



LAND AT BLACKLEY MERE, CRUMPSALL, MANCHESTER

REMEDIATION STRATEGY AND VERIFICATION PLAN

FOR

BLACKLEY DEVELOPMENTS LTD

Mr. C. S. Eccles - Brownfield Land Consultant

Contaminated Land Assessments, Options Appraisals, Remediation Strategy & Verification,
Geotechnical Design, Earthworks & Materials Reuse, Waste Assessments & Classification

Blackley Mere, Crumpsall - Remediation Strategy & Verification Plan

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Remediation Strategy & Verification Plan

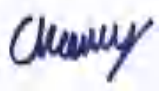
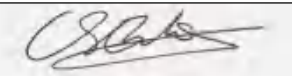
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Partially prepared by: Catherine Kenny MSc FGS CGeol, Consultant Geologist	
Report Completed & Approved by: Chris Eccles BEng, MSc, DIC, FGS, CGeol, CSci, CEnv, SiLC, UK RoGEP Adviser CL:AIRE DoWCoP QP 020, NQMS Suitably Qualified Person	
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Appendices

Appendix A: Development Plans

830 01-CIVIC-CS-GA 110 T01 Proposed Site Levels Strategy
830 01-CIVIC-CS-GA 120 Construction Areas & Build Ups
830 01-CIVIC-CS-GA 171 Proposed Formation Level Layout
830 01-CIVIC-CS-GA 181 Scope of Works – Phasing Overview
830 01-CIVIC-CS-GA 100 P02 General Arrangement Levels Plan-GA 005
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Appendix B: Earthworks Specifications

820-01 – Earthworks Specification – P01
820-01 – Earthworks Specification – T02

Appendix C: Soil Acceptance Criteria

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1 INTRODUCTION

C S Eccles Brownfield Land Consultancy (EBLC) was commissioned by Blackley Developments Ltd (The Client) to provide a remediation strategy and verification plan for a site at Blackley Mere, Crumpsall. Lagan Construction Aviation Ltd are the Principal Contractors for the site.

1.1 The Development

The site, which is around 4.5ha, is shown in Figure 1 and comprises an eastern area which was formerly occupied by an industrial estate and other historical industries, and a western area, which is occupied by two reservoirs (R1 and R2 in Figure 1), one of which (R1) has been partially infilled.

The site has planning permission for a residential development totalling 76 Units which are divided between two different planning permissions:

- Planning Permission 114849/JO/2016 – 48 Units Eastern Area
- Planning Permission 114850/JO/2016 – 28 Units Western Area

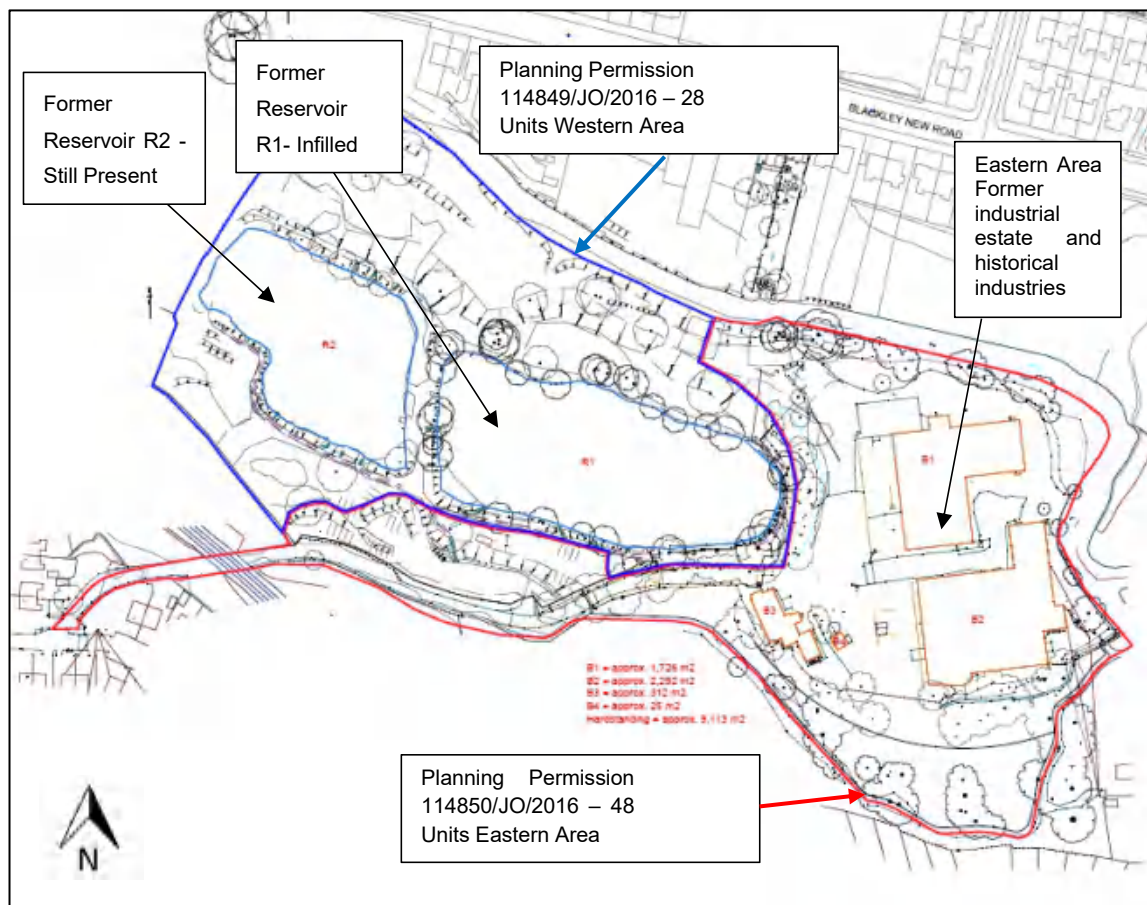


Figure 1: Planning Application Areas and Site Features

A selection of relevant development plans are presented in Appendix A and the Earthworks Specification is presented in Appendix B. Note if there are any discrepancies between the requirements set out in this report and the Earthworks Specification, the recommendations set out in this report should be implemented.

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1.2 Remediation Strategy Scope

The objectives of this report are to:

- Summarise:
 - the development history of the site;
 - the geo-environmental works to date
 - the conceptual site model that has been developed from these works,
 - provide a rationale for the remediation strategy
- Present the proposed remediation strategy;
- Present the proposed verification plan.

1.3 Summary of Relevant Interested Parties

The current ownership and interested parties associated with this site are:

Table 1 - Summary of Relevant Interested Parties	
Party	Involvement
Blackley Developments Ltd	Site Owner
Lagan Construction & Aviation Ltd	Principal Contractor for Phase 1 Remedial Works
Clive Hurt Plant Hire Ltd	Remediation/Enabling Works Contractor for Phase 1 Remedial Works
Mr. C. S. Eccles - Brownfield Land Consultant (EBLC)	Environmental Consultant for Phase 1 Remedial Works
Manchester City Council	Local Planning Authority
Environmental Protection, Manchester City Council.	Human Health Regulator
Environment Agency (EA)	Controlled Waters & Waste Regulator

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2 PREVIOUS WORK

The development history of the site is summarised below:

1. 2016: E3P site investigation identified limited chemical contamination, invasive weeds, areas of hard standing and foundations requiring removal, demolition of a remaining building and a requirement to import soils in order to form a suitable development platform. *"Blackley Mere, Blackley, Manchester M8 4LL: Phase Land Phase II Geo-Environmental Site Assessment"*. Report Reference: 11-164-R1. October 2016.
2. Planning permissions were gained.
3. Development works commenced in 2017 and around 60,000 m³ of materials were imported to create a development platform. The material was placed in two areas:
 - Around 7,000 m³ of material was imported and placed within the reservoir which is central in the site (Reservoir R1). This material filled about three quarters of this reservoir.
 - The majority of the material (circa 53,000 m³) was placed in the eastern area of the former industrial estate.
4. The Environment Agency (EA) visited the site on 17th October 2017 and issued a STOP Notice (letter of 19th October 2017) and all works ceased on the site. The reason for the notice was the material being placed in Reservoir R1 included soils and also domestic type waste materials. The earthworks contractor was also not able to provide adequate information on the source material. There were no problems with the material imported to the eastern area of the former industrial estate.
5. The Client employed LK Consult to undertake site investigation works of the imported soils and these works were reported as two separate reports:
 - Report on material placed in area of former Reservoir R1: LK Consulting "Land at Blackley Mere Upper Reservoir, Manchester. Geo-Environmental Investigation". Report reference LKC 19 1139, May 2019. The report identified some elevated contaminants and asbestos in the wastes.
 - Report on fill placed in eastern area of former industrial estate: LK Consulting "Land at Blackley Mere Lower, Manchester. Geo-Environmental Investigation". Report reference LKC 17 1257, May 2019
6. On 17th October 2019 there was a meeting held with the EA, the Developer, LK Consult and Lagan to discuss the investigation works and potential way forward. The EA outlined an 'END OF WASTE TREATMENT PROCESS' as the desired outcome, so the treated material could be utilised as geotechnical fill on-site, and any treated materials failing to meet standards for reuse were to be removed from the development site. No further works were carried out at the site following the above meeting for about a year.
7. In autumn 2020, Lagan appointed a new project team to resolve the illegal waste issue and progress the development. EBLC were appointed to provide technical advice and further discussions were held with the EA. The following actions were identified:
 - Ecological Update required.
 - Removal of the illegal waste materials from the site to suitably permitted treatment or disposal facilities.
 - Carry out additional groundwater investigation and risk assessment of the eastern area.

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- Produce a revised Remediation Strategy & Verification Plan.
8. The ecological report was produced by EBLC (Report 182.02.1 of 19th November 2020)
 9. Clive Hurt Plant Hire Ltd were commissioned to remove the illegal waste. EBLC were commissioned for the technical supervision of the removal of the waste. At the time of issue of this report this work is in progress with more than 65% of the waste already removed (EBLC Report 182.02.2 of February 2021)
 10. The additional groundwater investigation and risk assessment has been completed and is the principal reference document in relation to this report (see EBLC Report 182.01.3 Supplementary Groundwater Risk Assessment of January 2021)

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3 THE SITE

3.1 Site Location

The site is centred on National Grid co-ordinates 383980,403010 approximately 5km north of Manchester city centre in the Crumpsall area, between Blackley New Road, Bowker Bank Avenue and the A576 Middleton Road.

The development's address is Blackley Mere, Bowker Bank Avenue, Manchester, M8 4LL. The postcode for the Former Bowker Bank Industrial Estate, Bowker Bank Avenue, was M8 4LD.

The site location is shown in Figure 2, below.



Figure 2: Site Location

3.2 Site Description and Surrounding Area

The site is irregularly shaped and approximately 4.5 ha in area. The northern and eastern site boundaries are defined by the meandering right bank of the River Irk. The western site boundary runs along the rear boundary fences of residential properties which front onto Bowker Vale Gardens. The southern boundary is defined by Bowker Bank Avenue. The south western boundary is the base of an

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embankment to a railway which crosses over Bowker Bank Avenue to the south west of the site. Bowker Bank Avenue is included within the site area.

The site slopes down towards the east with a significant difference in site levels between the far west (c. 6-7m higher in elevation) and far east of the site.

Figure 3 depicts the current site status. A reservoir (R2) is present in the western sector of the site. The central sector comprises an infilled reservoir (R1). The eastern sector is partially covered with imported materials. A derelict building is present on the southern boundary. The immediate surrounding areas are predominantly residential but there is a cemetery on the far bank of the River Irk to the east of the site.



Figure 3: Site Aerial Photograph

3.3 Site History

The site is a former print works, which later became a bleach works, and more recently, a textile works. An industrial estate was present until recently, on the eastern sector of the site. See Section 2 for history since 2016.

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3.4 Re-Development Plan

Planning Applications have been made to Manchester City Council. Two separate planning permissions cover the site (See Figure 1).

- Planning Permission 114849/JO/2016 – 28 Units Western Area
- Planning Permission 114850/JO/2016 – 48 Units Eastern Area

The proposed residential redevelopment of the site is depicted in Figure 4, below.

The planning permission 114849/JO/2016 includes for the infilling of the reservoir which is located centrally on the site (R1 in Figure 1) and most of this has already been infilled with the illegal waste. The Western reservoir (R2) is to be retained. There will be provision for public access around the reservoir with dedicated car parking spaces. Woodland in the south eastern corner of the site will be retained. The retained reservoir will have a discharge via a swale to the river and there will also be three surface water attenuation lagoons.



Figure 4: Proposed Development Plan

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4 SITE SUMMARY FROM PREVIOUS REPORTS

The following information is summarised from the reports identified in Section 2. For the avoidance of doubt these reports should be read in conjunction with this remediation strategy and verification report.

Table 2: Summary of Previous Reports

Author	Title	Summary
E3P	<i>"Blackley Mere, Blackley, Manchester M8 4LL: Phase I & II Geo-Environmental Site Assessment"</i> . Report Reference: 11-164-R1. October 2016	Geoenvironmental receptors identified: • River Irk • Principal Aquifer bedrock • Secondary A Aquifer drift geology 12 window samples 25 trial pits Made Ground was found in all locations generally >1m in thickness, up to 3.45m bgl, and including demolition type materials. Extensive obstructions. Elevated heavy metals, non-volatile PAHs/ TPH and asbestos were identified. No elevated soluble contaminants. Below the Made Ground, drift deposits were generally granular with some clay bands in the central area Groundwater was 0.5-3.5m bgl. Ground gas indicated elevated carbon dioxide (Characteristic Situation 2 / NHBC Amber 1) Asbestos has been identified within the shallow Made Ground, and as such it will be necessary to carefully manage these impacted soils and place them in a legislatively compliant manner that will negate any possibility of future exposure. External areas will be covered by hard-standing or a chemically suitable cover system within all private garden and landscaped areas thereby removing the exposure pathway to future site users. Area of former electrical sub-station needs investigation. It is possible that as yet unidentified hydrocarbon impact is present within localised hotspots underlying the existing structures and location of former tanks. It is considered that any such contamination could be addressed by the delineation, excavation and treatment of impacted soils. Japanese Knotweed present.
LK Consulting	"Land at Blackley Mere Lower, Manchester. Geo-Environmental Investigation" (Report reference LKC 17 1257, May 2019	31 trial pits through stockpiles 1 sample per 1,000m³ Stockpiles comprised cohesive (2C) and granular (1A or 6F2) demolition material, ash, clinker, metal, ceramics, wrappers. Topsoil in TP108. Putrid odour in TP120. Elevated PAH, metals. Asbestos in TP104. Inert waste criteria exceeded. Elevated levels of heavy end petroleum hydrocarbons and inorganics in leachates. Potentially hazardous waste in the ground in one area only plus in one small area at the surface. See Figure 5.

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LK Consulting	"Land at Blackley Mere Upper Reservoir, Manchester. Geo-Environmental Investigation". Report reference LKC 19 1139, May 2019	19 trial pits through infill materials to R1 1 sample per 1,000m³ Infill comprised cohesive (2C, 2A/B) and granular (1A/1B) demolition material, ash, clinker, metal, plastics, wrappers. Putrid odours. Hydrocarbon odour in TP112. Elevated PAHs, arsenic, lead, asbestos (hazardous waste). Inert waste criteria exceeded. Elevated levels of naphthalene, lighter fraction hydrocarbons and inorganics in leachates. See Figure 6
Eccles Brownfield Land Consulting	Ecological Assessment Report (EBLC Report 182.02.1 of 19 th November 2020)	Habitat Protection: Required (See Figure 7): - The western reservoir R2 and woodland to the south east of the site is a Site of Biological Importance (SBI) - Along the banks of the River Irk Species Protection: No evidence of badgers. Further survey is required for: - Newts - Voles Pond in Reservoir R1 should be retained until after the survey) Invasive Non-Native Species : Japanese Knotweed, Himalayan Balsam: See Figure 8
Eccles Brownfield Land Consulting	Completion Report – Removal of Waste Report From Reservoir R1 (Report 182.02.2 February 2021)	The illegally imported waste in Reservoir R1 removed in accordance with the Waste Regulations, and Environmental Management Plan and Asbestos Management Strategy. These works are underway. Most of the material (>99%) is non-hazardous waste, with <1% hazardous material due to asbestos. Completion Report anticipated late February 2021.
Eccles Brownfield Land Consulting	Supplementary Groundwater Risk Assessment Report 182.03.2 31 st January 2021)	Controlled waters identified: Underlying aquifers, River Irk 9 window sample boreholes. Monitoring wells installed for water sampling: samples indicated localised slightly elevated concentrations of metals. Water sampling from River Irk: no impacts. It was concluded: Controlled Waters: no overall contaminant linkage to controlled waters. Human Health: Clean Cover required, assessment of ground below former substation for PCBs, putrid material in TP120 possibly removed. Ground Gas: Characteristic Situation 2 / NHBC Amber 1 Water Supply Pipework: A suitable UU approved risk assessment should be carried out following the remediation works to determine suitability for potable water pipe installation.

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Figure 5 Investigation Locations LKC (Eastern Area) Report (Taken from LKC Drawing no LKC 17 1257 Apr 2018)

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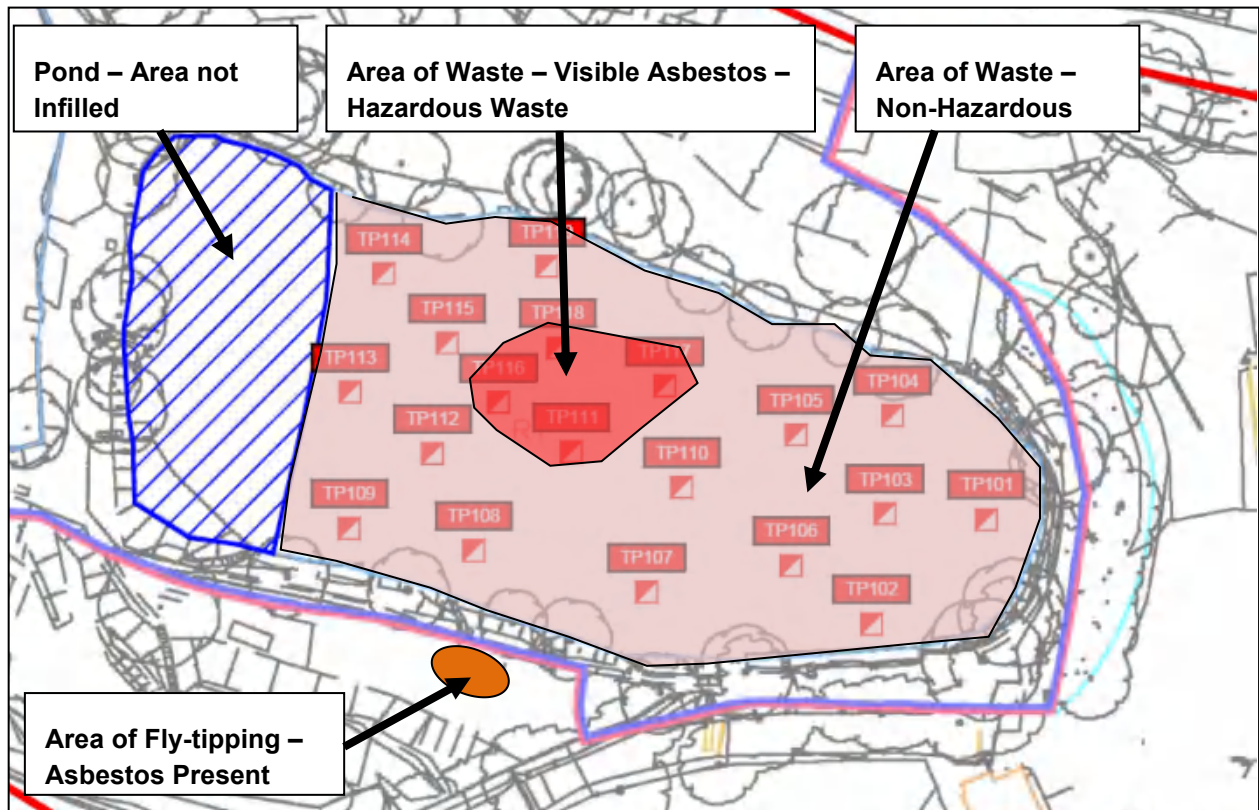


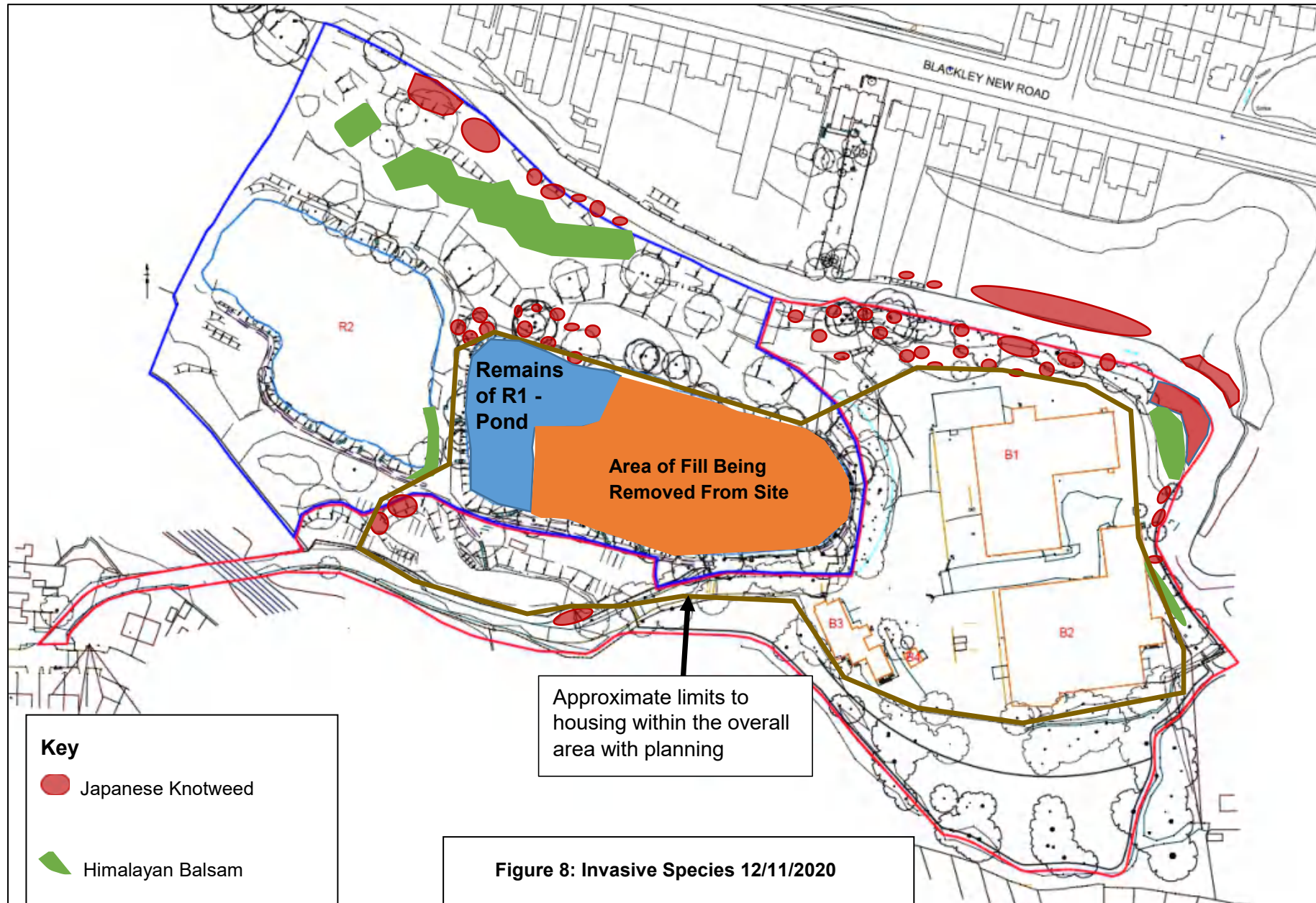
Figure 6: Location of Asbestos in Reservoir R1 (TP118 also TPH, is within the 'Asbestos' area)

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Figure 7: Areas Which Require Habitat Protection

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5 CONCEPTUAL SITE CROSS SECTIONS

The current ground and groundwater conditions are summarised in Figure 9 below:

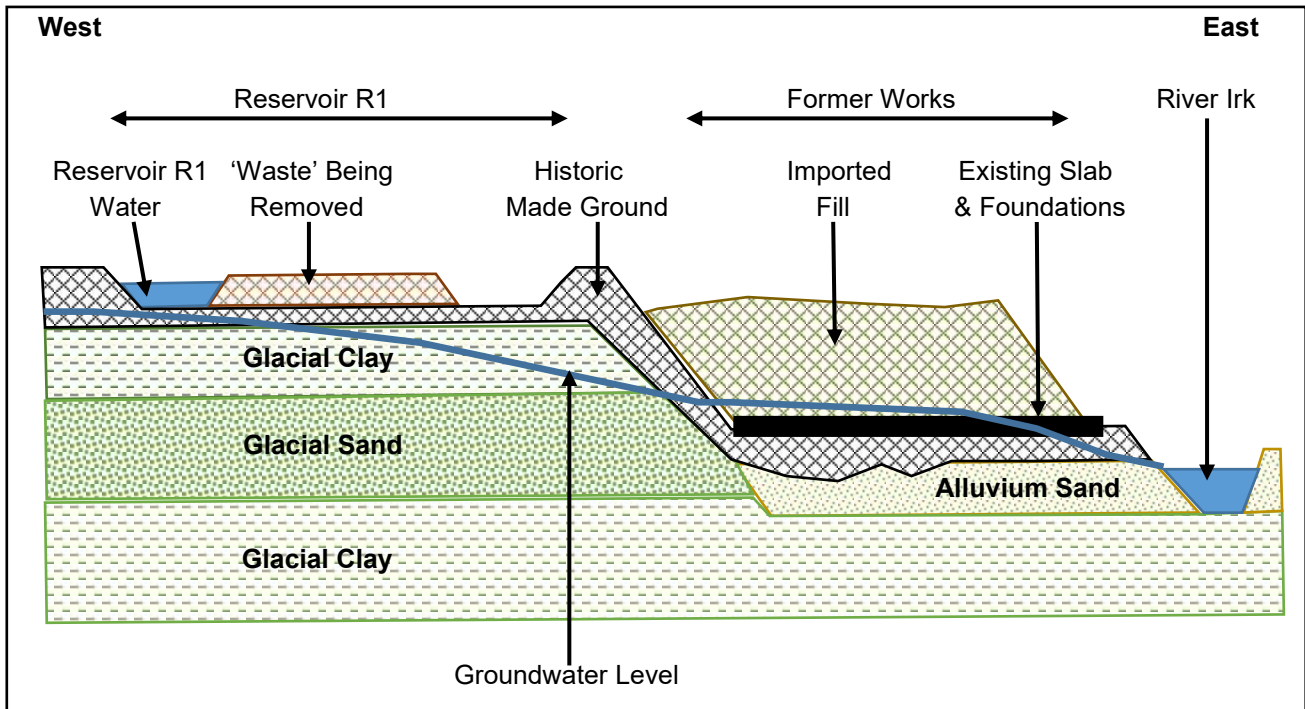


Figure 9: Schematic Cross-section - Current Ground and Groundwater Conditions

Presence of contaminants:

- Historic Made Ground:** This has localised elevated concentrations of some heavy metals, PAHs and asbestos is present. In area near former tank low level hydrocarbon impact in ground. No remediation required. Potential for buried tanks elsewhere on site. Location of former sub-stations requires investigation for PCBs.
- "Waste:"** This is being removed in Reservoir R1. It is mainly Non-hazardous waste, Hazardous waste in one area only. It has localised elevated concentrations of some heavy metals, PAHs and asbestos. TPH present in one location. This material will all be removed from site by the end of February 2021 apart from a small bund which is required to be temporarily retained so that the pond to the west of the waste is not drained until newt surveys can be completed in April 2021 and appropriate relocation of newts carried out if this is required.
- Imported Fill:** This stockpiled material is principally a clay and appears to be mainly imported glacial clay. However, there are localised elevated concentrations of some heavy metals, PAHs and asbestos was found in one location (TP104) at a concentration of 0.003 %. Removal of a limited quantity of putrid material is required from one location (TP120) before this Imported Fill is used to form the development platform.

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- **Shallow groundwater** in drift deposits:
 - General background of elevated manganese in all wells including the up-gradient wells;
 - In wells in the eastern area of the site there are slightly elevated concentrations of copper and nickel in two locations, zinc in two locations. No TPH or PAH exceedances;
- **River Irk:** No elevated concentrations of potential contaminants. Not impacted from site.

In order to form the consented development the required development will need to be created with current hard standing and foundations removed, stockpiled soils on site relocated and recompacted and additional fill imported. The remediation and enabling works will be delivered in a manner that will seek to ensure that the site is prepared to deliver the optimum foundation solution for the proposed structures, infrastructure and highways.

A conceptual model for the proposed site development is summarised in Figure 10. This shows the site post remediation after the remediation and development works has been completed.

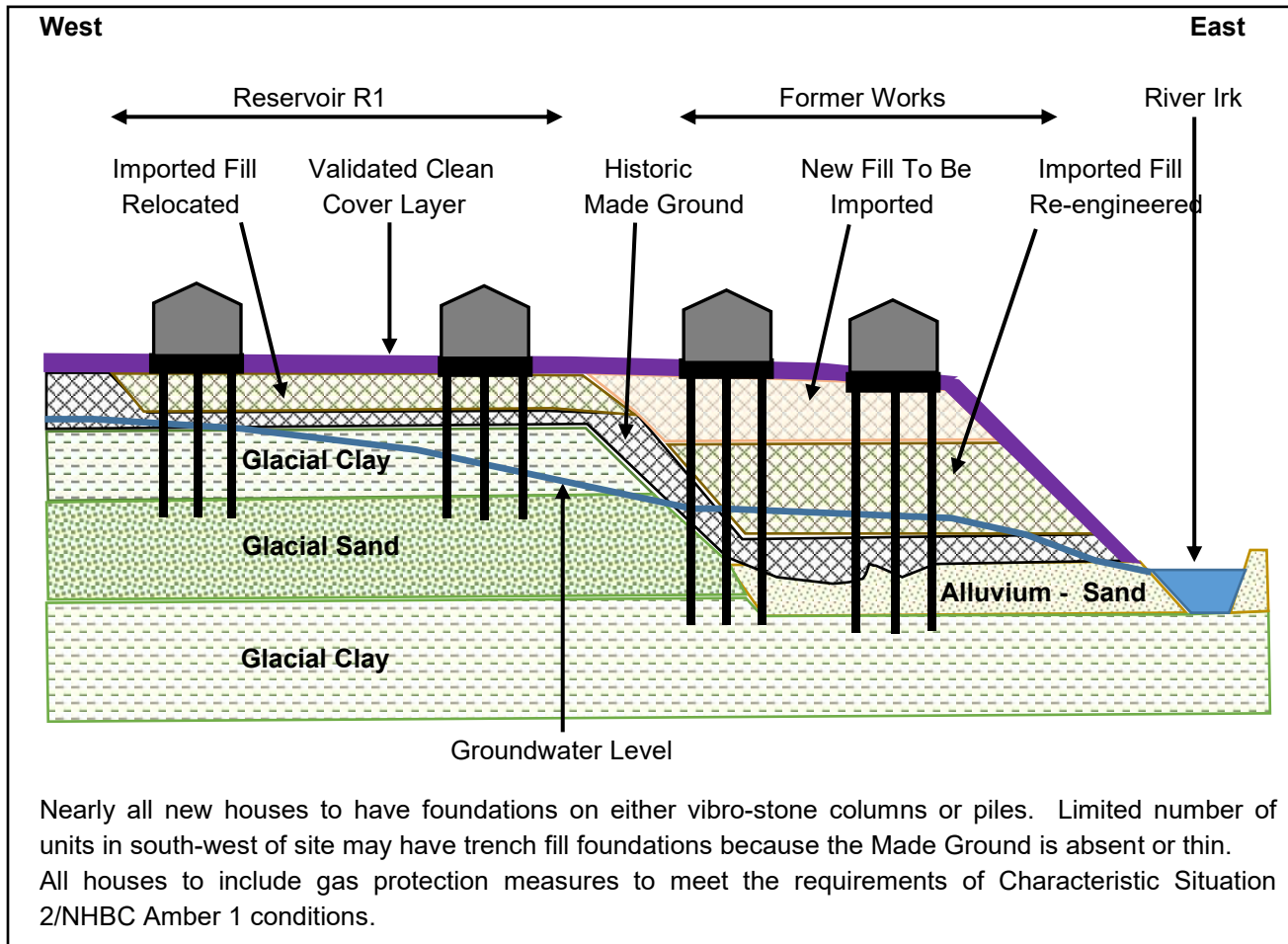


Figure 10: Schematic Cross-section – Post Development Ground and Groundwater Conditions

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6 OUTLINE OF REMEDIATION STRATEGY

6.1 Proposed works

This remediation works set out below provides a comprehensive specification for the regeneration of this land to ensure there are no contaminant linkages and construct a development platform that will be geotechnically suitable for the proposed residential end use. The required remediation works due to contamination is limited to:

- Removal of the remaining bund of 'Waste' from Reservoir R1 once newt surveys and any required relocation works have been carried out;
- Management of asbestos present in historic Made Ground in area of former Works and in one location (TP104 at a concentration of 0.003 %) with the stockpiled imported fill;
- Management of limited hot spots of contamination/ unsuitable material:
 - Removal of a limited quantity of putrid material is required from one location (TP120) before this Imported Fill is used to form the development platform;
 - Investigation of ground below former electrical sub-station for possible presence of PCBs and remediate area if necessary;
- All buildings to have ground gas protection measures to meet the requirements of Characteristic Situation 2/NHBC Amber 1 conditions;
- Importing and placement of clean cover layer of subsoil and topsoil in gardens and POS; and
- Verification of all works.

The above works will be implemented in strict accordance with UK Environmental Permitting and local planning authority requirements.

Where possible, the remediation contractor will implement remediation works in accordance with contemporary industry guidance or best practice. Such advice is published by government-led regulators and industry-led organisations including, but not limited to, the Environment Agency, CIRIA, CL:AIRE, HSE, BRE, British and International Standards, etc....

The remediation works has three phases:

- Phase 1: Enabling works and earthworks to create the development platform
- Phase 2: Ground gas protection measures to be included in all houses
- Phase 3: Provision of clean cover in gardens across all areas and also in areas of Public Open Space (POS) in the eastern part of the site.

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7 PHASE 1 ENABLING WORKS & EARTHWORKS TO FOR DEVELOPMENT PLATFORM

7.1 Pre Commencement Activities

Prior to commencing the remediation the a range of activities need to be addressed including:

- Gain approval with the Environment Agency so the 'Stop Notice' can be removed and development works can re-commence. This will require submission and approval of the following reports:
 - Completion Report – Removal of Waste Report From Reservoir R1 (EBLC Report 182.02.2 February 2021);
 - Supplementary Groundwater Risk Assessment Report (EBLC Report 182.03.2 31st January 2021); and
 - This Remediation Strategy & Verification Plan.
- Issue above reports to Manchester City Council's Environmental Health Department ensure they are copied into the Environment Agency's correspondence confirming that the 'Stop Notice' has been removed.
- Compliance with Health and Safety regulations (issue HSE Notification F10, production of CDM Construction Phase Plan with risk assessments, method statements, asbestos management plan, etc....);
- Additional ecological surveys are required so appropriate mitigation measures can be implemented if required:
 - A water vole survey of the ponds and River Irk will need to be carried out between April and October 2021 to determine if they are present on the site.
 - A pond eDNA survey will be required between April and October 2021 to determine the presence of great crested newts in the remaining ponds in Reservoir R1.
 - Confirmation of the areas impacted with non-native invasive species Figure 8 during the required removal/treatment works.

Note that remediation works can commence in areas more than 8 m from the river Irk and outside the areas impacted by non-native invasive species (see Figure 8) with most of the development area not being affected by any specific ecological restrictions so works can commence prior to the additional ecological surveys being completed.

- Issue the required LAPC Part B Notification for deployment of mobile crushing plant should be implemented prior to the establishment of equipment on site.
- Produce a CL:AIRE DoWCoP Materials Management Plan (MMP) for the reuse of soils on site and issue Qualified Person's (QP) Declaration. When suitable donor sites with clean natural soils have been located for the required additional imported fill the MMP shall be updated and additional QP Declarations made.
- Ensure that any site-won aggregates are reused in accordance with either an exemption to the environmental Permitting Regulations or these are produced in accordance with the WRAP Quality protocol: aggregates from inert waste.
- Check with the Environment Agency whether an Environmental Permit is required for any works close to the River Irk and gain consent as required.

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7.2 Construction of Development Platform

The levels required for the development platform will be below the finished ground levels and floor slab levels. If the remediation work is carried out prior to working platforms and road capping details being confirmed the site will generally be left 600 mm lower than the finished garden or road level on the plans in Appendix A with areas of POS left 450 mm below final level.

Table 3: Remediation and Enabling Works Levels Summary	
Description	Level Required
Trench-fill Plots	FFL - to be set by the Principal Designer
Vibro/Piled Plots	FFL - to be set by the Principal Designer
Strip Plots	FFL - to be set by the Principal Designer
Road	FRL - to be set by the Principal Designer
Shared Drives	FRL - to be set by the Principal Designer
Rear Gardens	FGL - 600mm
Front Gardens	FGL - 450mm
POS	FGL - 450mm
Note FFL = Finished Floor Level FRL = Finished Road Level FGL = Finished Ground Level	

The works required to create the development platform are:

- Comply with the development's environmental management plan in accordance with the requirements previously agreed including habitat protection, species protection and invasive non-native species. Note that:
 - Removal of a limited number of trees is required;
 - Removal and/or treatment of all invasive plant species (as required) in accordance with specialist contractor method statement, validation and independent certification.
- Removal of the remaining bund of 'Waste' from Reservoir R1 once newt surveys and any required relocation works have been carried out;
- Infill Reservoir R1 to the required engineering specification with previously imported fill stockpiled in the area of the former Works to form the required development platform level.
- Management of asbestos present in historic Made Ground in area of former Works and in one location (TP104 at a concentration of 0.003 %) with the stockpiled imported fill;

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- Removal of a limited quantity of putrid material is required from one location (TP120) before this Imported Fill is used to form the development platform;
- This will enable a suitable working area to be formed in the area of the former Works so the hardstanding, relict foundations and any other deleterious materials in the area of the former Works to be removed.
- Investigation of ground below former electrical sub-station for possible presence of PCBs and remediate area if necessary;
- A continuing watching brief will be required for additional potential hazards such as hotspots of contaminants and for any buried tanks or similar structures or further areas of putrid/deleterious materials in the previously imported fill.
- Reprocessing the hardstanding and foundations in order to form suitable granular material for use in road construction and for piling mats.
- Excavation and processing of Made Ground in a controlled manner with the sorting, processing and segregation of identified deleterious materials to geotechnical specification.
- Recompact the remains of the imported and stockpiled fill to form the required development platform;
- Import additional general fill and place to required specification to complete the development platform to the required levels.

7.3 Presence of Asbestos

Within the E3P site investigation asbestos was located in the Made Ground a significant proportion of exploratory holes. ACM poses a risk through fibre and dust inhalation and if present may pose a risk to construction workers during any future earthworks / demolition and to adjacent third party property should dust be generated during those works. No visual signs of ACM were encountered during the Ground Investigation, therefore it is likely only trace fibres are present within these localised soils. Due to the number of locations where asbestos was encountered it is recommended that all of the historic Made Ground is assumed to contain asbestos at trace concentrations.

It should also be noted that within the stockpiled imported fill that asbestos was located at a single location (TP104 at a concentration of 0.003 %) with the stockpiled imported fill.

The Contractor shall carry out their own Asbestos Risk Assessment. At this stage it is assessed that the proposed remediation works would be classed as non-notifiable non licensed works because the potential exposure to asbestos of any employee is extremely unlikely to exceed the control limit. The works will be carried out in such a way that the exposure of workers to Asbestos will not exceed the legal (HSE) control limit of 0.1 asbestos fibres per cubic centimetre of air (0.1 f/cm³) (averaged over a four hour period).

For further re-assurance it is recommended that during earthworks to remove foundations and other below ground structures within the historic Made Ground, background and personnel re-assurance air monitoring will be undertaken to monitor exposure levels and ensure that 'control limits' aren't being exceeded.

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During the earthworks to remove foundations and other below ground structures within the historic Made Ground any visible asbestos shall be removed and disposed of appropriately off site. The Made Ground will have low level asbestos and can remain on site at a depth of more than 1.0 m below finished ground levels to ensure it poses no unacceptable risk to the future site users.

7.4 Former Electrical Substation

An active electrical substation was located in the south-central sector of the site, adjacent to the former site office (see Figure 11). Historical mapping indicates this substation was likely constructed prior to the 1970s, and as such, it may potentially have contained PCBs. As soon as the hard standing/floor slab has been removed in this area it is proposed that eight trial pits will be carried out around this location with testing for PCBs and a risk assessment carried out. If PCBs are encountered, localised remediation will be required to ensure that there is an acceptable degree of risk to future residential site users and the wider environment.

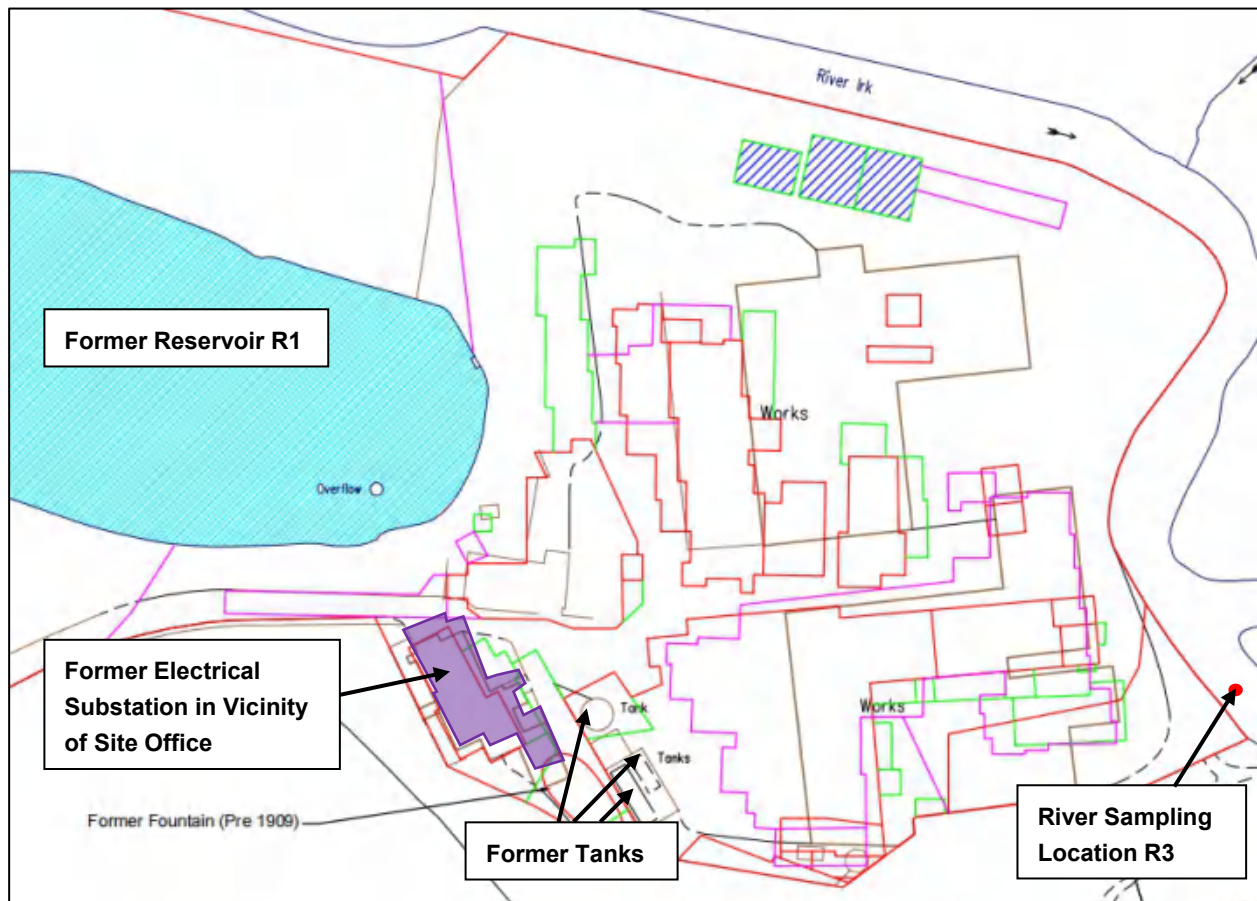


Figure 11: Location of Former Above Ground Tanks and Electrical Substation (from E3P Report)

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7.5 Previously Unidentified Contamination

When considering the prior land use, as yet unidentified potentially harmful contaminants cannot be discounted. The proposed remediation works include for the full depth turnover of all Made Ground under the supervision of an experienced geo-environmental consultant.

In the event that any as yet unidentified contaminant is encountered, this will be the subject of further investigation including laboratory analysis and subsequent assessment of risk within the context of the remediation works and proposed development.

Where a theoretical risk to either human health, controlled waters or the wider environment is identified, appropriate contact should be made with overseeing consultant and the regulators with appropriate remediation works to be agreed and instigated.

Note that no below ground tanks are expected at the site and the only known above ground tanks were located in the south central part of the site as indicated in Figure 11. Site investigation has shown that there is slightly elevated concentrations of hydrocarbons in the ground around these tanks but this does not warrant any specific remedial action. During groundworks the most likely location for high concentrations of hydrocarbons to be encountered is below these tanks or down-gradient to the east of the tanks.

7.6 Dealing with Suspected Impacted Material

Material deemed to be impacted through either visual or olfactory observations or as a result of notable PID readings (>50ppm) will be excavated and stockpiled on an impermeable membrane. The membrane will be placed upon an impermeable area and covered to negate the risk of soils leaching and dispersal of any odours and/or vapours.

Any stockpiles will be regularly monitored with a PID to determine the need for boundary monitoring (albeit not anticipated). This material will then be subject to detailed laboratory analysis to determine the suitability for re-use or the requirements for off-site disposal.

7.7 Disposal of Unsuitable Materials

In the event soils are identified to be impacted with contaminants which render the material unsuitable for treatment and retention on site the materials should be disposed of off-site to a suitably permitted waste facility under duty of care and waste disposal legislation. The remediation contractor shall be responsible for the safe disposal of any excess of unsuitable material found on the site.

7.8 Geotechnical Engineering Specification

The earthworks shall be carried out in accordance with the Earthworks Specification as set out in Appendix B to ensure that the soils are suitable to form the platform in terms of settlement, strength, etc....

7.9 Excavation, Breaking and Processing of all Below Ground Structures

Obstructions, relict foundations and abandoned infrastructure (apart from live services) are to be removed from the areas of proposed residential development (including plot footprints, private driveways, adopted highway and utilities infrastructure corridors) in their entirety, to a depth of 2m below the slab level of the former Works in the east of the site. If any obstructions are present at a depth of 2m below the level of

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the former hard standing then the area shall be surveyed and the location communicated to the Client informed who will decide upon the required action.

Hard standing should be broken out, crushed and stockpiled ready for testing in line with WRAP protocols. Where materials are to be re-used or disposed of, further testing will be undertaken to classify the materials. Materials will be tested as per the Redstart chemical specification found in Appendix F.

7.10 Import of Materials

Where there is a net shortfall of material required to achieve the proposed ground levels, it will be necessary to import natural inert soils and aggregate as per the engineering and validation requirements detailed in Section 10.2 and 10.3.

Imported material must be certified as suitable for use in strict accordance with the chemical criteria and be suitable to meet the geotechnical performance criteria as set out in Appendix B. The remediation contractor shall comply with MMP and the requirements of any waste permit exemptions.

If recycled aggregates are imported laboratory testing should be completed to demonstrate compliance with the WRAP Protocol.

7.11 Construction of Temporary Working Platform

Plots will require a vibro-stone columns or piled foundation solutions; therefore a temporary working platform will be constructed.

The specific design for such a platform should be obtained from the Principal Designer; however, as a minimum this will comprise:

- Proof rolling of the subgrade to ensure a California Bearing Ratio (CBR) > 3%; and
- Placement of 300 mm of certified 6F2 to be rolled and compacted to ensure a CBR > 6%.

Note that depending upon the type of piling rig the working platform may have to include a reinforcing geogrid and be thicker than 300 mm.

7.12 Environmental Monitoring & Mitigation Measures

Management of Environment Protection & Nuisance Control

The remediation contractor will be responsible for the management of all works so as to ensure that no environmental nuisance is created through potential Asbestos fibre release, dust emissions, noise or vibration levels.

The remediation contractor should:

- Ensure that all works are completed in a manner so as not to create any structural risk to the adjacent highways;
- Implement all temporary works as necessary to support excavations throughout the duration of the works.

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In the event that a complaint is made in respect of dust emissions, noise or vibration levels, remedial measures and a programme of ongoing monitoring should be agreed with the local authority and implemented on site.

Controlled Waters

No source of any gross contamination was identified during previous investigation works requiring remediation and no contaminant linkage was assessed as being active. Surface drainage measures being placed as part of the development would further reduce any potential risk that mobile contamination would represent to controlled waters. The risk to controlled waters was considered low and no remediation works is required specifically for controlled waters.

Due to the proximity of River Irk, daily inspections of the river are required to ensure that there is no evidence of soils entering the river during the works and that there is also no other visible indication of contamination (e.g. no hydrocarbon sheen). Surface water sampling will be required during the course of the remediation to confirm the works are not leading to any contaminants becoming mobilised and thus impacted the River Irk. It is proposed that monthly water samples are taken from the river at location R3 as indicated in Figure 11.

Control, Monitoring and Reporting of General Aerial Emissions; Dusts and Particulates

The soils at the site are generally granular Made Ground and have a moisture content unlikely to give rise to dust. Crushing operations that have the potential to give rise to dust will be required to have appropriate dust suppression system in place. If during the remediation operations associated machine movements generate visible dust then the following should be implemented:

If, during any excavation or material processing works, dust is observed, the material will require to be damped down using water to control the generation of dust (this may also comprise precipitation).

- Where necessary, haul road, work areas and stockpiles will be damped down with water spray;
- The application of water to haul roads, work areas and stockpiles should be closely monitored by the resident engineer to ensure that soils are not saturated and therefore the potential for water run-off is appropriately mitigated;
- Once completed, any stockpiles will be sealed by compacting at the surface; and,
- Vehicle speeds and movements on site will be kept to a minimum (<5mph) during excavation works to reduce the potential to generate dust.

If necessary, monitoring for dust in air will be carried out by the remediation contractor, during the excavation works. Monitoring should be undertaken at the up-wind and down-wind locations at the site boundaries. Dust monitoring using a 'real time' dust monitor or similar should be undertaken as required. Dust levels should be recorded on a daily record sheet.

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Asbestos Fibre Release Reassurance Air Monitoring

It is recommended that background reassurance air monitoring be carried out during excavation and re-engineering of the historic Made Ground in accordance with the requirements of HSG 248. The monitoring should be carried out by a suitably qualified person from a UKAS accredited laboratory.

Background re-assurance asbestos fibre air monitoring should be carried out at strategic locations (i.e. downwind of remediation activities and adjacent to any potential receptor boundaries) during the 'hot-spot' remediation works. Personal monitoring should also be carried out on operatives undertaking the works.

The monitoring will only be required during excavation and re-engineering of the historic Made Ground. The results of the monitoring should be made available to the remediation contractor on the same day to demonstrate the deployment of the required control procedures and safe working methods are sufficient.

Monitoring of Local Weather Conditions

The site manager should record prevailing wind directions, weather conditions. Daily/weekly weather forecasts should be monitored and works carefully planned taking into account expected weather conditions. Should adverse weather conditions be encountered and/or the above measures prove insufficient to ensure satisfactory dust control the works generating dust should be suspended until conditions improve.

The use of real time on-site weather monitoring is a useful tool in assessing the risk associated with the generation of particulate emissions and can also be used to demonstrate to any interested parties (such as the HSE) that a high level of diligence is being employed when dealing with hazardous substances such as ACM.

Visual monitoring of aerial emissions shall be carried out by site staff supervising materials handling operations. Visual monitoring should also be undertaken by the Site Manager or Supervisor, at least twice per day, at the site boundary situated downwind of the engineering operations, and shall be recorded in the site diary

Noise Monitoring

It is anticipated that there will be short noisy intervals when concrete is broken out or machinery for crushing of concrete is in operation. The siting of construction plant and timing of operations should be planned to limit nuisance.

Works should be carried out by the least noisy plant, or working method, where feasible. All plant and machinery should be well maintained and operated in accordance with the manufacturers' instructions.

If deemed necessary, noise monitoring should be carried out by the remediation contractor, during the remediation works. This monitoring will be undertaken at the site boundaries at areas where receptors are closest and compared with site specific thresholds. Should the thresholds be exceeded noise mitigation may be required.

Trigger levels for noise will be set in compliance with The Control of Noise at Work Regulations 2005 (the Noise Regulations) which came into force on 6 April 2006. A review of all applicable planning conditions

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for the site should be undertaken to determine if there are any site specific requirements that need to be incorporated into the noise monitoring regime. The minimum noise monitoring trigger values are:

Lower Exposure action values:

- Average exposure of 80dB(A) and peak sound pressure of 135dB(C); and
- Action at which employers must assess the risk to workers' health.

Upper Exposure action values:

- Average exposure of 85dB(A) and peak sound pressure of 137dB(C); and
- Action at which employers must provide hearing protection and hearing protection zones.

Exposure limits NOT to be exceeded are:

- Average exposure of 87dB(A) and peak sound pressure of 140dB(C).

Fires and Accidental Spillages

No fires will be allowed on site unless appropriate exemptions are in place; suitable fire extinguishers will be kept on site in case of a fire.

The remediation contractors fuel bowzers should be bunded with the bund being impermeable to oil and water, have no direct outlet and have a capacity of at least 110% of the maximum capacity of the fuel tank. All ancillary equipment associated with the tank shall be stored within the bund. If the fill pipe for the tank is outside the tank bund, then a drip tray shall be used on delivery of fuel to collect accidental drips of fuel. A competent person shall supervise deliveries of fuel to help avoid spillages, prevent damage to the environment and save loss of fuel.

The fuel bowser shall be locked when not in use. A competent person shall inspect the bowser and bunding regularly to detect leaks or damage that may lead to a spill. In areas where fuel or other polluting substances are stored, validation samples will be taken from the surface directly below where the materials have been stored. The appropriate action will be taken based on the findings. Drip trays or plant "nappies" will be placed under all static equipment storing fuel (compressors / generators).

Spill kits comprising hydrophobic & oil absorbent booms, pads and granules should be kept permanently on site in close proximity to areas of fuel storage.

All mechanical equipment to be used at the site will be regularly maintained in good working order and will undergo daily checks.

Odour Monitoring

During previous ground investigation the soils encountered did not give rise to significant odours. If deemed necessary, olfactory monitoring for odour nuisance will be undertaken at the site boundary downwind of the excavation area during all excavation works.

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If deemed necessary odour monitoring will be carried out at the start of each day. In addition, a PID will be used for volatile monitoring in the air. At each monitoring event, the odour level will be subjectively classified as none, slight, moderate, or high, where:

A slight odour level is detectable but not particularly noticeable;

- A moderate odour level is noticeable but not offensive; and
- A high odour level is offensive.

If high odour levels are detected in the same location on more than two occasions during any three-day period, then works should be halted until odour suppression units are installed and used. However, based on investigations to date, it is not anticipated that there will be any odour problems during the excavation works.

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8 PHASE 2 GROUND GAS PROTECTION MEASURES

All houses will require ground gas protection measures in accordance with Characteristic Situation 2/HNBC Amber 1 with construction in line with BS8485:2015+A1 2019 which requires a minimum of 3.5 points of protection to be achieved by installation of a suitable combination of measures detailed below:

Table 4: Gas Protection Scores for Different Elements of Floor Slab, Ventilation and Barriers**BS8485+A1:2019 Table 5 Gas protection scores for structural barriers**

PROTECTION ELEMENT/SYSTEM	SCORE	COMMENTS
Floor and substructure design		
Floor slabs		
Block and beam floor slab	0	<i>General – score conditional that breaches of slab are sealed</i>
Cast in situ ground-bearing floor slab (with only nominal mesh reinforcement)	0.5	
Cast in situ monolithic reinforced ground-bearing raft or reinforced cast in situ suspended floor slab with minimal penetrations (with only nominal mesh reinforcement)	1 or 1.5	<i>To achieve 1.5, raft or suspended slab to be well reinforced to prevent cracking and minimal penetrations</i>
Basement floor and walls to BS 8102:2009, Grade 2 waterproofing – See notes in BS8485:2015+A1:2019	2	
Basement floor and walls to BS 8102:2009, Grade 3 waterproofing - See notes in BS8485:2015+A1:2019	2.5	<i>Conditional that waterproofing is not based on geosynthetic clay liner</i>

BS8485:2015+A1:2019 Table 6 Gas Protection Scores for Ventilation Protection Measures

PROTECTION ELEMENT/SYSTEM	SCORE	COMMENTS
Pressure relief pathway (usually formed by low fines gravel or with a thin geocomposite blanket with strips terminating in a gravel trench external to the building)	0.5	<i>Whenever possible, a pressure pathway relief pathway (as a minimum) should be installed in all gas protection measures systems. If a layer has a low permeability and/or is not terminating in a venting trench (or similar), then the score is zero.</i>
Passive sub floor dispersal layer Very good performance Good performance Media used to provide the dispersal layer are: • Clear void • Polystyrene void forming blanket • Geocomposite void former blanket • No-fines gravel layer with gas drains • No-fines gravel layer	2.5 1.5	
Active dispersal layer, usually comprising fans with active abstraction (suction) from a subfloor dilution layer, with roof level vents. The dilution layer may comprise a clear void or be formed of geocomposite or polystyrene void formers	1.5 to 2.5	<i>This system relies on continued serviceability of the pumps, therefore alarm and response systems should be in place. [See Annex B].</i>
Active positive pressurisation by the creation of a blanket of external fresh air beneath the building floor slab by pumps supplying air to points across the central footprint of the building into a permeable layer, usually formed of a thin	1.5 to 2.5	<i>This system relies on continued operation of the pumps, therefore alarm and response systems should be in place. [See Annex B].</i>

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geocomposite blanket		
Ventilated car park (floor slab of occupied part of the building under consideration is underlain by a basement or undercroft)	4	<i>Assumes car park is vented, designed to Building Regulations 2000, Approved Document F.</i>
BS8485:2015+A1:2019 Table 7 Gas protection score for gas resistant membrane		
PROTECTION ELEMENT/SYSTEM	SCORE	COMMENTS
Gas resistant membrane meeting all of the following criteria: • Sufficiently impervious to gases with a methane gas transmission rate $<40.0 \text{ ml/day/m}^2/\text{atm}$ (average) for sheet and joints (tested in accordance with BS ISO 15105-1 manometric method) • Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions; • Sufficiently strong to withstand in-service stresses (e.g. settlement if placed below a floor slab); • Sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, dropping tools etc...); and to withstand in-service stresses (e.g. settlement if placed below a floor slab) • capable, after installation, of providing a complete barrier to the entry of the relevant gas; and • verified in accordance with CIRIA C735	2	<i>The performance of membranes is heavily dependent on the quality and design of the installation, resistance to damage after installation, and the integrity of joints.</i> <i>If a membrane is installed that does not meet the criteria, then the score is zero.</i>
See notes in BS8485:2015+A1:2019 regarding membrane requirements		

The gas protection measures should be detailed and installed in accordance with BRE 414 (2001). The Principal Contractor must ensure that the gas membrane is suitably protected from damage by follow on trades.

The design and detailing of the ground gas protection measures should be carried out by an appropriately experienced company and these should be approved in advance by Manchester City Council and the warranty provider.

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9 PHASE 3: PROVISION OF CLEAN COVER

9.1 General Requirements

Clean cover is required in gardens across all areas and also in areas of Public Open Space (POS) in the eastern part of the site in order to mitigate theoretical risk to human health.

The clean cover layer shall comprise;

- Garden areas – 600 mm thick layer with 450 mm of sub-soil and 150 mm of topsoil
- POS – 450 mm thick layer with 300 mm of sub-soil and 150 mm of topsoil

The clean cover system should consist of natural soils without anthropogenic material and based on industry best practice as outlined within BRE 465 and in line with NHBC Standards. In line with NHBC guidelines the cover system should contain no construction rubbish or debris. To avoid impact during the construction phase it is recommended that the cover soils be placed once external and internal works on the buildings are nearing completion.

There will negligible topsoil and subsoil generated from site won materials at this site so all this material will have to be imported. If any site won material is generated then it shall be appropriately validated to confirm suitability.

The developer will be responsible for importing and placement of a clean cover layer in areas on gardens and public open space. All garden areas where a cover system is required will be subject to plot-specific independent validation.

9.2 Provision of Subsoil

The sub-soil in residential gardens and areas of soft landscaping shall comply with BS 8601:2013: Specification for subsoil and requirements for use. This material shall either be a quarried product or be suitable clean natural soil from another development site imported through implementation of an MMP.

The garden and landscaped areas will require depth validation to satisfy the requirement of the Council of Mortgage Lenders (CML) in order to demonstrate that the appropriate thickness has been provided as a growing medium and chemical testing as set out in Section 12.

9.3 Provision of Topsoil

The topsoil in residential gardens and areas of soft landscaping shall comply with BS 3882:2015: . Specification for topsoil. This material shall either be:

- A product from a greenfield producer, or
- Be suitable clean natural topsoil from another development site imported through implementation of an MMP; or
- Be produced by manufacture at a suitably permitted site.

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Topsoil shall, wherever practicable, be used immediately after its import, if this is not possible it shall be stored in stockpiles of heights not exceeding 2.0m; topsoil shall not be stockpiled for more than two years. Topsoil shall not be unnecessarily trafficked or mixed with other materials upon delivery to the

The garden and landscaped areas will require depth validation to satisfy the requirement of the Council of Mortgage Lenders (CML) in order to demonstrate that the appropriate thickness has been provided as a growing medium and chemical testing as set out in Section 12.

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10 VERIFICATION OF PHASE 1 WORKS

10.1 General

All remediation and enabling works completed will be documented within a Validation Report which will eventually make part of the overall verification report for the site. The Validation report is required to be compiled in general accordance with the Environment Agency document 'Land Contamination: Risk Management' LCRM - 2019.

10.2 Verification Sampling & Testing – Contamination

Validation evidence should include results of field screening and chemical analysis to confirm that all impacted material has been suitably dealt with, validation that a suitable depth of remediation cover is available, soil audit detailing material movements in line with the requirements of DoWCoP MMP, any waste transfer notes, photographic evidence, surveys etc....

Validation samples will be collected from all materials that are to be subject to movement and for materials to be imported onto site to facilitate the proposed residential development. The general sampling interval will be as follows:

- Made Ground to be excavated and recompacted below the existing hardstanding in the area of the former Works – Sample 1 per 500 m³;
- Fill already Imported and stockpiles – Sample 1 per 1,000 m³;
- New fill to be imported – Sample 1 per 1,000 m³. Note that this will be clean natural soils imported in accordance with the site's MMP declarations and should be low risk clean material.

Soil samples destined for chemical analysis will be collected at regular intervals in appropriate sampling containers. All samples will subsequently be stored in cooled boxes prior to submission to a UKAS / MCERTS accredited laboratory. The testing suite and compliance criteria are set out in Appendix C.

All samples will be collected using appropriate PPE and sampling equipment that will be cleaned at each sampling location.

Samples will be obtained in broad compliance with BS5930:2015 – Code of practice for site investigations, and BS10175:2011+A2:2017 – Investigation of potentially contaminated sites – Code of Practice.

Laboratory chemical analysis results will be assessed. Where material is found to contain concentrations of potential contaminants at levels in excess of the site specific screening criteria (as detailed within Appendix C), the remediation contractor will be required to undertake further assessment and contact the supervising consultant for recommendations on the appropriate use for the material. Materials not assessed as being suitable to remain on site may be disposed off-site to a suitable waste management facility.

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10.3 Verification Testing Geotechnical

Validation evidence should include results of field testing and laboratory analysis to confirm that all earthworks material have been placed to meet the Specification. The geotechnical testing and verification requirements are set out in Appendix A.

10.4 Survey of Obstructions left in-situ

Subsurface structures should be grubbed out to a depth of at least 2m below existing ground level. Where any obstructions are left below this depth they should be recorded and the position surveyed. The supervising engineer should be advised if any obstructions are left below this depth.

10.5 Earthworks Levels

Final finish levels shall be provided by the developer and the thickness of the road design and working platforms need to be provided by the Principal Designer. For the remediation and enabling works the following levels are expected to be required: (subject to change)

- The Sub-Formation Level and side batters;
- The top of the Development Zone general fill;
- The finished ground level on top of the granular capping;
- Appropriate site plans showing extent of any excavations and where site-won soils have been placed and their origin/Class;

A full as-built survey shall be carried out on completion of the works.

10.6 Phase 1 Verification Report

Verification of the earthworks and remediation will be required to be presented in a sufficiently detailed Verification Report. The Verification Report will document the source of materials, their processing/treatment and where the materials are moved to. The Verification Report will document any changes that have been made and contingency arrangements implemented such as encountering unexpected contamination. The following items will be included in the Verification Report, although this is not an exhaustive list and constitutes the basic quality control procedures:

- (i) Description of the works;
- (ii) Description of how the use of materials links with this Remediation Strategy and the Earthworks Specification;
- (iii) Contractor's documentation (e.g. method statements, plant data sheets etc.);
- (iv) Manufacturer's/ supplier's product documentation (e.g. compliance certificates & delivery notes);
- (v) Contractor's daily progress records;
- (vi) Verification Engineer's daily logs including photographic records;
- (vii) As-built drawings, as a minimum, to include surveys of:

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- The Sub-Formation Level and side batters;
 - The top of the Development Zone general fill;
 - The finished ground level on top of granular capping or working platforms;
 - Location and numbering system of samples taken for laboratory testing;
 - Appropriate site plans showing extent of any excavations and where site-won soils have been placed and their origin/Class;
- (viii) Results of geochemical validation testing compared to validation targets;
- (ix) Results of geotechnical testing and comparison to validation criteria;
- (x) Copy of all permits and licences and statutory notifications (e.g. notification of Licensable Asbestos Works);
- (xi) Any relevant statutory correspondence;
- (xii) CL:AIRE MMP Qualified Persons' Declaration(s);
- (xiii) Records of earthworks including those required to comply with the CL:AIRE DoWCoP Materials Management Plan such as materials' tracking records;
- (xiv) Details of any unexpected contamination encountered and how it was investigated, assessed and mitigated;
- (xv) Records of any imported topsoil, subsoil and soil conditioning material for the site complete with laboratory test certificates demonstrating that the material is suitable for use (as appropriate);
- (xvi) Environmental monitoring data (e.g. asbestos fibre monitoring, noise, odour, etc....);
- (xvii) Details of the disposal of materials off site including quantities, test results, a copy of all Waste Consignment Notes/ Chain of Custody notes:

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11 VERIFICATION OF PHASE 2 GAS PROTECTION: INSTALLATION VERIFICATION

The designer of the ground gas protection system should also design the verification requirements and get this agreed with the Local authority and warranty provider. All stages of the gas protection measures should be verified including the height of any sub-floor voids, the location, number and state of air/ventilation bricks and the membrane installation.

BS 8485:2015 + A1 2019 operating alongside the CIRIA 735 (2014) code of practice states Independent Gas Membrane Testing and Verification Programs are as important as the design and installation process. Because each project is unique in terms of size, construction type, ground gas protection system and applicator experience it is recommended that a Validation and Verification program is in place prior to the employment of any specialist application company in order that all risks are correctly assessed. The installation process should be verified through site inspection, photographic evidence and a report. It is unlikely that verification will require integrity testing of barriers/membranes due to the protection measures only being required to meet Characteristic Situation 2/NHBC Amber 1 conditions.

The verification records should be compiled into reports as the development progresses and submitted to the Local Authority and warranty provider.

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Following completion of remedial works in Phase 1, all garden areas and POS will require placement of a clean cover layer to complete the remediation of earthworks.

The chemical quality and thickness of soil placed in gardens should be confirmed through sampling, laboratory testing and inspections of soil thickness. A verification letter report should be included for each batch of plots.

Subsoil and topsoil shall be free of any deleterious materials, such as buildings materials, timber, plastics, rhizomes of invasive plants etc.... and conform to the requirements of BS 8601:2013 and BS 3882:2015.

12.1 Testing

The chemical testing requirements for topsoil and subsoil are presented in Table 5:

Table 5: Specification for Testing of Cover Systems		
Material Use	Testing Frequency	Suite of Analysis
Site Won Subsoil and Topsoil – very limited volumes anticipated	1 Sample per 25 m ³	See Appendix C
Imported Subsoil Greenfield Source	1 Sample per 200 m ³	See Appendix C
Imported Subsoil Brownfield Source	1 Sample per 50 m ³	See Appendix C
Imported Topsoil Greenfield Source	1 Sample per 200 m ³	See Appendix C
Imported Topsoil Brownfield Source	1 Sample per 50 m ³	See Appendix C
With a minimum of three samples per source.		
The soils should meet the chemical criteria specified in Appendix C.		

Inspection pits should be excavated at a frequency of one pit per plot to confirm the soils have been placed at the appropriate thickness as set out in Table 3.

12.2 Validation Reports

Soil Cover Validation Reports will be issued for sets of plots or areas of POS as this work is completed to confirmation the placed thickness within each plot/areas of POS and compliance with chemical testing criteria. Each report will contain the following information:

- Details of the provenance of the topsoil/subsoil;

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- Chemical test data;
- An interpretation of the chemical data indicating whether the soils are suitable for use in a clean cover layer;
- A drawing indicating the location of cover thickness validation trial pits; and
- Photographs of the excavated inspection pits confirming the thickness of placed soils.

Soil Cover Validation Reports may need to be issued to the Client, Local Authority and to the developers housebuilder warranty provider (e.g. NHBC) by email.

Appendix A:

Development Plans

830 01-CIVIC-CS-GA 110 T01 Proposed Site Levels Strategy

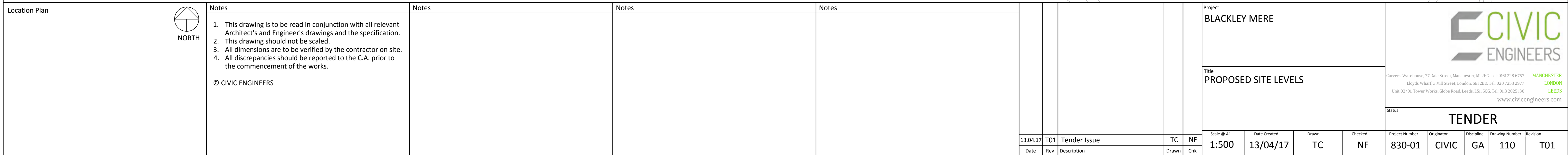
830 01-CIVIC-CS-GA 120 Construction Areas & Build Ups

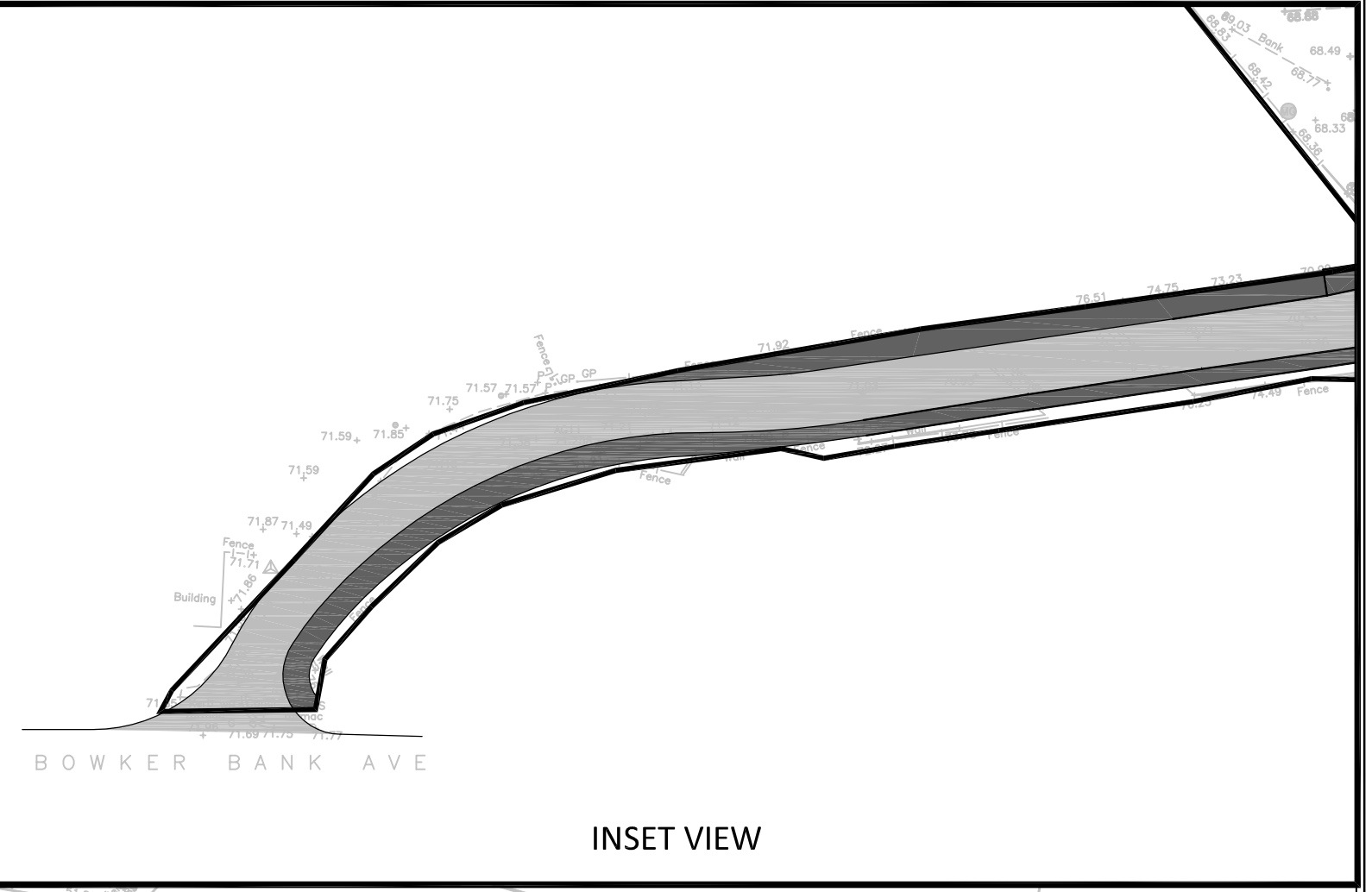
830 01-CIVIC-CS-GA 171 Proposed Formation Level Layout

830 01-CIVIC-CS-GA 181 Scope of Works – Phasing Overview

830 01-CIVIC-CS-GA 100 P02 General Arrangement Levels Plan-GA 005

830 01-CIVIC-CS-GA 110 Proposed Site Levels





Proposed Carriageway Construction - Shared Space

200x100x60mm Thk Concrete blocks by Marshalls or similar approved.
8mm Jointing Sand to BS7533:3; Table D3.

30mm Thk compacted sharp sand binder course to B7533-3; Table D2, Category II.

70mm Thk dense coated macadam road base (32mm coarse aggregate) to BS EN 13108-1

290mm Thk DTP Type 1 granular material sub-base to CL 803 Specification for Highway works.

Proposed Carriageway Construction - Full Depth

40mm HRA 30/14 f surf 40/60 (PD6691 Annex C) overlay with 14mm (grey chip) pre-coated chippings with clear binder applied at minimum rate of 10kg/m² to achieve average texture depth of 1.2mm (measured to BS-EN 13036-1) PSV 60+, Surface Course to Clause 943, Specification for Highways Works

60mm Thk AC20 Dense binder course (PD6691 Annex B) 40/60.

150mm Thk AC32 Base (PD6691 Annex B) 40/60 with a layer of Tensar Tri-Ax Geogrid..

320mm Thk MOT Type 1 granular material sub-base. Based on 5% CBR value. If different CBR value is encountered onsite then refer to Table A. Capping layer may be used if CBR values cannot be met.

Proposed Permeable Paving Construction

200x100x80mm Thk Permeable Concrete blocks

30mm Thk of single sized 5mm clean crushed stone to Table D.6 BS 7533-3, or as Block Manufacturer's recommendations

Terram 1000 or similar approved

100mm Dense Bitumen Macadam (32mm aggregate) to BS EN 13108-1 (AC 32 dense bin). (See Note for Core drilling details)

Terram 1000 or similar approved

100mm Thk Upper sub-base 4/20 Table D.5, BS 7533-3 (20mm-5mm)

Terram 1000 or similar approved

240mm Thk of lower sub-base 4/40 Table D.5, BS 7533-3

Terram 1000 or similar approved

Proposed Footway Construction

20mm Thk AC6 Dense Surface Course. Surf 100/150 to BS EN 13106 Part 1.
See Landscape architects drawings for colour

60mm Thk AC 20 Dense Binder Course. Bin 100/150 to BS EN 13106 Part 1.

150mm Thk MOT Type 1 granular material sub-base.

Proposed Tactile Paving

400mm x 400mm buff-coloured Tactile Paving units to BS 7997:2003 bedded on 30mm Thk laying course, medium-course sand on 150mm Thk Type-1 sub-base

Proposed Landscaping - Public

150mm Thk well-graded and tilled topsoil, Seeded with Flowering meadow mix (WFG2) to Landscape Architect Specification.

450mm Topsoil Capping layer/Growing medium to Landscape Architect specification
On layer of Coloured Geotextile liner, subject to agreement with the local planning authority.

Proposed Landscaping - Private Gardens

150mm grass turf to Landscape Architects specification

450mm Topsoil Capping layer/Growing medium to Landscape Architect specification
On layer of Coloured Geotextile liner, subject to agreement with the local planning authority.

Self Binding Gravel Path

50mm Self Binding Gravel

150mm Type 1 MOT Sub Base layer

Colour to Landscape Architect specification.
On layer of Coloured Geotextile liner, subject to agreement with the local planning authority.

Location Plan

Notes

- This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and the specification.
- This drawing should not be scaled.
- All dimensions are to be verified by the contractor on site.
- All discrepancies should be reported to the C.A. prior to the commencement of the works.

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Notes

Notes

SUB BASE ONLY DESIGN							
SURGRADE CBR (%)	2.5	3	4	5	6	7	8
SUB BASE (TYPE 1) mm	450	420	360	320	290	250	200
TOTAL THICKNESS mm	450	420	360	320	290	250	200

SUB BASE AND CAPPING DEIGN							
SURGRADE CBR (%)	2.5	3	4	5	7	10	15
SUB BASE (TYPE 1) mm	350	320	270	240	220	180	150
CAPPING (SERIES 600) mm	250	240	220	210	190	170	150
TOTAL THICKNESS mm	600	560	490	450	410	350	300

TABLE A

Notes

01.11.17	T03	Issued for Tender	TC	PM
04.08.17	T02	Issued for Tender	TC	PC
13.04.17	T01	Issued for Tender	TC	NF
Date	Rev	Description	Drawn	CHK

Project

BLACKLEY MERE

Title

CONSTRUCTION AREAS & BUILD UPS

Scale @ A1

1:500

Date Created

Apr 17

Drawn

TC

Checked

NF

Project Number

830-01

Originator

CIVIC

Discipline

GA

Drawing Number

120

Revision

T03

Status

TENDER

Carver's Warehouse, 77 Dale Street, Manchester, M1 2HG. Tel: 0161 228 6757

Lloyds Wharf, 3 Mill Street, London, SE1 2BD. Tel: 020 7253 2977

Unit 02/01, Tower Works, Globe Road, Leeds, LS11 5DU. Tel: 0113 2625 198

www.civicingengineers.com

MANCHESTER LONDON LEEDS



Location Plan



Notes

1. This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and the specification.
2. This drawing should not be scaled.
3. All dimensions are to be verified by the contractor on site.
4. All discrepancies should be reported to the C.A. prior to the commencement of the works.

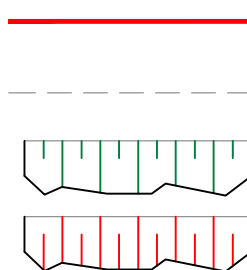
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Notes:

Notes

1. Site boundary as per Architect's masterplan received on 19 April 2017.
2. Due to lack of topographical information, certain areas are under review and subject to change.
3. For the coordinates of setting out points refer to Civic Engineer's drawing GA(172).
4. For formation level sections refer to Civic Engineer's drawing SE(030).

Note



- Site boundary

- Approximate toe of platform

- Fill Grading

- Cut Grading

[illegible]

Project	
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BLACKLEY MERE

Title

PROPOSED FORMATION LEVEL LAYOUT

Scale @ A

Date Created

Drawn

Checked

Project Number

Originator

Discipline	Draw
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Number	Revision
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Carver's Warehouse, 77 Dale Street, Manchester, M1 2HF; Tel: 0161 228 6757 MANCHESTER
Lloyds Wharf, 3 Mill Street, London SE1 2BD; Tel: 020 7253 2977 LONDON
Unit 02/01, Tower Works, Globe Road, Leeds, LS11 5QE; Tel: 0113 2025 130 LEEDS
www.civiceengineers.co.uk

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CONSTRUCTION