 1,510.6 m³ of Type 1 sub-base supplied by Tarmac Trading Limited and J O'Shea & Sons Limited used for both construction beneath foundation bases and as fill beneath the landscaped areas; and
- 118 m³ of fill sand supplied by J O'Shea & Sons and 109.2 m³ of stone supplied by J O'Shea & Sons Limited were used for foundation build-ups and break out piles.

The capping limestone (Class 6F5) and the type 1 sub-base has been imported from Tunstead Quarry. A selection of imported material records is provided within Appendix E.

The contractor has confirmed that barring topsoil for landscaping works, no other soil or non-virgin aggregate materials were imported to site. No environmental chemical testing was undertaken on the imported aggregate material.

4.6 Verification V6: Unexpected Contamination

Verification Reference V4 relates to the identification and management of unsuspected contamination. This has been addressed as **Verification V1: Hydrocarbon Impacted Soils within Former Basement Area** in Section 4.1.

Ramboll consider the V6 remediation and verification item to be completed and no further actions are required.

4.7 Verification V7: Potable Water Supply Pipe

Verification Reference V3 relates to the installation of appropriate potable water supply pipes. Due to the presence of hydrocarbons within the shallow on-site soils (albeit in limited concentrations along the new routing), it was recommended that barrier type water supply pipes are installed where new connections / routes are required.

Ramboll undertook a watching brief on 6th April 2022 during the partial installation of the water supply barrier pipe to verify its installation. The barrier pipe (Puriton® Barrier Pipe, 63 mm) was observed along the south-western and north-western areas of the site. The excavations were observed to be free of any visual or olfactory contamination and Laing O'Rourke confirmed that no evidence of contamination was observed during the excavation works.

A site visit record for the watching brief, including photographs of the barrier pipe, trenching and installation works is included within Appendix F.

The product specification of the barrier pipe (Puriton® Barrier Pipe, 63 mm) and the service drawing of the water pipe route is included within Appendix F.

Ramboll consider the V7 remediation and verification item to be completed and no further actions are required.

4.8 Verification V8: Ground Gas Protection Measures

Verification V8 relates to the installation of ground protection measures.

As detailed within the Ramboll, October 2019: Contaminated Land Interpretative Report (Ref: LP44107-RAM-XXX-XX-RP-Y-00004, Rev. 2), the site has been classified as having a Characteristic Situation 2 regime; requiring gas protection measures as part of the site development.

As reported within the Ramboll, October 2021: Remediation Strategy (Ref: LP44107-RAM-ZZZ-XX-RP-Y-00007 P03 RS, Rev.3), the ground gas protection system has been designed by Visqueen Ltd and comprises the installation of gas resistant membrane and a structural barrier of a ground bearing monolithic reinforced foundation slab (500 mm in thickness). The gas protection designer has specified the use of the Visqueen Gas Barrier Membrane which is stated to comply with the requirements of BS 8485:2015 + A1:2019. Gas resistant tapes and tanking membrane are also specified. Based on the information provided by Visqueen Ltd, the installation of an appropriately installed and verifacative gas membrane combined with the structural barrier would confer in excess of the 2.5 points required for a CS2 classification.

Ramboll undertook watching brief to verify the installation of the gas membrane on two occasions; 6th December 2021 and 17th February 2022. During the Ramboll site visits in December 2021 and February 2022, areas of the basement and upper raft were inspected. Site records including the photographic record of the site visits are supplied in Appendix G of the report.

Geoshield Ltd has independently inspected and verified the gas membrane Ltd in accordance with CIRIA C735 throughout the installation process. During the course of the inspection the integrity of the membrane, joints and service penetrations were inspected, and any noted defects were repaired as per recommendations of the verification officer, to an overall excellent standard.

The verification certificate and Geoshield site visit records are provided in Appendix G.

Ramboll consider the V8 remediation and verification item to be completed and no further actions are required.

4.9 Waste Management

No material was reused on site. According to the records provided by Laing O'Rourke, approximately 8,891 m³ of material has been taken off-site as 'non-hazardous' between 2021 and 2023 under the European Waste Code 17 05 04. It was transported by J O'Shea & Sons Ltd (EA Reference CBDU90839) to two sites; Viridor, Pilsworth North Bury (EA Reference BS7951IB) and the J O'Shea & Sons Recycling Centre, Orchid Road, Salford, M6 6FL (EA Reference EPR/AP3098CK).

Records of the total volumes taken off-site, and a selection of the Waste Transfer Notes have been included within Appendix H of the report.

A total of approximately 63.7 m³ of 'hazardous' material was removed off-site by J O'Shea & Sons Ltd under the European Waste Code 17 05 03. It was transported to the Maw Green Provectus Soil Management Centre, Maw Green Road, Crewe (EA Reference BS7722ID).

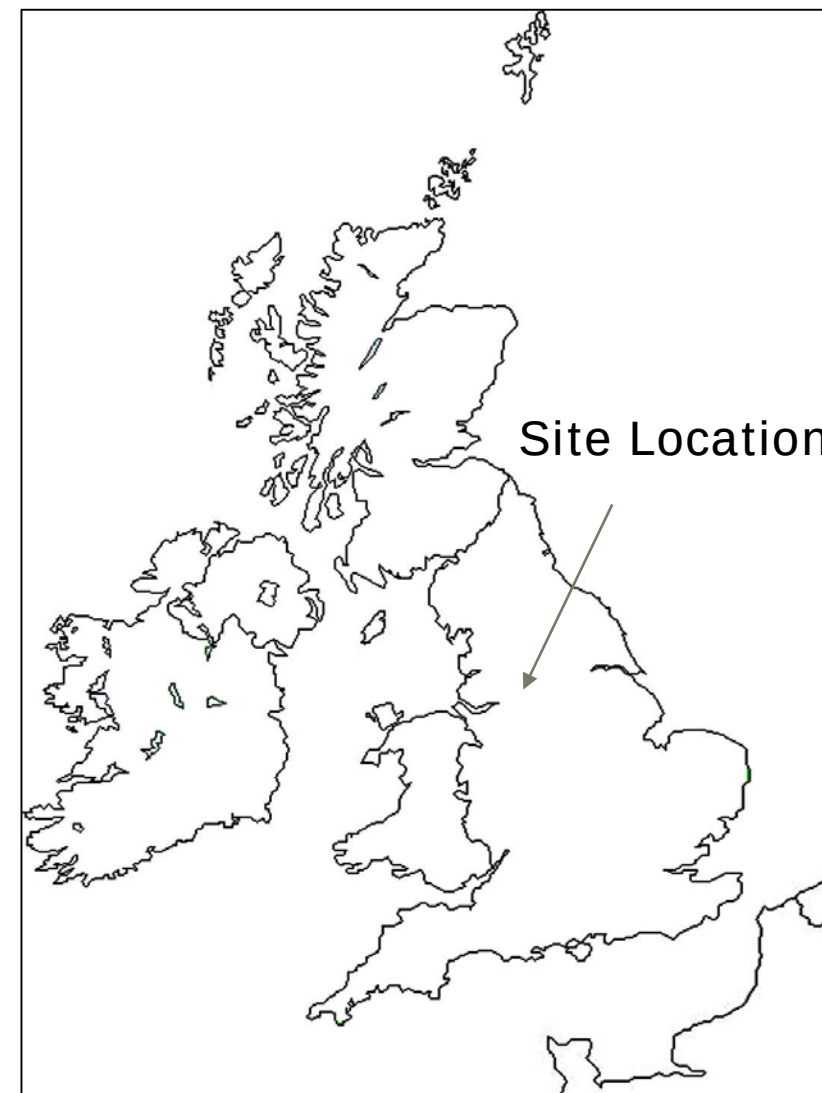
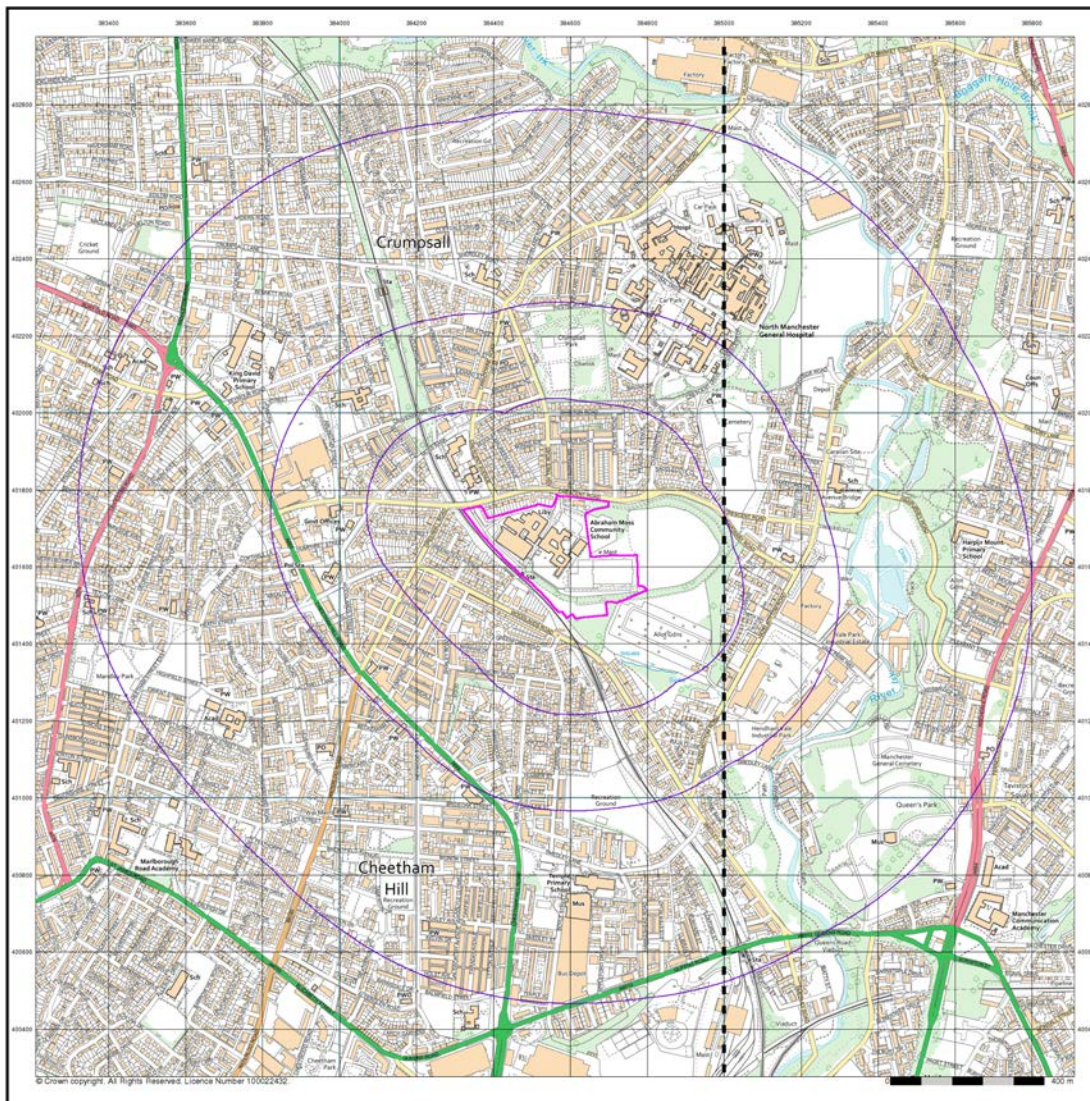
Records of the total volumes taken off-site, and a selection of the Consignment Notes have been included within Appendix H of the report.

5. CONCLUSIONS

The information contained herein represents the available verification works documentation for the site and is considered sufficient to demonstrate that the risks identified within the previous phases of assessment have been addressed in such as manner as to facilitate the safe development of the site.

No further verification works in relation to the development is recommended by Ramboll.

FIGURES AND DRAWINGS



Reproduced From Landmark Envirocheck Report:190343603_1_1



1 Broad Gate, Leeds, LS1 8EQ
leeds@ramboll.co.uk
T: 0113 245 7552

Project: Abraham Moss

Title: Site Location Plan

Status:

Description: Site Location Plan

Date: Jan 19

Scale: NTS

Date: Jan 19

Drawn: CD

Checked: HC

Figure 1620005164/E/01

Rev: -



- Site Boundary
- Abraham Moss Leisure Centre
- Primary School and FE College
- Secondary School
- Playground
- Sports Pitches
- Surface Water location and flow direction



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Project: Abraham Moss Community School		Status:	Description:		
Title: Site Layout Plan		Scale: NTS		Drawn: VG	Checked:
		Figure No: 2			Rev: 01

Project Id: 1620005164-001
Project Title: Abraham Moss Leisure Centre
Location: Manchester, M8 5UF
Client: LOR

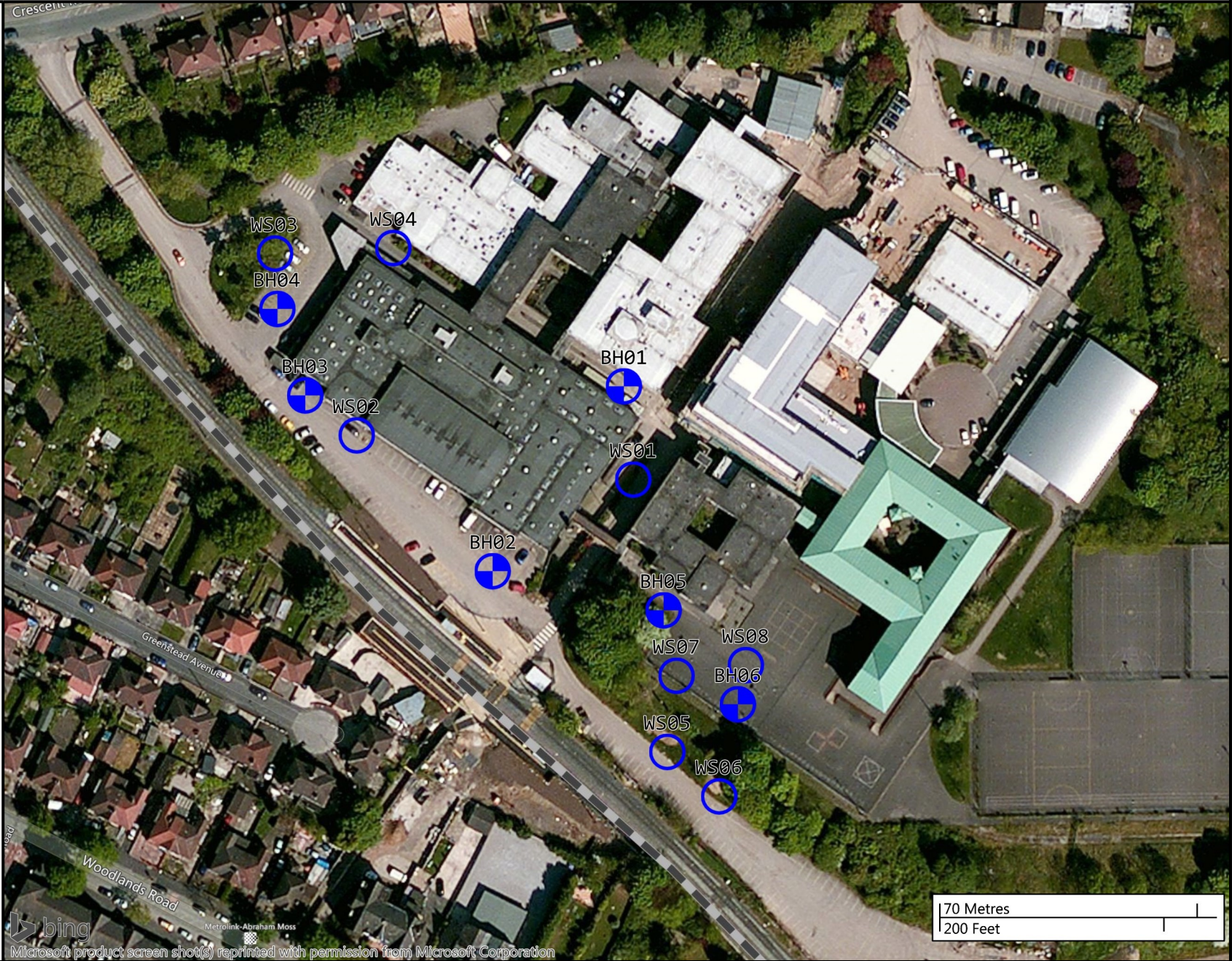
Title: Site Plan
Scale: 1:1500
Engineer: Ramboll
Contractor: RUK / Central Alliance



Legend Key

-  Locations By Type - CP
-  Locations By Type - WLS


Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation





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All dimensions are in millimetres unless specified



- KEY**
- Paving Type 1
Tobermore 'Fusion' concrete paving blocks, 300 x 200 x 80mm, colour - Rose. 'Stripes' in Sienna Graphite 208 x 173 x 60mm - 2 rows
 - Paving Type 2
Tobermore 'Sienna' concrete paving blocks, 208 x 173 x 80mm, colour - Silver. 'Stripes' in Sienna Graphite 208 x 173 x 80mm - 2 rows
 - Paving Type 3
Tobermore 'Sienna' concrete paving blocks, 240 x 160 x 80mm, colour - Silver. Laid on a rigid bed
 - Vehicular grade macadam to Engineers specification
 - Pedestrian/MEWP access grade macadam to Engineers specification
 - Pcc blister paving 400 x 400 x 65mm
 - Turf over 150-mm depth topsoil
 - Semi Mature Tree 20 - 25cm girth, underground guyed in paving with Tobermore 125mm wide Country Kerb surround laid flush with resin bound gravel infill system
 - Semi Mature Tree 16 - 18cm girth, underground guyed in paving with Tobermore 125mm wide Country Kerb surround laid flush with resin bound gravel infill system
 - Standard tree 12 - 14cm girth, double staked in grass in 1m diameter circle of bark mulch
 - Shrub planting in raised container - Europlanters GRP planter, finished in RAL 7016. Spread 75mm layer bark mulch on completion
 - Shrub planting into 450mm depth topsoil into ground. Spread 75mm layer bark mulch on completion
 - Stainless Steel bollards
 - Broxap 'Blyth' seat, finished in RAL 7016 with arm rests
 - Marshalls Metrolina Modular concrete seat. Each seat comprises: 2m2 radiused end blocks, 1m2 radius corner block, 1m2 intermediate block, 2m2, 1.2m seat blocks with timber seat, no backs or armrests
 - 4 stainless steel sheffield parking hoops
 - Existing levels
 - Extent of cellular structural soil system to trees in paving

REV	DATE	REVISION NOTE	BY	CHECKED
001	10/12/20	Stage 1/10/20	AW	AW
002	10/12/20	Updated in the path planning comments	AW	AW
003	10/12/20	Minor amendments	AW	AW
004	11/11/20	Stage 4	AW	AW
005	10/12/20	Planning phase	AW	AW
006	10/12/20	Updated library of external	AW	AW
007	10/12/20	Updated library of external	AW	AW
008	10/12/20	Updated library of external	AW	AW
009	10/12/20	Updated library of external	AW	AW
010	10/12/20	Final issue	AW	AW



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This drawing must not be scaled. Dimensions are in millimetres unless specified.

Package includes the following GreenBlue Urban products per tree:

GBURAC600A RootSpace uprights - 500mm x 70mm x 600mm per tree

GBURAC500A RootSpace Airflow deck - 500mm x 500mm x 70mm

Rootsoil 20 to fill RootSpace and RootDirector spaces (including root ball volume) - allow 9 cu. m per tree.
Additional allowance needs to be made for settlement

RootStart Mycorrhiza - apply to tree pit at time of planting in accordance with manufacturer's recommendations - allow 200g per tree

RRARBV150A Arborvent 150 single inlet aeration system with cast inlets including 0.75m 100mm diameter pipe

RD1000-RSA RootSpace RootDirector - medium

GLTWGNA twinwall geonet -
GRN20 plastic open reinforcing mesh, 20mm aperture

SASAPA Arborguy strapped anchor system - large

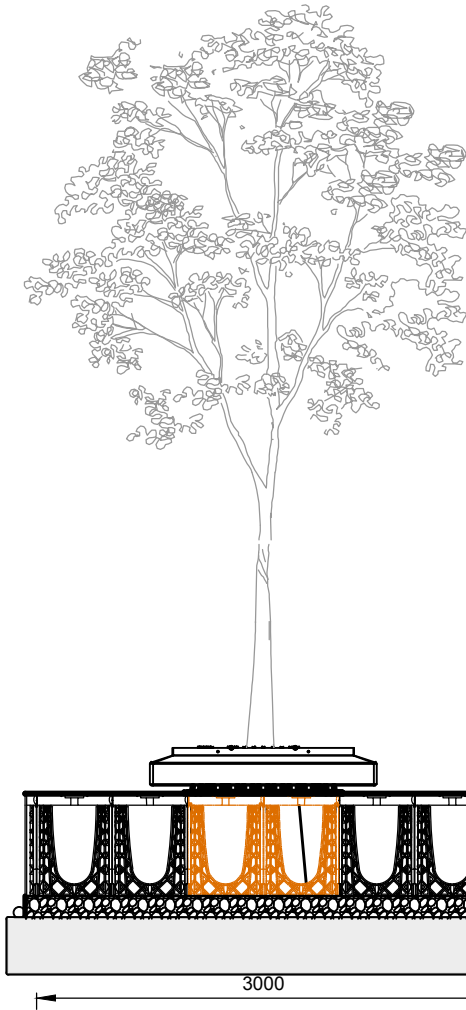
ADUR12B Adur 1200mm x 1200mm tree grille, finished in black, with galvanised steel support frame

GBUMOT3A - Drainage layer as per installation instructions

Note:
20% additional for with the Geotextile and Reinforcing Mesh to allow for overlap and cutting requirements

For heavy load applications, install RootSpace side panels to installation as directed by engineer

Structural engineer's note:
For increased strength and stability in soft ground conditions, specify RootSpace modules to incorporate side panel inserts to tree pit perimeter
Additional geonet is required where sub-base is less than 3% CBR



1200 x 1200mm ArboResin pre cast Recessed Tree Grille and frame supplied filled with Resin bound gravel - colour Dorset Gold - 50mm deep, fill centre ring with loose gravel to match. c/w RootRain Hydrogrille irrigation inletset on concrete haunch

Tobermore Country Kerb, 125 x 255 x 915mm, colour Granite Aggregate

RD1000-RSA RootSpace RootDirector, medium, modular root barrier system

RRARBV150A Arborvent 150 single inlet aeration system with cast inlets fitted to RootSpace Airflow inlet

SASAPA Arborguy strapped anchor system c/w deadman plates

GBUMOT3A - 200mm minimum depth of drainage layer

RootRain single inlet irrigation system with cast inlet

Tobermore Country Kerb, 125 x 255 x 915mm, colour Granite Aggregate

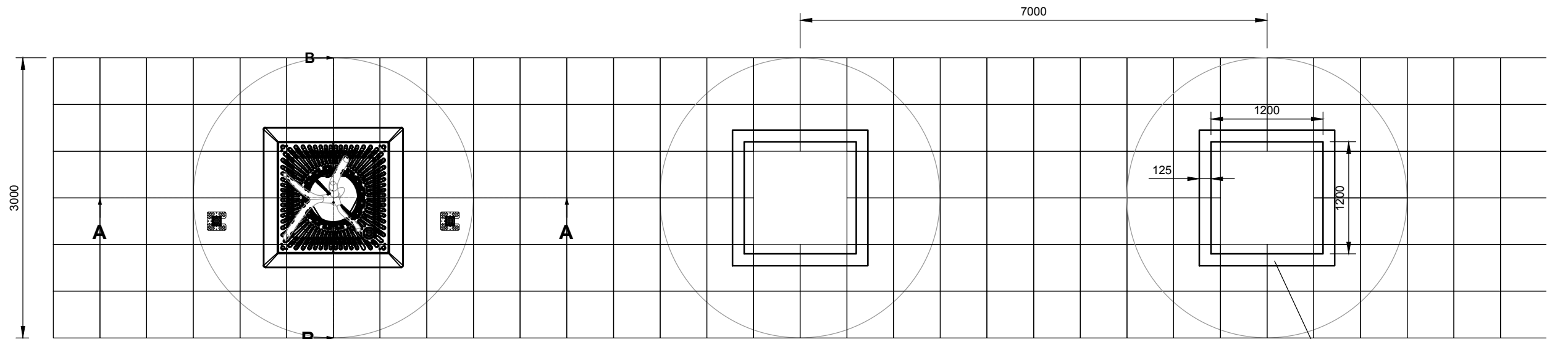
Footpath construction

GLTWGNA twinwall geonet laid over RootSpace structure

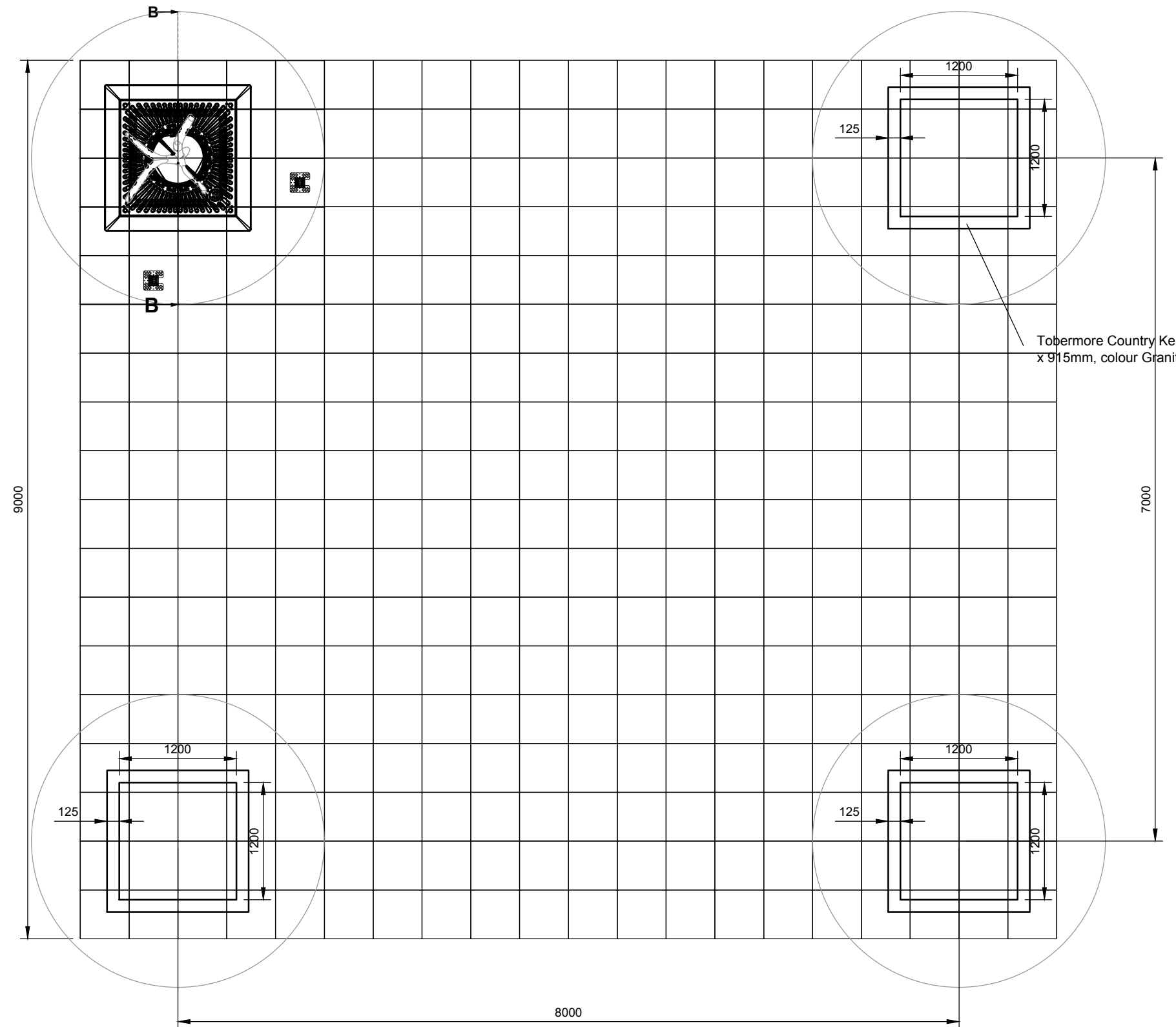
RootSpace structure - 1 upright deep x areas as shown on Soft Landscaping drawing (1 x 2 x 2 module void below RootDirector) loaded with RootSoil 20 c/w Airflow deck

GRN20 plastic open reinforcing mesh, 20mm aperture laid below and around sides of RootSpace structure

Additional twinwall GeoNet (GLTWGNA) to be installed where sub-base is installed below 3% CBR - Minimum 2%

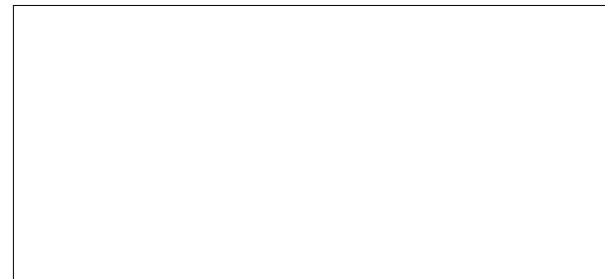
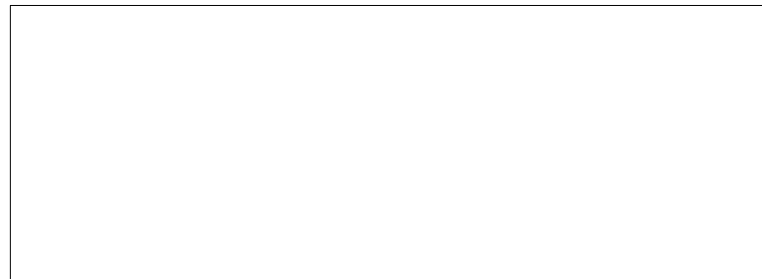


Tobermore Country Kerb, 125 x 255 x 915mm, colour Granite Aggregate



Tobermore Country Kerb, 125 x 255 x 915mm, colour Granite Aggregate

P01	17.10.19	STAGE 4	NH	MK
REV	DATE	REVISION NOTE	BY	CHECK



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Trees in Hard paving details

2434_LG(90)05 REV P01

STATUS | STAGE 4

SCALE | 1:50 @ A2

DRAWN BY | NH

DATE | 17.10.19

LP44107-EWL-ZZZ-ZZ-DR-L-94005