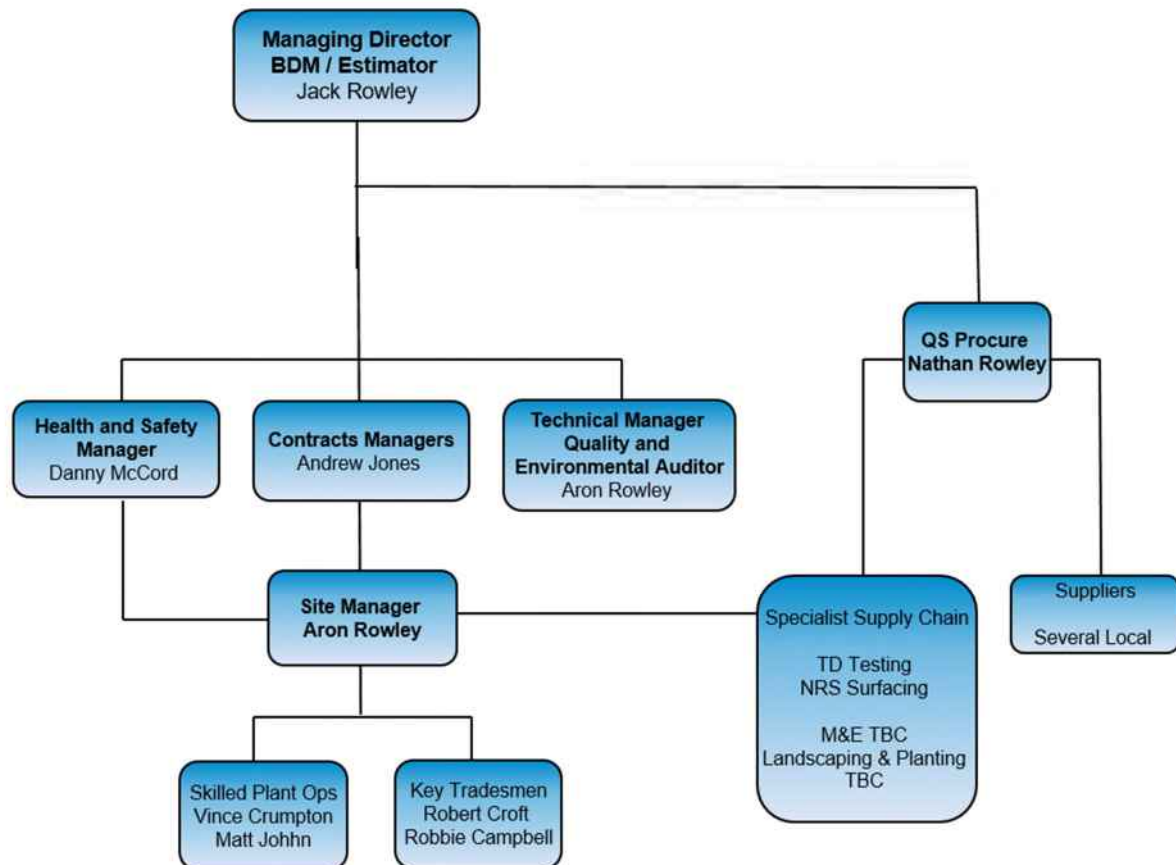


CONTRACT NO: C305		CONTRACT NAME: BODDINGTONS BREWERY		ISSUE NO: AJ001 Rev D	
Contract Title and Address: Boddingtons (Former Brewery) Gt Ducie Street (Francis Street), M3 1PT				START DATE: 01/09/2022	
				DURATION: 14 WEEKS	
1.0	The Project Team				Action
1.1	The Client Clarion Level 6 6 More London Place Tooley Street London SE1 2DA				
	Name: Garath Watters	Tel: 07739 194897	Email: gareth.watters@clarionhg.com		
1.2	Clients Agent Arcadis (UK) Limited. Suite 1A. 4 Piccadilly Place. Manchester. M1 3BN.				
	Name: Paul Haniak	Tel: 07827553296	Email: paul.haniak@arcadis.com		
1.3	Principal Designer Ridge & Partners 7 Brewery Place, Brewery Wharf, Leeds LS10 1NE				
	F10 Provided	Yes	No	To be checked	
	Name: Steve Silver	Tel: 01132421672	Email: Stevesilver@ridge.co.uk		
1.4	Architect Assael Architecture Limited 123 Upper Richmond Road, London SW15 2TL				
	Name: James Baron	Tel: 020 7736 7744	Email:		
1.5	Structural Engineer SGI Phoenix House, Manchester M2 4JF				

	Name: Amere Jones	Tel: 0161 837 1500	Email:	
1.6	Mechanical & Electrical Engineer Wallace Whittle Suite 516, Chadwick House, Birchwood Park, Warrington, WA3 6AE			
	Name: Daniel Young	Tel: 07518 388482	Email: Daniel.Young@wallacewhittle.com	
1.7	Principal Contractor C&R Ltd Telephone: C&R Ltd Construction & Remediation Managing Director: Jack Rowley Mobile: 07582000011 Contract Manager: Andrew Jones Mobile: 07590118200 Senior QS: Jack Rowley Mobile: 07582000011 C&R Ltd SHE Manager: Danny McCord Mobile: 07919591284 Site Manager: Aron Rowley Mobile: 07925 854943 Quantity Surveyor (Procurement): Nathan Rowley Mobile: 07933607594 Environmental Engineer: Tom Magee Mobile: 07484872230 Senior Engineer: Aron Rowley Mobile: 07925854943			

C&R Ltd

SITE ORGANOGRAM



1.0	The Project Team	Action
1.4	This Project Site Team Andrew Jones Contracts Manager will be full time on this works as its our first scheme for Clarion as Lead Contact and Project Manager. Andrew has 30 years of site experience and NVQ Level 4, SMSTS, First Aid and CSCS. Aron Rowley is Project Engineer has HNC Civil Engineering, SMSTS, Street Works Supervisor Temporary works co-ordinator and CSCS. Aron is responsible for engineering matters and quality of works compliance and is full time on site. Aron would be Site Manager responsible for site works if Andrew Jones not on site. Tomas Magee is Environmental Engineer has BSc in Environmental Engineering SMSTS, Street works Supervisor and CSCS. Tom is full time at site and responsible for all environmental matters on site. Danny McCord is our Company Health and Safety Advisor. Danny audits all site and provides monthly continuous safety training and Dany is a Mental Health coach. Danny CV has been issued at PQQ and confirms his safety consultant qualifications including NEBOSH IOSH and SMSTS.	All C&R Team
1.5	Jack Rowley is our MD and Estimator. Jack is a qualified Civil Engineer (BSc Civil Eng) and has over 25 years' experience with IOSH and NEBOSH in Health and Safety. If Andrew Jones is off site at any time (Andy is planned to be full time at site) Jack Rowley shall be in attendance at site to support the project team.	
1.6	Our Operations team, plant operators and site operatives all have a minimum of 3 years site experience and CSCS qualification. We accept NPOR's National Plant and CPCS for Plant operative certifications	
1.7	Other Details (Requested 9.8.22 and contained in Construction Environmental Monitoring Plan (CEMP) August 2022 and Remediation Strategy Implementation plan (RSIP) issued to EHO W/C 1.8.22) Display of an emergency contact number; # C&R Emergency Phone Number (will be on signs on the site fencing and on the local resident's letter drop) is 07599 035322. Details of Wheel Washing; # Concrete on site will be maintained to ensure clean access and egress lorries will not run on soil on site. Furthermore, we will have a jest wash and gate man on stand by and road sweeper facilities as and when required. Note please the Construction Environmental Monitoring Plan (CEMP) that covers noise dust vibration control and monitoring. See Appendix 2. Dust suppression measures; # All works will be subject to dust suppression from the dust boss and site bowser for the works and water system for any crushing. Note please the appended CEMP that covers noise dust vibration control and monitoring. Compound locations where relevant; # Site Compound is as the site plan located in Appendix 1.	

1.8	<i>Consultation with local residents/local businesses;</i> <i># We will issue letters to all local residents and businesses and hold an open evening to discuss the works. This will be detailed in the letter drop.</i> <i>Location, removal and recycling of waste;</i> <i># The works are of sustainable design in recycling and bio remediation as set out in the Remediation Strategy Implementation plan (RSIP)..</i> <i>Routing strategy and swept path analysis;</i> <i># This is noted in the outline construction management plan as approved under the planning consent and expanding to further in Appendix 2. The swept path relates to 'construction logistics plan 1' as set out in the approved outline construction management plan. However, the footway will be inspected daily and maintained by C&R during the works with jet wash and brush sweeper to ensure clean at all times</i> <i>Parking of construction vehicles and staff; and</i> <i># Construction Vehicles will be parked off site at a local procured facility. Contractors will be provided information on the alternative sustainable transport modes, including tram, bus and train.</i> <i>Sheeting over construction vehicles.</i> <i># All lorries exiting site are subject to pre automatic sheeting as detailed in the appended CEMP.</i> Please note all above items in 1.7 are covered in the CEMP RSIP and MMP in detail. Issued CEMP and RSIP to EHO W/C 1.8.22 Health & Safety Principles and Objectives C&R Ltd Principles and Objectives aim towards: - - Zero accidents/incidents - All employees with positive attitudes towards safety - Repeat business - HSE/External bodies confidence and zero HSE Actions - Zero lost time due to unsafe and inefficient working practices - Reduced insurance costs - Contract completion on time with minimum disruption - Comply with the current C&R Ltd Safety Policy and procedures - C&R Ltd are OHSAS 18001 & ISO 14001 accredited and have a full set of S.H.E procedures which are operated on all projects. Please find attached	
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	example of the S300 C&R Ltd directory of safety documents which will be implemented and adhered to throughout the duration of the project.	
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1.9

Accident/Incident Reporting

Accident/Incident occurs

S053- Accident Record, to be filled in by the Site Manager and sent to the SHE Manager for review.

S054- Accident/Incident Investigation Report to be generated at the discretion of the SHE Manager after his initial review to determine cause of the issue and for avoidance of repetition.

The original copies of the S053 and if applicable S054&S055 are sent in to the SHE Manager with copies of all forms sent to the Construction Director.

If the Accident is Reportable i.e.

1. Fatality and major injury
2. Injuries Resulting in incapacity for more than 7 days
3. Dangerous Occurrences
4. Specified diseases

It is the duty of the Employer of the injured party to report the incident and keep C&R Ltd informed of subsequent events i.e., medical treatment and return to work.

1.9.1

The Accident/ Incident is Reportable if:

1. Collapse, overturning or failure of any load bearing part of any lift. hoist, crane, derrick, MEWP, excavator, piling rig or forklift truck.
2. Collapse or partial collapse of any scaffold over 5m high or fall of any cradle
3. Collapse of 5tonnes or more of any building or structure, or any false-work, or any wall or floor in any workspace
4. Explosion, bursting or collapse of any closed vessel.
5. Contact with arcing from any over-head electric cable
6. Electrical short circuit with fire or explosion
7. Explosion or fire caused by any material resulting in stoppage of work or plant for more than 24 hours.
8. Uncontrolled release of 100kg or more of flammable liquid, 10kg or more of a flammable liquid above its boiling point or 10g of a flammable gas inside a building and 500kg or more externally
9. Uncontrolled release of any biological agents
10. Accidental ignition of an explosive
11. Failure of any load bearing part of a container
12. Bursting, explosion or collapse, or fire involving a pipeline
13. Specific incidents involving road tankers
14. Specific incidents involving dangerous substances being conveyed by road
15. Escape of any substance in a quantity sufficient to cause death, injury or damage to health
16. Malfunction of any breathing apparatus whilst in use or when being tested before use.

1.9.2

There are also Dangerous Occurrence's which are required to be reported which are as follows:

1. Unintended collapse of: any building or structure under construction, alteration or demolition where over five tonnes of material falls; a wall or floor in a place of work; any false-work
2. Explosion or fire causing suspension of normal work for over 24 hours
3. Sudden, uncontrolled release in a building of: 100 kg or more of a flammable liquid; 10 kg or more of a flammable liquid above its boiling point; or 10 kg or more of a flammable gas; or 500 kg of these substances if the release is in the open air
4. Accidental release of any substance which may damage health

1.9.3

There are also Diseases which are required to be reported which are as follows:

1. Certain poisonings
2. Some skin diseases such as occupational dermatitis, skin cancer, chrome ulcer, oil folliculitis/acne
3. Lung diseases including occupational asthma, farmer's lung, pneumoconiosis, asbestosis, mesothelioma
4. Infections such as leptospirosis, hepatitis, tuberculosis, anthrax, legionellosis and tetanus
5. Other conditions such as occupational cancer, certain musculoskeletal disorders, decompression illness and hand-arm vibration syndrome

If an incident occurs which is reportable, this will be reported to the HSE either by C&R Ltd SHE Manager or the Employer of the injured or affected party.

1.9.4

Specified injuries to workers:

The list of 'specified injuries' in RIDDOR 2013 (regulation 4) includes:

1. A fracture, other than to fingers, thumbs and toes;
2. Amputation of an arm, hand, finger, thumb, leg, foot or toe;
3. Permanent loss of sight or reduction of sight;
4. Crush injuries leading to internal organ damage;
5. Serious burns (covering more than 10% of the body, or damaging the eyes, respiratory system or other vital organs);
6. Scalping's (separation of skin from the head) which require hospital treatment;
7. Unconsciousness caused by head injury or asphyxia;
8. Any other injury arising from working in an enclosed space, which leads to hypothermia, heat-induced illness or requires resuscitation or admittance to hospital for more than 24 hours.

1.10	Site Rules	
1.10.1	Anyone working on or visiting this site <u>must sign in</u> and <u>out</u> of the site office- no one is allowed to work on site unless they have attended a site-specific Safety, Health and Environmental induction.	
1.10.2	All operatives must have read and understood a suitable and sufficient RAMS for their work element which has been reviewed and accepted by C&R Ltd Management, and they must also sign a RAMS briefing sheet to acknowledge their understanding of how the planned works are to be carried out.	
1.10.3	This is a No Smoking Site. Smoking may be permitted at a designated point this will be directed by the Site Manager during the SHE Induction.	
1.10.4	C&R Ltd operate a strict Drugs and Alcohol Policy, anyone found be taking or thought to be under the influence of drugs or alcohol will be removed from site and the incident will be reported to the Director who is responsible for SHE matters within their Company for disciplinary action to be taken.	
1.10.5	If you spend a large part of your working life in the open air, it is important to wear suitable clothing if you are to avoid ill health or injury. As a minimum, on this project you must wear a safety helmet, safety footwear and high visibility clothing at <u>all</u> times. All personal protective equipment/clothing must be kept in good condition and maintained. Please report <u>any</u> PPE problems to your foreman/supervisor. Additional personal protection i.e., for your hands, eyes, ears etc. must be worn when the work activity requires it.	
1.10.6	No one is allowed to deviate from the designated access route (as indicated on the Contractors Site Layout Drawing, Appendix 1) to and from the work place. Keep existing footpaths/routes clear and safe for pedestrians. <i>If barriers are erected you must not cross/climb over them.</i> The places at which you work and the access to these places should be kept free from unnecessary equipment, materials and substances that are liable to cause people to trip or slip. Access roads must be kept free from spoil and debris at all times. When excess dust is produced it must be reduced using appropriate measures such as dampening down with water sprays. Obey all warnings/hazard notices and speed limit signs.	
1.10.7	C.O.S.H.H Assessments must be readily available for all materials/substances on site. Ensure that you read <u>and</u> understand them prior to using any hazardous materials and you must also advise any other third parties who may be affected by the materials in use. Copies of <u>all</u> C.O.S.H.H Assessments are available in the Site Offices.	
1.10.8	A lot of injuries received at work are the direct result of bad lifting and carrying practices-you can reduce the chances of injuring yourself by avoiding Manual handling whenever possible-use a machine.	
1.10.9	Never use a scaffold if you think it is unsafe. If you find that the scaffold is unsafe, report the faults to your Supervisor so that he can have them put right. Scaffold alterations may only be carried out by persons who are trained and competent, normally scaffolders. Everyone should note that a 'Scaff Tag' system will operate for the duration of this contract and this will apply to both tube & fitting as well as mobile towers.	

1.10.10	All ladders, steps etc., must be inspected prior to use. Ladders may only be used for access and egress to a working platform or location, and for work of short duration. In all instances, ladders & step ladders should only be used as a last resort following the elimination of safer systems of work i.e., mobile towers etc. All work operations to be carried out from step-ladders or ladders can only be undertaken following the issue of a LADDER PERMIT.	
1.10.11	When working near edges or openings, ensure that suitable guardrails and toe-boards are fitted. Ensure that wherever guardrails and toe-boards are erected that you do not cross or climb over them.	
1.10.12	All operators or machinery or equipment must ensure that they have their valid certificate with them, or a copy available for immediate inspection, when carrying out processes for which training is required i.e., scaffolding, abrasive wheels etc.	
1.10.13	Never attempt to operate mobile plant or lifting equipment unless you have a valid CPCS / C.T.A Certificate with you and are prepared to operate the item according to the training given. All certificates must be approved by C&R Ltd. Never use any plant/equipment that is defective. Any/all defects must be reported.	
1.10.14	Make yourself aware of the site's emergency <u>fire-drill</u> procedure-identify the position of fire extinguishers and other fire-fighting equipment. Also make yourself aware of the emergency site procedures, the route to the nearest hospital is displayed on the Site SHE Notice Board(s).	
1.10.15	If you are unfortunate enough to suffer any incident you must report <u>all injuries to the Site Manager</u> and ensure that first aid is given. This also applies to minor injuries-even small cuts and grazes can become infected if not treated promptly.	
1.10.16	Permits-to-work are required for the following: ▪ Permit to Work (Site specific); ▪ Permit to Pump; ▪ Permit to Dig/Break Ground; ▪ Confined Space Permit; ▪ Permit to Work on or near Live Services; ▪ Hot Work Permit; ▪ Permit to Work Off Step-Ladders or Ladders; ▪ Permit to Lift. ▪ Permit to Strike or Dismantle in respect of Temporary Works	
1.10.17	All excavations <u>must comply</u> with the requirements relating to avoiding underground services and providing support and protection, contained within the specified Risk Assessment and Method Statement before anyone enters them.	
1.10.18	If operating plant or vehicles, never reverse without a competent banks-man to guide you. As a pedestrian, do not walk behind moving plant, make yourself known to the reversing vehicle banks-man in the area. Be seen at all times.	

1.10.19	All portable electrical equipment must be 110v only and display an identity and test tag. Always use the correct tool for the job. Inspect the tool prior to use and then at regular intervals, never use any hand-held tools that are defective and report all defective tools to your Foreman/Supervisor.	
1.10.20	Good housekeeping is a number one priority on site because a clean site is a safe and environmentally friendly site. Keep your own work area clean and tidy, place all waste in suitable containers. As a minimum, this must be done at the end of every working shift or at the request of C&R Ltd's Site Management.	
1.10.21	Always respect the natural environment and the local community. Nuisance must not be caused to neighbouring areas i.e., noise must be within acceptable levels, if you believe you are causing a noise nuisance inform your supervisor. Please do not use abusive language whilst on site. When re-fuelling by hand use a funnel or container with a spout to prevent spillage. Drip trays must be used to contain any potential leaks from fuel driven plant. Do not allow any substances, i.e., cement, diesel, oil, silty water etc. to enter into any watercourses. Notify any leaks from tanks, plant etc. If a problem occurs, report it to your Foreman/Supervisor immediately. Spill clean-up kits are available on site, make sure you know where they are located and how to use them. The locations of Spill Kits will be identified in the Site Induction. If pumping water away from your works always request/follow instructions from your supervisor. Silty water (i.e., water containing suspended solids) must never be pumped directly into a watercourse. It must be treated prior to discharge (i.e., through settlement lagoons, by pumping onto grassland in order for it to soak-away naturally, through settlement tanks/skips or through straw bales etc.) from site. Always follow the instructions on the Permit-to-Pump, if in any doubt ASK! Take additional care when working in proximity to the existing properties.	
1.10.22	No fires are allowed on site.	
1.10.23	To prevent injuries and distractions we do not allow radio's, I-pods or the like to be used on site.	
1.10.24	Resist the temptation to play practical jokes and do not indulge in horseplay or running on site-such behaviour often leads to serious injuries.	
1.10.25	Always respect the toilet and welfare facilities provided for your use and report any deficiencies. Anyone found urinating on site or abusing these facilities will be removed from site.	
1.10.26	If affected, make sure you receive and understand the C&R Ltd "Precautions Against Risk of Illness for those Working in Contact with Sewage and Rat-Infested Premises Card (Weils Disease)"	
1.10.27	If affected, make sure you receive and understand the precautions required for working in Contaminated Land.	
1.10.28	Mobile phones must not be used while operating any construction plant or vehicles. Any-one using a mobile phone must stand in a safe area or in the site compound.	
1.10.29	Report all incidents to the Site First Aider(s) whose names are listed on the site S.H.E Notice Board.	

2.0	Contract Details	Action
2.1	Scope of Works including any Design Brief Enabling Works: - To establish welfare facility's & secure compound. - To install Herris fencing ensure that all site boundaries are fenced & secure & then Timber hoarding inclusive of passenger gates and vehicular gates to be installed. When hoarding complete herris fencing to be removed. - Disconnections of existing services and drainage. - Breaking out existing hardstanding and crushing for re-use. - Reduced level excavation including breaking out obstructions and crushing for reuse. - Remediation of localised area of contamination. - Up filling the site and construction of cover layer. - Pile probing. - Relocation of a highways sign that is close to the Great Ducie Street Boundary. - Disconnection, diversion and site clearance of utility infrastructure. - Timber hoarding inclusive of passenger gates and vehicular gates to be installed at the end of the project. Sub Structure: N/A Superstructure: N/A External Works: - Construction of the new sewer connection in Great Ducie Street - New site entrance from Great Ducie Street and obtaining Section 50 from Manchester City Council.	

2.2	Site Access and Limitations Initial site access will be via Francis Street into Total Car Parks & once the new permanent entrance is formed it will then be via Great Ducie Street. Traffic Management Co-ordinator: Andrew Jones / Tom Magee Street works Act Supervisor: Aron Rowley	
2.3	Programme See Attached Programme Risk Assessment and Method Statements by Specialist Contractors as required which will include but not be limited to: 1. Site Clearance Works. 2. Hand Excavate Trial Holes To Locate Services. 3. Timber Hoarding Installation Works. 4. Bulk Earthworks to Include Removal of Concrete Slabs & Relic Foundations. 5. Remediation Works. 6. Excavation of Hot Spots. 7. Crushing/Processing oversize concrete material down to a 6F5 product	

2.0	Contract Details (Cont'd)	Action
2.4	Public Relations: - Public Relations Manager: Action Plan • C&R Ltd will maintain its approach as a Considerate Contractor throughout this development. • C&R Ltd will maintain the site boundary fencing throughout their works on site to prevent the chances of any dangerous un-authorised access onto site both during and out of construction hours. Daily boundary checks will be undertaken & recorded on the E201 daily environmental record sheet. • Safety signage will be erected so as to inform and warn of any dangers linked the construction of this development • C&R Ltd will make efforts to minimise the impact of the construction of this development that may affect any members of public or surrounding properties and businesses. • Regular noise environmental readings shall be taken & recorded on the E201 daily environmental record sheet. • A periodic newsletter will be posted to all nearby businesses to advise them of the progress of the works being undertaken. • The site shall be responsive to any queries by the public or surrounding properties. • The Site Manager will deal with any complaints swiftly and these complaints will be logged and made available to the CDM Coordinator/Clients Agent and Client alike.	
3.0	Control of Main Hazards and Risks as Applicable: C&R Ltd S.H.E Procedures to be adhered to for all construction processes.	
3.1	Existing Services – Overhead/Underground Drawings from the appropriate statutory undertakers are to be made available and these will be posted on the Site Safety Notice board at all times. The location of the services that are to be altered will be identified and marked appropriately on site during the period of modification. Service Co-ordinator: Aron Rowley Deputy Co-ordinator: Tom Magee Cable Locator available: CAT 4 Plus Training required: Yes Permit to Dig prepared by C&R Ltd: Aron Rowley	

3.2 Plant Requirements

Lifting Operations:

We anticipate that the following areas of work will involve the use of lifting equipment:

1. *There are no contract lift operations envisaged at this time the general lifting operations will be covered on the S113 Repetitive Lifting Plan for putting general equipment into place such as Ground Water Pumps & associated equipment.*

Ground testing will be completed prior to commencement to ensure that the crane platform is suitable. This will be approved by a Structural Engineer.

The RAMS and copies of lifting plan, Appointed Persons certification are to be witnessed and approved by C&R Ltd Appointed Person/Crane Co-ordinator-.

All documentation will be reviewed and accepted to proceed by C&R Ltd SHE Department using the necessary (S084) Lift Plan Checklist procedure which will be adhered to.

Permit to Lift (S083) will be implemented.

Repetitive lifting operations for the tele-handler, HIAB Deliveries and excavators being used as cranes will be assessed as and when required. A repetitive lifting plan using C&R Ltd S113 document will be implemented by C&R Ltd Site Manager

Crane Co-ordinator: C&R Ltd SHE Manager & Company Appointed Person.

Piling Operations:

1. *(Insert project specifics) N/A*

Ground Testing will be completed to ensure piling platform sufficiency prior to commencement. This will be approved by a Structural Engineer.

The RAMS, copies of associated lift plans if required are to be reviewed as a minimum by the Contracts Manager for the project. C&R Ltd S.H.E Department will review as required.

Permit to Pile (S083) will be implemented.

Permit to Dig/Break Ground (S060) will also be implemented.

Plant Authorisation:

Plant Inspections will be carried out by the Sub-contractors who are providing and using the plant in line with the manufacturer's recommendations. However, it will be the responsibility of the C&R Ltd Site Manager to ensure that the inspections are completed and submitted to C&R Ltd in line with PUWER Regulations.

All mobile plant is to be operated under strict control of a banksman

3.4	Temporary Works (Earthworks/Scaffold/Cofferdams etc.) Refer to C&R Ltd Management of Temporary Works Procedure (S052) Temporary Works External Consultant: ALM Consult C&R Ltd Designated Individual: Danny McCord Temporary Works Co-ordinator (Not the Designer): Aron Rowley Appointed By: (Designated Individual) Signed Accepted By: (TW Coordinator) Signed Temporary Works Register (S124) to be completed by: Permits to Load and Dismantle Temporary Works will be issued by C&R Ltd Temporary Works Associated with the project include, but are not limited to: 1. Herris Fencing Installation & Daily Inspections along with Hoarding. 2. Drainage Shoring Systems 3. General Earthworks Temporary Stockpiles, Access/Egress, Edge Protection, Batters & Bunds	
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3.5	Confined Space Works Activities: Drainage Permits to Enter issued by: Aron Rowley/Tom Magee Training requirements: All operatives and staff directly involved are to be certificated. Where required for (United Utilities operations) staff will be City and Guilds Confined Space Entry trained.	
3.6	Vibration Works involving vibration will be monitored before and during the construction phase to ensure that any adjacent properties are not affected. Where possible and deemed to be necessary, vibration control measures will be implemented. Use of vibrating tools will be required and assessments will be completed before the use of the tool. Vibration magnitudes of the tools will be assessed and the required time constraints for the use of the tool per person in 8 hours will be determined and adhered to-operatives will be briefed accordingly.	

3.7	Manual Handling Masonry operations will involve repeated manual handling, however, the weights of bricks and blocks will not require any additional control measures due to the limited quantity of the materials involved. The manual handling hierarchy of control will be followed and specific assessments will be put in place as required. Installation of materials will always be done mechanically where possible, such as installation of kerbs, pavements, lintels, steel, pre-cast units.	
3.8	Working at Height: Where working at height is a risk, applicable control measures will be implemented such as: • Avoid the need to work at height where possible • WAH Hierarchy will be adopted. • Scaffolding erected by competent operatives and inspected every 7 days by a competent person • Use of MEWPS by trained operatives on suitable hard standings • Barrier off all areas where plant is in use	
3.9	General Excavations Site service plans, CAT Scan surveys and Permits to Dig will be completed and issued by: Aron Rowley Shoring Equipment will be used where required and also as described in the TW section of the plan.	
3.10	Drainage Excavations RAMS will be reviewed and signed off pre start of drainage works. To include confined space access and egress requirements with edge protection controls. Daily / twice daily inspections to be recorded using S111 by: Tom Magee	
3.11	Fire Risk Management and Controls: Andrew Jones	
3.11.1	Insurance Requirements: Covered In Company Insurance Policy	

3.11.2 **Emergency Services:** Contact the local Fire and Rescue Service to inform them of our project requirements. Fire Risk Assessments will be completed and periodically reviewed as required in line with C&R Ltd Safety Procedures

3.11.3 **NAMED PERSONELL:** Andrew Jones

The Responsible Person: Andrew Jones

Fire Marshalls: Tom Magee/Andrew Jones

Competent Person: S.H.E Department or External Consultants.
Danny McCord

Specify which Fire RA to be completed: RA 066 or RA 067
(Delete as applicable as discussed with S.H.E Manager. This could be a combination dependant on how the project progresses).
RA 066

Completed By: (This could be external consultant) Andrew jones

Reviewed By: Danny McCord

On Site Fire Controls: (List the specifics).

- Air Horns To Raise The Alarm & warn people.
- CO2 Fire Extinguishers.
- Foam Fire Extinguishers.
- Water Fire Extinguishers.
- Dedicated Muster Point.
- Site Signing In Register Sheet To Be Checked If The Emergency Evacuation Plan Is Used To Insure All Personnel Are Accounted For.

3.11.4

Fire Plan:

The following items are to be assessed and will compile the site fire plan. Please tick the boxes below as applicable:

- Is the site fire safety plan based on the fire risk assessment, specific to the site and reviewed and updated periodically as circumstances change? (6.2) ☐
- Does the fire safety plan detail, as a minimum, the following requirements stated in the *Joint Code of Practice*:
 - (a) the organisation of, and responsibilities for, fire safety and arrangements for recording all training given to site operatives? (6.2a) ☐
 - (b) general site precautions, fire detection and alarm systems, temporary emergency lighting, fire extinguishers and fire points? (6.2b) ☐
 - (c) the need for clear access to the site and buildings to be maintained at all times? (6.2c) ☐
 - (d) the need for escape routes inside the building, including corridors and stairwells, to be clearly signed and kept clear of obstructions as far as is reasonably practicable? (6.2d) ☐
 - (e) the locations of designated smoking areas where they are provided in compliance with no smoking legislation? (6.2e) ☐
 - (f) the requirements for a hot work permit regime where hot work cannot be avoided by other means? (6.2f) ☐
 - (g) temporary buildings and temporary accommodation, including location, fire protection, construction and maintenance? (6.2g) ☐
 - (h) fire escape and communications (including an effective evacuation plan and procedures for calling the fire and rescue service)? (6.2h) ☐
 - (i) fire and rescue service access, facilities and co-ordination? (6.2i) ☐
 - (j) instructions given to those on site of the required actions in case of fire? (6.2j) ☐
 - (k) security measures to minimise the risk of arson? (6.2k) ☐
 - (l) a materials storage and waste control regime, with particular reference to flammable and highly flammable materials? (6.2l) ☐
 - (m) the maintenance of temporary electrical installations? (6.2m) ☐
 - (n) the location of inverters and associated isolators where photovoltaic panels are being installed? (6.2n) ☐
 - (o) the use of fire retardant coverings? (6.2o) ☐
 - (p) arrangements for plant and vehicles? (6.2p) ☐
 - (q) measures to prevent fire spread from the site (where appropriate)? (6.2q) ☐

3.12

Diving Operations and Works near Water

N/A

3.13

Working with Explosives (Planned or Unplanned)

N/A

3.14	Working with Caissons or Compressed Air	N/A
3.15	Stability of Existing/Temporary Structures	N/A
3.16	Permit to Work Permits to work will be issued and controlled by C&R Ltd for the following operations: • Permits to Enter Confined Spaces including Top Man Records • Permits to Lift • Permits to Dig • Permits to Pump • Permits to Load and Dismantle • Hot Works Permits • Permit to operate on Live Electrical Apparatus • General Permit to Work for Ordinary Activities Specific contract requirements: • Permit To Dig • Permit To Enter Confined Spaces Including Top Man Records • Hot works Permit (Plant Maintenance)	
4.0	Selection of Sub Contractors:	
	C&R Ltd procedure for ensuring that sub-contractors are competent involves a detailed selection and audit process. Sub-contractors are required to complete an S11 Sub-contractor evaluation questionnaire which is reviewed for sufficiency by the C&R Ltd Director Jack Rowley & SHE Advisor Danny McCord. The questionnaire covers various SHE issues and the sub-contractor is required to provide various supporting documents as evidence of their competence. Upon review of the information the Director/SHE Advisor will either deem them competent to join the approved list or not. No Contractor is permitted to work unless either approval is given or dispensation is given. Dispensation is ONLY at the Construction Directors discretion. The S11 Competent Contractor Data Base is updated monthly.	

4.1

Site/Sub Contractor Audits:

C&R Ltd complete an S50 which is an internal SHE Audit on a two weekly basis. This is completed by a member of the Management team-most usually the Site Manager, in addition to this on a 4 Weekly basis the site is inspected and audited by the applicable C&R Ltd SHE Manager with an independent Safety Report completed and issued. (S003). The SHE Managers Spot Visits are also completed on a monthly basis and reports are issued

Regular 4 Weekly Safety meetings ARE held to plan the forthcoming work. This is attended by the C&R Ltd Site Team, Contracts Manager and SHE Manager.

The performance of sub-contractors is recorded in these meetings and if required as a result of poor performance the Construction Director is informed and an action plan to remedy the situation is established and acted upon.

4.2

Health and Safety Communication to Employees

Company Standard Communication Boards are to include:

4.3

Direct Employer to Employee/Sub-Contract Employee Communication Includes:

RAMS briefings and addendum documentation is completed with all operatives prior to work commencement.

Operatives are required to sign record documents to confirm that they acknowledge and understand the contents of the RAMS and that they will adhere to the contents at all times.

RAMS addendums are identified and are recorded if work patterns change and risks are re-evaluated. When addendums are required to the original planned works, the operatives involved are re-briefed accordingly and again will sign to acknowledge the contents of the addendum.

Tool Box Talks are periodically held with operatives which remind them of the risks involved and control measures required to mitigate the risks. Operatives are encouraged to actively contribute to the Tool Box Talks and at the end of each talk's there is generally a question and answer session.

Safety Alerts are distributed around the business by C&R Ltd SHE Manager- these cover various issues ranging from Legislation updates to general safety concerns.

Safety Alerts are displayed on the Site Safety Notice Boards which are located in the canteen/welfare areas and are also circulated directly to the sub-contractors.

4.4

Worker Involvement:

Sub-Contractors and Visitors are encouraged to voice concerns by reporting any issues on site. In order to do this observation cards are available on site which can be completed and placed in the Site Observation Box. In addition we also have a "You Said We Did" wipe board to encourage workers to easily pass comments which can be dealt with immediately by the site team as required.

The image displays three safety-related forms from CPUK (Civil Remediation UK):

- Observation Report Card:** A form for reporting observations. It includes fields for Project, Date, Time, Location, Employer, and Name (Optional). It also has a section for 'Your issues applicable to this Observation' with checkboxes for various hazards such as Access & Egress, Electricity, Fire & Hot Work, Hazardous Substances, Lifting Operations, Lighting & Signage, Machinery & Tools, Manual Handling, Noise & Vibration, Plant & Machinery, PPE, Public Danger, Traffic, Traffic Management, and Work at Height.
- Make Safety Personal:** A blue form with the CPUK logo and the text 'Make Safety Personal'.
- YOU SAID WE DID:** A wipe board with two columns labeled 'YOU SAID' and 'WE DID' for recording and addressing concerns.

5.0	Environmental Considerations	Action
	Environmental Liaison Manager: Reference to C&R Ltd Environmental Impacts and Aspects Register which is available upon request.	
5.1	Rivers/Water courses:	N/A
5.2	Trees:	N/A
5.3	Flora:	N/A
5.4	Fauna:	N/A
5.6	Planning Constraints:	N/A
5.7	Previous use of Land and Remediation Strategies: Boreholes taken: YES Additional samples required: NO Known contaminants (update as applicable): PAH'S Within working boundary with areas already identified. C21 TO C35 Hydro Carbons at significant depth outside of works vertical boundary. Selenium In Ground Water At WS108. Asbestos anticipated due to historical site history, but none identified in ground investigation report reference 15-175-R2-1 Phase 2 Geo Environmental Site Assessment Report From E3P. Decontamination if required: N/A At this time.	
5.8	Noise Limitation Working hours: Working hours will be in line with Manchester City Council's normal working hours for building site operation: - Monday to Friday: 7.30am to 6pm - Saturday: 8.30am to 2pm No noisy work will be done on Sundays or Bank holidays. Noise assessment: Completed as part of RAMS Submissions and also plant recorded on the Noise Register on the SHE Notice Board Plant assessed by: Tom Magee	

	CONSTRUCTION PHASE PLAN	FORM S001 Rev - D Page 25 of 33
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	Noise Meter available: Yes	
5.9	Waste Materials: Person responsible for: Tom Magee • Duty of Care Waste Transfer Notes: • Hazardous Waste Consignment Notes: C&R Ltd Hazardous Waste Registration Number for the site: N/A (Obtain this from Stuart Whittle) SIC Code for the Site: Existing Hazardous materials: Airborne hazards: General Dust from bulk earthworks activity's (Dust suppression will be in attendance at all times working/running with the plant movements around the site)	
5.10	COSHH Assessments will be carried out by: Sub-contractors to be included in the RAMS submission along with the relevant Data Sheet for the material. Briefings by: C&R Ltd Site Manager and Sub Contractors supervisors will brief operatives accordingly on the contents of the RAMS including COSHH Assessments prior to commencement after the induction has taken place. Typical materials include: Mortar, cement, concrete silica dust, diesel fuel, petrol, oil, paint, adhesives	
5.11	Proposed/existing hazardous materials: PAH'S Hydro Carbons at significant depth. Selenium In Ground Water At WS108. Asbestos anticipated due to historical site history, but none identified in ground investigation report reference 15-175-R2-1 Phase 2 Geo Environmental Site.	

6.0	Welfare & Site Coordination						
6.1	Plan of site showing office, compound and material storage required. See Attached Drawing (see site Traffic Management plan) Specific signage required: See Attached Drawing Welfare Arrangements Maximum No. of personnel anticipated to be on site: 17 <table><tr><td>Office Facility Requirements:</td><td>Secure Offices with galley area will be required</td></tr><tr><td>Mess facility requirements:</td><td>Hot and cold water YES Means of heating food YES Drying room YES Canteen YES Toilets 2+1 Washing facilities YES</td></tr></table> Electrical inspection: All cabins to undergo 12 monthly inspection and be certificated. All site temporary electric supplies to undergo a 3 monthly inspection and be certified Cleaning requirement: A local cleaning contractor will visit site as required and will complete a full clean of the welfare facilities Weekly inspections by: Andrew Jones/Tom Magee		Office Facility Requirements:	Secure Offices with galley area will be required	Mess facility requirements:	Hot and cold water YES Means of heating food YES Drying room YES Canteen YES Toilets 2+1 Washing facilities YES	
Office Facility Requirements:	Secure Offices with galley area will be required						
Mess facility requirements:	Hot and cold water YES Means of heating food YES Drying room YES Canteen YES Toilets 2+1 Washing facilities YES						
6.2	Emergency Procedures: • Services to be contacted- • Information to be displayed on all notice boards and at all phone points. • Fire plan to be prepared by: Andrew Jones & Signed Off By Danny McCord • Fire Safety Co-ordinator: Andrew Jones • Deputy Fire Co-ordinator: Tom Magee • Fire extinguishers/office set up: FirePro - 01254 388 450 • Fire certificate required: No • Alarm required: Yes (Air Horns) • Regular Two Weekly fire checks: S50 and deficiencies recorded on the Risk Assessment RA66 • First aiders: Andrew Jones/Tom Magee • First aid equipment: Located In Welfare Units & Main Site Office + In Company Pick Up Trucks.						

	CONSTRUCTION PHASE PLAN	FORM S001 Rev - D Page 27 of 33
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6.3	Security Security Fencing: Herris Fencing Temporary & Then Wooden Hoarding once installed. Out of hours security: Copeland Security Public protection/security: N/A Contact telephone Numbers: Copeland Security 08009554414 24hr	
6.4	Site Orientation and Training	
	Site Induction prepared by: Andrew Jones General Site Operatives and Managers Personnel are to watch the C&R Ltd Safety Induction Video and have the specifics of the site explained to them. All personnel to complete a Site Induction record form. After Induction RAMS briefings to take place as required. Short Duration Visitors Process: • Have the Site Specific Risks explained to them • Must complete a Next of Kin Induction form S015 and had the site specific risks verbally explained to them. • Must be escorted by a member of the C&R Ltd Site Team and must be signed in. Young Person's Induction Process: 16-18 year olds must: • Must receive a full Induction and complete a specific Young Persons Induction Form S014 • Prove a form of safety training such as a C.S.C.S Card or similar approved training. • Must have a specific RA and a nominated Full Time Supervisor (RAMS to be provided and issued to C&R Ltd SHE Manager for review prior to commencement on site). A Child e.g. Work Experience/Children: Minimum School Leaving Age (MSLA) Children below the minimum school leaving age (MSLA) must not be employed in industrial workplaces such as factories, construction sites etc, except when on work experience. Children Below MSLA Induction: • Must receive a full Induction and complete a specific Young Persons/Child Induction Form S014 • Must have a specific RA and a nominated Full Time Supervisor (RAMS to be provided and issued to C&R Ltd SHE Manager for review prior to commencement on site). • Parents must also have been informed of the processes to be completed by the child and a copy of the RAMS issued to them for their review and they must acknowledge receipt of this document. Specific Safety Training requirements for contract: Confined Space & Top Man Training Vehicle Traffic Marshal Training	
7.0	Implementation and Review	Action

	Meetings	Chaired By	Frequency if Applicable	
7.1	Supervisors Safety Meeting	Site Manager	2 Weekly	
7.2	Specialist Contractors Pre-Start Meeting	Site Manager	All Contractors	
7.3	Site Progress Meeting	Site Manager	Weekly	
7.4	Specialist Contractors Progress Meeting	Site Manager	Weekly	
7.5	Clients Progress	Client	Monthly	
7.6	4 Weekly Safety Plan (CDM update)		Monthly	
7.7	Design Review Meeting and CDM Coordination		Monthly-CDM as required if Principal Designer.	
7.8	Health and Safety File			
	Layout and Format: To be agreed Arrangements for collecting information: To be agreed Storage of Information: To be agreed			

7.9	Operation and Maintenance Manuals and As Built records O and M Manuals will be developed as the construction processes are completed and will comprise part of the final Health and Safety File	
8.0	Any Other Business	
	N/A	



SITE SPECIFIC FORMS AND ALLOCATION RECORDS

**Form S300
Rev J
Page 1 of 3**

CONTRACT NO :

CONTRACT NAME:

RESPONSIBILITY

COMPLETED BY :

DATE :

Category: Statutory Requirement (SR)
Industry Standard (IS)
CPUK Policy/Procedure (CP)

FORM REF	FORM TITLE	CONTRACT MANAGER (CM)	SITE AGENT	FOREMAN	ENGINEERS	KEY OPERATIVE	QUANTITY SURVEYOR (QS)	DESIGN COORDINATOR	SHE MANAGER AGREED SITE MODIFIED FORM	N/A ON THIS PROJECT	COMMENTS	LOCATION	CAT	DIST
	<u>Safety</u>													
S001 Rev C	Contract H&S Plan											Notice Board	SR	
S002 Rev F	4 Weekly Safety plan											Notice Board	CP	
Procedure	SWMS Programme										Procedure form not	Notice Board	IS	
Procedure	Traffic Plan										Procedure form not	Notice Board	SR	
Procedure	Fire Assembly Point										Procedure form not	Notice Board	SR	
Procedure	Local A&E Hospital										Procedure form not	Notice Board	IS	
S008 Rev B	Induction Pack											Safety File	SR	
S011 Rev C	SHE Subcontractors Pre-Qualification Doc										Procedure form not	Head Office	IS	
S011a Rev B	SHE Pre-Qualification Scoring criteria										Procedure form not	Head Office	IS	
S012 Rev-	SHE Employment Agencies Pre-Qualification Doc.										Procedure form not	Head Office	N/A	
S015 Rev G	Induction Record and next of kin contact details											Safety File	IS	
S016 Rev D	RAMS Briefing Sheet											Safety File	IS	
S017 Rev A	Site Specific Rules											Notice Board	SR	
S019 Rev C	Tool Box Talk signature sheet											Safety File	IS	
S021 Rev A	Lighting Level Record											Notice Board	IS	
S040 Rev C	COSHH Register											Notice Board	SR	
S041 Rev C	Noise Register											Notice Board	SR	
S048 Rev C	PUWER Inspection Report											Notice Board	IS	
S049 Rev A	HQ Inspection Report											Notice Board	IS	HQ
S050 Rev G	S50 Inspection report											Notice Board Current/Safety file old ones	SR	
S050a Rev G	S50 scoring criteria										Procedure form not	Safety File	N/A	
S051 Rev D	RAMS review sheet											Safety File	IS	
S052 Rev-	Management of Temporary Works Procedure										Procedure form not	Safety File	CP	
S053 Rev B	Accident/Dangerous Occurrence Record											Safety File	SR	HQ
S054 Rev E	Accident/Dangerous Occurrence Report											Safety File	IS	HQ
S055 Rev C	Witness statement											Safety File	IS	HQ
S060 Rev F	Permit to dig											Live on Notice board. Old ones in File	IS	
S062 Rev C	Underground Service Damage Report											Safety File	CP	



SITE SPECIFIC FORMS AND ALLOCATION RECORDS

**Form S300
Rev J
Page 2 of 3**

CONTRACT NO :

CONTRACT NAME:

RESPONSIBILITY

COMPLETED BY :

DATE :

Category: Statutory Requirement (SR)
Industry Standard (IS)
CPUK Policy/Procedure (CP)

FORM REF	FORM TITLE	CONTRACT MANAGER (CM)	SITE AGENT	FOREMAN	ENGINEERS	KEY OPERATIVE	QUANTITY SURVEYOR (QS)	DESIGN CO-ORDINATOR	SHE MANAGER AGREED SITE PROTECTED EXEM	N/A ON THIS PROJECT	COMMENTS	LOCATION	CAT	DIST
S063 Rev B	General permit to work											Live on Notice board. Old ones in File	IS	
S064 Rev D	Permit to enter Confined Spaces											Live on Notice board. Old ones in File	IS	
S064a Rev-	Top Man Record											Live on Notice board. Old ones in File	IS	
S065 Rev C	Hot works permit											Live on Notice board. Old ones in File	IS	
S066 Rev C	Permit to work adjacent to electrical services											Live on Notice board. Old ones in File	IS	
S067 Rev C	Ladder/Step ladder permit											Live on Notice board. Old ones in File	IS	
S067a Rev-	Ladder/Step ladder Flow Chart											Live on Notice board. Old ones in File	N/A	
S068 Rev-	Permit to load/dismantle											Live on Notice board. Old ones in File	IS	
S082 Rev C	Concrete pump permit											Live on Notice board. Old ones in File	IS	
S083 Rev D	Permit to operate Crane											Live on Notice board. Old ones in File	IS	
S084 Rev-	AP Lift Plan Checklist										D McCord specific form	Safety File with RAMS	CP	
S085 Rev A	RAMS Template											Safety File	CP	
S099 Rev-	Spot Visit Action Plan										D McCord specific form	Live on Notice board. Old ones in File	CP	
S100 Rev C	Safety & Environmental improvement notice											Safety File	CP	
S101 Rev C	Safety & Environmental prohibition notice											Safety File	CP	
S105 Rev B	Site MEWP Checklist											Safety File	SR	
S106 Rev B	FLT/Telescopic Materials Handler Checklist											Safety File	SR	
S107 Rev C	Excavator Checklist											Safety File	SR	
S108 Rev C	Lifting Appliance Form											Live on Notice board. Old ones in File	SR	
S109 Rev -	Scaffold Tower Inspections											Safety File	SR	
S110 Rev C	Scaffold Inspections											Safety File	SR	
S111 Rev A	Excavation Inspections											Notice Board	SR	
S113 Rev B	Repetitive Lifting & Loading Plan -Forklifts/Excavators											Safety File	SR	
S115 Rev A	Competent and Appointed Persons Register											Notice Board	SR	



SITE SPECIFIC FORMS AND ALLOCATION RECORDS

**Form S300
Rev J
Page 3 of 3**

CONTRACT NO :

CONTRACT NAME:

RESPONSIBILITY

COMPLETED BY :

DATE :

Category: Statutory Requirement **(SR)**
Industry Standard **(IS)**
CPUK Policy/Procedure **(CP)**

FORM REF	FORM TITLE	CONTRACT MANAGER (CM)	SITE AGENT	FOREMAN	ENGINEER	KEY OPERATIVE	QUANTITY SURVEYOR (QS)	DESIGN COORDINATOR	SHE MANAGER ASSIGNED SITE	MODIFIED FORM	N/A ON THIS PROJECT	COMMENTS	LOCATION	CAT	DIST
S116 Rev A	Daily Site Signing In/Out												Ring Binder	IS	
S117 Rev -	Crane Lifting Plan											D McCord specific form	Safety File	SR	
S120 Rev A	PAT Register												Safety File	IS	
Procedure	HIAB Procedure											Procedure form not	Safety File	IS	
S124 Rev A	Temporary Works Register												Notice Board	IS	
S300 Rev J	Site Specific Forms & Records											Procedure form not	Notice Board	N/A	

CPP Review:

Record of Construction Phase Plan Review. 4 Weekly Safety Plan Audit to be recorded and SHE Managers S003 Score to be included.

Date	Comments	Signature

Appendix 1 – Site Plan and Traffic Management

Prepared by C & R

C305 FORMER BODDINGTONS BREWERY SITE LOCATION SET UP & TRAFFIC MANAGEMENT PLAN AJ002A

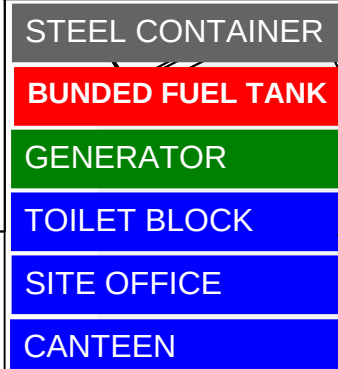


Job Title
Former Boddingtons
Enabling Works

Location
Manchester

Client

NOTE:
All Pedestrians & vehicle
access/egress will be a
biometric access control and
attendance system



→ PROPOSED
VEHICLE ACCESS &
EGRESS FROM SITE
FOR ALL DELIVERY
VEHICLES. PLEASE
NOTE ALL VEHICLES
LEAVING SITE MUST
TURN LEFT

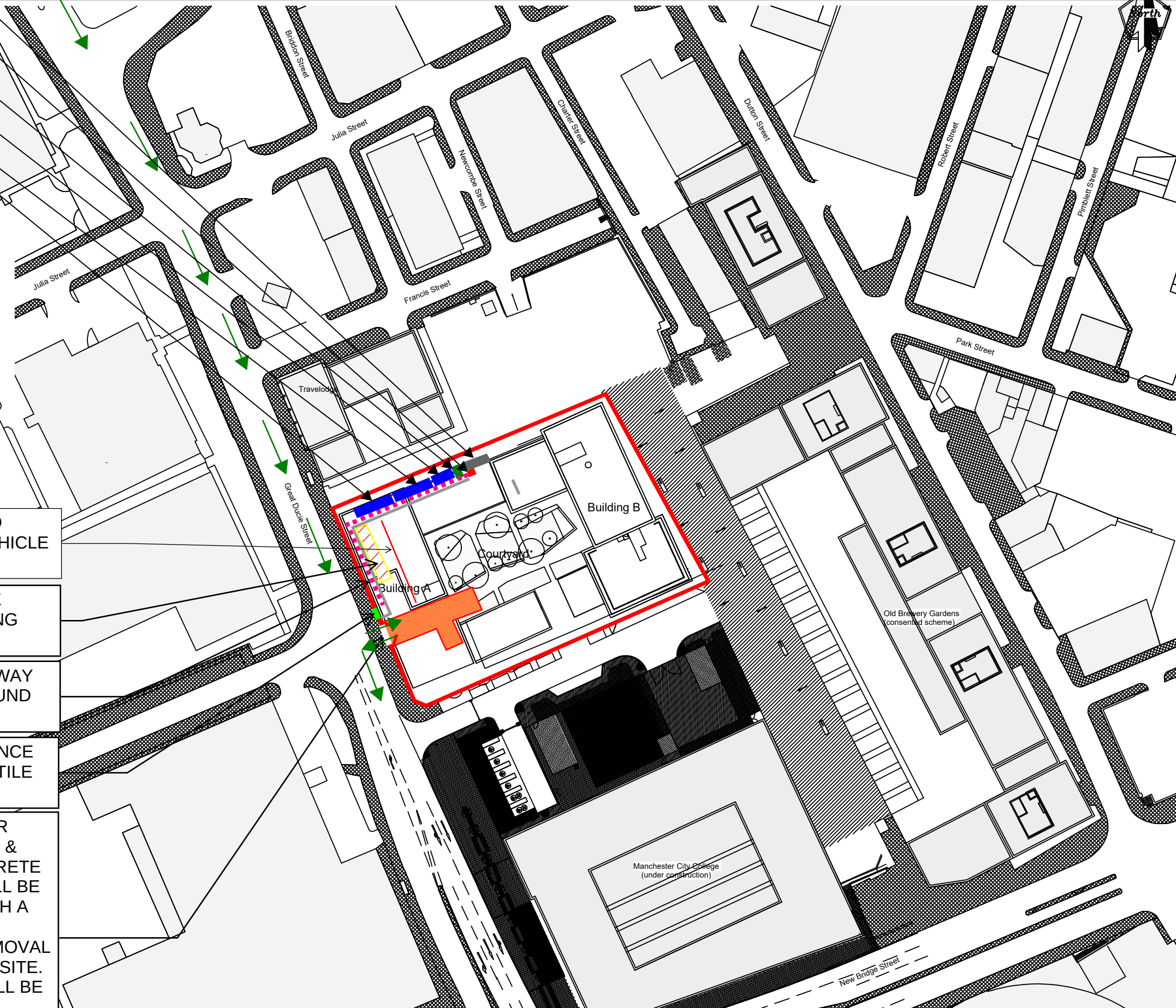
HERRIS FENCING TO
SEGRIGATE SITE VEHICLE
PARKING AREA

CONTRACTORS SITE
VEHICLE CARPARKING
AREA

PEDESTRIAN WALK WAY
FROM MAIN COMPOUND
CARPARK

PEDESTRIAN ENTRANCE
THROUGH A TURN STILE
TO ENTER SITE

SITE MAIN GATE FOR ACCESS/EGRESS TO & FROM SITE. A CONCRETE HARD STANDING WILL BE LEFT IN OPLACE WITH A TURNING AREA TO FACILITATE THE REMOVAL OF MATERIAL FROM SITE. POWER WASHER WILL BE IN ATTENDANCE IF WAGON WHEELS REQUIRE



Rev	Date	Description
A	22/07/22	Information
Drawing Status		
Information		
Drawing Title		
C305 FORMER BODDINGTONS BREWERY SITE SET UP & TRAFFIC MANAGEMENT PLAN AJ002		
C&R Project Code	C305	Scale
		NTS
	Date Drawn	22/07/22
	Drawn By	AJ
	Reviewed By	AR
	Original Size	

Drawing Number	Rev
C305/TMP/001	A

Appendix 2 – Construction Management Plan

Prepared by Bridgehead Consultancy Limited

Prepared by Bridgehead Consultancy Limited
On behalf of Latimer Developments Limited

Construction Management Plan

Boddingtons Brewery Manchester M3



**Boddingtons
Brewery
Manchester M3**
Construction
Management Plan

Version 6 | 2 March 2022

This report has taken into consideration
the particular instructions and requirements
of our client.

It is not intended for and should not be relied
upon by any third party and no responsibility
is undertaken to any third party.

Job number 1104

Bridgehead Consultancy Ltd
Munnelly House
84-88 Pinner Road
Harrow
United Kingdom
www.bridgeheadconsultancy.com





Document Verification

Job title		Boddingtons Brewery Manchester M3			Job number 1104	
Document title		Construction Management Plan			File reference	
Document reference						
Revision	Date	File name	Bridgehead - Boddingtons CMP v1			
Version 1	06/08/2021	Description	Construction Management Plan			
			Prepared by	Checked by	Approved by	
		Name	Josh Foster	Paul David Munnelly		
		Signature				
Version 2	29/10/2021	File name	Bridgehead - Boddingtons CMP v2			
		Description	Construction Management Plan			
			Prepared by	Checked by	Approved by	
		Name	Josh Foster	Paul David Munnelly		
Version 3	16/11/2021	Signature				
		File name	Bridgehead - Boddingtons CMP v3			
		Description	Construction Management Plan			
			Prepared by	Checked by	Approved by	
Version 4	30/11/2021	Name	Josh Foster	Paul David Munnelly		
		Signature				
		File name	Bridgehead - Boddingtons CMP v4			
		Description	Construction Management Plan			
Version 5	22/12/2021		Prepared by	Checked by	Approved by	
		Name	Josh Foster	Paul David Munnelly		
		Signature				
		File name	Bridgehead - Boddingtons CMP v5			
Version 6	24/02/2022	Description	Construction Management Plan			
			Prepared by	Checked by	Approved by	
		Name	Josh Foster	Paul David Munnelly		
		Signature				
Version 7	02/04/2022	File name	Bridgehead - Boddingtons CMP v7			
		Description	Construction Management Plan			
			Prepared by	Checked by	Approved by	
		Name	Josh Foster	Paul David Munnelly		
		Signature				

Issue Document Verification with Document



Contents

	Page
1 Introduction	5
2 The Site	5
3 Outline Programme	6
4 Site Establishment	7
4.1 Site Hoarding	7
4.2 Welfare & Accommodation	8
4.3 Parking for the Site	9
5 Hours of Site Working	9
6 Construction Logistics	9
6.1 Considerations	9
6.2 Construction Logistics Plans	
6.2.1 Construction Logistics Plan (1)	10
6.2.2 Construction Logistics Plan Alternative (2a)	10
6.2.3 Construction Logistics Plan Alternative (2b)	12
6.3 Construction Logistics and Cyclist Safety (CLOCS)	13
6.4 Vehicle Site Access	13
6.5 Pit Lane Delivery Areas	14
6.6 Traffic Management	15
6.7 Vehicle Site Egress	15
6.8 Hoists, Lifts & Cranes	16
6.9 Delivery Route	17
6.10 Delivery Management	18
6.11 Loading & Unloading	19
6.12 Consolidation Centres	20
6.13 Public Path & Road Closure/Access	20
7 Waste Management	21
8 Site Security	22
9 Operative Histogram Analysis	23
10 Vehicular Histogram Analysis	24
10.1 Construction Vehicles	25
11 Potential Impacts During Construction	25
12 Safety, Health, Environmental & Quality	27
12.1 Fire Precautions	28
12.2 Fire Alarm	28
12.3 Emergency Evacuation Procedure	28
12.4 Fuel Management	29
12.5 Unexploded Ordnance Survey	29
12.6 Flood Risk & Surface Water Drainage	29
12.7 Considerate Constructors Scheme	29
12.8 Wheel Wash Management	30
12.9 Dust Suppression	30
12.10 Noise Pollution	31
12.11 Vibration Suppression	32
12.12 Lighting Pollution	32
12.13 Communication & Liaison between the Client and Others	32

1 Introduction

The purpose of the Construction Management Plan is to establish the overall delivery and site control thus minimising impacts during the construction of Boddingtons Brewery.

This report has been prepared to support an application for full planning permission for the proposed construction of the project. This is an initial plan and has been prepared in advance of the appointment of the Main Contractor.

This document has been developed following the engagement with all stakeholders regarding the development of the site. The purpose of this document is to outline the principles of the construction methodology and construction logistics for the proposed site works and is subject to refinement as the project evolves and the Main Contractor is appointed on the development.

This report details the proposed outline programme and key activities for the construction works with potential significant environmental impacts associated with these activities being identified and, where necessary, proposals for mitigation are outlined in consideration to the requirements of Manchester City Council.

The development will likely procure a single Main Contractor for the entire construction works with the appointed Main Contractor supervising and overseeing all works. The Main Contractor, when appointed, will use this report as a basis for further preparation of its own working site activity which will be submitted at a later date.

2 The Site

The site is located to the North of Victoria Railway station and the Manchester Arena on the inner ring road on New Bridge Street. Comprising of 1.24 acres of brownfield, it is currently being used as a surface car park and was formerly part of the former Boddingtons Brewery. The surface car park is enclosed by secured fencing with a gated entrance off of Great Ducie Street.



Beyond the immediate boundaries to the North is the 7 storey Travelodge, the West is the proposed boulevard and the Brewery Gardens scheme. To the east is a mixed low rise industrial use building subject to potential redevelopment. The scheme is well located with all the required infrastructure readily available.

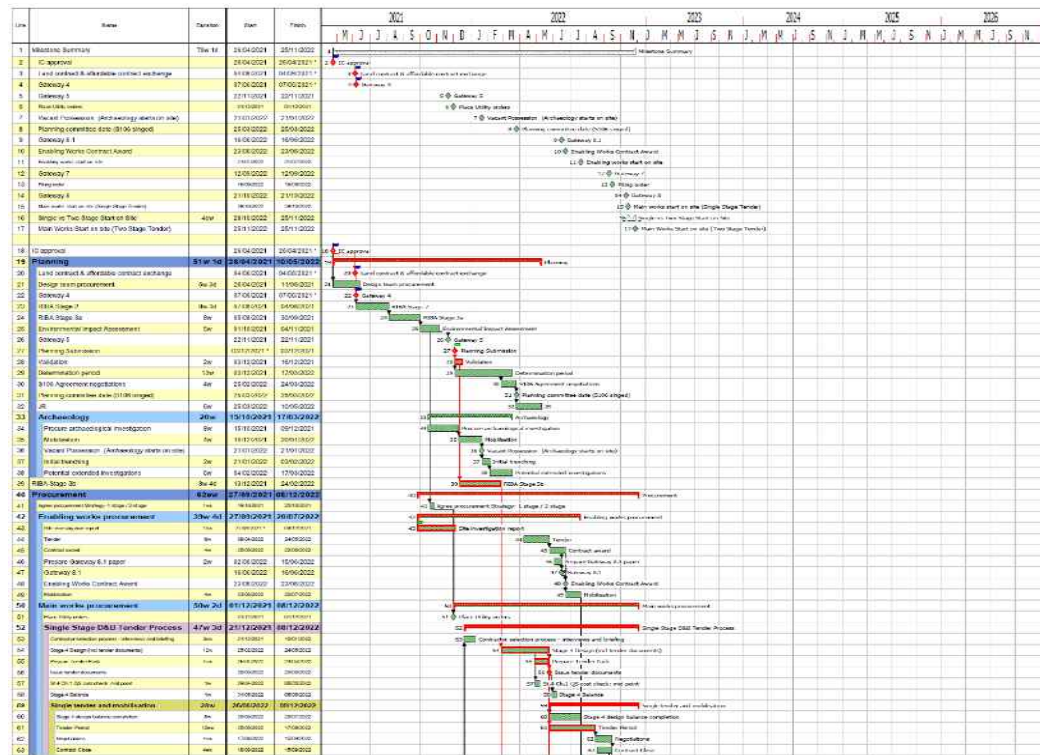
The project consists of the construction of circa 445 residential units with associated ancillary accommodation, within four blocks ranging from 10 to 24 storeys. In addition, there is to be retail/commercial units at ground floor level. The residential accommodation comprises of a mix of one, two and three bedroom dwellings and is mainly set around hard landscaping and access roads.

The site sits in an emerging location in Manchester city centre, within 500m walk to Victoria station and 650m walk to the top of Deansgate. The area is currently dominated by low rise business sheds, however, a plan for the wider area has been adopted by Manchester City Council.

Adjacent to the site, a new college is currently being built by LTE Group in association with Manchester City Council which will enhance the area's character and demographics.

3 Outline Programme

The outline timescales for delivering the development after planning has been approved are as follows:



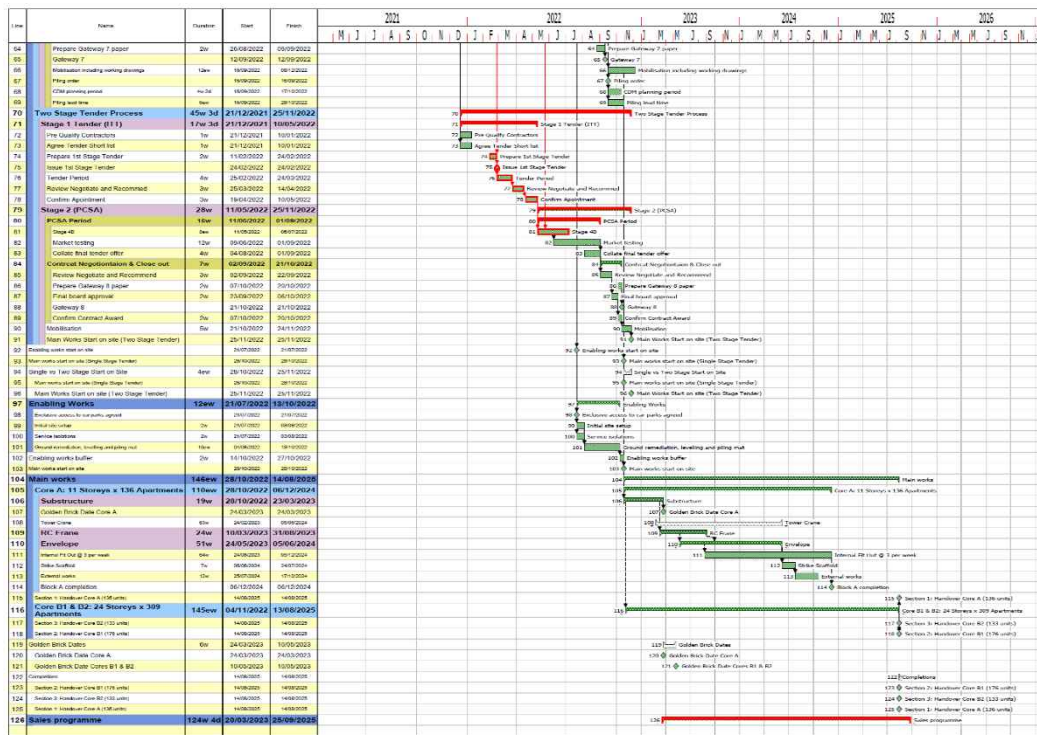


Figure 1: Master Programme

4 Site Establishment

4.1 Site Hoarding

An early activity will be to protect and enclose the site before construction activity commences. A solid hoarding will be employed to the whole perimeter of the site boundary and maintained at all times. Site hoarding will be 2.5m high, painted and made of solid outdoor grade plywood.



Figure 2: Construction Logistics Model (Option 1)

Where the hoarding is set into the road, temporary vertical concrete barriers will be installed at the base of the hoarding for added protection. Concrete blocks will also be deployed where the highways meet the pitlane.

The site hoarding line will include low level lighting where the hoarding line fronts the public highway. This lighting will only be illuminated in the dark autumn nights and overnight.

Signage will be displayed on the hoarding for health and safety purposes, Considerate Constructors Scheme signage and a point of contact for the neighbouring residents.

4.2 Welfare & Accommodation

It is fundamentally important to provide a safe and comfortable environment for all sites workers, therefore, site establishment and welfare accommodation will be installed to provide a high quality and secure site.

The Main Contractor is responsible for providing appropriate welfare facilities, with typical site accommodation including:

- Main Contractor management offices and meeting rooms;
- Welfare facilities including canteen, drying/changing rooms as well as toilet and shower facilities;
- Supply of drinking water;
- Security office;
- Sub-contractor facilities.

There are 3 potential locations for the welfare and accommodation placement:



Figure 3: Welfare & Accommodation Plan

Option 1: Outside site boundary (double stacked on top of the gantry and parallel to A56 Great Ducie Street).

Option 2: Within the site boundary (at the location of the proposed cycle stores).

Option 3: Within the site boundary (parallel to the hoarding to the North of the site).

Note:

Option 1 requires site workers to access and egress using stairs running parallel to the College land.

Option 3 requires the cycle stores to be constructed at the latter part of the programme.

4.3 Parking for the Site

There will be no parking provided for construction worker vehicles on the site nor will there be any off-site provision. Parking will not be allowed on the site and all contractors and sub-contractors will be advised through their contract documentation that no parking is available and that all personnel should use sustainable transportation.

5 Hours of Site Working

The working hours for construction activities will be in line with requirements of the Control of Pollution Act 1974 Part III and the site will operate in accordance with the following Manchester City Council guidance:

- Monday – Friday: 7.30am – 6pm
- Saturday: 8.30am – 2pm
- Sunday/Bank Holidays: No work

The workforce may arrive on site 30 minutes prior to work commencing but there is to be no working outside of these times (unless changed by prior agreement with Manchester City Council).

Noise is to be kept to a minimum in the first hour and site operations on a Saturday should be avoided where possible

6 Construction Logistics

6.1 Considerations

As the site is located in a busy area of central Manchester, it is important to consider how the site will be serviced and the impact of construction logistics on the surrounding area. Construction logistics planning is both considered at a macro and micro level.

Construction logistics planning allow project and design management teams to understand how their proposed project design will be impacted by site and vehicle movements.

Within construction logistics planning, access and egress routes are determined to offer the least congested solution for vehicles, cyclists and pedestrians to the site and surrounding area.

Site activity must avoid any unnecessary disruption to the local community and ensure the safe and efficient operation of the construction phase of the project. Planning of the construction logistics process ensures site operations are effectively planned, managed and monitored to keep the project site moving safely without compromising productivity.

The traditional backbone of construction logistics has always been delivery & traffic management, waste management, material distribution, welfare provision, site security and safety.

6.2 Construction Logistics Plans

6.2.1 Construction Logistics Plan (1)

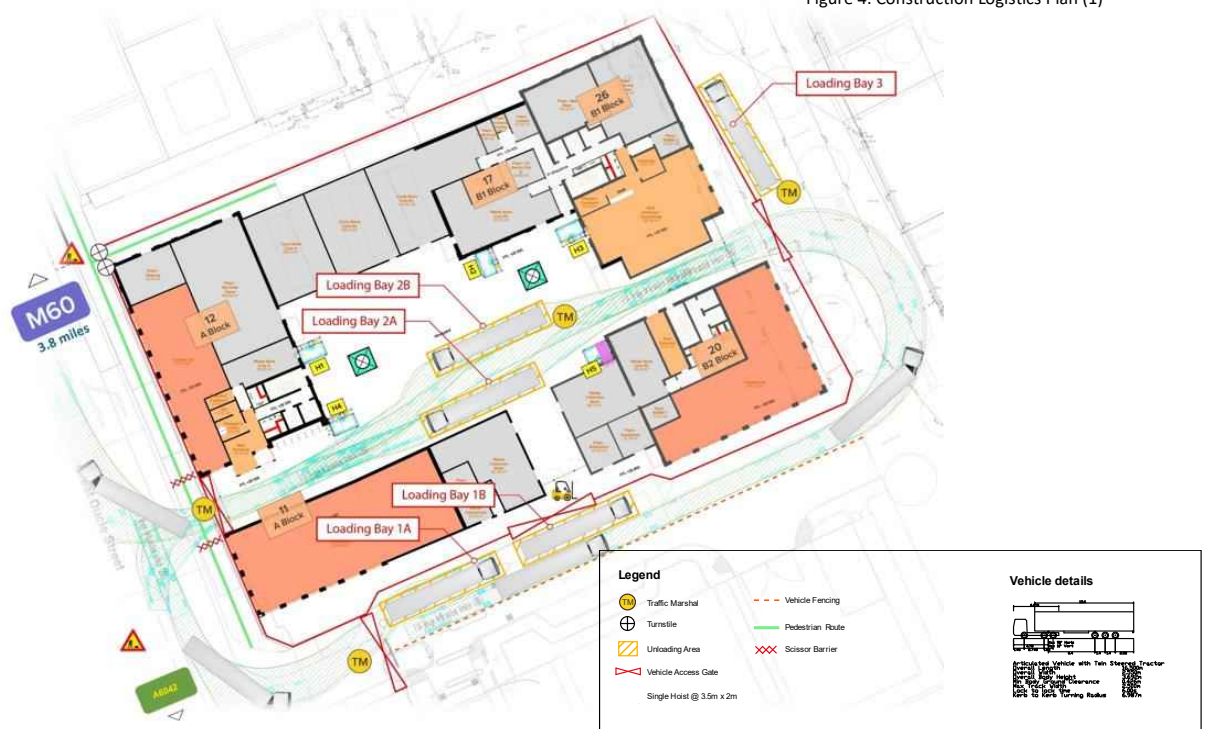
All vehicles delivering or collecting from the site are to approach and leave site via the A56 Great Ducie Street. All vehicles are to exit right towards the M60 and avoid the A6042 (South).

Pit lanes will be required for deliveries, lay down of materials and concrete deliveries into the site demise. This will require deliveries to be unloaded and be marshalled back onto A56 Great Ducie Street by the construction logistics team.

Temporary loading bay 3/vehicle holding zone to be removed when not in use. The South-East boundary is to be cornered off to allow for a sweep path into the site area via the North-East vehicle entrance gate.

During phase 2 of the construction of Manchester College, access over the private road will be managed by a 3rd party company offering traffic management whilst the two projects operate simultaneously. No stopping is to take place on the private road on the College land outside of the loading bays by either site.

Figure 4: Construction Logistics Plan (1)



6.2.2 Construction Logistics Plan Alternative (2a)

All vehicles delivering or collecting from the site are to approach and leave site via the A56 Great Ducie Street. All vehicles are to exit right towards the M60 and avoid the A6042 (South).

Pit lanes will be required for deliveries, lay down of materials and concrete deliveries into the site demise. This will require deliveries to be unloaded & be marshalled back onto A56 Great Ducie Street by the construction logistics team.

Manchester City Council would need to suspend parking bay spaces along Francis Street for the duration of project. The South-East boundary is to be cornered off to allow for a sweep path into the site area via the North-East vehicle entrance gate.

During phase 2 of the construction of Manchester College, access over the private road will be managed by a 3rd party company offering traffic management whilst the two projects operate simultaneously. No stopping is to take place on the private road on the College land outside of the loading bays by either site.



Note:

Option 2a is to be implemented if the land to the North can be secured.

6.2.3 Construction Logistics Plan Alternative (2b)

All vehicles delivering or collecting from the site are to approach and leave site via the A56 Great Ducie Street. All vehicles are to exit right towards the M60 and avoid the A6042 (South).

Pit lanes will be required for deliveries, lay down of materials and concrete deliveries into the site demise. This will require deliveries to be unloaded & be marshalled back onto A56 Great Ducie Street by the construction logistics team.

Manchester City Council would need to suspend parking bay spaces along Francis Street and Briddon Street for the duration of project. The South-East boundary is to be cornered off to allow for a sweep path into the site area via the North-East vehicle entrance gate. During phase 2 of the construction of Manchester College, access over the private road will be managed by a 3rd party company offering traffic management whilst the two projects operate simultaneously. No stopping is to take place on the private road on the College land outside of the loading bays by either site.



Figure 6: Construction Logistics Plan (2b)

Note:

Option 2b is to be implemented if the land to the North can be secured.

6.3 Construction Logistics & Cyclist Safety (CLOCS)

The standard for construction logistics, managing work related road risk (WRRR), is the result of collaboration between construction clients, logistic operators and industry associations.

The document draws together emerging practices from several individual standards, policies and codes of practice into one common WRRR standard. This common standard is implemented by developers and can be adhered to in a consistent way by fleet operators.

The standard aims to ensure that construction companies follow effective practice in the management of their operations, vehicles, drivers and construction sites.

Each requirement has been developed to reduce the risk of a collision between heavy goods vehicles in the construction sector and vulnerable road users such as cyclists and pedestrians.

The standard sets the detailed minimum requirements to create a consistent baseline but is written in a way that encourages road safety to be managed ever more rigorously as new best practice emerges.

The CLOCS standard is a key step to demonstrate the commitment of construction logistics industry organisations to improve road safety throughout the supply chain.

The contractor will be required to operate both the Fleet Operator Recognition Scheme (FORS) and Construction Logistics and Cyclist Safety (CLOCS) safety schemes whilst working on site.

6.4 Vehicle Site Access

We have proposed access of a one-way route from A56 Great Ducie Street into the private road on the College land to allow for articulated vehicle deliveries.

All deliveries to site should be undertaken through a shared electronic Delivery Management System (DMS), managed by the construction logistics team, with all deliveries allocated to a specific time slot.

Failure to adhere to the time slot may result in a Sub-Contractor's delivery being denied entry as there will be no allotted vehicle holding zones on the public street to allow access to the site.

The delivery management process and system is integrated into the traffic management planning and operation to ensure the two work proactively together to reduce the impact of vehicle congestion. They will also be co-ordinated with crane and hoist movement on site.

This provides the safest and most sustainable working solution of segregation to the workforce from material deliveries. All movement and unloading of both contractors, over the private road will be managed by the construction logistics team.

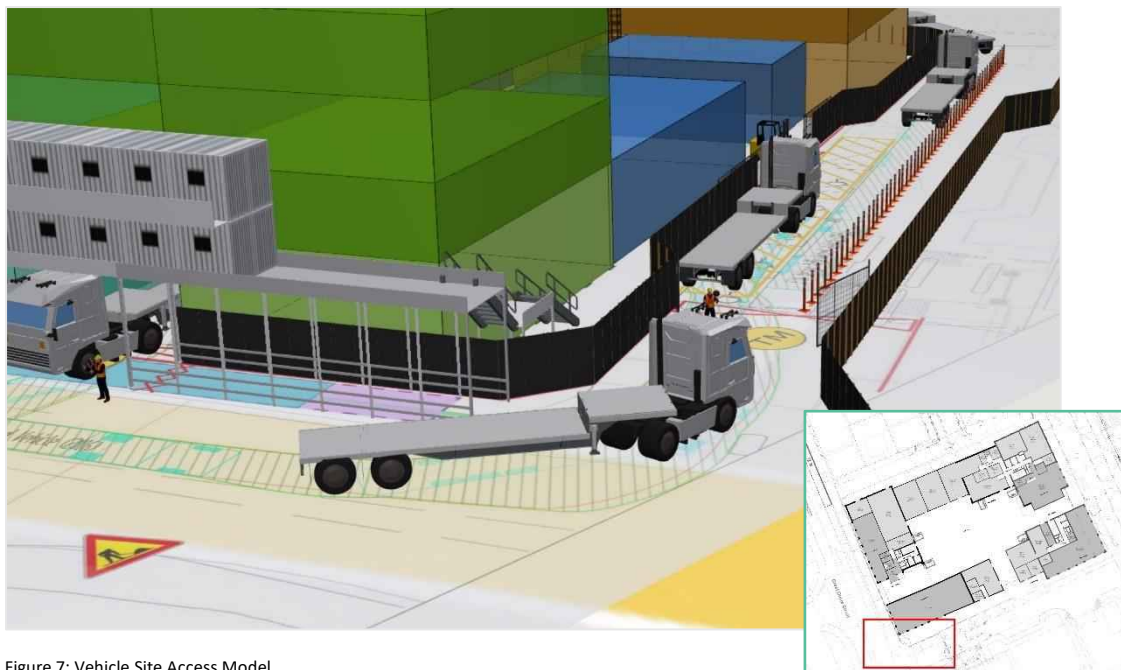


Figure 7: Vehicle Site Access Model

6.5 Pit Lane Delivery Areas

Due to the limited area available within the site footprint the proposed use of pit lanes, to enable the delivery of materials, will be required on the new private road.

The private road is currently being used to support the construction of the Manchester College City Centre Campus. To avoid congestion (to both projects and neighbouring stakeholders) we have consulted with the neighbouring projects contractor to agree access and usage of the new private road.

This will ensure we have sufficient access and use of the disabled parking bays for the proposed pit lane delivery areas that will service the site.

Traffic management will manage all site related traffic and take responsibility for supervising and directing all vehicle and pedestrian movement in and around the site.

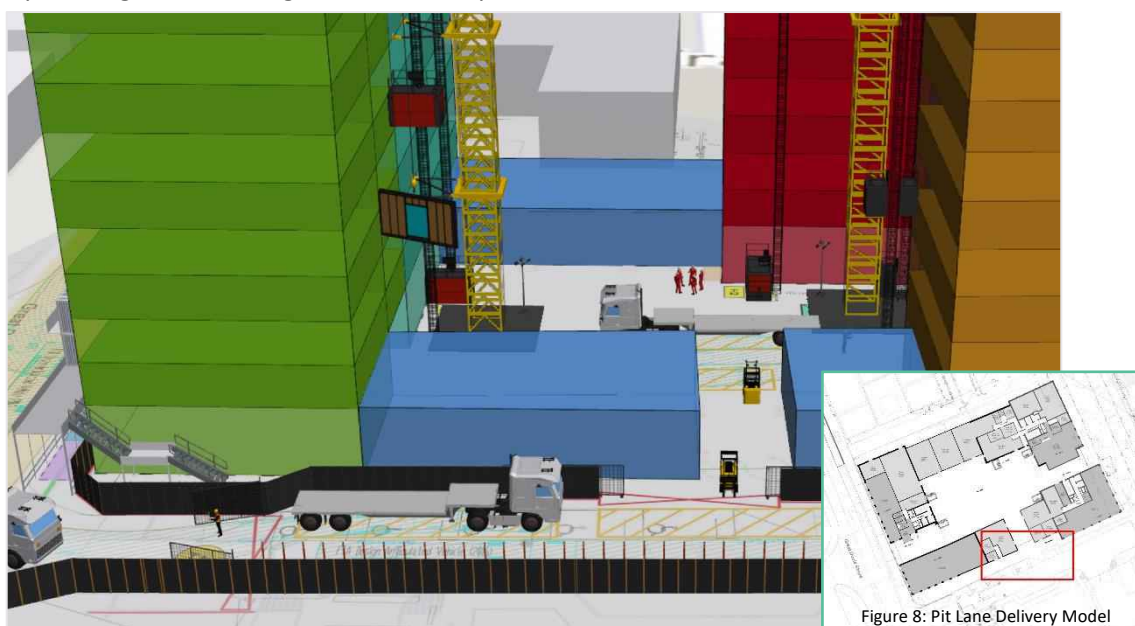


Figure 8: Pit Lane Delivery Model

6.6 Traffic Management

A robust traffic management approach is key to construction logistics and will be crucial to the success of the Boddingtons Brewery site.

The primary responsibility of the traffic management team is to ensure safe and sustainable flow and movement of construction traffic on, off and around the site. Traffic management will manage all site related traffic and take responsibility for supervising and directing all vehicle and pedestrian movement in and around the site.

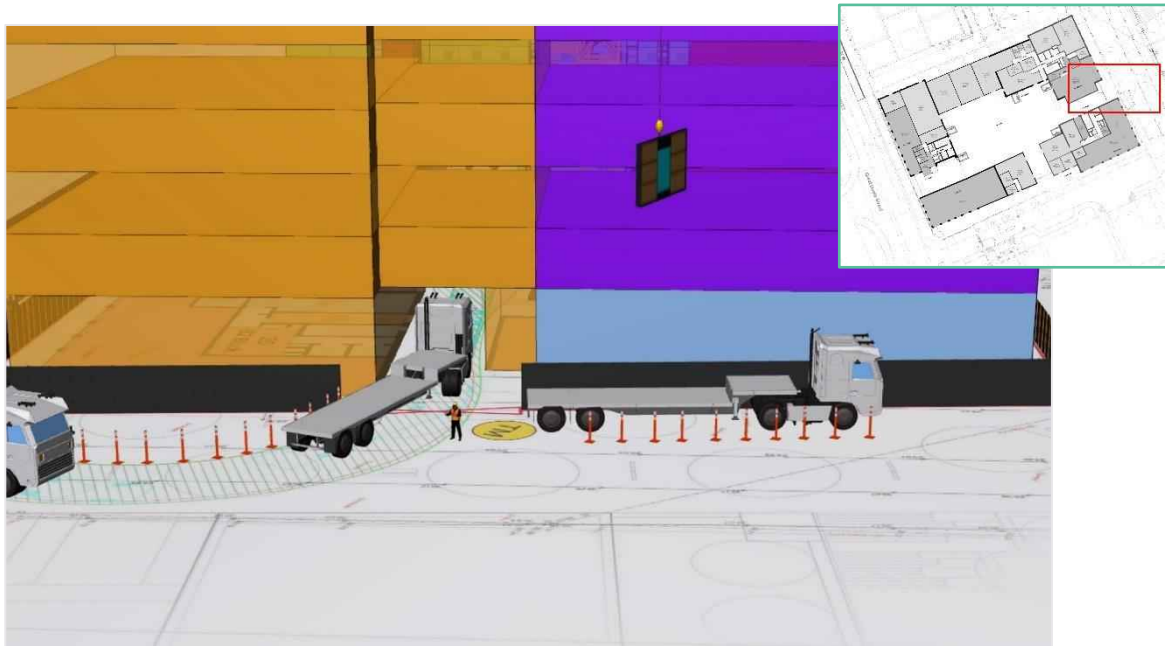


Figure 9: Traffic Management Model

The commitment to the CLOCS industry standard not only ensures that all fleet services will be compliant with the FORS silver standard (at a minimum) but also means the construction logistics team are dedicated in ensuring that the construction traffic is safely managed, protecting sites and local communities from collisions and pollution.

There will be safe demarcation routes for the workforce throughout the site, with the traffic management team ensuring all vehicles are safely banked away from the site to protect all stakeholders.

6.7 Vehicle Site Egress

The success of the Boddingtons Brewery site will rely on the management of site egress, ensuring construction vehicles do not impact the traffic flow on A56 Great Ducie Street.

The hoarding line is to be installed at the back of the pavement so the footpath can still be used, from the new private road running parallel to A56 Great Ducie Street. Effective traffic management and retractable barriers are to be used to ensure safe egress of construction traffic from site.

Upon consultation with Manchester City Council regarding use of A56 Great Ducie Street, the proposed construction logistics plans do not require pit lanes on the public road and will also ensure the existing bus lanes will remain operational. For access and egress, there is segregation between both pedestrian and vehicle traffic with turnstile access located on the North-West corner of the site.

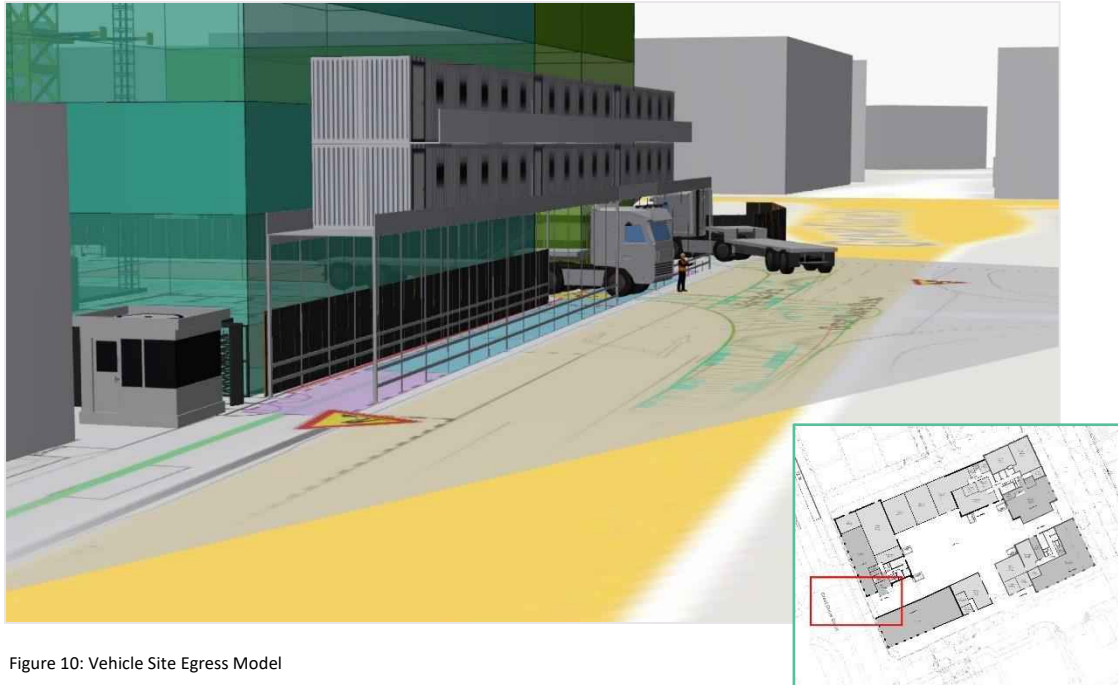


Figure 10: Vehicle Site Egress Model

6.8 Hoists, Lifts & Cranes

External hoisting positions may be required for use during the construction of Boddingtons Brewery. As a general principle, all deliveries to site will be off-loaded within the site boundary. All cranes will be suitably sized and coordinate with the oversailing licences by the appointed Main Contractor to ensure that there will be no height clashes with the existing adjacent buildings.

Due to the potential of multiple cranes within a tight area, the crane strategy should be considered carefully by the appointed Main Contractor.

The key issues are:

- Collisions of cranes at height;
- Over sailing of adjacent properties;
- Over sailing of public highways (and infrastructure routes).

Furthermore, hoists can often operate inefficiently (with half loads going up to the floors). Through central delivery management, there is unbiased movement of materials. Deliveries go to the relevant location on the same day regardless of time of arrival (ready for use the next day). All hoist checks are to be done correctly and any faults found must be logged and reported to the Main Contractor to alleviate any the time lost.

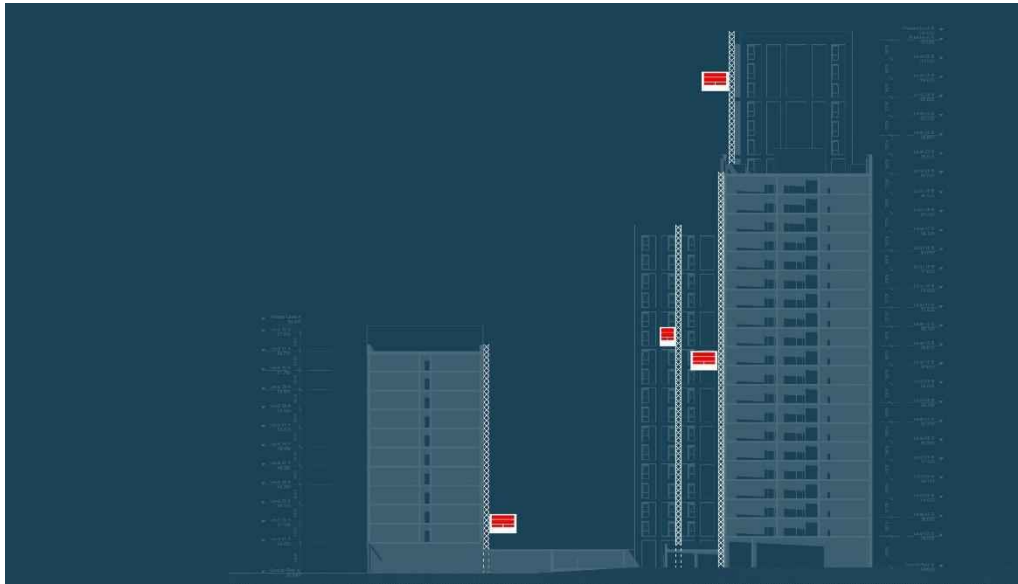


Figure 11: South-East Elevation

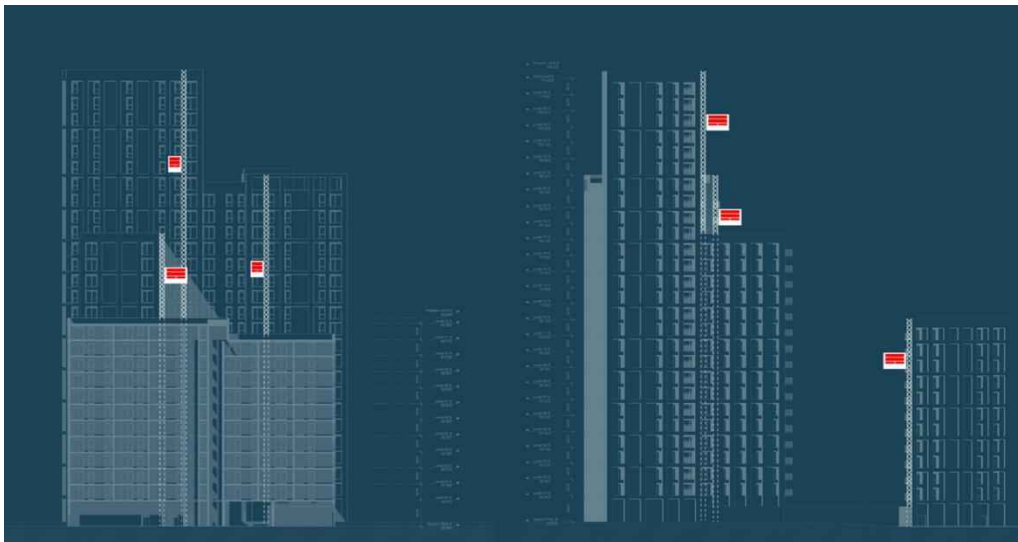


Figure 12: South-West Elevation

Figure 13: North-West Elevation

6.9 Delivery Route

All deliveries to site will be undertaken through an electronic delivery management system, managed by the construction logistics team, with all deliveries allocated a specific time slot. Typically, failure to adhere to the time slot may result in a sub-contractor's deliver being denied access to the site. There will be no waiting on the street for access to the site.

Construction vehicle traffic will be directed away from Manchester City Centre and would be required to take the following route:

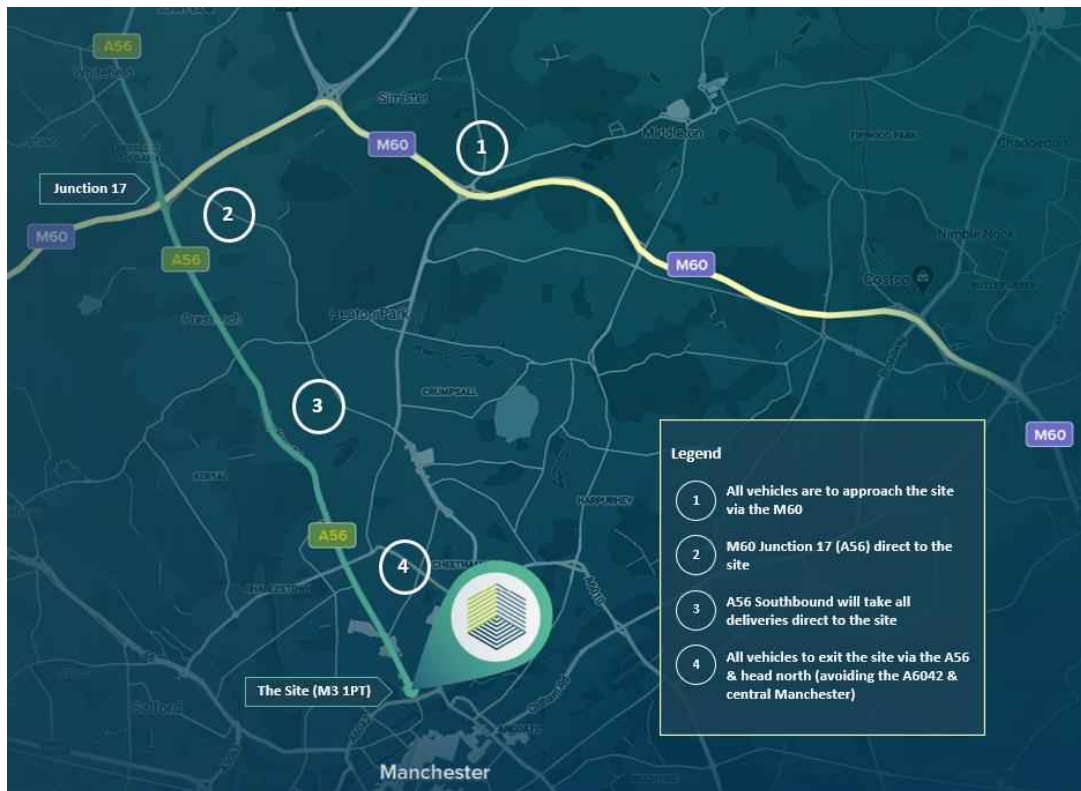


Figure 14: Traffic Management Plan

6.10 Delivery Management

Managing site deliveries is critical to the logistical planning and movement of a construction site with poorly managed deliveries causing significant project delay and disruption. All material deliveries are to be planned to be off loaded and taken directly to the location where the materials are required or to be pre-assigned to lay down areas.

Effective and efficient delivery and material management will also promote safe operative movement around the site and allow for easier transportation of materials within the site by the sub-contractors.

A web-based delivery management system will be used to manage and control all collections and deliveries from the site.

A competent Delivery Manager will supervise all deliveries, with the construction logistics team taking over all material distribution from delivery to the location required.

The access gates are to be manned and an operative will control pedestrian flow while the vehicle is being directed into the site. The gates will be designed as not to encroach on the footpath, highway or into the site. A similar process will be adopted for vehicles exiting site.

Operatives will ensure suitable pedestrian and vehicle segregation using extendable gates (or similar) on either side of the pedestrian walkway. This will ensure pedestrians do not cross vehicular paths, as well as ensuring they do not gain access to the site. The same arrangement will be provided at the exit gate from the site.

The Main Contractor will manage a Just-in-Time delivery policy for all site materials and deliveries.

6.11 Loading & Unloading

Pit lanes will be required for deliveries, lay down of materials and concrete deliveries into the site demise. This will require deliveries to be unloaded and be marshalled back onto Great Ducie Street by the construction logistics team.

Due to the area available within the site footprint the proposed use of pit lanes, to enable the delivery of materials, will not be necessary on the public highways.

Materials must be pre-loaded in a manner that will ease off-loading and onward site handing e.g. palletised goods, pre-slung reinforcing and mesh, stillages or crates for flat panels and glass must clearly identify lifting/handling arrangements, with panels, glass sheets individually secured to stillage/crates where possible to prevent any load shedding during panel/glass removal. All such stillages must be stored on firm and level ground.

Suitable arrangements must be in place to provide access to vehicle loads where required e.g. for Banksmen (slingers/signallers) to eliminate persons needing to access the rear of vehicle and therefore minimise the risk of falling.

Loading and unloading bays must have (as a minimum requirement):

1. No unloading to take place at other locations;
2. Concrete hard standing or equivalent;
3. Road markings and clearly defined zone;
4. Scissor type extendable metal barrier;
5. Clear signage displaying 'permit to work area -lifting operations taking place';
6. Connected crowd barrier controlling access/egress;
7. Banksman – only Banksman and FL driver permitted to enter zone;
8. Permit – white board named access rights and TC delivery;
9. FL 360 degrees camera and 'zone' camera at suitable location.
10. FL 360 degrees camera and 'zone' camera at suitable location.

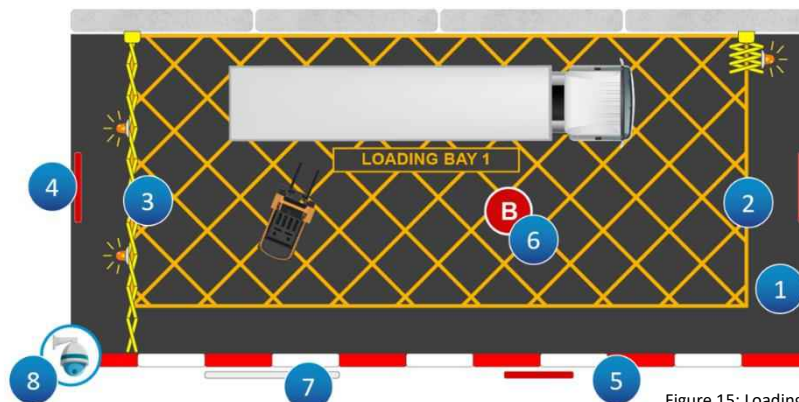


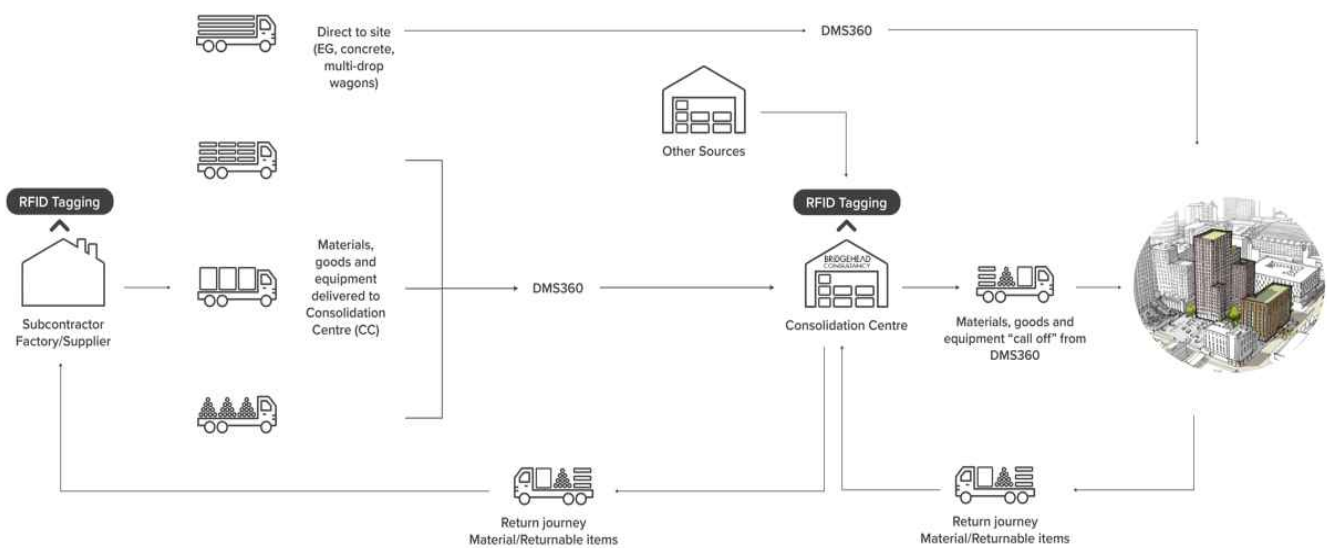
Figure 15: Loading & Unloading Bay

6.12 Consolidation Centres

Fragmented material supply chains, as well as environmental and quality consideration, have forced the construction industry to consider how it can evolve to ensure equipment and materials are delivered; Just-In-Time, on suitable vehicles and in the right quantities and condition.

The consideration and use of Consolidation Centres have become a popular solution to the problems associated with material supplier chains.

The process for managing delivery and Consolidation Centres is based upon extensive planning and programming to ensure optimum efficiency in delivery and productivity promotion, whilst minimizing traffic impact around site.



6.13 Public Path and Road Closure/Access

Full road closures are to be avoided throughout the works, with the primary proposals to only include parking bay suspension and pavement closures.

The current Project Development Programme proposes that public path closures (in purple) will be required to allow for the project foundation, ground floor, first floor and scaffolding to be erected.

This timeframe is indicative and is subject to the Main Contractor's submission of the Project Construction Programme.

Public paths will then be reopened with public and project protection measures in place and they will include:

- Gantry and cladding
- Barriers at vehicle egress sites
- Placement of Traffic Marshalls to manage safety of pedestrians and vehicle movement
- Security CCTV



Figure 17: Pedestrian Path Closure

7 Waste Management

Control of waste material on site is a key factor in the successful outcome of a project and BREEAM requirements. The Main Contractor will agree and implement a Site Waste Management Plan (SWMP) at the commencement of the works. The strategy should be based around locating waste vessels in central locations.

Wheelie bins will be utilised to remove waste from the various work locations. Site operatives would then deposit the waste materials into the wheelie bins or larger items directly into the skips. The construction logistics team would be responsible for co-ordinating the removal of the full wheelie bins and empty them in the correct allocated skips, with full bins being replaced with empty ones on removal.

Furthermore, the skips will be continuously replaced regularly to ensure space for waste material is always available.

Through the production of a sustainable procurement strategy, the Main Contractor will set targets for responsible sourcing of materials. This will use product certification such as FSC, ISO 14001, BES 6001 etc and will encourage products to be selected based on Environmental Product Declarations where possible.

The Main Contractor must have 100% chain of custody certification on timber products (i.e. FSC and PEFC) and will develop a black list of products/materials that are either

harmful or come from unsustainable sources. The Main Contractor will also reduce the amount of waste to landfill through increased recycling and reuse of materials.

The BRE Smartwaste tool will be introduced to measure and benchmark the impacts of the site (CO2 emissions, energy use, water use, transport to and from site and pollution).

Sub-contractors are to actively investigate measures to reduce the level of CO2 created as a result of their activities.

This will include interrogating the supply chain to identify opportunities to eliminate part-loads and gain full visibility of the supply chain to ensure that the correct materials are being manufactured in line with the developing programme for delivery site in a truly Just-In-Time basis.

Delivery miles to site, fuel type, vehicle type and size will be recorded for all vehicles attending the site.

8 Site Security

The site security for the project will be in operation from the outset with the worksite being fully enclosed and protected from unauthorised access. The Main Contractor shall ensure that the site remains secure and controlled at all times with all works undertaken having the appropriate signage.

The traffic management plan is to be integrated with the site security plan to enable effective access and egress to the project, thus minimising disruption to local traffic, businesses and stakeholders.

Paying specific attention to access and egress touch points, working with a Security Industry Authority (SIA) approved security contractor, the Main Contractor will deploy static site guarding and mobile patrol services to act as a deterrent to non-authorised personnel and carry out checks to those entering the project on a daily basis.

Combining physical checks with biometric, facial recognition and access control systems, the Main Contractor will be able to give a true account of who is on and off site at any time.

Physical security barriers are to be installed to provide a deterrent to unauthorised access to site with Closed Circuit Television (CCTV) to be installed at intervals of no more than 20m apart.

The internal and external boundaries of the site will be patrolled regularly in line with the approved risk and threat assessment with clear site security signage displayed around the external perimeter of the project.

The security team will liaise with the local police Safer Neighbourhoods Team (SNT) to share intelligence and ensure mutual understanding of any threats. This will include but not be limited to creating and agreeing a stakeholder escalation and reporting protocol.



Figure 18: Access & CCTV Plan

9 Operative Histogram Analysis

The number of construction workers on the site at any one time will depend on the different phases of the development and method of construction.

The number of operatives on site is estimated below:

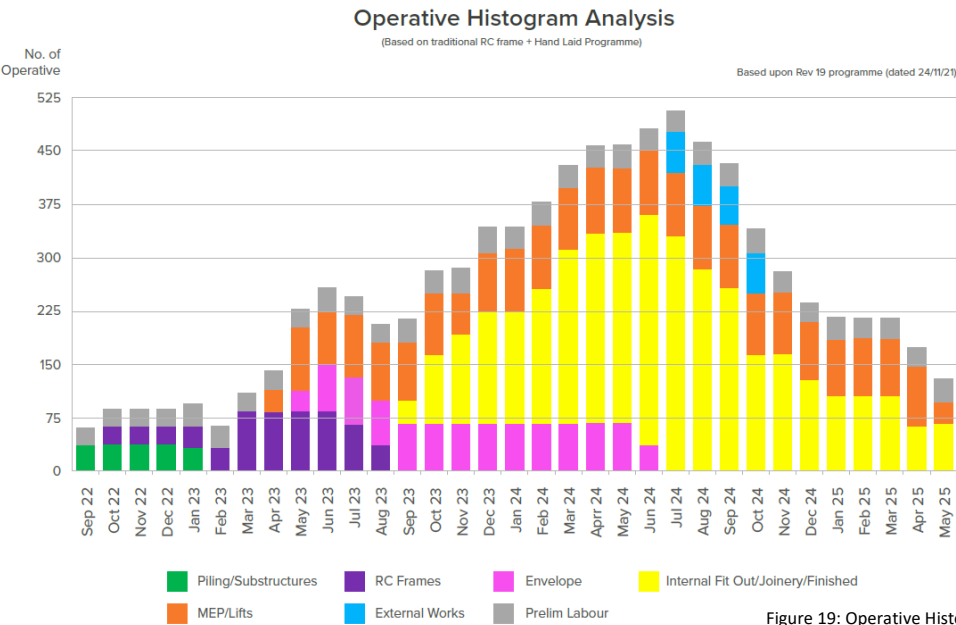


Figure 19: Operative Histogram Analysis

It is anticipated that most construction workers will travel to the site by public transport and personnel will be given detailed information on travel options.

10 Vehicular Histogram Analysis

Construction vehicle movements will vary during the works; however, it is anticipated that the maximum number of trips will be as below.

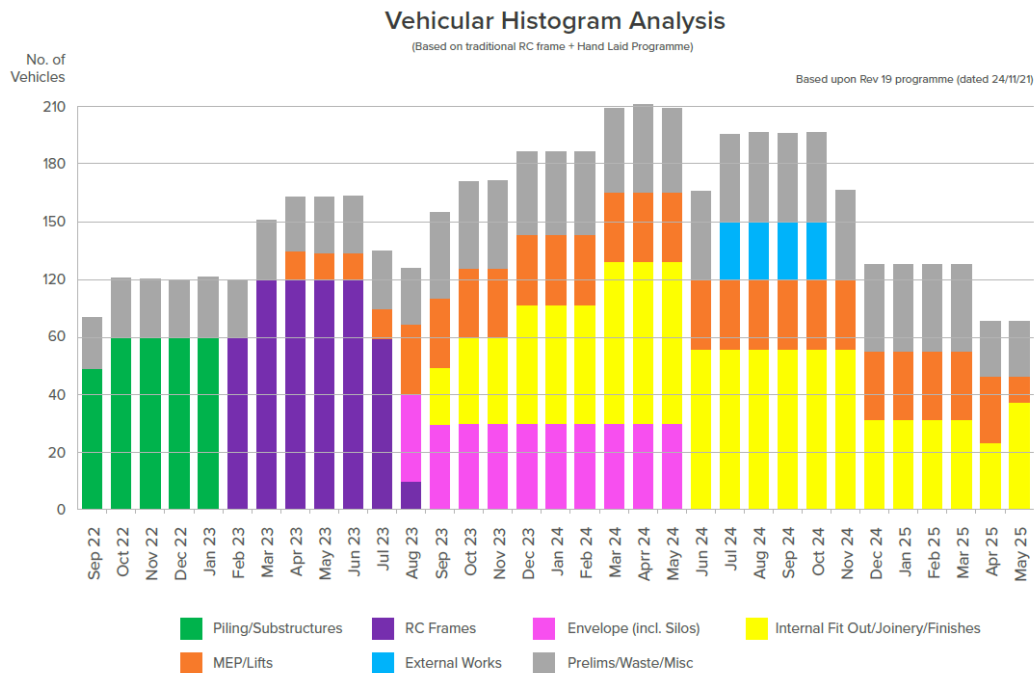


Figure 20: Vehicular Histogram Analysis

In the early stages of the project there will be a variety of vehicles, plant and equipment requiring access to the site. Some of the vehicles will be coming to the site on a regular turnover basis and some on a one-off or infrequent basis.

SUMMARY OF VEHICLE TYPE, USE AND DISTRIBUTION		
Vehicle Type	Use	Distribution
Rigid heavy goods vehicle	Excavated material removal	Strategic road network to motorway
Small articulated vehicle	Plant, steel bar, bricks and cladding panels	Strategic road network to motorway

Specialized articulated HGV	Tower crane erection & dismantle, mechanical & electrical plant, façade panels, roofing materials	Strategic road network to motorway
Specialized equipment low loader	Occasional delivery of plant	Strategic road network to motorway
Vans	Plant service, materials, other suppliers as well as existing tenant's deliveries	Distributed to local and strategic road network
Cars	Occasional deliveries, couriers etc	Distributed to local and strategic road network

10.1 Construction Vehicles

The site speed limit is 5mph and is to be displayed on site signage at the site entrances which must be communicated to all delivery drivers through the delivery instructions.

No vehicles should be left unattended at any time. All engines must be turned off when not in use and keys removed to prevent unauthorised persons using vehicles. The site and surround roads has an anti-idling and anti-reversing policy and this is also communicated in the delivery instructions.

All deliveries to site should be undertaken through an electronic Delivery Management System (DMS), managed by the construction logistics team, with all deliveries allocated to a specific time slot and shared between both sites.

Failure to adhere to the time slot may result in a sub-contractor's delivery being denied entry as there will be no allotted vehicle holding zones on the public street to allow access to the site.

The delivery management process and system is integrated into the traffic management planning and operation to ensure the two work proactively together to reduce the impact of vehicle congestion. They will also be co-ordinated with crane and hoist movement on site.

This provides the safest and most sustainable working solution of segregation to the workforce from material deliveries.

11 Potential Impacts During Construction

A review has been undertaken of the potential source of adverse impacts, which can be associated with carrying out construction works.

The results of this are presented in the following table:

POTENTIAL IMPACTS AND HEADLINE MITIGATION MEASURES DURING DE-CONSTRUCTION AND CONSTRUCTION		
Issue	Potential Impacts	Mitigation
Noise	Increased road noise levels from vehicles. Increased noise levels from plant during excavation, piling and general construction works (e.g. from the use of air compressors and diamond cutters).	Defined working hours, baffles to certain plant, local acoustic screening. Vehicle routing. Beepers, radios etc. to be silenced. Engines turned off and all measures outlined in the Considerate Constructors Scheme.
Vibration	Increased vibration levels from vehicles. Increased vibration levels from plant during de-construction, piling and general construction works. Defined working hours. Selection of appropriate plant and work procedures.	Phased deliveries to minimize numbers of vehicles attending site. Vehicle routing. Engines to be switched off when vehicles are idle or on site.
Dust / Air Quality	Windblown dust from ground surfaces, stockpiles, vehicles, work faces and cutting and grinding of materials. Exhaust emissions from lorries and plant delivering and removing materials including dust and particulates.	Cover all open backed vehicles, 'water down' construction activities; switch off vehicle engines when parked. Regular and controlled monitoring of air quality, including agreement and implementation of trigger and action levels.
Waste	Waste generation and its disposal.	Instigate Site Waste Management Plan and re-cycling program.
Water	Increased sediment loadings to storm water system. Potentially contaminated storm-water runoff.	Do not allow direct discharge of water into sewerage collection system.
Traffic	Traffic congestion caused by site traffic. Local traffic diversions will be required for tower crane erection and dismantle and mobile crane lifts. Increased vehicle movements mainly consisting of Heavy Goods Vehicles (HGVs). Nominal levels of transfer of mud and material from vehicles	Phased deliveries to minimize numbers of vehicles attending site, switch off vehicle engines when parked, minimize abnormal loads. Vehicle routing.

	onto the public highway. Disruption from abnormal or hazardous loads. Exhaust emissions.	
Storage of fuels and construction materials	Accidental spills, discharges to drains/storm-water systems. Contamination to ground.	All fuel tanks etc. to be bunded, no discharge allowed into the sewerage collection system.
Pedestrian access	Restrictions on pedestrian access to walkways, footpaths and roads.	Erect protective gantries / pedestrian tunnels over footways.
Hazardous and contaminated materials	Exposure of the workforce to deleterious / hazardous materials and contaminated land, mobilization of any source contaminants and creation of pathways from source to groundwater receptor.	Site investigation reports to indicate if any contaminated fill is present. COSHH assessments and careful implementation of associated working method statements to ensure that no hazardous materials find a path to groundwater source.
Ecology	Water / mud run off into the drains.	Do not allow direct discharge of water into sewerage collection system, utilize interceptors where necessary.
Energy usage	Indirect impacts associated with energy consumption such as CO2 emissions, depletion of natural resources, air pollution etc.	Site environmental plan to be implemented.
Views	Views impacted and / or impeded from construction equipment, particularly cranes.	Tower crane to be positioned to have minimal impact upon adjacent views.

12. Safety, Health, Environmental & Quality

The management of safety, health, environmental & quality is a crucial element to all UK construction sites. Construction sites are high-risk areas which can present life threatening situations if not properly managed.

The site will be managed in line with the 'Construction (Design and Management) Regulations 2015' and all associated legislation, including environmental responsibilities placed on the duty holders. The duty of care owed to those directly involved, and those indirectly affected by the project, will be recognized and managed in line with regulatory guidance, and industry best practice.

One of the aims of this plan is to facilitate the safe and timely completion of the project, whilst ensuring that the clear lines of communication are always available to those with an interest in the project, and those in the local community looking for reassurances for their own interests.

The health, safety and well-being of all individuals associated with the appointed Main Contractor, supply chain and stakeholders is an integral part of the site operation. To manage the site safely and efficiently, the following areas will be required as part of the site establishment:

- Clear health and safety information and signage in the offices and worksites, holding regular toolbox and site talks as well as issuing internal communications via email and notice boards.
- Before any member of the team enters the site, whether one of the appointed Main Contractor's own workers or part of the supply chain, they must have undertaken the relevant induction training, hold the correct qualifications and are equipped with the correct PPE.
- Due to the scope of the site, there is going to be a consistent need to ensure clear walkway and access between the buildings are well-marked safe access and egress across the site.
- Health and safety are a mandatory aspect of all site operations, focused on ensuring the safety, well-being and protection of the workforce at all times.

12.1 Fire Precautions

All fire precautions will be taken and fire checks will be made at the end of each working day before personnel leave the site. Fire points will be set up within easy reach of the work areas, storage points and hot works locations. Throughout the works, 'hot works permits' will be required as standard for all hot works. The process will be managed by the appointed Main Contractor.

12.2 Fire Alarm

Each building will be temporarily fire alarmed back to separate security monitoring areas. The appointed Main Contractor will agree fire communication, evacuation strategies, drills for both themselves and relevant third parties.

12.3 Emergency Evacuation Procedure

Contact names and phone numbers will be made available in case of out of hours emergencies relating to the site. This information will be drawn up and prominently displayed on site by the appointed Main Contractor.

The site offices will also have their own plans drawn up with site evacuation routes clearly marked on site (inclusive of fire extinguisher points) and practice drills being carried out regularly.

12.4 Fuel Management

All fuel will be stored in bunded tanks away from any surface water drains or gullies. Emergency spill kits will be suitably available on site.

12.5 Unexploded Ordnance Survey

The four key areas that have been assessed are all considered to be low or very low risk, as summarised below:

- WWI Aerial Delivered Ordnance – Very low risk.
- WWII Aerial Delivered Ordnance – Low risk.
- Former Military Use & Alliance Ordnance – Low risk.
- Aircraft Crash Site – Very low risk.

The Main Contractor will produce an emergency plan detailing actions to be taken if a UXO is discovered. Any person working in the ground (site investigation surveyors, piling contractors, ground contractors or similar) are to undertake a UXO briefing as part of the initial site induction and for regular completed toolbox talks.

12.6 Flood Risk & Surface Water Drainage

The flood risk & surface water report has found the site is at low risk of flooding from most sources. The surface water drainage strategy for the new development site will be to discharge surface water discharge into Great Ducie Street.

Attenuation has been proposed in the form of geocellular storage (subject to detailed design). The new surface water networks will be designed in line with current British Standard and Sewers for Adoption Guidance up to the 100-year storm return period including an allowance for climate change.

Beyond the 30-year criterion out of chamber flooding may occur and flood water will be directed away from the building to the external areas, where it will then be directed back into the drainage network as pipe water levels recede.

12.7 Considerate Constructors Scheme

The appointed Main Contractor, Sub-Contractors and Consultants will be required to enrol and comply with all the requirements of the Considerate Constructors Scheme, which is administered by the Construction Industry Board.

This voluntary code of practice seeks to:

- Minimize any disturbance or negative impact (in terms of noise, dirty and inconvenience) sometimes caused by construction sites to the immediate neighborhood.
- Eradicate offensive behavior and language from sites.
- Recognize and reward the Contractor's commitment to raising standard of site management, safety and environmental awareness beyond statutory duties.

Principally, the requirement will be for all stakeholders to pay their employees the Real Living Wage as a minimum as defined by the Living Wage Foundation. There will also be

a requirement that all apprentices are to be paid the adult minimum wage rather than the under 25 values (same wage for the same job regardless of age).

Contractors must also provide safe sites to work on and live near to. Therefore, the requirement is to operate to high standards of Health & Safety and set targets for significant reductions of AIIR (accident injury incident rates).

12.8 Wheel Wash Management

The site has designated loading areas that will also serve as wheel wash areas for vehicles leaving the confines of the site.

A road sweeping machine will be periodically employed as required to either brush clean the roads around the site or in periods of dry weather wet down the highway to control the dust. All ground or surface water run-off will be strictly controlled in line with environmental legislation and best practice to prevent pollution of drains and watercourses.

12.9 Dust Suppression

Manchester City Council's Local Development Framework Core Strategy (2012) guides the spatial strategy for development within Manchester. At all times the Air Quality Policy EN16 will be considered. This policy states:

"The Council will seek to improve the air quality within Manchester, and particularly within Air Quality Management Areas, located along Manchester's principal traffic routes and at Manchester Airport. Developers will be expected to take measures to minimise and mitigate the local impact of emissions from traffic generated by the development, as well as emissions created by the use of the development itself, including from Combined Heat and Power and biomass plant. When assessing the appropriateness of locations for new development the Council will consider the impacts on air quality, alongside other plan objectives. This includes cumulative impacts, particularly in Air Quality Management Areas."

Some activities have the potential to create large amounts of dust. During these activities the following dust suppression methods can be utilised:

- The use of filters to remove particles from the air. This method is particularly useful in small and enclosed spaces. It is not to be used outdoors or in large areas.
- Dust extraction can be used to remove dust from the air into a central receptacle i.e. a vacuum. This is particularly useful for specific tasks such as cutting or drilling.
- Water based dust suppression will be used for large scale dust suppression. The dampening down of material before, during and after breaking, cutting or disturbing. The use of a garden hose, pressurized water canisters or water misting cannons is recommended.
- Dust generation will be located as far away as possible from the development site boundaries and neighbouring properties.
- All plant and equipment will be maintained in accordance with manufacturer's recommendations to ensure emissions to atmosphere are minimised.
- Skips, chutes, and conveyors will be covered and if necessary enclosed to

- ensure that dust does not escape.
- Review delivery activities, plant, stockpiled materials and/or any other activities liable to be significant.

When reasonably possible working methods can be enacted to prevent the creation of dust altogether. Some activities (such as demolition) is to use dust suppression at all times during the works. Dust suppression methods will be in line with the principles and recommendations of the 'Control of Dust and Emissions from Construction and Demolition – Supplementary Planning Guidance' and the 'Control of Dust from Construction and Demolition Activities'.

A road-sweeping machine will be periodically deployed as required to either brush clean the roads around the site or (in periods of dry weather) wet down the highway to control the dust

Dust will be constantly monitored and suppression will be controlled at the working face and will be carted away by a fine water supply. The quantity of water emitted by the sprays will be regulated and controlled to prevent any flooding at the ground water level.

12.10 Noise Pollution

The Main Contractor's Method Statement will be in accordance with the standards set out in B.S 5228:2008 'Code of Practice of Noise Control on Construction and Open Sites' respectively to ensure Best Practical Means (BPM) are implemented to control noise and vibration. These codes of practice will be used to inform the Main Contractor's site specific control measures detailed in their Method Statement.

NOISE IMPACTS AND HEADLINE MITIGATION MEASURES DURING DE-CONSTRUCTION AND CONSTRUCTION		
Issue	Potential Impacts	Mitigation
Plant & Machinery	Increased noise levels from plant during excavation, piling and general construction works (e.g. from the use of air compressors and diamond cutters).	All mechanical plant and machinery used during the enabling works will be fitted with proper and effective silencers and will be maintained in good and efficient working order. Static plant and machinery (such as crushing plant) will be sited as far away as possible from inhabited buildings or other noise sensitive locations and located adjacent to proposed stockpile locations, where possible and practicable. All plant

		and machinery in intermittent use will be shut down in the intervening periods between work.
Construction Traffic	Increased road noise levels from construction vehicles. Traffic congestion caused by site traffic.	Traffic routing will be selected to avoid the requirement for vehicle reversing. Phased deliveries to minimize numbers of vehicles attending site. Engines to be switched off when vehicles are idle or on site. Vehicle routing. Beepers, radios etc. to be silenced. Engines turned off and all measures outlined in the Considerate Constructors Scheme.
Compressors	Plant and machinery is capable of generating significant noise and vibration levels.	All compressors will be 'noise reduced' models that are fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use. All ancillary pneumatic percussion tools will be fitted with mufflers or silencers of the type recommended by the manufacturers.
Diesel or Petrol Powered Equipment	Multi-fuel combustion equipment is capable to produce excessive noise.	Wherever possible mains electricity or battery powered equipment will be used instead of diesel or petrol powered equipment.
Handling of Materials	Handling of Materials can increase noise levels if not considered.	The handling of materials will be conducted in such a manner that minimises noise, including minimising drop heights into hoppers and lorries
Stereos or Similar Amplified Devices	Stereos or similar amplified devices are capable in creating additional noise.	No stereos or similar amplified devices will be audible at the site boundary.

Unless specified otherwise, works will be with all Best Practical Means (BPM) taken to minimise any noise disruption to adjacent businesses and residential properties.

Site operations that are audible at the site boundary are to be restricted to only taking place between 0730 to 1800hrs Monday to Friday, and 0830 to 1400hrs on Saturdays (these hours include deliveries and removal of plant, equipment, machinery and waste).

Operatives working in noisy areas will be monitored to ensure they are wearing the necessary protective equipment and that they are not exceeding their permitted exposure periods.

Where it is necessary to carry out noisy activities, these will be identified well in advance by the Main Contractor and the timing agreed prior to commencement. Particularly noisy activities such as piling will commence after 0900hrs.

Several methods are to be taken to mitigate noise levels and the nuisance caused including.

- The use of acoustic barriers. These are best suited to noise coming from a particular area and can be fixed to fence panels to surround the noisy works. They are most effective when they are as close to the noise creation as reasonably possible.
- The use of electricity from the incoming main, avoiding the use of generators on site.
- The banning of radios and other speakers for non-construction related activity.
- The use of modern plant and machinery.
- Mufflers fitted to site plant with inspection covers to remain closed during the operation of plant.
- Pneumatic tools used only when a reasonable alternative is not available and fitted with mufflers or silences when reasonable possible.
- Switching off idling plant / equipment when not in use.
- Where possible, locating noisy activities away from sensitive receptor locations.
- Limiting drop heights when loading muck away vehicles with excavators.

All plant and equipment to be used for the works will be properly maintained, silenced where appropriate to prevent excessive noise and switched off when not in use and where practical.

12.11 Vibration Suppression

All site personnel to ensure industry best practice is implemented and encouraged during the planning and works execution the Main Contractor will ensure a dedicated point of contact is available should complaints or compliments be raised by neighbours or members of the public.

To mitigate vibration absorbed by operatives (HAVS) all tools will be checked for their HAVS rating and used in accordance with the HSE recommendations on safe working time using the Ready Reckoner. Should the tools have vibration reduction options, these must be used at all times.

To prevent ground vibrations (which could compromise structure), continuous ground vibration monitoring is to be installed with any construction activity deemed to create high levels of vibration.

12.12 Lighting Pollution

Working with the Local Authority and third party consultants, the appointed Main Contractor is to introduce measures to minimise impact on artificial lighting, such as restrictions in hours of operation, and the location and angling of lighting.

12.13 Communication & Liaison between the Client and Others

Community relations personnel will be provided, who will be focussed on engaging with occupiers of nearby properties (residential and business), local amenity associations and neighbourhood forums (where these exist) at all stages of the project starting and, where practicable, before any works begin on site. This will be of particular importance in proximity to noise sensitive receptors or those sensitive to vibration where early engagement will be invaluable in planning logistics.

They will provide appropriate information and be the first line of response to resolve issues of concern. Reasonable steps will be taken to engage with the elderly and residents with disabilities and with other groups in the neighbouring area who might be affected by construction impacts in different ways (religious groups with different holy days or noise sensitive receptors for example).

This will include producing a newsletter at appropriate stages, providing details of site progress (including photographs) and a look ahead to the coming week advising people in advance of any likely noisy works that are likely to take place.

The community relations personnel will ensure that occupiers of nearby properties, local amenity associations, business improvement districts or similar groups where these exist, will be informed in advance of works taking place, including: the start date, estimated duration and nature of the project, the principal stages of the project, details of contact names and numbers of appropriate site personnel.

The community relations personnel will be required to take a proactive approach with a robust system of communication between all members of the project being established between all parties. This may require regular meetings to ensure that both parties are aware of any activities or issues that may impact the project.

The community relations personnel shall ensure that a 'contact board' is displayed outside the site (e.g. on hoardings), identifying key personnel (with contact addresses, telephone numbers and email address) so that members of the public know who to contact in the event of a report or query.

The robust system of communication will detail how a contact number will be advertised to the public, investigation procedure when a complaint is received, any monitoring to be carried out and what will happen in the event that the complaint is not resolved. Written records of any complaints received (and actions taken) shall be kept and will be forwarded to the Local Authority during construction works on request.

Appendix 3 – Remediation and Enabling Works Strategy

Prepared by e3p



Remediation and Enabling Works Strategy
Former Boddingtons Site, Cheetham Hill

Reference: 15-175-R3-4
Date: March 2022



REMEDIATION AND ENABLING WORKS STRATEGY

Former Boddingtons Site
Great Ducie Street
Cheetham Hill
Manchester
M3 1PT

Prepared for:
Latimer Developments Ltd

Report Ref: 15-175-R3-4
Date Issued: March 2022

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QUALITY ASSURANCE

PROJECT NUMBER	15-175			
VERSION	Version 1	Version 2	Version 3	Version 4
REMARKS	Draft	Final – Updated following comments	Final – updated with final ground gas assessment	Final amendments following comments. EHO
DATE	January 2022	January 2022	February 2022	March 2022
PREPARED BY	N Dawson	N Dawson	R. Hodnett	R. Hodnett
QUALIFICATIONS	BSc (Hons), FGS	BSc (Hons), FGS	BSc (Hons), FGS, MEnvSc	BSc (Hons), FGS, MEnvSc
CHECKED BY	R. Hodnett	R. Hodnett	R. Hodnett	R. Hodnett
QUALIFICATIONS	BSc (Hons), FGS, MEnvSc	BSc (Hons), FGS, MEnvSc	BSc (Hons), FGS, MEnvSc	BSc (Hons), FGS, MEnvSc
AUTHORISED BY	A Edgar	A Edgar	A Edgar	A Edgar
QUALIFICATIONS	BSc, MSc, PIEMA, MEnvSc, CEnv	BSc, MSc, PIEMA, MEnvSc, CEnv	BSc, MSc, PIEMA, MEnvSc, CEnv	BSc, MSc, PIEMA, MEnvSc, CEnv



Cert No 18890

ISO 9001 (2015)
ISO 14001 (2015)
ISO 45001 (2018)



EXECUTIVE SUMMARY

Site Address	Former Boddingtons Site, Cheetham Hill, Manchester, M3 1PT
Grid Reference	E383786, N399268
Site Area	0.49 Ha.
Background	E3P has been instructed by Latimer Developments Ltd to develop a remediation and enabling works strategy for the proposed mixed-use development comprising 461 residential units, and commercial spaces at the site known as the Former Boddingtons Site, Cheetham Hill, Manchester. The development will comprise two main blocks with differing numbers of stories, between 1 story and 26 stories. This Remediation and Enabling Earthworks Strategy report has been produced in due consideration of the geoenvironmental site investigation and contaminated land assessments undertaken by E3P.

CONTAMINATED LAND RISK ASSESSMENT

Human Health Risk Assessment	The Tier I Human Health Risk Assessment has identified the presence of elevated concentrations of inorganic heavy metals, PAH compounds and naphthalene within Made Ground deposits. The Made Ground is not suitable for use within proposed “soft” areas, where a direct exposure pathway exists. Elevated TPH has been identified within underlying natural strata at a depth of 5.60 m bgl in one location (WS108). All landscaped areas will require the placement of a 450 mm chemically suitable cover system (comprising a capillary break layer, 300 mm subsoil and 150 mm topsoil) to remove the exposure pathway and ensure no unacceptable risk to human health receptors in line with the Manchester City Council guidance document. Localised naphthalene impacted materials within WS109 at 0.80 m bgl will require delineation and removal of impacted soils as it presents a risk of vapour inhalation to the proposed end-user. The delineation, excavation, and removal of all impacted soils with subsequent validation testing of the resulting excavation will demonstrate the removal of the contaminant source. The excavated impacted material can be subject to on-site ex-situ treatment with validation testing utilised to demonstrate options for future re-use. In terms of the localised TPH C16-C21 and TPH C21-C35 identified in one location on site within the underlying natural SAND (WS108 at 6.60 m bgl), the pathway for these compounds is dermal contact and ingestion and given the depth of the identified impact (>5.00 m bgl), it is unlikely that this will pose a future risk to the proposed development in terms of human health. Localised, as yet unidentified, contaminant impact cannot be discounted; therefore, the site remediation and enabling works will be completed under the supervision of an independent geoenvironmental engineer. In the event of any as yet unidentified/unexpected source impact being observed, samples will be subject to laboratory testing to inform robust risk assessment and, where necessary, remedial action.
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Controlled Waters Risk Assessment	The direct comparison of groundwater samples recovered from dedicated monitoring wells has identified elevated concentrations of selenium and TPH Aliphatic C21-C35 within one location (WS108) which exceed the screening criteria for the Drinking Water Standards (DWS). Elevated TPH Aliphatic C21-C35 within WS108 are considered to be associated with the hydrocarbon impacted SAND deposits. The CL:AIRE Petroleum Hydrocarbons in Groundwater guidance document shows the mobility ranking of TPH carbon bandings; TPH Aliphatic C21-C35 are not included however TPH Aliphatic C16-C21 are considered to have a very low sorption ranking and potential mobility ranking, and overall relative mobility in groundwater assessed as being very low. Given the elevated TPH bandings identified in the groundwater analysis it is considered they will have low mobility so are unlikely to migrate. The groundwater samples were obtained using a low flow technique, and it is recommended further monitoring be completed across the site to understand if there is site-wide impact. It should be noted that the elevated concentrations of selenium and TPH Aliphatic C21-C35 are typically considered to be of low mobility. Given the absence of any notable receptors within proximity to the site, the low mobility of the identified contaminants which exceed DWS screening criteria, there is considered to be a low risk to controlled waters. Further groundwater monitoring should be completed comprising at least two additional visits using a low flow sampling technique to confirm these findings.
Ground Gas	Based on the ground gas monitoring completed the subject site would be classified as CS1 for the proposed development area, and therefore ground gas protection measures are not required within the construction of the proposed development.
Coal Mining and Historical Workings	The site is not considered to be at risk from mining or quarrying-related issues.
Potable Water Supply	The site investigation and contaminant risk assessment identified elevated concentrations of potentially volatile hydrocarbon compounds, which could permeate into the potable supply infrastructure. It will therefore be necessary to undertake appropriate remediation works with robust validation tests including a post-remediation UKWIR assessment to confirm the proposed pipeline requirements.

GEOTECHNICAL ASSESSMENT

Relict Sub-Structures	All relict substructures, infrastructure and materials deemed geotechnically deleterious will require removal from beneath proposed structures and infrastructure to the depths and extents as defined within this specification.
Adverse Ground Conditions	All infilled and historical features where deleterious/putrescible material are encountered, should be subject to the necessary remediation works in order to render the site suitable for the proposed development.
Proposed Foundations	The overarching aims of the remediation and enabling earthworks will be: ☛ Preparation of plot footprint (+ 2 m on all elevations) to be suitable for a piled foundation solution.



Proposed Foundations	✿ Preparation of a temporary cover layer using locally-won recycled concrete aggregate to the structural engineers specification. Where structures are to be supported by the use of a pile foundation, all newly placed material will be engineered to ensure no unacceptable long-term consolidation/settlement that would induce negative skin friction and subsidence to external hardstand/landscaping.
Highways and Infrastructure	All proposed adopted roads will be constructed in accordance with the geotechnical engineering requirements as defined within the MCHW Series 600. Specific engineering and compaction of materials will be completed in strict accordance with the geotechnical specification contained within this report. All materials outside of structural/infrastructure development will be engineered and compacted to ensure consolidation associated with self-weight settlement is limited to < 50 mm in accordance with the E3P specification.

REMEDIATION AND ENABLING WORKS

Objectives	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. The structural engineer's drawings should be referenced in addition to this report.
Remediation and Enabling Works	The site remediation and enabling works strategy provide a comprehensive specification for the regeneration of the land to negate identified pollutant linkages and construct a development platform that will be geotechnically suitable for the proposed end-use. The salient features of the remediation and enabling works strategy are summarised as follows: ✿ Implementing all works in strict accordance with UK Environmental Permitting and local planning authority requirements. ✿ Pre-commencement supplementary site investigation within areas of limited access during the previous E3P site investigation in the south and west of the site. ✿ Removal of all hardstanding, structures, relict foundations and buried features in their entirety (with the exception of live services until re-located if required). ✿ Crushing of hardstanding for re-use on site in the temporary cover layer and stockpiling of surplus for possible future use. ✿ (Only if encountered) The identification, delineation and excavation of potential asbestos impacted materials and validation testing of material that remains and removal of all unsuitable soils in a controlled and legislatively compliant manner. ✿ Delineation and excavation of naphthalene impacted materials and validation testing of material that remains and removal of all unsuitable soils. ✿ Groundwater sampling to confirm there is no unacceptable degree of risk to controlled waters. ✿ Removal of all materials considered geotechnically unsuitable. ✿ Excavation and processing of Made Ground in a controlled manner with the sorting, processing and segregation of identified deleterious materials to comply with the geotechnical specification.



	- Validation sampling and leachate testing to confirm material retained on-site poses no unacceptable risk to the residential end-users, controlled waters or wider environ. - Removal of surplus materials from site to achieve the reduced levels as per the engineers specification. - Replacement of material in accordance with the E3P enabling specification and engineering requirements. - Development of a suitably engineered temporary cover layer of locally-won recycled concrete aggregate.
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BUILD PHASE REQUIREMENTS

Summary of Build-Phase Mitigation Requirements	The developer's works will also include the completion of the following additional elements: - Provision of a 450 mm cover system with capillary break layer, using certified material with appropriate validation within proposed areas of public open space and soft landscaping. - Construction of appropriate potable water supply infrastructure.
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TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1. INTRODUCTION	7
1.1. Background	7
1.2. Report Objectives	7
1.3. Scope of Works	7
1.4. Previous Works	7
1.5. Redevelopment Plan	8
1.6. Summary of Parties Involved	9
1.7. Regulatory Correspondence	9
1.8. Site Details	9
1.9. Site Summary	10
1.10. Summary of Reported Ground Conditions	12
2. E3P CONTAMINATION RISK ASSESSMENT	13
2.1. Background	13
2.2. Human Health Risk Summary	13
2.3. Controlled Waters Contamination Risk Summary	16
2.4. Ground Gas	16
2.5. Potable Water Supply Infrastructure	17
3. SITE REMEDIATION AND ENABLING WORKS	18
3.1. Remediation Options Appraisal	18
3.2. Determination of Sufficiency of Information	18
3.3. Requirement for Regulatory Control	18
3.4. Remediation Technology	19
3.5. Contaminants of Concern (CoC)	19
3.5.1. PAH, Non-Volatile Hydrocarbon (Petroleum Range) Compounds	19
3.5.2. Asbestos	19
3.5.3. Localised Naphthalene Impact	20
3.5.4. TPH (Aliphatic) C21-C35	20
3.6. Identification of Feasible Remediation Options	21
3.6.1. Objectives	21
3.6.2. Available Technologies	21
3.6.3. Selection of Technology Options	22
3.7. Summary of Preferred Remediation Options	25
3.8. Overview of Works	26
3.9. Validation Sampling Protocol	36
3.10. Remediation Contractors Site Management and Responsibility	37
4. MATERIALS MANAGEMENT AND LEGISLATIVE COMPLIANCE	38
5. ENVIRONMENTAL MONITORING AND VALIDATION	39
5.1. Site Management	39
5.2. Completion	39
5.3. Mitigation of Risk from Soils with Asbestos Fibres	40
5.3.1. Pre-Commencement Works	40
5.3.2. Control, Monitoring and Reporting of General Aerial Emissions from Dusts and Particulates	40
6. GEOTECHNICAL ENGINEERING SPECIFICATION	43
6.1. E3P Geotechnical Engineering Specification	43
6.2. Locally Won Fill Material	43
6.3. Classification of Fill Material	44
6.3.1. General Classification	44



6.3.2.	Pre-Commencement Earthworks Testing Frequency / Performance.....	44
6.3.3.	Use of Fill Materials	46
6.4.	General Requirements.....	46
6.4.1.	Construction of Fills – Highways.....	48
6.4.2.	Construction of Fills – Adopted Highways, Estate Roads and Car Park	48
6.4.3.	Unacceptable Material.....	50
6.5.	Earthworks Material Tests	51
7.	RECORD-KEEPING AND VERIFICATION.....	52
7.1.	Record-Keeping	52
7.2.	Verification.....	52
8.	CONTINGENCY PLAN	53
8.1.	Previously Unidentified Contaminants	53
9.	SECOND PHASE MITIGATION AND MANAGEMENT – BUILD PHASE.....	54
9.1.	Placement Of Cover System	54
9.1.1.	Procedure for Placement of Chemically Suitable Cover System	56
9.2.	Potable Water Supply – Contaminant Assessment Criteria	58
	APPENDIX I LIMITATIONS.....	59
	APPENDIX II GLOSSARY	61
	APPENDIX III DRAWINGS	64
	APPENDIX IV E3P REMEDIATION/ VALIDATION CRITERIA.....	65
	APPENDIX V E3P MATERIAL IMPORT CRITERIA	70
	APPENDIX VI CONTRACTOR PRE-COMMENCEMENT CHECK SHEET	72
	APPENDIX VII CONTRACTOR COMPLETION CHECK SHEET	75

Drawing List

15-175-016 – Remediation Issues Plan



1. INTRODUCTION

1.1. BACKGROUND

E3P has been instructed by Latimer Developments Ltd to develop a remediation and enabling works strategy for the proposed mixed-use development comprising 461 residential units and commercial spaces at the site known as the Former Boddingtons Site, Cheetham Hill, Manchester. The development will comprise two main blocks with differing numbers of stories, between 1 story and 26 stories.

1.2. REPORT OBJECTIVES

The objectives of this report are to:

- ✿ Prepare an overview of contaminated land remediation requirements;
- ✿ Evaluate feasible remedial technologies;
- ✿ Assess the most-appropriate earthworks solution to ensure the delivery of the optimum development platform;
- ✿ Define validation criteria to demonstrate the successful implementation of the site remediation and enabling works plan;
- ✿ Specify geotechnical engineering performance requirements; and
- ✿ Ensure the safe, cost-effective and regulatory compliant redevelopment of the site.

1.3. SCOPE OF WORKS

The development of the risk management strategy for the subject site includes the following tasks:

- ✿ Identification of the relevant pollutant linkages;
- ✿ Review of site characteristics;
- ✿ Identification of geotechnical constraints;
- ✿ Development of remedial objectives;
- ✿ Selection of appropriate remedial technology; and
- ✿ Development of remedial strategy.

1.4. PREVIOUS WORKS

The following phases of geoenvironmental investigations have previously been carried out at the site:

- ✿ **E3P** – *Phase I Geoenvironmental Site Assessment*. Report Ref: 15-175-R1-2, dated December 2021, Prepared for Latimer Developments Ltd.
- ✿ **E3P** – *Phase II Geoenvironmental Site Assessment*. Report Ref: 15-175-R2, dated December 2021, Prepared for Latimer Developments Ltd.



To inform the assessment of the potential risk to contaminated land within the context of the proposed residential development and to inform the preparation of the remediation strategy, the pertinent points from the above report are summarised within Section 2.

For the avoidance of any doubt, the following reports should be read both as a precursor to and in conjunction with this document:

- 📌 **E3P** – *Phase I Geoenvironmental Site Assessment*. Report Ref: 15-175-R1-2, dated December 2021, Prepared for Latimer Developments Ltd.
- 📌 **E3P** – *Phase II Geoenvironmental Site Assessment*. Report Ref: 15-175-R2, dated December 2021, Prepared for Latimer Developments Ltd.

1.5. REDEVELOPMENT PLAN

E3P understands that Latimer Developments Ltd is involved with a proposed scheme to redevelop the site for residential use. Assael Architects has completed a feasibility study for a car-free development comprising 442 homes and commercial spaces. The development will comprise two main blocks with differing numbers of stories, between 1 story and 27 stories.

The site forms part of the adopted Great Ducie Street Strategic Regeneration Framework Masterplan, bringing forward the redevelopment of the former Boddingtons Brewery demolished circa 10 years ago. The site has been purchased from LTE Group (trading as Manchester College) who are delivering a new college facility on the southern part of the site, this is due for completion by summer 2022.

FIGURE 1.1 SNAPSHOT OF PROPOSED DEVELOPMENT



1.6. SUMMARY OF PARTIES INVOLVED

FUNCTION/INTEREST	NAME OF PARTY
Local Planning Authority	Manchester City Council
Developer	Latimer Developments Ltd
Geoenvironmental Consultant	E3P
Main Contractor	TBC
Remediation/Enabling Works Contractor	TBC
Human Health Regulator	Manchester City Council
Controlled Waters and Waste Regulator	Environment Agency
Highways Adoption Authority	Manchester City Council

1.7. REGULATORY CORRESPONDENCE

Latimer Developments Ltd is in the process of submitting a detailed planning application to the local planning authority for the proposed redevelopment of the site for a combined commercial and high-rise residential housing as part of a car-free development.

It is presumed that as part of the planning approval process, the planning authority will undertake consultation with the pertinent statutory consultees, which will include:

- ✿ Environmental health/contaminated land officer at the local authority (or external adviser);
- ✿ Environment Agency planning liaison; and
- ✿ The Coal Authority.

1.8. SITE DETAILS

Site Address	Former Boddingtons Site, Cheetham Hill, Manchester, M3 1PT
National Grid Reference	E383786, N399268
Site Area	0.49 Ha.

All acronyms used within this report are defined in the glossary presented in Appendix II.

A site location plan is presented in Appendix III as Drawing 15-175-001.



1.9. SITE SUMMARY

TABLE 1.1 SITE DESCRIPTION AND SETTING

Occupancy/Use	The site currently comprises land bound by the Travelodge and surface level car parking to the north, the remainder of the surface level car parking and beyond this Dutton Street to the east, the under-construction Manchester College to the south, and Bury New Road to the west in Manchester.	
	The site is itself forms part of a surface level car parking with access gained via Francis Street to the northwest of the site.	
	The site is covered in hardstand with street lighting present along the boundaries of the site (except for the northern boundary which forms part of the wider car park). No structures are present within the site boundary.	
Environmental Setting	Drift Geology	Till – Diamicton (east of site) No superficial drift deposits recorded by the BGS in the west of the site.
	Bedrock Geology	Chester Formation - SANDSTONE
	Hydrogeology	Secondary undifferentiated superficial aquifer in the east overlying a principal bedrock aquifer. The west of the site has been noted as a secondary A aquifer, however, drift deposits have not been recorded.
	Faults	The Ardwick Fault is present across the site trending approximately north-west to south-east with the downthrow side present on the north-east of the fault.
	Hydrology	No surface water features are present on site. The nearest surface water feature is the River Irwell located 156 m south-west. Based on the local topography and location of nearby surface water features, it is likely that any shallow groundwater if present will flow in a westerly direction towards the River Irwell.
	Flood Risk	The site is located in a Flood Zone 2.
Site History	The subject site comprised buildings associated with print works along with Briddon Street and Nightingale Street in earliest mapping from 1848. By 1850 the site was named Strangeways Calico Print Works with several buildings, boilers and tanks on-site; terraced housing was present in the west of the site. In 1892 the site was named Strangeways Finishing Works with Albion Works present on the north-eastern boundary. Mapping from 1933 identified several industries on the site including boot repairs, rag and cotton warehouse, plumber, dentist, hotel, waterproof clothing factory, cotton goods warehouse, mortar mill, garage, quilt and clothing factory and an oil store. Terrace housing in the west of the site was demolished and replaced with a warehouse circa 1949-1951; by this time the site was part of Strangeways Brewery. Mapping dated 1978-1989 notes that Briddon Street and Nightingale Street were no longer present with large areas of the site cleared or demolished. The site then comprised the brewery and areas of hardstanding up until some point between 2006 and 2009 where the site was demolished and was subsequently utilised as a car park, which is still its current use.	



Landfill Sites and Ground Gases	No landfill sites (current or historic) are located within 250 m of the site. The site has undergone numerous phases of historic development which is likely to have resulted in the deposition of deep and variable Made Ground across the site, which may be a potential source of hazardous ground gases such as methane and carbon dioxide. Potentially infilled land (water and non-water) associated with unknown filled ground has been identified between 23 m and 248 m from the site.
Radon	Less than 1% of houses above the 'Action Level' – no special precautions required.



1.10. SUMMARY OF REPORTED GROUND CONDITIONS

E3P has prepared a detailed Phase II Geoenvironmental Site Assessment Report (Ref: 15-175-R2, dated December 2021). The summary of reported ground conditions is given in Table 1.2.

TABLE 1.2 SUMMARY OF GROUND CONDITIONS

MADE GROUND	MADE GROUND – 0.00 m bgl – 5.10 m bgl MADE GROUND was encountered within all exploratory hole locations to a maximum proven depth of 5.10 m bgl (WS108), however, typically made ground deposits were encountered at depths less than 3.00 m bgl. The majority of locations comprised concrete or asphalt in the upper 0.3 m with the exception of W101, WS102, WS104 and WS108 which comprised brown sandy gravel or gravelly sandy clay with gravel of brick, mudstone, concrete and sandstone. The underlying made ground deposits generally comprised sandy gravel with brick, coal, sandstone, concrete and occasional clinker (TP102 and WS110) and metal (ws110). Reworked silty clay deposits were identified within TP102 (1.40-2.20 m bgl), WS105 (2.00-3.10 m bgl), WS108 (1.00-2.60 m bgl). An organic odour was identified within made ground clay deposits in WS106 at 1.60-1.80 m bgl.
Drift	DRIFT – 0.40 m bgl – 6.70 m bgl Drift deposits were encountered within the majority of exploratory locations with the exception of those where the full depth of Made Ground could not be proven. Drift deposits were not encountered within TP102, TP103, WS101, WS102, WS109 and WS110. Brown silty CLAY was encountered within ten exploratory hole locations between the depths of 0.40 m bgl to a maximum encountered depth of 6.00 m bgl. CLAY deposits were generally firm to stiff, however soft very low strength CLAY was identified within WS105 at circa 5.00 m bgl. The CLAY deposits were typically identified to be underlain by a silty fine to medium SAND within four exploratory locations between depths of 1.80 m bgl to a maximum confirmed depth of 6.70 m bgl. SAND deposits were noted to be loose to medium dense. Loose SAND deposits were noted in BH102 at 2.00 m bgl. and BH104 at 4.00 m bgl. A SAND and GRAVEL and GRAVEL band were noted within WS103 (1.65-1.80 m bgl) and BH103 (3.50-4.60 m bgl.) A stiff to very stiff clayey SILT was identified in WS107 at 3.20-5.45 m bgl.
Bedrock	SOLID - >4.60 m bgl Sandstone bedrock was encountered within four exploratory hole locations from 4.60 m bgl - 6.70 m bgl. Deep rotary boreholes confirmed the presence of a weak to moderately strong SANDSTONE bedrock to a maximum depth of 29.00 m bgl.
Groundwater	Groundwater strikes were encountered during the ground investigation at 2.00 m bgl and 3.10 m bgl. Initial monitoring visits indicate groundwater at depths between 0.80 m bgl and 4.80 m bgl however within the majority of locations groundwater is at a depth >2.00 m bgl.



2. E3P CONTAMINATION RISK ASSESSMENT

2.1. BACKGROUND

E3P has completed a Tier 1 Qualitative Contaminated Land Risk Assessment to determine the potential risk to human health, controlled waters and the wider environment. This assessment is documented in full within the E3P Geoenvironmental Site Assessment report and, for clarity, is summarised in the following sections of this document.

2.2. HUMAN HEALTH RISK SUMMARY

The E3P Tier 1 Qualitative Human Health Risk Assessment identified concentrations of the following determinants at or above the screening criteria for the assessment of no unacceptable degree of risk to human health:

- ✿ Naphthalene
- ✿ Benzo(b)Fluoranthene
- ✿ Benzo(a)Pyrene
- ✿ Dibenzo(a,h)Anthracene
- ✿ TPH C16-C21
- ✿ TPH C21-C35
- ✿ Carbazole.

The identified elevated concentrations have primary exposure pathways related to soil ingestion (TPH), dermal contact and ingestion (PAH), and indoor vapour inhalation (naphthalene and carbazole).

The chronic risk to human health associated with the elevated concentrations of inorganic heavy metals and non-volatile PAH compounds can be mitigated through the installation of a suitable cover system in all proposed landscaping and public open space to remove any potential for direct exposure to impacted soils.

Naphthalene has been identified within one isolated location on site (WS109 at 0.80 m bgl) and presents a risk of vapour inhalation. This material is currently capped by hardstand and therefore does not present a risk to current site users. As the proposed development comprises residential apartments, this material will require delineation and removal in its entirety from the footprint of the buildings to render the site suitable for residential development. The materials would likely be suitable for retention within areas of Public Open Space (POS).

TPH C16-C21 and TPH C21-C35 have been identified in one location on site (WS108 at 5.60 m bgl), however the pathway for these compounds is dermal contact and ingestion and given the depth of the identified impact (>5.00 m bgl), it is unlikely that this will pose a future risk to the proposed development in terms of human health. As such it is not considered that further works in this area are required; during remediation and enabling works further investigation within this area should be completed to confirm it is not part of a wider hydrocarbon plume.

Carbazole above the limit of detection was identified within WS111 at 0.80m at a concentration of 0.80 mg/kg.



Carbazole is a non-threshold substance and is a white, crystalline solid. It has a characteristic odour. It is a product of incomplete combustion of organic matter and occurs in petroleum, coal, peat, crude oil and coal tar. There is no toxicological data available to inform the preparation of robust site-specific risk-based assessment criteria that would model the potential for ingress of vapour to indoor air.

The US national library for medicine confirms:

"Carbazole released to air will also be in or on particles that eventually fall to the ground. It is expected to be broken down by sunlight, depending on environmental conditions. It will not move into air from moist soil and water surfaces."

If released to soil, carbazole can have high to no mobility based upon a Koc range of 114-4980, with most values suggesting low mobility to immobility. Volatilisation from moist soil surfaces is not expected to be an important fate process based upon a Henry's Law constant of 1.16×10^{-7} atm-cu m/mole. Carbazole is not expected to volatilise from dry soil surfaces based upon its vapour pressure.

It is accepted that carbazole is a non-threshold substance, however, it will be encapsulated in soils with a temperature in the region of 10°C, furthermore given that it is highly unlikely to move into the ambient air via a vapour phase migratory pathway from a soil or water there cannot be a complete pollutant linkage in this instance.

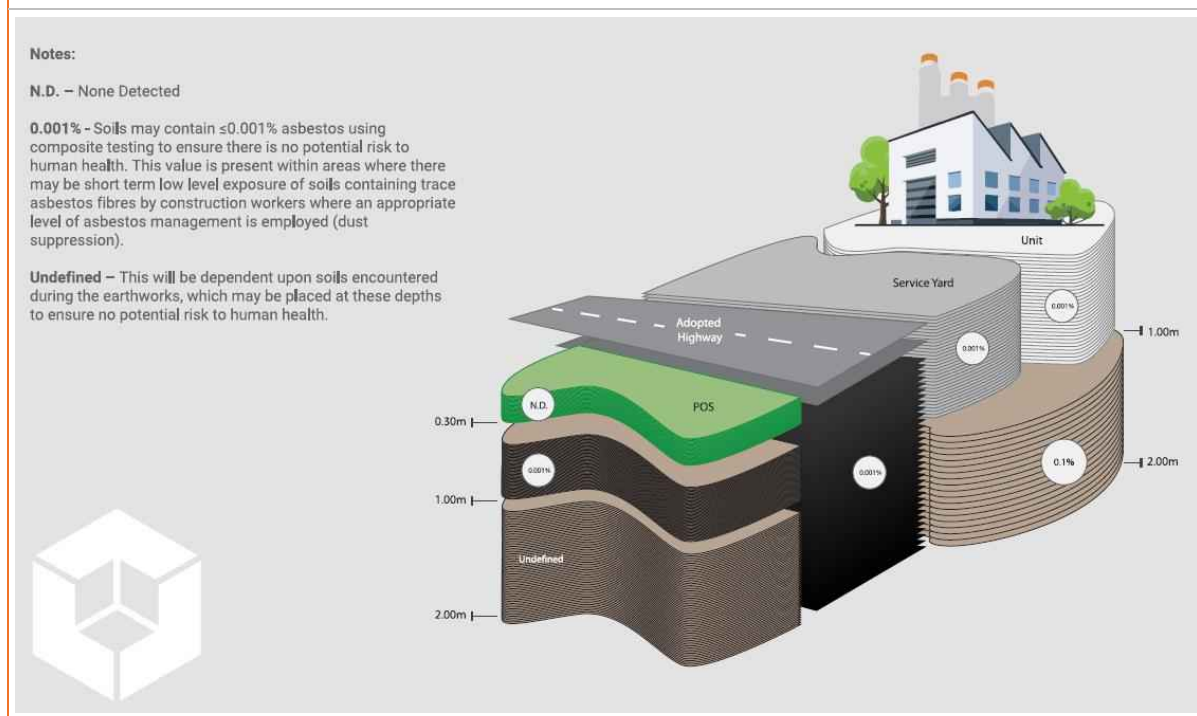
The recorded concentration is marginally above the limit of detection for the analytical method.

Carbazole can also be banded with dibenzofuran due to the absence of a GAC. Based on the threshold of 230 mg/kg, the concentrations within WS111 are not considered to be exceeding and will not present a risk to future end-users.

Asbestos was identified as a potential contaminant based on the historic site use however no asbestos was identified within the 8 samples analysed and no visual ACM was noted during the intrusive works. During remediation and enabling works, further testing of Made Ground will likely be required to confirm the findings of the ground investigation. Should any ACM be identified, this should be analysed and either appropriately placed on site in line with the E3P Asbestos Conceptual Site Model (see Figure 4.1) or removed from site by a licensed waste contractor.



FIGURE 2.1 ASBESTOS CONCEPTUAL SITE MODEL



All proposed landscaped areas within the development are to be installed with a 300 mm chemically suitable cover system, which will ensure that future site users will be at no unacceptable risk from the identified contaminant exceedances.

It is concluded that the site will be suitable for the proposed mixed-use development subject to the completion of the supplementary assessments and the following build-phase mitigation items:

- ✚ Further testing and validation of Made Ground soils to ensure that all materials are suitable for retention on-site or whether they can be placed in areas of low sensitivity during the site enabling works.
- ✚ Further groundwater monitoring to ensure there is no unacceptable degree of risk to controlled waters.
- ✚ Delineation, excavation, treatment and disposal of naphthalene impacted materials and subsequent testing to confirm the suitability of materials for retention on-site or removal off-site.
- ✚ Use of potable water supply infrastructure that will be compliant with United Kingdom Water Infrastructure Risk (UKWIR) assessment criteria following a post-remediation UKWIR assessment.
- ✚ Construction of a 450mm clean cover system with capillary break layer to all areas landscaping in accordance with the detailed methodologies herein.



2.3. CONTROLLED WATERS CONTAMINATION RISK SUMMARY

A Tier 1 Controlled Water Risk Assessment was completed by E3P as part of the E3P Geo-Environmental Site Assessment, the findings of which are summarised as follows:

- ✿ The direct comparison of groundwater samples recovered from dedicated monitoring wells has identified elevated concentrations of Selenium and TPH Aliphatic C21-C35 within one location (WS108) which exceed the screening criteria for the Drinking Water Standards (DWS).
- ✿ Elevated TPH Aliphatic C21-C35 within WS108 are considered to be associated with the hydrocarbon impacted SAND deposits. The CL:AIRE *Petroleum Hydrocarbons in Groundwater* guidance document shows the mobility ranking of TPH carbon bandings; TPH Aliphatic C21-C35 are not included however TPH Aliphatic C16-C21 are considered to have a very low sorption ranking and potential mobility ranking, and overall relative mobility in groundwater assessed as being very low. Given the elevated TPH bandings identified in the groundwater analysis it is considered they will have low mobility so are unlikely to migrate. The groundwater samples were obtained using a low flow technique, and it is recommended further monitoring is completed across the site to understand if there is site wide impact.
- ✿ It should be noted that the elevated concentrations of selenium and TPH Aliphatic C21-C35 are typically considered to be of low mobility.
- ✿ Given the absence of any notable receptors within proximity to the site, the low mobility of the identified contaminants which exceed DWS screening criteria, there is considered to be a low risk to controlled waters however further groundwater monitoring should be completed to confirm these findings.

2.4. GROUND GAS

Ground gas monitoring has been completed and the full assessment is summarised within the Ground Gas Addendum Report (Ref:15-175-R4-1, dated February 2022). The assessment was completed in accordance with the methodology outlined within BS8485:2015+A1:2019, utilising the results of the ground gas monitoring surveys to calculate a tentative gas screening value (GSV). The GSVs for the monitoring positions are summarised in Table 2.1.

TABLE 2.1 GAS RISK PROFILE AND LOCATION

LOCATION	MAX CO ₂ (% v/v)	GSV (l/hr)	MAX CH ₄ (% v/v)	GSV (l/hr)	CLASSIFICATION
Made Ground					
WS105	0.10	0.0001	0.10	0.0001	CS1
WS108	2.10	0.0021	0.10	0.0001	CS1
WS109	2.50	0.0025	0.10	0.0001	CS1
WS111	2.50	0.0025	0.10	0.0001	CS1
Drift					
WS103	0.10	0.0036	0.10	0.0036	CS1
BH102	0.10	0.0001	0.10	0.0001	CS1
BH103	0.10	0.0001	0.10	0.0001	CS1

The GSV has been compared to the criteria outlined within BS8485:2015+A1:2019 to determine the level of risk to the proposed development and to ensure the appropriate remedial options are incorporated into any future building design in this area.



Ground gas monitoring suggests that the site can be classified as CS1, and it is considered that ground gas protection measures will not be required.

Limited monitoring has been completed within WS105 due to the presence of a vehicle on the location, further monitoring will be completed in due course and the ground gas risk assessment subsequently updated.

2.5. POTABLE WATER SUPPLY INFRASTRUCTURE

A UKWIR assessment identified elevated concentrations of potentially volatile/soluble hydrocarbon compounds therefore based on the current ground conditions barrier pipe will be required for the proposed potable water supply. It will be necessary to delineate the impacted soils where present at locations that could potentially impact the potable water infrastructure with subsequent robust validation testing to confirm the post-remediation ground conditions.

A post remediation UKWIR assessment will be required to confirm the conditions following remediation as the site materials will vary from the current site conditions. If unacceptable concentrations remain where they pose a risk to the potable water supply post-remediation, then potable water infrastructure should be constructed in accordance with a suitably robust risk assessment and design compliant with UKWIR.



3. SITE REMEDIATION AND ENABLING WORKS

3.1. REMEDIATION OPTIONS APPRAISAL

A remediation options appraisal has been completed in accordance with the principals as set out within Environment Agency publication Land Contamination: Risk Management (LC:RM)(updated May 2020).

The LC:RM requires that the following tiered assessments are followed to ensure sufficiently detailed and robust appraisal of remediation options to inform the selection of the preferred approach and utilisation of the correct technologies to promote safe and sustainable land remediation:

- ✿ Identification of feasible remediation technologies;
- ✿ Detailed evaluation of viable options; and,
- ✿ Selection of appropriate remediation option.

3.2. DETERMINATION OF SUFFICIENCY OF INFORMATION

Prior to the commencement of the tiered assessment of remediation options, it is a requirement to assess the sufficiency of available information and validity of the risk-based assessment on which the remediation options appraisal is based.

Intrusive ground Investigation works completed to date is considered sufficient in order to fully understand the risks to future end users, controlled waters and the wider environ. However, due to the access limitations and the site conditions, the ability to gather further detailed information is considered required as part of the remediation and enabling works.

3.3. REQUIREMENT FOR REGULATORY CONTROL

The LC:RM requires that due consideration be given to the following key issues which will impact the appropriate selection of suitable remediation options.

- ✿ Requirement for regulatory permits.

The proposed remediation works may be covered by a specific Environmental Permit, it is considered that the processes as outlined below will be applicable to the project.

The processing of recycled aggregates will be completed using LAPC Part B licensed plant with the appropriate deployment notification to the local authority prior to commencement of works. All materials that are recovered as recycled aggregate will be compliant with the requirements of the WRAP protocol and the E3P validation testing requirements and as such would not be deemed to be a waste material.

Where necessary, operations as outlined within the remediation enabling works rationale summarised in this report may be subject to regulation using the appropriate environmental permit, standard rules exemption and materials management plan, to be created in accordance with version 2 of the CL:AIRE Definition of Waste: Code of Practice (DoW CoP).

It is noted that if material is to be imported utilising the CL:AIRE DoW CoP from an alternative development site, then only chemically certified, clean, naturally occurring material can be transferred.

The MMP will be created with due consideration of all proposed remediation and enabling works operations prescribed within this document and will be undertaken by a qualified person with a signed declaration submitted to the EA prior to reuse of materials on the site.



The importation of material for use within the proposed construction of a development platform will be subject to the compliance with the E3P protocol for the importation of materials as set out within the specification for material import included within Appendix V of this report.

3.4. REMEDIATION TECHNOLOGY

Considering the site-specific conditions, including the nature of the identified impacts, the geology and the objectives of the remediation, the most-appropriate soil remedial technologies are considered to be:

- ✿ Validation of soils during works to show that all residual soil concentrations are below the remediation targets for the protection of human health, controlled waters and the wider environment.
- ✿ Hotspot removal and delineation of soils impacted by naphthalene within the locality of WS109.
- ✿ Further investigation and additional groundwater sampling within the area of WS108 should be completed to confirm the identified TPH impact at 5.60 m bgl is not part of a wider hydrocarbon plume.
- ✿ Further testing of Made Ground to confirm the absence of asbestos.
- ✿ Removal of geotechnically unsuitable Made Ground, backfilled with suitably engineered granular material to mitigate the potential for future settlement.
- ✿ Provision of a capillary break layer and chemically suitable 450mm clean cover system within all areas of landscaping and public open space.

It is considered that these technologies and methodologies will address the identified active pollutant linkages, as detailed in the following subsections.

3.5. CONTAMINANTS OF CONCERN (COC)

3.5.1. PAH, NON-VOLATILE HYDROCARBON (PETROLEUM RANGE) COMPOUNDS

The human health risk drivers for the carcinogenic PAHs and TPHs CoC are:

- ✿ Direct contact with the soil source by future on-site residents; and
- ✿ Ingestion of impacted soils by future on-site residents.

Therefore, a cover system is considered to be an appropriate remediation technique to address these impacts, as the installation of a cover system to unsurfaced areas of the site will sever the pathway of contact for human health receptors. A cover system is not considered to be required in future hardstanding areas or beneath buildings, as it can reasonably be assumed that the presence of a hardstanding will prevent direct contact.

3.5.2. ASBESTOS

The human health risk driver for asbestos is:

- ✿ Inhalation of dust fibres by future on-site residents and adjacent residents



Asbestos has not been identified during the ground investigation however given the significant historic developments on site, there is potential for asbestos fibres to be present within the Made Ground matrix on site.

Further testing of Made Ground soils should be carried out during remediation works to ensure there is no unacceptable risk from asbestos fibres on site. If identified on-site, ACM-impacted soils must be managed to ensure no airborne fibre release during construction or placement of impacted material in such a manner as to ensure no future exposure risk.

If any visible pieces of asbestos-containing material are identified during the site remediation and enabling work, this material must be dealt with in strict accordance with the Control of Asbestos Regulations (CAR) 2012, UK Waste Management Legislation and the Environmental Protection Act 1994. Due to the close proximity of adjacent buildings, asbestos in air monitoring in accordance with HSG248 may be required to confirm that no asbestos fibres have been generated from the enabling works activities.

Should off-site disposal be required, then additional asbestos quantification and waste classification testing should be undertaken to ensure that it is classified correctly and disposed of at a suitably licensed facility.

3.5.3. LOCALISED NAPHTHALENE IMPACT

The human health risk driver for the volatile CoC, naphthalene, is:

-  Inhalation of vapours by future on site residents

The delineation, excavation, and removal of all impact soils with subsequent validation testing of the resulting excavation will demonstrate removal of contaminant source.

The excavated impacted material can be subject to on-site ex-situ treatment with validation testing utilised to demonstrate options for future re-use.

Where material is deemed unsuitable for retention and re-use, it will need to be removed and disposed of at a licensed treatment facility.

3.5.4. TPH (ALIPHATIC) C21-C35

The human health and controlled waters risk drivers for the petroleum hydrocarbon CoC are:

-  Migration into controlled waters, secondary A aquifer, within the drift geology beneath the site.
-  Migration into controlled waters, principal aquifer within the underlying bedrock geology.

Further groundwater monitoring is required during remediation and enabling works to confirm there is no unacceptable risk to controlled waters.



3.6. IDENTIFICATION OF FEASIBLE REMEDIATION OPTIONS

3.6.1. OBJECTIVES

The remediation works must be completed in a safe and sustainable manner that ensures that the post remediation condition of the site poses no unacceptable risk to controlled waters or the wider environs. The developed Conceptual Site Model must ensure no complete pollutant linkage to ensure successful implementation.

The remediation works must be completed in a manner that promotes sustainable re-use of material in a manner that minimises waste and maximises retention of material on-site.

The works should be designed and implemented in a manner that ensure no risk to an identified receptor during the works in terms of odour, air quality or noise impact.

Works should be designed, planned and implemented in a manner that ensures full compliance with all pertinent waste management and environmental permit legislation.

3.6.2. AVAILABLE TECHNOLOGIES

Potential remedial technologies that can be applied in order to remediate the identified contaminants of concern are summarised in Table 3.1, below. The remedial techniques considered would potentially break any source-pathway-receptor linkages, thereby reducing the risk to human health from vapour inhalation to acceptable levels.

TABLE 3.1 SOIL REMEDIATION TECHNOLOGIES

REMEDIAL TECHNOLOGY	CLASSIFICATION	APPLICATION	MEDIUM	LINKAGE ELEMENT AFFECTED
Capping	Containment	In situ	Soil	Pathway interruption
Electro-remediation	Physical	In situ / ex situ	Soil	Removes source
Soil washing	Physical	Ex situ	Soil	Source management
Soil vapour extraction	Physical	In situ	Soil	Removes source
Ex-situ bioremediation	Biological	Ex situ	Soil	Removes source
Thermal desorption	Thermal	Ex situ	Soil	Removes source
Vitrification	Thermal	In situ	Soil	Removes source / breaks pathway
Stabilisation / Solidification	Chemical	In situ / ex Situ	Soil	Pathway Interruption
Excavation and offsite disposal	Civil Engineering	Ex situ	Soil / groundwater	Removes source
Enhanced Bioremediation	Chemical / Biological / Natural attenuation	In situ	Soil / groundwater	Removes source / breaks pathway



REMEDIAL TECHNOLOGY	CLASSIFICATION	APPLICATION	MEDIUM	LINKAGE ELEMENT AFFECTED
Monitored Natural Attenuation	Natural attenuation	In situ	Soil / groundwater	Pathway interruption / eventual removal of source
Vacuum Enhanced Recovery	Physical / Chemical	In situ	Soil / groundwater	Removes source / breaks pathway
Air sparging / Biosparging	Physical / Biological	In situ	Soil / groundwater	Removes source / Pathway interruption
In situ oxidation	Chemical	In situ	Soil / groundwater	Removes source / Pathway interruption

3.6.3. SELECTION OF TECHNOLOGY OPTIONS

Several remedial technologies have been considered in addressing the contaminant linkages of concern identified at the site, as summarised in Table 3.2, overleaf.

In order to assess which of these technologies are most viable for this particular project, each technology has been reviewed on the basis of applicability, permissibility, cost, timescale and acceptability (including sustainability).

A combination of remediation solutions and technologies will be required to address and treat the numerous contamination issues identified on this site.

Aspects of sustainable remediation are also included within the review element of applicability.

Sustainable remediation is, 'the practise of demonstrating, in terms of environmental, economic and social indicators, that the benefit of undertaking remediation is greater than its impact and that the optimum remediation solution is selected through the use of a balanced decision-making process', (as defined within 'A Framework for Assessing the Sustainability of Soils and Groundwater Remediation', produced by Sustainable Remediation Forum UK, dated March 2010).



TABLE 3.2 ASSESSMENT OF REMEDIATION TECHNOLOGIES APPLICABILITY

REMEDIAL TECHNOLOGY	APPLICABILITY	REGULATORY APPROVAL / PERMITRY	COST	TIME-FRAME	SCORE	SUITABILITY COMMENT
Capping	5	5	5	5	20	Essential remediation solution to remove direct exposure pathways.
Electro-remediation	0	0	0	0	0	Technique unlikely to treat identified contaminants of concern in an efficient manner.
Soil washing	0	0	0	0	0	Technique unlikely to treat identified contaminants of concern in an efficient manner.
Soil vapour extraction	1	1	1	1	4	Land to be remediated by excavation for geotechnical and geoenvironmental purposes meaning such a solution is limited in terms of viability.
Ex-situ bioremediation	0	0	0	0	0	Technique unlikely to treat identified contaminants of concern in an efficient manner.
Thermal desorption	0	0	0	0	0	Technique unlikely to treat identified contaminants of concern in an efficient manner.
Vitrification	0	0	0	0	0	Technique unlikely to treat identified contaminants of concern in an efficient manner.
Stabilisation / Solidification	0	0	0	0	0	Technique unlikely to treat identified contaminants of concern in an efficient manner.
Excavation and offsite disposal	5	5	1	5	16	Limited by cost being prohibitive. Small quantities of material that cannot be treated will be removed. Likely to form one aspect of the remediation approach.
Enhanced Bioremediation	0	0	0	0	0	Technique unlikely to treat identified contaminants of concern in an efficient manner.
Monitored Natural Attenuation	0	0	0	0	0	Technique unlikely to treat identified contaminants of concern in an efficient manner.



REMEDIAL TECHNOLOGY	APPLICABILITY	REGULATORY APPROVAL / PERMITRY	COST	TIME-FRAME	SCORE	SUITABILITY COMMENT
Vacuum Enhanced Recovery	0	0	0	0	0	Technique unlikely to treat identified contaminants of concern in an efficient manner.
Air sparging / Biosparging	0	0	0	0	0	Technique unlikely to treat identified contaminants of concern in an efficient manner.
In situ oxidation	0	0	0	0	0	Technique unlikely to treat identified contaminants of concern in an efficient manner.



3.7. SUMMARY OF PREFERRED REMEDIATION OPTIONS

Based on the options appraisal, it is considered that the following combination of remediation technologies provides the most sustainable, viable and economic solutions that will ultimately result in the successful remediation for the site:

-  **Capping** of site with a suitable certified clean cover system comprising 150mm topsoil and 450mm subsoil will remove any future direct exposure pathways to future end users.
-  **Excavation and off site removal** of hazardous materials which cannot be treated will be required, this operation needs to be limited to materials that cannot be treated on-site to promote sustainability and ensure viable regeneration.
-  **Excavation of hotspot materials** for placement in areas of low sensitivity or removal off-site.



3.8. OVERVIEW OF WORKS

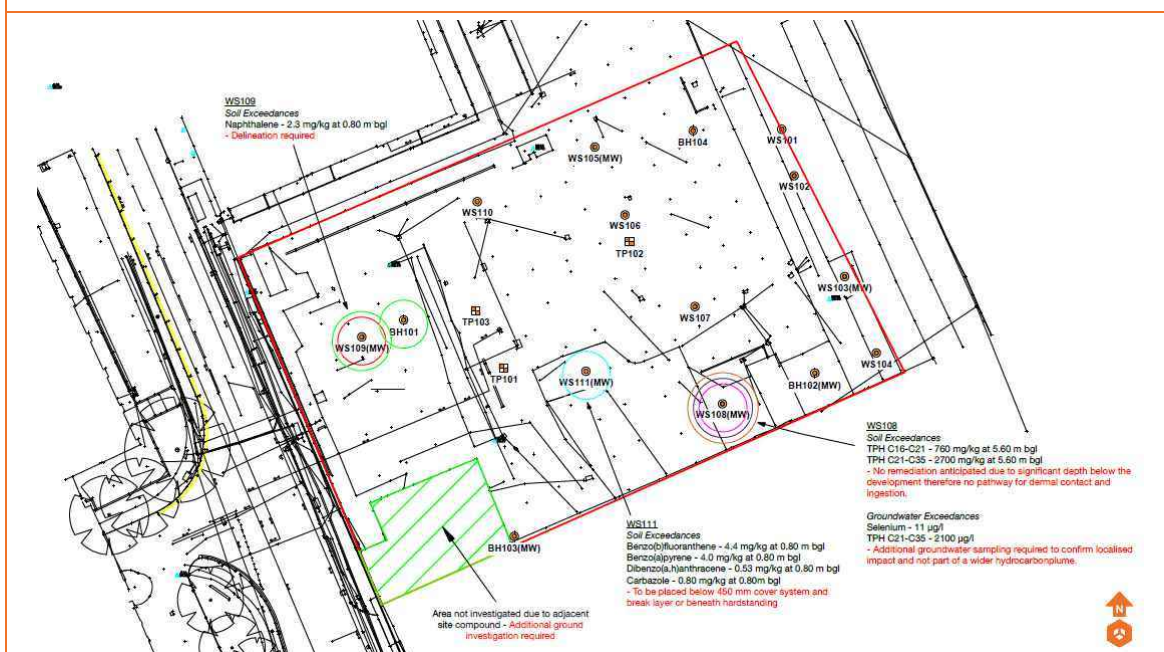
Prior to the commencement of works on site, the contractor must establish all necessary plant, equipment and site welfare facilities as is necessary to complete the contract within the agreed timescales to the rationale as outlined in the following subsections.

For the avoidance of any doubt, the proposed operations as set out herein document the required performance objectives and validation sampling protocols; however, the specific methods of work deployed to ensure the remediation objectives are achieved in a compliant manner on site will be the responsibility of the appointed contractor.

RE-1 – Pre-commencement Supplementary Site Investigation

Following the removal of hardstanding and concrete slabs, supplementary investigation and soil sampling is recommended in localised areas where previous investigation was limited, particularly in the west of the site and where the adjacent site compound prevented access. A snapshot of Drawing 15-175-015 (included in Appendix III) indicates the areas where the previous investigation was limited.

FIGURE 3.1 LOCATION OF RECOMMENDED ADDITIONAL SITE INVESTIGATION



Following removal of the existing hardstanding, mechanically excavated trial pits will be advanced with additional chemical analysis of the soils completed to confirm no unacceptable risk to human health and controlled waters.

If any yet unidentified contamination is identified, this will be the subject of further investigation including laboratory analysis and subsequent assessment of risk within the context of the agreed parameters. Where a theoretical risk to either human health, controlled waters or the wider environs is identified, appropriate remediation works are to be instigated by the placement of clean cover systems to break the pathway or delineation and source removal where required.



RE-2 – Pre-commencement Regulatory Compliance

Prior to the commencement of any works on site, all reports relating to the assessment of risk to contaminated land should be submitted to the regulatory authorities to gain written approval.

All relevant Standard Rules Permits should be registered with the EA.

The LAPC Part B Notification for the deployment of mobile crushing plant should be implemented prior to the establishment of equipment on site.

If the proposed volume of soils to be reused (excluding crushed materials) exceeds the parameters of the Standard Rules Permit, a CL:AIRE Materials Management Plan (MMP)-qualified declaration should be made by the contractor, having obtained full written approval for the remediation strategy from the LPA and Environment Agency.

It is not anticipated that there will be any requirement to treat any materials on-site (such as hydrocarbon-impacted soil or groundwater); however, should any previously unidentified contamination be encountered, the contractor must either notify E3P and, if appropriate, relevant regulators of their intention to complete a minor works operation or arrange for the deployment of the appropriate environmental permit for the specified operation.

RE-3 – Environment and Nuisance Control

Management of all works is required to ensure that no environmental nuisance is created through dust emissions, noise or vibration levels.

All works are to be completed in a manner so as not to create any structural risk to the adjacent highways.

Temporary works are to be implemented as necessary to support excavations throughout the duration of the works.

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.

RE-4 – Risk to Infrastructure

Site works should be completed in a manner that ensures no risk of disturbance to the adjacent infrastructure.



RE-5 – Site Clearance Operations

General site clearance and provision of welfare, offices and site security are to be determined as per the contract requirements.

There is no vegetation currently present on-site, however, if encountered, roots should be grubbed out in their entirety and the resulting void backfilled with suitably engineered fill.

As part of the site clearance operations all previous monitoring wells will be removed in their entirety and the resulting void backfilled with bentonite to ensure no future potential migration pathways.

RE-6 – Further Investigation into Elevated TPH within Groundwater

Elevated TPH Aliphatic C21-C35 identified within WS108 are considered to be associated with the hydrocarbon impacted SAND deposits.

Additional groundwater monitoring is required to further assess the previously identified TPH impact to confirm that there is a low risk to controlled waters. The additional monitoring should be carried out over multiple visits using a low flow technique.

A watching brief will be completed during the turnover of this area of the site. Additionally, further trial pits within the area and sampling of shallower deposits will be completed to ensure no further TPH impact is present.

RE-7 – Delineation, Excavation and Treatment of Potential Asbestos Impact

Asbestos has not been identified during the ground investigation however given the significant historic developments on site, there is potential for asbestos fibres to be present within the Made Ground matrix on site.

Further testing of Made Ground soils should be carried out during remediation works to ensure there is no unacceptable risk from asbestos fibres on site. If identified on-site, ACM-impacted soils must be managed so as to ensure no airborne fibre release during construction or placement of impacted material in such a manner as to ensure no future exposure risk.

If any visible pieces of asbestos-containing material are identified during the site remediation and enabling work, this material must be dealt with in strict accordance with the Control of Asbestos Regulations (CAR) 2012, UK Waste Management Legislation and the Environmental Protection Act 1994. This process should be completed under strict controls to be devised and employed by the nominated contractor to ensure no potential for fibre release into the ambient air. Due to the close proximity of adjacent buildings, asbestos in air monitoring in accordance with HSG248 may be required to confirm that no asbestos fibres have been generated from the enabling works activities.

The contractor must ensure that all personnel working on site are trained in the identification of ACM and the risks associated with impacted soils.

Should off-site disposal be required, then additional asbestos quantification and waste classification testing should be undertaken to ensure that it is classified correctly and disposed of at a suitably licensed facility



RE-8 – Delineation, Excavation, Treatment and Disposal of Naphthalene Impacted Materials

During the E3P investigation, elevated Naphthalene was identified in WS109 at 0.80 m bgl. This location should be treated as a localised hotspot, with soils delineated, excavated and validated during remediation works.

A watching brief should be completed during remediation works to monitor the area where naphthalene impact has been identified to ensure there is no further visual or olfactory evidence of wider contamination.

In the event that any as yet unidentified contaminant is identified, this will be the subject of further investigation including laboratory analysis and subsequent assessment of risk within the context of the agreed parameters. Where a theoretical risk to either human health, controlled waters or the wider environs is identified, appropriate remediation works are to be instigated.

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

An E3P engineer will regularly monitor the stockpiled material 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 reuse or the requirements for off-site disposal.

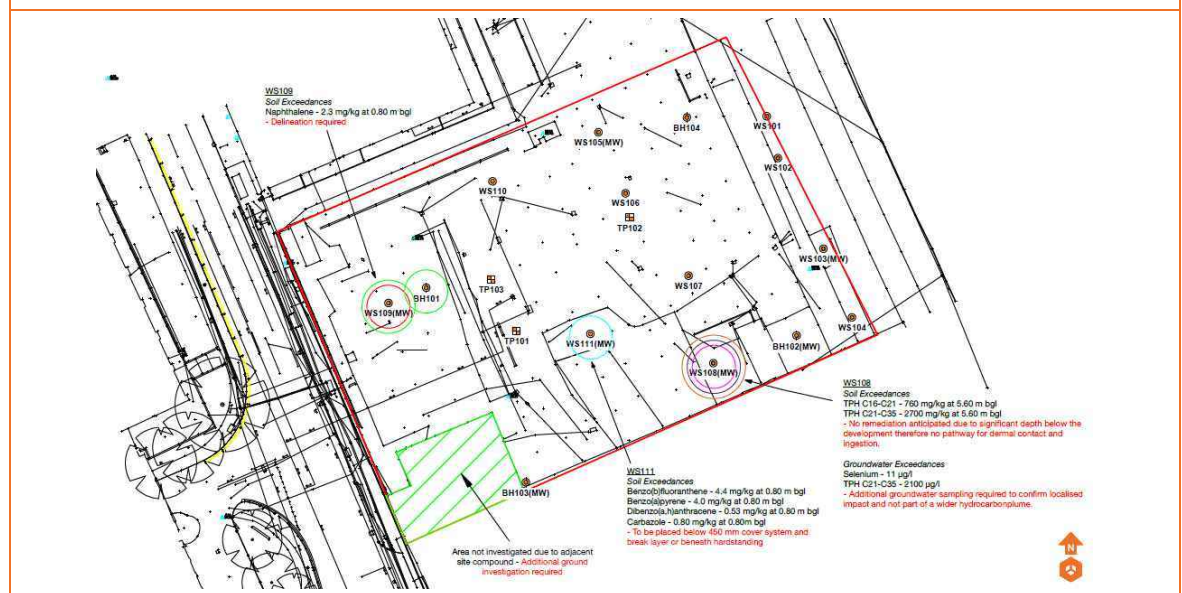
Upon completion of the delineation and excavation, the sides and base of the resulting void(s) where impacted material is present will be chemically validated to confirm that no impacted materials remain in situ. Validation samples will be collected at 10 linear metre centres from the side and base of the excavation. The results of this validation testing will be directly compared to the site-specific remediation targets (as defined within Appendix III of this report) to demonstrate that no unacceptable level of risk to human health, controlled waters or the wider environment remain.

Should further elevated concentrations of naphthalene be identified within either the hotspot delineation works or site won Made Ground then further investigation and risk assessment will be completed. There may be a requirement to complete further delineation and removal of materials. Following assessment and further laboratory analysis appropriate mitigation or remediation measures will be put in place.

The location of know naphthalene impacted soils (circled red) are shown in Figure 3.2.



FIGURE 3.2 LOCATION OF IDENTIFIED NAPHTHALENE IMPACT



RE-9 – Excavation, Breaking and Processing of All Above- and Below-Ground Structures

Obstructions, relict foundations, concrete slabs and infrastructure (apart from live services) are to be removed from the areas of proposed development in their entirety.

Artificially hard materials should be broken out and crushed. Stockpiles will be made, validation testing undertaken, and site-won material reused on-site where required. Materials will be processed as per the specifications provided in Section 5 using licensed plant.

The E3P drawings denote the extent of known historic features with obstructions; however, it will be the contractor's responsibility to remove all obstructions.

Obstructions encountered within the near-surface soils will be chased to their full depth and removed; if not possible, the obstruction must be surveyed with the location communicated to E3P, the client and the developer.

Where natural soils are present at a relatively shallow depth, extreme care should be taken to ensure that the natural cohesive deposits remain undisturbed with a full reduced-level survey to be completed to map the depth of filled/processed material.

It is anticipated that given the substantial depths of Made Ground identified in some areas, a full depth turnover may not be viable.

Where a full depth Made Ground turnover is not completed, these areas should be surveyed, with the locations communicated to E3P, the client and the developer. Across the site, and in particular within these areas, the proposed pile locations will require proof drilling to confirm there are no obstructions which would prevent the piles reaching full depth.



RE-10 – Cut-And-Filling of Made Ground to Development Levels

The Made Ground is noted to be present to substantial depths in some areas of the site (> 2 m). Where the proposed enabling works levels require the current landform to be cut, extreme care should be taken so as not to disturb the underlying stratum prior to the placement of the appropriate platform, in compliance with the E3P Geotechnical Specification.

Where the development levels require material to be filled, site derived Made Ground must be sorted in a controlled manner prior to replacement, in accordance with the requirements of this specification for the intended land use.

The maximum dry density must be determined in laboratory conditions utilising UKAS-accredited testing before the commencement of filling and compaction works. In-situ density testing is required to demonstrate compliance with the E3P Geotechnical Performance Specification.

RE-11 – Construction of Temporary Cover Layer

The site is to be prepared in a manner that will facilitate a piled foundation solution, as such a temporary cover layer will be constructed using locally-won recycled concrete aggregate.

As a minimum this will comprise:

-  Proof rolling of the subgrade to ensure a California bearing ratio (CBR) > 3%; and
-  Placement of certified 6F2 in accordance with structural engineer specification (thickness to be confirmed) to be rolled and compacted to ensure a CBR > 5%.

RE-12 – Replacement of Materials, Geotechnical Engineering Requirements

Material is to be backfilled in strict compliance with the E3P Geotechnical Engineering Specification as presented in detail within Section 5 of this report, which generally requires the reinstatement and compaction criteria presented in Table 3.3.



TABLE 3.3 GEOTECHNICAL ENGINEERING WORKS SCHEDULE

Land Use	Construction Requirement	Requirement
Footprint of Proposed Structure (2 m on All Elevations)	Pile Foundation	Backfill using general method compaction to CBR of 5%.
	Vibro-Stone Column	Particle size distribution (PSD confirmed as < 125 mm with no more than 10% fines (0.63 micron). Or Compaction to achieve > 95% of the laboratory determined maximum dry density (DD) with < 5% air void ratio. CBR > 6% with suitable pile mat. PSD testing of backfill material at 1 sample per 2000 m ³ to confirm.
	Traditional Spread Foundation	Ensure no disturbance of natural soil at shallow depth.
Highways	Adopted Estate Road/Drainage	Manual of Contract Documents for Highways Works (MCHW) Series 600 ensuring CBR > 5% in subgrade (engineered fill).
Driveways	Private Drives and Car Parking	Method compaction to CBR > 5%.
Gardens and Public Open Space	N/A	Method compaction to ensure no settlement.

RE-13 – Importation of Bulk Fill

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 requirements (Section 5).

Imported material must be certified as suitable for use in strict accordance with the E3P chemical and geotechnical performance criteria (See Section 5) and in conjunction with the required duty of care notes and waste transfer exemption.

If recycled aggregates are imported, then laboratory testing should be completed to demonstrate compliance with the Waste and Resources Action Programme (WRAP) protocol.

Where inert soils are imported, laboratory testing should be completed in accordance with the requirements of the pertinent environmental permit (i.e., U1 Standard Rules) or CL:AIRE MMP for the reuse of clean, naturally occurring soils.



RE-14 – Preparation of Landscaped Areas for Cover System

As part of the remediation works, landscaped areas will be prepared in a manner that will facilitate the placement of the clean cover system during the development phase of the works. The preparation of the areas requiring clean cover is critical in ensuring delivery of the site in a manner that will ensure no risk to the proposed end-users.

Where Made Ground is deemed unsuitable for retention in a landscaped area, the area will be subject to a reduced-level dig to remove unsuitable material to a minimum depth of 450 mm below finished level or verified natural stratum (whichever is the shallower) with a capillary break layer at the base.

Excavated soil will be stockpiled pending the results of the appropriate validation testing (to be completed in accordance with this specification) prior to reuse in an area of no sensitivity or, where necessary, this material will be removed from the site in accordance with UK waste management legislation.

The placement of certified subsoil and topsoil will be completed as part of the developer works/build-phase mitigation plan. All landscaped areas where a cover system is required will be subject to independent validation.

RE-15 – Provision of Subsoil

Chemical analysis of the natural drift deposits has identified these soils to be acceptable for use as subsoil within the proposed garden areas with the exception of drift deposits noted to contain hydrocarbon impact; however, further chemical validation samples will be required.

The use of the natural clay soils will also be dependent on the requirements for the site as there is significant depths of Made Ground encountered across the majority of the site therefore the cut/fill works to 'win' the subsoil may be significant. Therefore, dependent on the final requirements for the proposed cut/fill, it is deemed possible to reuse natural materials that are cut as part of the wider earthworks or through a soil inversion (regulated by an MMP) to generate the required volumes of material.

If a soil inversion is not within the scope of the development works, and no site-won subsoil is available, there will be a requirement to import suitable material for use within the proposed development.

The landscaped areas will require depth validation to satisfy the requirement of the Local Planning Authority in order to demonstrate that the appropriate thickness has been provided as a growing medium. As per Manchester City Council's Planning and Contaminated Land Technical Guidance document, all landscaped areas require a minimum of a capillary break layer, 300mm subsoil and 150mm topsoil. Areas where specific vegetation types are to be planted may require deeper cover systems to provide adequate growing medium (~450mm-900mm) which are outlined in the MCC Technical Guidance document.



RE-16 – Provision of Topsoil

No material that would be deemed suitable for use as topsoil is present on-site and as such there will be a requirement to import suitable material for use within the proposed development.

Topsoil will require testing in line with the schedule present within Section 3.5 and Table 3.2.

The landscaped areas will require depth validation to satisfy the requirements of the CML in order to demonstrate that the appropriate thickness has been provided.

RE-17 – Independent Validation: Watching Brief

Given the site history and potential contamination sources identified within the ICSM, a degree of uncertainty remains with regard to the potential for as yet unidentified contamination impact within the near-surface soils and groundwater.

It will therefore be necessary to instigate the site-wide remediation and enabling works under the supervision of a suitably qualified and independent specialist. The specialist is required to attend site as and when appropriate to monitor works, record ground conditions and fully investigate all potential sources of as yet unidentified contamination.

RE-18 – Waste Soils Surplus to Requirements

In the event that a surplus of excavation material is present on-site, this, in most cases, will be deemed to be a waste in accordance with the Waste Framework Directive (Article 3(1) Waste Framework Directive 2008/98/EE). The waste producer – but ultimately, the landowner – is responsible for the compliant disposal of such materials.

A formal waste classification assessment must be undertaken, irrespective of any future options or considerations for those materials that will be removed from the site. Waste classification should only be made following the Environment Agency *Technical Guidance WM3 – Guidance on the Classification and Assessment of Waste*.

To remove the surplus material from the site it will either need to be sent to a disposal site (landfill), to a permitted treatment facility or, dependent on the waste classification assessment, it may be suitable for use on a permitted land improvement or restoration operation.

Subject to suitability, these soils can be transferred to the receiving site, subject to an approved permit or materials management plan following guidance in the CL:AIRE *Definition of Waste: Code of Practice*.



RE-19 – Validation of Materials for Potable Water Supply Infrastructure

A contaminant risk assessment, completed in accordance with the UKWIR assessment framework identified elevated concentrations of potentially volatile/soluble hydrocarbon compounds that necessitate the use of protected water supply pipework.

All materials where organic hydrocarbon impact is identified at concentrations above the UKWIR assessment criteria for a polyurethane pipe within the proposed locality of potable water supply infrastructure should be delineated and removed by the remediation contractor under the supervision of the geoenvironmental consultant.

Validation sampling should be completed at 10 m chainage at depths of 0.75 m and 1.50 m within the locality of the potable supply pipes where impacted material is removed, with samples analysed for all pertinent volatile and semi-volatile hydrocarbons and, where necessary, chlorinated/halogenated compounds.

Upon successful remediation of all impacted materials, the post-remediation validation testing will be reviewed by a qualified person to inform an updated UKWIR assessment to be reviewed and approved by the statutory adoption authority.

If unacceptable concentrations remain following remediation, then potable water infrastructure should be constructed in accordance with a suitably robust risk assessment and design compliant with UKWIR.

Where imported material is required to construct the potable water infrastructure pipework, this material will need to comply with the requirements of UKWIR pipework thresholds for the specified pipework. For the avoidance of doubt, the PE thresholds are presented in Section 9.2. Failure to meet the required specification may necessitate further remedial works.

RE-20 – Remedial Verification Report

Collation of information relating to site clearance, chemical testing, remedial works, remedial verification, material movements and waste transfer documentation is required, where appropriate.

Complete remedial validation is to be reported in line with regulatory guidance. This will include a detailed risk assessment. The report will be submitted to the local authority for approval following completion.



3.9. VALIDATION SAMPLING PROTOCOL

In accordance with the current requirements of the regulatory authorities, validation samples will be collected from all materials that are to be subject to movement under the protocols outlined within this remediation and enabling works strategy, or for materials to be imported onto site to facilitate the proposed residential development.

Upon removal of the hotspot of unsuitable Made Ground in the northern sector, validation samples will be collected from the base (two samples) and sidewalls (four samples) of the excavation to reasonably demonstrate no residual impact to the underlying strata.

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.

All samples will be collected using appropriate personal protective equipment (PPE) and sampling equipment, which will be cleaned at each sampling location.

A detailed copy of E3P Ltd sampling methodology, QA procedures and laboratory chain of custody forms will be documented within the site records and presented with the final validation report for the site.

Where the material is found to contain concentrations of potential contaminants at levels in excess of the site-specific screening criteria (as detailed within Appendix III), E3P will undertake further assessment and recommendations on the appropriate use for the material in question, which may involve the disposal of such materials off-site to a suitable waste management facility.

The sampling frequency for materials to be managed under the remediation strategy is presented within Table 3.4.

TABLE 3.4 SPECIFICATION OF CHEMICAL VALIDATION LABORATORY ANALYSIS

MATERIAL USE	TESTING FREQUENCY	SUITE OF ANALYSIS
Site-Generated		
Site-Generated 6F2	1 Sample per 1000 m ³	A/B/C/D
Site-Won MADE GROUND General Backfill	1 Sample per 250 m ³ where visual and/or olfactory impact is identified	G
Site-Won MADE GROUND General Backfill	1 Sample per 1000 m ³	A/B/C/D
Site-Won MADE GROUND General Backfill	1 Sample per 2000 m ³	I
Site-Won Natural Backfill	1 Sample per 2000 m ³	A/B/C/D
Site-Generated Subsoil (450 mm Garden Cover)	1 Sample per 250 m ³	A/B/C/D
Site-Generated Topsoil Cover (150 mm Garden Cover)	1 Sample per 50 m ³	A/B/C/D
Hotspot Validation Samples	1 Sample per 10 m of linear excavation to base and sidewall	E/G
Imported		
6F2	1 Sample per 1000 m ³	A/B/C/D
Subsoil Greenfield Source	1 Sample per 200 m ³	A/B/C/D



MATERIAL USE	TESTING FREQUENCY	SUITE OF ANALYSIS
(150 mm Landscape Cover)		
Subsoil Brownfield Source (150 mm Landscape Cover)	1 Sample per 50 m ³	A/B/C/D
Topsoil Greenfield Source (150 mm Landscape Cover)	1 Sample per 200 m ³	A/B/C/D
Topsoil Brownfield Source (150 mm Landscape Cover)	1 Sample per 50 m ³	A/B/C/D
General Engineering Fill (Class 1 and 2 Soil)	1 Sample per 1000 m ³	A/B/C/D

Notes

Suites of Analysis:

- A. Speciated PAH.
- B. Speciated TPH (C5-C35).
- C. Asbestos (ID).
- D. CLEA Inorganic Heavy Metals.
- E. Speciated PAH, Banded TPH and VOCs.
- F. SVOC/Speciated TPH.
- G. On-Site Screening for VOC Using Calibrated PID.
- H. Leachate 2:1 Speciated PAH and Banded TPH.
- I. Leachate Analysis of Inorganic Heavy Metals, TPH, Sulphate and PAH.

All analysis prescribed above to be completed by UKAS-accredited laboratory.

3.10. REMEDIATION CONTRACTORS SITE MANAGEMENT AND RESPONSIBILITY

The appointed remediation contractor will take full and overarching responsibility for all methods of work required to complete the site remediation and enabling operations to ensure the delivery of the site and the completion of the objectives in a safe, legislatively compliant manner that ensures no pollution to the subject site or the wider environs.

For individual remediation operations as set out within this performance specification, the contractor will provide site-specific methods of work for individual operations pertaining to the removal and treatment of contaminated liquids and soils. For each and every operation as set out herein, the contractor will provide a written methodology of works to be supplied to the supervising geoenvironmental engineer prior to the instigation of operations on site.

The site manager will be responsible for documentation of each day's activities with a full recorded schedule of works completed and corresponding site-specific method statements that have been utilised to ensure the completion of the task to the required standard.



4. MATERIALS MANAGEMENT AND LEGISLATIVE COMPLIANCE

The processing of recycled aggregates will be completed using LAPC Part B licensed plant with the appropriate deployment notification to the local authority prior to commencement of works. All materials that are recovered as recycled aggregate will be compliant with the requirements of the WRAP protocol and the E3P validation testing requirements and as such would not be deemed to be a waste material.

A U1 Exemption will be registered for the site, which allows the reuse of up to 5000 T of prescribed material within construction, with up to 25,000 T of material permissible to be reused in the construction of roads. It should be noted that only 1000 T of material described as sand, stones or clay soil classified as waste can be reused with a U1.

A T5 Exemption, allowing for the screening and recovery of up to 5000 T of permissible material for subsequent reuse in construction will also be registered.

All materials that are recovered under the WRAP protocol, U1 or T5 exemptions must be analysed to demonstrate that they are both chemically and structurally suitable for use within the context of the development.

The relevant LAPC, U1, T5 and WRAP licences, exemptions and protocols provide the legislative framework for material compliance during the site remediation and enabling works to be completed by the specialist contractor under the supervision of E3P.

Where necessary, operations as outlined within the remediation enabling works rationale summarised in this report may be subject to regulation using the appropriate environmental permit, standard rules exemption and materials management plan, to be created in accordance with version 2 of the CL:AIRE *Definition of Waste: Code of Practice (DoW CoP)*.

It is noted that if material is to be imported utilising the CL:AIRE DoW CoP from an alternative development site, then only chemically certified, clean, naturally occurring material can be transferred.

If required, the MMP will be created with due consideration of all proposed remediation and enabling works operations prescribed within this document and will be undertaken by a qualified person with a signed declaration submitted to the EA prior to reuse of materials on the site.

The importation of material for use within the proposed construction of a development platform will be subject to the compliance with the E3P protocol for the importation of materials as set out within the specification for material import included within Appendix IV of this report.



5. ENVIRONMENTAL MONITORING AND VALIDATION

5.1. SITE MANAGEMENT

The tracking of materials will be based on the following hierarchy:

- ✿ The principal contractor will have the responsibility for setting out areas of the site on the basis of the contract specification.
- ✿ Operatives will have instructions only to excavate and to emplace materials in specified areas as assigned by the site manager/foreman.
- ✿ The site manager (employed by the principal contractor) will issue daily instructions to drivers regarding the placement of materials sourced from specific stockpiles or areas, ensuring that appropriate documentary evidence is collected that details which materials are going where and why.
- ✿ An E3P consultant, who will be in attendance as required, will:
 - Inspect the excavation areas and certify that the correct materials are being excavated;
 - Conduct spot checks on loaded vehicles to ensure compliance with this remediation strategy; and
 - Ensure that any loads that fail visual, olfactory or spot checks either remain on the vehicle or, if unloaded, are excavated and set aside. This material will be treated according to the recommendations of the E3P site engineer.
- ✿ E3P will conduct an audit of waste consignment notes. All material imported and removed from the site will have a duty of care/consignment notes, copies of which will be retained on-site by the site manager.
- ✿ Materials directly reusable will be incorporated into the earthworks, subject to operational conditions and phasing of excavations, in which case they will be stockpiled prior to final placement.

5.2. COMPLETION

Following the completion of the remediation works, a report will be compiled by the environmental consultant detailing all site enabling works undertaken, waste consignment notes, and all site investigations, laboratory test certificates and validation testing undertaken.

A certificate of completion of earthworks should be included within the report which should then be issued to the local authority for their approval.

E3P considers that with the adoption of the above best practices the site can be safely redeveloped. The site enabling works process and presence of any residual contamination (if this is the case) should be recorded for future reference by landowners/occupiers. Future development at the site where this may result in penetration of new areas of hardstanding should be subject to no-less-stringent measures with respect to assessment and, where appropriate, monitoring, than those set out herein.



5.3. MITIGATION OF RISK FROM SOILS WITH ASBESTOS FIBRES

Asbestos has not been identified during the ground investigation however given the significant historic developments on site, there is potential for asbestos fibres to be present within the Made Ground matrix on site.

Further testing of Made Ground soils should be carried out during remediation works to ensure there is no unacceptable risk from asbestos fibres on site. If identified on-site, ACM-impacted soils must be managed so as to ensure no airborne fibre release during construction or placement of impacted material in such a manner as to ensure no future exposure risk. The following information has been included given the possibility that asbestos and ACM may be present on-site therefore mitigation measures will be required.

5.3.1. PRE-COMMENCEMENT WORKS

Prior to the commencement of works the following requirements must be satisfied:

- ☛ Induction of all people that will be involved with the proposed site works; and
- ☛ All methodologies must be agreed upon by all parties involved.

5.3.2. CONTROL, MONITORING AND REPORTING OF GENERAL AERIAL EMISSIONS FROM DUSTS AND PARTICULATES

DAMPING DOWN OF SOILS – MITIGATE PARTICULATE (DUST) EMISSION

During excavation, as outlined within the detailed working methodologies, soils will be regularly damped down using water to control the generation of dust (this may also comprise precipitation). The contractor will determine the best form of dust suppression to be used when a detailed programme has been issued.

If any previously unidentified asbestos-containing materials are identified, these should be dealt with in strict accordance with the *Control of Asbestos Regulations* (2012) and industry best practice as detailed in CIRIA 733.

GENERAL CONTROL OF DUST

The following control measures should be utilised to ensure that dust levels are kept to a minimum at all times:

- ☛ 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, that the potential for water run-off is appropriately mitigated.
- ☛ Once completed, any stockpiles will be sealed by compacting at the surface.
- ☛ Vehicle speeds and movements on site will be kept to a minimum (< 5 mph) during civil excavation works to reduce the potential to generate dust.



PERSONAL PROTECTIVE EQUIPMENT (PPE)

In accordance with the HSE *Guidance Note em6: Asbestos Essentials, Personal protective equipment (including RPE)*, E3P recommend that all site operatives present within the work area where potential asbestos-impacted soils are being excavated are supplied with the following personal protective equipment:

Overalls:

- ✿ Disposable overalls.
 - Type 5 (BS EN ISO 13982-1) are suitable.
 - Cotton overalls hold dust and need specialist laundering.
- ✿ Waterproof overalls for outdoor work.
- ✿ Use oversized overalls - this will help to prevent ripping at the seams.
- ✿ If the cuffs are loose, seal them with tape.
- ✿ Avoid wearing a long-sleeved shirt as these are difficult to cover properly.
- ✿ Wear the overall legs over footwear as tucking them in lets dust into footwear.
- ✿ Wear the hood over the RPE straps.

Failure to utilise and correctly employ PPE will result in immediate cessation of works. Works will not be permitted to recommence until the individual has undergone further training in the use of PPE or the individual is removed from the works area.

At this current time, with the levels of ACM identified within the soils, the above-listed PPE is not considered to be required for all site personnel during the entire management of these soils.

When handling asbestos-impacted soils during the enabling works, asbestos monitoring works should be conducted in accordance with, but not limited to, the following HSE legislation and guidance:

- ✿ *Health & Safety at Work Act 1974;*
- ✿ *The Control of Asbestos Regulations 2012;*
- ✿ CL:AIRE, 2016. *Control of Asbestos Regulations 2012 - Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials: Industry guidance;*
- ✿ *Approved Code of Practice L143 Work with materials containing asbestos;*
- ✿ *Management of Health and Safety at Work Regulations 1999;*
- ✿ *HSE Guidance Note HSG248 Asbestos, the analysts guide to sampling and analysis;*
- ✿ *HSE Guidance Note HSG247 Asbestos: The licensed contractors' guide;* and
- ✿ *CIRIA 733 Asbestos in soil and made ground: a guide to understanding and managing risks.*



If required, air monitoring in accordance with HSG248 will be undertaken intermittently throughout the duration of the works at a frequency to be determined by the contractor, entirely dependent on whether asbestos-impacted soils are being handled at any given time. In general terms, during any one monitoring period, ten standard monitoring pumps will be run throughout the day, for the appropriate time period to achieve the required limit of detection. These slides will be analysed immediately by the on-site UKAS-accredited laboratory.

Once any monitoring has been analysed by the on-site UKAS-accredited laboratory, the results will be delivered to the resident engineer who will then follow the correct site procedure. The results will then be included within the verification report.



6. GEOTECHNICAL ENGINEERING SPECIFICATION

6.1. E3P GEOTECHNICAL ENGINEERING SPECIFICATION

The overarching philosophy of the site enabling works will be the delivery of the following:

- ✿ Preparation of plot footprint (+ 2 m on all elevations) to be suitable for a piled foundation solution.
- ✿ Preparation of a temporary cover layer using locally-won recycled concrete aggregate to the structural engineers specification.
- ✿ Engineer all areas of proposed adopted road and private drive to be compliant with the E3P Geotechnical Specification with CBR and elevation defined by the client.

In the event that it is not possible to prepare the site in a manner that will achieve the required foundation solution, the supervising engineer and client should be contacted at the first available opportunity.

The contractor should employ a suitably experienced engineer to be present on-site during these earthwork operations to ensure soil suitability, placement, compaction and testing is undertaken in accordance with this specification and to ensure that any unforeseen circumstances, such as adverse weather, do not compromise the earthworks process.

Works should be halted during periods of intermittent or prolonged rainfall to ensure the materials are not placed in a manner that would result in softening of either the formation or the newly placed material. It will be the contractor's responsibility to determine appropriate weather conditions and determine the suitability of works.

Particular attention must be given to variable weather conditions when re-engineering clay soils as a moisture content fluctuation ($\pm 2\%$) of the tolerable limit will result in an unacceptable degree of compaction loss.

6.2. LOCALLY WON FILL MATERIAL

It is proposed to upfill and level the site with material won from the development area. From the site-specific investigations undertaken to date, it is expected that the soil won from the processing of demolition material will be granular and cohesive.

Due to climatic weather conditions and variance in long-term differential settlement associated with even well-compacted granular soils, it is essential that the cut-and-fill process is well controlled, and materials are placed/compacted in accordance with this specification.

Where site-won materials are to be used as fill to achieve the required development platform, they must be compacted to ensure suitable compaction as stated in Table 6.2.

Materials should only be compacted when the actual moisture content is within 2% ($\pm$) of the optimum for the soil matrices as determined by laboratory bench testing.



6.3. CLASSIFICATION OF FILL MATERIAL

This specification should be read in conjunction with the following:

-  The Manual of Contract Documents for Highway Works, Volume 1, Specification for Highway Works, Series 600, Earthworks as amended in February 2016; and
-  BS 1377-1:2016 Methods of test for soils for civil engineering purposes. General requirements and sample preparation

6.3.1. GENERAL CLASSIFICATION

The contractor should ensure that all earthworks materials comply with Clause 601 of the *Specification for Highway Works* and shall fall into one of the following general classifications as defined in Table 6/1 of the *Specification for Highway Works*.

-  General granular fill (Class 1);
-  General cohesive fill (Class 2), excluding Class 2A and 2E; or
-  Selected granular fill (Class 6).

6.3.2. PRE-COMMENCEMENT EARTHWORKS TESTING FREQUENCY / PERFORMANCE

To determine the geotechnical classifications of any material to be placed and compacted in layers, representative samples will be taken at a frequency of **1 per 2,000m³** and submitted for particle size distributions (PSDs). Maximum Dry Density and Natural and Optimum Moisture Content determinations.

To determine the geotechnical classifications of any cohesive material to be placed and compacted in layers, representative samples will be taken (following removal of any inclusions of oversize material, metal, timber, plastic, etc.) at a frequency of **1 per 1,000m³** and submitted for liquid and plastic limits, plasticity index and natural moisture content determinations. Organic matter determinations shall be prescribed at the discretion of the supervising consultant, dependent on visual observations.

Representative samples of all proposed backfill shall be taken at a frequency of **1 per 3000m³ (minimum 3nr)** and submitted for Dry Density / Optimum Moisture Content analysis using either a 4.5Kg or 2.5kg rammer to determine the optimum moisture content and maximum dry density for the engineering of structural fill.

For an unaltered fill material to be deemed suitable for use, the natural moisture content must be within 2% (+/-) of the optimum to achieve the required maximum dry density. Where the laboratory test indicates that the soil parameters are outside this requirement, stabilising agents should be added to assess suitability for use to the contractor's own design.



TABLE 6.1 E3P EARTHWORKS GEOTECHNICAL COMPACTION SPECIFICATION

SOIL/MATERIAL TYPE	CLASS	DESCRIPTION	COMPACTION EQUIPMENT	LAYER THICKNESS	ROLLER PASSES
Granular Fill (Sand and Gravel Matrices)	1 A	Sandy Gravel with some cobbles	> 5000 kg vibrating roller	225 mm	4
	1 B	Sand or Gravel of same grading size	> 5000 kg vibrating roller	250 mm	10
	1 C	Coarse gravels with many cobbles	> 5000 kg vibrating roller	400 mm	5
Cohesive Fill (Clay with Minor Sand and Gravel Component)	2 A	Wet Clay	> 1000 kg vibrating tamping roller (sheep foot only)	100–225 mm	3
	2 B	Dry Clay	> 5000 kg vibrating roller or 1400 kg tamping (trench roller)	225 mm or 125 mm	4 or 12
	2 C	Gravelly Clay	> 5000 kg vibrating roller or 1400 kg tamping (trench roller)	225 mm or 125 mm	4 or 12
	2 D	Silty/Sandy Clay	> 5000 kg vibrating roller or 1400 kg tamping (trench roller)	225 mm or 125 mm	4 or 12
Recycled Aggregate Crush (< 125 mm Well Graded)	6F2	Any combination of inert hard materials, other colliery spoil, or rock with substantial amounts of clay-like component	> 5000 kg vibrating roller	250 mm	6



6.3.3. USE OF FILL MATERIALS

In addition to any grading requirement, the maximum particle size of any fill material shall be no more than two-thirds of the compacted layer thickness except that cobbles having an equivalent diameter of more than 150 mm shall not be deposited within the restored surface level unless directed otherwise by the engineer. Un-burnt colliery spoil, pulverised fuel ash or furnace bottom ash shall not be used as a fill material.

6.4. GENERAL REQUIREMENTS

The contractor shall employ only plant and working methods that are suited to the materials to be handled and traversed. The contractor shall be responsible for maintaining the nature of the acceptable material so that when it is placed and compacted it remains acceptable in accordance with the contract.

For the purposes of this contract, the proposed earthworks requirements have been split into distinct end-use categories, with the corresponding requirements for the earthworks specification assigned to individual areas.

TABLE 6.2 COMPACTION/BACKFILL REQUIREMENTS

LAND USE REQUIREMENT	COMPACTION METHODOLOGY AND GENERAL PERFORMANCE CRITERIA
Piled Foundation	All plot footprint (+ 2 m) must be free of any deleterious elements, tree roots and obstructions > 150 mm. Where upfill is proposed, material is to be placed using method compaction specification to achieve a CBR as required by the developer for piling mat construction. Piling mat is to be placed and constructed in accordance with the approved geotechnical engineer's temporary works design.
Adopted Highways (+ 2 m from Back of Footpath)	<i>Method Compaction – MCHW Specification For Highway Works Series 600</i> is to be followed, with in-situ validation testing to meet requirement of adoptions authority. A CBR > 5% is required at subgrade formation (prior to placement of capping).
Estate Roads	<i>Method Compaction – MCHW Specification For Highway Works Series 600</i> is to be followed to achieve a CBR > 5%.
Gardens, POS and Other External Areas	Material is to be placed in layers not exceeding 300 mm and must be rolled using dedicated plant (no earth moving equipment) and in general compliance with the requirements of <i>MCHW Specification For Highway Works Series 600</i>.

Acceptability shall be determined in accordance with Table 6/1 of the *Specification for Highway Works*.

Laboratory testing for the purposes of determining acceptability and compaction requirements will be conducted by the engineer.



Haulage of material to embankments or other areas of fill shall proceed only with sufficient spreading and compaction.

Plant should only operate at the place of deposition to ensure compliance with Clause 612 of the *Specification for Highway Works*.

No excavated acceptable material or unacceptable material required to be processed, other than surplus to the requirements of the contract, shall be removed from the site.

Where the excavation reveals a combination of acceptable and unacceptable materials, the contractor shall carry out the excavation in such a manner that the acceptable materials are excavated separately for use in the permanent works without contamination by the unacceptable materials. Unless otherwise described in the contract, classes of fill material required to be deposited separately shall be excavated separately without contamination by other classes of material.

The contractor shall make their own arrangements for the stockpiling of acceptable material, and unacceptable material to be processed, and for the provision of a site for this purpose.

The contractor shall ensure that they do not adversely affect the stability of excavations or fills by their methods of stockpiling materials, use of plant or siting of temporary buildings or structures.

Topsoil shall, wherever practicable, be used immediately after its stripping and, if not, shall be stored in stockpiles of heights not exceeding 2 m. Topsoil shall not be stockpiled for more than two years. Topsoil shall not be unnecessarily trafficked, either before stripping or when in a stockpile. Stockpiles shall not be surcharged or otherwise loaded and multiple handling shall be kept to a minimum.

Excavations requiring backfilling shall remain open only for the minimum period necessary.

The contractor shall keep earthworks free of water, including:

- ✿ Arranging the rapid removal of water:
 - shed on to the earthworks; and
 - entering the earthworks from any source;
- ✿ Provide, where necessary, temporary watercourses, drains, pumping and the like;
- ✿ Discharge accumulated water and groundwater into the permanent outfalls of the drainage system where practicable; and
- ✿ Provide adequate means for trapping silt on temporary systems discharging into permanent drainage systems.

The contractor shall carry out and maintain groundwater lowering or other treatment as required.

Where materials are designated either Class U1B or Class U2 (according to the *Specification for Highway Works*), the contractor shall carry out any special requirements for their handling. Where such materials are encountered during the progress of the works, the contractor shall make all necessary arrangements for their safe handling and disposal after consultation with the appropriate environmental authority.



6.4.1. CONSTRUCTION OF FILLS – HIGHWAYS

All fills shall be constructed:

-  In the locations as shown in the contract drawings to the lines and levels stated therein;
-  Of classes of material complying with this specification;
-  By deposition, as soon as practicable after excavation, in layers to meet the compaction requirements as required for each class of material as specified; and
-  To the requirements of this clause and any other requirements for fill in this specification.

Before commencing work on any area of fill, the contractor shall ensure that:

-  The base is sound and stable by excavating and removing any topsoil as soft subsoil;
-  Base layers are not exposed until the fill layer is ready for placement; and
-  Uncompacted material on the side slopes of previously backfilled zones shall be removed and benches of between 1.0 m and 1.5 m height cut in compacted fill immediately prior to deposition of the new fill to ensure that the new backfill placed against the slope is properly integrated.

Whenever fill is to be placed on surfaces inclined at 1 vertical to 7 horizontal or steeper, the surface shall be benched immediately prior to deposition of the fill in order to achieve horizontal basal surfaces. The benches shall be between 1.0 m and 1.5 m in height.

Areas of fill shall, unless otherwise permitted by the engineer, be constructed evenly over their fullest possible extent and the contractor shall carefully control and direct construction plant and other vehicular traffic uniformly over the area of compacted fill. The minimum plan dimensions of any one panel of backfilling shall be properly integrated with areas of previous backfilling. Damage by construction plant and other vehicular traffic shall be made good by the contractor with the material having the same characteristics and strength as the material had before it was damaged.

Temporary slopes within compacted and uncompacted backfill shall be formed at gradients that ensure stability.

6.4.2. CONSTRUCTION OF FILLS – ADOPTED HIGHWAYS, ESTATE ROADS AND CAR PARK

The contractor shall carry out compaction upon the materials that require to be compacted, as soon as practicable after deposition.

Compaction shall be either method as required for the classes of fill in Table 6/1 that require to be compacted.

The contractor shall obtain permission from the overseeing organisation before carrying out compaction requirements as listed in Table 6/1 for the class of material being compacted.

Method compaction shall be undertaken using the plant and methods appropriate to the compaction requirements as listed in Table 6/1 for the class of material being compacted.



Earthmoving plant shall not be accepted as compaction equipment nor shall the use of a lighter category of plant to provide any preliminary compaction to assist the use of heavier plant be taken into account when assessing the amount of compaction required for any layer.

If more than one class of material is being used in such a way that it is not practicable to define the areas in which each class occurs, the contractor shall compact with plant operating as if only the material which required the greater compaction effort is being compacted.

If the results of field tests show densities that indicate the state of the compaction to be inadequate, then if this is due to failure of the contractor to comply with requirements of the contract, the contractor shall carry out such further work as is required to comply with the contract.

Refer to Clause 612/10 of the *MCHW Specification for Highway Works* for definition of plant to be used in accordance with these specified works.

The contractor will be responsible for assessing the class of fill in accordance with Table 6/1 of the *Specification for Highway Works*. Table 6/4 of the *Specification for Highway Works* should then be employed to assess the method of compaction to be employed. The test results and method statements shall be submitted to the consulting engineers for approval.



6.4.3. UNACCEPTABLE MATERIAL

The contractor is solely responsible for ensuring full and detailed analysis of all reported ground conditions and areas of risk in terms of the potential for unacceptable material to be present within the proposed earthworks. Limitations in the available information should be highlighted to the supervising engineer prior to the commencement of earthworks. The contractor is to make full and unequivocal arrangements to investigate the potential presence for unsuitable materials within the earthworks and construction of highway fill. All unsuitable materials are to be identified for removal in accordance with this specification.

Unacceptable material Class U1A shall be:

Material which does not comply with the permitted constituents and material properties of MCHW Table 6/1 and contract specific Appendix 6/1 for acceptable material; and;

Material, or constituents of materials, composed of the following unless otherwise described in contract specific Appendix 6/1:

- ✿ Peat, materials from swamps, marshes and bogs;
- ✿ Logs, stumps and perishable material;
- ✿ Materials in a frozen condition;
- ✿ Clay having a liquid limit determined in accordance with BS 1377: Part 2, exceeding 90 or plasticity index determined in accordance with BS 1377: Part 2, exceeding 65; and,
- ✿ Material susceptible to spontaneous combustion except unburnt colliery spoil complying with sub-Clause 15 of this Clause;(ii)unacceptable material

Unacceptable material Class U1B shall be:

Contaminated materials, including controlled wastes (as defined in the Environmental Protection Act 1990 Part IIA) whose level of contamination is above that given either in contract specific Appendix 6/14 or in contract specific Appendix 6/15, but excluding all hazardous wastes (as Volume 1 Series 600 Specification for Highway Works Earthworks W2 Amendment – February 2016 defined in the Hazardous Waste (England and Wales) Regulations 2005) and radioactive wastes (as defined in the Radioactive Substances Act 1993).3(02/16).

Unacceptable material Class U2 shall be:(i) hazardous waste (as defined in the Hazardous Waste (England and Wales) Regulations 2005) and radioactive waste (as defined in the Radioactive Substances Act 1993).4(02/16).

Where required in contract, unacceptable material (other than Class U2) shall be processed by mechanical, chemical or other means to render the material acceptable for use in the permanent works in accordance with the requirements of Table 6/1 and contract specific MCHW Appendix 6/1.



6.5. EARTHWORKS MATERIAL TESTS

Prior testing of the potential sources of fill shall be undertaken by the contractor and submitted to the consulting engineers for approval. This testing shall include, but not necessarily be limited to, the compaction and backfill requirements detailed in Table 6.3.

TABLE 6.3 COMPACTION/BACKFILL REQUIREMENTS

LAND USE	COMPACTION METHODOLOGY and GENERAL PERFORMANCE CRITERIA				
Liquid and Plastic Limits	BS 1377: Part 2				
Grading	BS 1377: Part 2				
Uniformity Coefficient	Calculated from grading curve				
Moisture Content Multi-point moisture condition value (MCV) (to assess optimum moisture content).	BS 1377: Part 2				
Organic Matter (Maximum 2.5% Total Organic Content)	BS 1377: Part 3				
Water Soluble Sulphate	TRL Report 447 Test No 1				
Total Sulphate Content	TRL Report 447 Test No 4				
Earthwork In-situ Tests Subsequent to the filling and compaction of the material, a series of in-situ tests shall be undertaken to confirm the success of the compaction process. This testing shall include, but necessarily be limited to, the following: <table><tr><td>Test</td><td>Test Method</td></tr><tr><td>Plate Load Tests (Equivalent CBR of 5%)</td><td>BS 1377: Part 9</td></tr></table>	Test	Test Method	Plate Load Tests (Equivalent CBR of 5%)	BS 1377: Part 9	Clause 632 (BS 1377: Part 4)
Test	Test Method				
Plate Load Tests (Equivalent CBR of 5%)	BS 1377: Part 9				
Disposal of Materials The contractor shall be responsible for the safe disposal of any excess of unsuitable material found on the site.					
Proctor Compaction Testing	BS 1377: Part 4				



7. RECORD-KEEPING AND VERIFICATION

7.1. RECORD-KEEPING

During the course of the remediation and site enabling works, the on-site site manager will undertake the following record-keeping protocols:

- ✚ Detailed daily site diary including material movements;
- ✚ Sampling register, testing results, photographs, details of locations of hydrocarbon-impacted soils (drawings), details of hotspot removals, details of consignment notes of any hydrocarbon-impacted material that is required to be disposed of off-site; and
- ✚ Detailed surveys (volumes).

Record-keeping on site, in particular movements and analysis of specific material types, will be in the form of site diaries and a remediation excavation record. This record will remain on-site and will be completed by the site manager during the course of the remediation and site enabling works.

7.2. VERIFICATION

The records listed above will then be compiled into a validation report produced by E3P on completion of the remediation and site enabling works, clearly referencing the origin of the materials used and testing carried out to confirm its suitability for use, where required. E3P will also prepare an as-built development drawing clearly detailing the materials present on-site to be cross-referenced with the supporting validation documentation.

The validation report will include the following:

- ✚ Remediation strategy (including copies of confirmation from regulatory authorities agreeing criteria);
- ✚ Detailed surveys of all excavations and production of as-built drawings for the earthworks;
- ✚ Copy of consignment notes relating to the movement of wastes to a licensed waste management facility;
- ✚ Detailed drawings showing all sampling locations for both chemical and geotechnical testing;
- ✚ Chemical test results;
- ✚ Geotechnical test results;
- ✚ Details of qualified persons signed declaration; and
- ✚ Monitoring results if undertaken (e.g., asbestos in air, gas water).



8. CONTINGENCY PLAN

8.1. PREVIOUSLY UNIDENTIFIED CONTAMINANTS

Should significantly impacted material be encountered during the development, then it will be excavated and stockpiled on an impermeable material and sampled and tested for an appropriate range of determinants.

Once the laboratory analysis of the material is available, an assessment will be undertaken to determine whether it can be retained on site as part of the material management plan or whether it should be disposed of off site.

Depending on the nature of any such impact, it may be necessary to undertake validation testing of the excavation faces in order to demonstrate that no such materials are left in situ.



9. SECOND PHASE MITIGATION AND MANAGEMENT – BUILD PHASE

This document details the construction works that are required to ensure full compliance with the remediation strategy, Regulatory Authorities, Building Control and Warranty Providers;

The following should be implemented during the build phase of the development:

- ✚ Laboratory testing of the imported topsoil;
- ✚ Chemical validation of any additional subsoil imported for use within gardens;
- ✚ Placement of a capillary break layer beneath the clean cover system;
- ✚ Placement and validation of subsoil (clean material) in a 300mm layer within any landscaped areas where the material was not placed during the Remediation and Enabling works; and
- ✚ Placement and chemical validation of imported topsoil within all landscaped areas.

The validation protocols are presented within the E3P Remediation and Enabling Works Strategy and are presented below.

9.1. PLACEMENT OF COVER SYSTEM

The Remediation and Enabling Works Strategy for the site, concerning human health of the future site users include the provision of a chemically suitable clean material to be installed in all landscaped areas as stated in the Manchester City Council Planning and Contaminated Land Technical Guidance; the construction of the clean cover/placement of clean material shall consist of:

- ✚ Capillary break layer;
- ✚ 300mm subsoil; and
- ✚ 150mm topsoil.

Under the MCC technical guidance, if vegetation, shrubs or trees are included within the landscaped areas, specific requirements for the provision of growing medium and planting outlined in the technical document (Manchester City Council Planning and Contaminated Land Technical Guidance) should be adhered to. These have been summarised in Table 9.1 below.

TABLE 9.1 GROWTH MEDIUM ROOTING DEPTH FOR VARIOUS VEGETATION TYPES

VEGETATION TYPE	ROOTING DEPTH (mm)
Grass	450
Plants	450
Shrubs	600
Trees	900

Following the current requirements of the regulatory authorities, validation samples will be collected from all materials that are to be imported or re-used on-site to confirm the proposed development will pose no unacceptable risk to human health or the wider environment.



Subsoil and topsoil shall be free of any deleterious materials, such as buildings materials, timber, plastics etc. and conform to the requirements of BS 3882:2007.

Testing requirements for topsoil and subsoil are presented in Table 9.2.

TABLE 9.2 SPECIFICATION FOR SOIL TESTING

MATERIAL USE	TESTING FREQUENCY	SUITE OF ANALYSIS
Subsoil Greenfield Source (150 mm Landscape Cover)	1 Sample per 200 m ³	A/B/C/D
Subsoil Brownfield Source (150 mm Landscape Cover)	1 Sample per 50 m ³	A/B/C/D
Topsoil Greenfield Source (150 mm Landscape Cover)	1 Sample per 200 m ³	A/B/C/D
Topsoil Brownfield Source (150 mm Landscape Cover)	1 Sample per 50 m ³	A/B/C/D
General Engineering Fill (Class 1 and 2 Soil)	1 Sample per 1000 m ³	A/B/C/D

Notes

Suites of Analysis:

- A. Speciated PAH.
- B. Speciated TPH (C5-C35).
- C. Asbestos (ID).
- D. CLEA Inorganic Heavy Metals.



9.1.1. PROCEDURE FOR PLACEMENT OF CHEMICALLY SUITABLE COVER SYSTEM

Landscaped areas need to be backfilled with 300 mm chemically validated subsoil, with 150 mm topsoil overlaying this. Topsoil is required to be confirmed as chemically suitable prior to placement. Where subsoil is not placed during remediation and enabling works, E3P will be required to return to the site and undertake independent validation of the correct placement of subsoil.

The placement of 450 mm of clean material and capillary break layer will be undertaken during the build phase works of the project.

The placement of subsoil and corresponding validation will be documented within the Landscaping Validation Letters (to be issued on completion of the contractor's works).

If proposed utilities are to be placed within the cover system, the clean cover should be placed prior to installation of these utilities.

E3P will collect photographic evidence of the placement of 150 mm of certified topsoil and 300 mm of subsoil on completion of construction works. This element will also be checked by the Building Control Officer as part of the site completion.

The landscape validation procedure is detailed in Table 9.3.

TABLE 9.3 LANDSCAPE VALIDATION PROCEDURE

PROCEDURE	METHOD
Chemical Validation	Imported subsoil and topsoil will need to be chemically analysed to confirm suitability for use with the proposed cover system prior to installation and completion of the garden systems. E3P will issue an email to the appropriate party with an assessment of the chemical suitability of both subsoil and topsoil. If acceptable the materials can be installed to the required depth at which time the plot will be deemed complete following a validation procedure by a suitability qualified E3P engineer.
Trial Holes	Trial holes are deemed necessary for all landscaped areas given that the 300 mm cover system will need to be placed within all landscaped areas during the build phase.
Validation	Photographic evidence will be taken by E3P of the topsoil and subsoil placement demonstrating the depth of topsoil and subsoil and practical completion of works.
Validation Certificate	Once the photographs of the placement of topsoil (over the clean material) have been provided, E3P will issue a plot-specific validation certificate to demonstrate that the required subsoil and topsoil has been placed in the required landscaped areas along with the chemical analysis.
Completion Report	Upon completion of all landscaped areas within the development, a Completion Report will be issued providing the confirmation that all remediation requirements have been achieved.

Plate 1 provides an example of landscape validation photographs that will be required.



PLATE 1 EXAMPLE LANDSCAPE COVER SYSTEM VALIDATION

Plot No: 4 (Car Park Landscaping)

Depth of Strata (m bgl)

0.00-0.30

Validated TOPSOIL

Depth of Cover System Materials



Depth of Cover System Materials



Depth of Cover System at Ground Level and in Relation to Unit / Structure



9.2. POTABLE WATER SUPPLY – CONTAMINANT ASSESSMENT CRITERIA

Table 9.4 provides a summary of the threshold concentrations that must not be exceeded within remediated ground at pipeline depth in order to PE pipe works to be acceptable for the proposed development.

TABLE 9.4 PIPELINE SELECTION PE THRESHOLD CONCENTRATIONS

Contaminant Group	PE-threshold
Total VOC	0.5
Total BTEX And MTBE	0.1
Total SVOCs (Excluding PAH and those substances marked with an *)	2
EC5-EC10 Aliphatic and Aromatic Hydrocarbons	2
EC10-EC16- Aliphatic and Aromatic Hydrocarbons	10
EC16-EC40 Aliphatic and Aromatic Hydrocarbons	500
Phenols (From SVOC Analysis)*	2
Cresols and Chlorinated Phenols (From SVOC Analysis)	2
Ethers*	0.5
Nitrobenzene*	0.5
Ketones*	0.5
Aldehydes*	0.5
Amines	Fail

Upon completion of the remedial works a full UKWIR Risk Assessment should be undertaken.

END OF REPORT



APPENDIX I

LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the Client as indicated in Section 1.2.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information, it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover, reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover, no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials, this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
9. E3P cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by E3P is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by E3P in this connection without their explicit written agreement there to by E3P.
10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.



APPENDIX II

GLOSSARY

TERMS

ACM	Asbestos-containing material	MMP	Materials management plan
ADS	Acoustic design statement	ND	Not detected
AST	Above-ground storage tank	NDP	Nuclear density probe
BGS	British Geological Survey	NMP	Noise management plan
BSI	British Standards Institute	NPSE	Noise policy statement for England
BTEX	Benzene, toluene, ethylbenzene, xylenes	NR	Not recorded
CA	Coal Authority	PAH	Polycyclic aromatic hydrocarbon
CBR	California bearing ratio	PCB	Polychlorinated biphenyl
CIEH	Chartered Institute of Environmental Health	PI	Plasticity index
CIRIA	Construction Industry Research Association	PID	Photo ionisation detector
CLEA	Contaminated land exposure assessment	POS	Public open space
CML	Council of Mortgage Lenders	PPE	Personnel protective equipment
CoC	Contaminants of concern	ProPG	Professional practice guidance
CSM	Conceptual site model	QA	Quality assurance
DNAPL	Dense non-aqueous phase liquid (chlorinated solvents, PCB)	SGV	Soil guideline value
DWS	Drinking water standard	SPH	Separate-phase hydrocarbon
EA	Environment Agency	SPT	Standard penetration test
EQS	Environmental quality standard	SVOC	Semi-volatile organic compound
FFL	Finished floor level	TPH	Total and speciated petroleum hydrocarbon
GAC	General assessment criteria	TPH CWG	Total Petroleum Hydrocarbon (Criteria Working Group)
GL	Ground level	UKWIR	United Kingdom Water Infrastructure Risk
GSV	Gas screening value	UST	Underground storage tank
HCV	Health criteria value	VCC	Vibro-concrete column
ICSM	Initial conceptual site model	VOC	Volatile organic compound
LEL	Lower explosive limit	VRSC	Vibro-replacement stone columns
LMRL	Lower method reporting limit	VSC	Vibro-stone columns
LNAPL	Light non-aqueous phase liquid (petrol, diesel, kerosene)	WHO	World Health Organisation
MCV	Moisture condition value	WRAP	Waste and Resources Action Programme
MIBK	Methyl isobutyl ketone	WTE	Water table elevation



m	Metres	ppm	Parts per million
km	Kilometres	mg/m³	Milligram per metre cubed
% v/v	Percent volume in air	m bgl	Metres below ground level
mb	Millibars (atmospheric pressure)	m bcl	Metre below cover level
l/hr	Litres per hour	mAOD	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	kN/m²	Kilonewtons per metre squared
ppb	Parts per billion	µm	Micrometre
mg/kg	Milligrams per kilogram (parts per million)	SSRT	Site Specific Remediation Target
PSD	Particle Size Distribution	DD	Dry Density
CL:AIRE	Contaminated Land: Applications in Real Environments	Mc	Moisture Content
ρ	Bulk Density	GPR	Ground Penetrating Radar
NDP	Nuclear Density Probe	FFL	Finished Floor Level
LEL	Lower Explosive Limit	UKWIR	UK Water Industry Research
CIRIA	Construction Industry Research and Information Association	LOD	Limit of Detection



APPENDIX III

DRAWINGS

APPENDIX IV E3P REMEDIATION/ VALIDATION CRITERIA

HUMAN HEALTH REMEDIATION TARGETS – LOW-RISE RESIDENTIAL END USE

DETERMINAND	UNITS	WITHIN 600 mm COVER SYSTEM (GARDEN)	HARD STANDING AND >600 mm OF COVER	PUBLIC OPEN SPACE 300 mm COVER	PUBLIC OPEN SPACE > 300 mm	PATH- WAY
Arsenic	mg/kg	37 ⁽ⁱ⁾	40 ⁽ⁱⁱ⁾	79 ⁽ⁱⁱⁱ⁾	170 ^(iv)	1
Cadmium	mg/kg	11 ⁽ⁱ⁾	85 ⁽ⁱⁱ⁾	120 ⁽ⁱⁱⁱ⁾	532 ^(iv)	1
Chromium (Hexavalent)	mg/kg	6 ⁽ⁱ⁾	6 ⁽ⁱⁱ⁾	7.7 ⁽ⁱⁱⁱ⁾	220 ^(iv)	1
Lead	mg/kg	200 ^(vi)	310 ^(vii)	630 ^(viii)	1300 ^(viii)	1
Elemental Mercury	mg/kg	1.2 ⁽ⁱ⁾	1.2 ⁽ⁱⁱ⁾	16 ⁽ⁱⁱⁱ⁾	30 ^(iv)	2
Nickel	mg/kg	130 ⁽ⁱ⁾	180 ⁽ⁱⁱ⁾	230 ⁽ⁱⁱⁱ⁾	800 ^(iv)	1
Selenium	mg/kg	250 ⁽ⁱ⁾	430 ⁽ⁱⁱ⁾	1100 ⁽ⁱⁱⁱ⁾	1800 ^(iv)	1
Copper	mg/kg	2400 ⁽ⁱ⁾	7100 ⁽ⁱⁱ⁾	12,000 ⁽ⁱⁱⁱ⁾	44,000 ^(iv)	1
Zinc	mg/kg	3700 ⁽ⁱ⁾	40,000 ⁽ⁱⁱ⁾	81,000 ⁽ⁱⁱⁱ⁾	170,000 ^(iv)	1
Phenol	mg/kg	120 ^{(i)(xi)}	440 ^{(xiv)(xi)}	440 ^{(iii)(xi)}	440 ^{(iv)(xi)}	2
Naphthalene	mg/kg	2.3 ^{(i)(xi)}	2.3 ^{(xiv)(xi)}	1200 ^{(iv)(xi)}	1200 ^{(iv)(xi)}	2
Acenaphthylene	mg/kg	170 ^{(i)(xi)}	500 ^(v)	15,000 ^{(iii)(xi)}	29,000 ^{(iv)(xi)}	3
Acenaphthene	mg/kg	210 ^{(i)(xi)}	500 ^(v)	15,000 ^{(iii)(xi)}	29,000 ^{(iv)(xi)}	1
Fluorene	mg/kg	170 ^{(i)(xi)}	500 ^(v)	9900 ^{(iii)(xi)}	20,000 ^{(iv)(xi)}	1
Phenanthrene	mg/kg	95 ^{(i)(xi)}	500 ^(v)	3100 ^{(iii)(xi)}	6200 ^{(iv)(xi)}	3
Anthracene	mg/kg	500 ^{(i)(xi)}	500 ^(v)	74,000 ^{(iii)(xi)}	150,000 ^{(iv)(xi)}	3
Fluoranthene	mg/kg	280 ^{(i)(xi)}	500 ^(v)	3100 ^{(iii)(xi)}	6300 ^{(iv)(xi)}	3
Pyrene	mg/kg	500 ^{(i)(xi)}	500 ^(v)	7400 ^{(iii)(xi)}	15,000 ^{(iv)(xi)}	3
Benzo(a)Anthracene	mg/kg	7.2 ^{(i)(xi)}	11 ^{(ii)(xi)}	29 ^{(iii)(xi)}	49 ^{(iv)(xi)}	3
Chrysene	mg/kg	15 ^{(i)(xi)}	30 ^{(ii)(xi)}	57 ^{(iii)(xi)}	93 ^{(iv)(xi)}	3
Benzo(b)Fluoranthene	mg/kg	2.6 ^{(i)(xi)}	3.9 ^{(ii)(xi)}	7.1 ^{(iii)(xi)}	13 ^{(iv)(xi)}	3
Benzo(k)Fluoranthene	mg/kg	77 ^{(i)(xi)}	110 ^{(ii)(xi)}	190 ^{(iii)(xi)}	370 ^{(iv)(xi)}	3
Benzo(a)Pyrene	mg/kg	2.2 ^{(i)(xi)}	3.2 ^{(ii)(xi)}	5.7 ^{(iii)(xi)}	11 ^{(iv)(xi)}	3
Indeno(123-cd)Pyrene	mg/kg	27 ^{(i)(xi)}	45 ^{(ii)(xi)}	82 ^{(iii)(xi)}	150 ^{(iv)(xi)}	3
Dibenzo(a,h)Anthracene	mg/kg	0.24 ^{(i)(xi)}	0.31 ^{(ii)(xi)}	0.57 ^{(iii)(xi)}	1.1 ^{(iv)(xi)}	3
Benzo(ghi)Perylene	mg/kg	320 ^{(i)(xi)}	360 ^{(ii)(xi)}	640 ^{(iii)(xi)}	1400 ^{(iv)(xi)}	3
TPH C ₅ -C ₆ (aliphatic)	mg/kg	42 ^{(i)(xi)}	42 ^{(ii)(xi)}	42 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₆ -C ₈ (aliphatic)	mg/kg	100 ^{(i)(xi)}	100 ^{(ii)(xi)}	100 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₈ -C ₁₀ (aliphatic)	mg/kg	27 ^{(i)(xi)}	27 ^{(ii)(xi)}	27 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₁₀ -C ₁₂ (aliphatic)	mg/kg	130 ^{(i)(xi)}	130 ^{(ii)(xi)}	130 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₁₂ -C ₁₆ (aliphatic)	mg/kg	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	10,000 ^{(xiv)(xi)}	1
TPH C ₁₆ -C ₂₁ (aliphatic)	mg/kg	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	1000 ^{(xiv)(xi)}	10,000 ^{(xiv)(xi)}	1
TPH C ₂₁ -C ₃₅ (aliphatic)	mg/kg					1
TPH C ₅ -C ₇ (aromatic)	mg/kg	70 ^{(i)(xi)}	370 ^{(ii)(xi)}	370 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₇ -C ₈ (aromatic)	mg/kg	130 ^{(i)(xi)}	860 ^{(ii)(xi)}	860 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₈ -C ₁₀ (aromatic)	mg/kg	34 ^{(i)(xi)}	47 ^{(ii)(xi)}	47 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2
TPH C ₁₀ -C ₁₂ (aromatic)	mg/kg	74 ^{(i)(xi)}	250 ^{(ii)(xi)}	250 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	2



Former Boddingtons Site, Cheetham Hill
Remediation and Enabling Works Strategy
March 2022

TPH C₁₂-C₁₆ (aromatic)	mg/kg	140 ^{(i)(xi)}	1800 ^{(ii)(xi)}	1800 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	1
TPH C₁₆-C₂₁ (aromatic)	mg/kg	260 ^{(i)(xi)}	1900 ^{(ii)(xi)}	1900 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	1
TPH C₂₁-C₃₅ (aromatic)	mg/kg	1000 ^{(xiv)(xi)}	1900 ^{(ii)(xi)}	1900 ^{(ii)(xi)}	10,000 ^{(xiv)(xi)}	1
Asbestos	Fibres Volume Weight (%)	NFD	0.001%	NFD	0.001	4

Notes 1

NFD = No Fibres Detected

Asbestos will be screened visually on site by a qualified environmental consultant and where potential ACM is identified, representative samples will be subject to quantitative analysis of % volume by weight.

Should any ACM be identified within the soil matrices, further detailed % assessment would be required when the reported laboratory result exceeds the limit of detection for the analytical method at 0.01% by volume (weight).

Notes 2

Excludes matrices where free product is observed.

No viable exposure pathway beneath hardstanding and cover system.

Notes 3

Main exposure pathways: 1 = soil ingestion, 2 = vapour inhalation (indoor), 3 = dermal contact and ingestion, 4 = dust inhalation.

Abbreviations: GAC = general assessment criteria, n = number of samples, MC = maximum concentration, N/A = Not Applicable (no exceedance of assessment criteria), Loc of MC = location of exceedances.

- i. Value derived from LQM Sutable 4 Use Levels (S4ULs) for residential end use with plant uptake.
- ii. Value derived from LQM Sutable 4 Use Levels (S4ULs) for residential end use without plant uptake – these levels used below 600 mm cover system within residential gardens as soils will be present within a residential setting, yet soils will not be disturbed, and garden plants will not reach these soils.
- iii. Value derived from LQM Sutable 4 Use Levels (S4ULs) for public open space (POS) residential.
- iv. Value derived from LQM Sutable 4 Use Levels (S4ULs) for public open space (POS) park – these levels used below 300 mm POS cover system as soils will not be disturbed by any future site users and exposure to these soils will be similar to a park end use.
- v. Value derived from LQM Sutable 4 Use Levels (S4ULs) alongside assessment with WM3 to ensure that materials remaining on site do not exceed the WM3 toxicity criteria for hazardous waste.
- vi. Value derived from Category 4 Screening Levels (C4SL) for residential land use with homegrown produce.
- vii. Value derived from Category 4 Screening Levels (C4SL) for residential land use without homegrown produce.
- viii. Value derived from Category 4 Screening Levels (C4SL) for public open space (POS) residential.
- ix. Value derived from Category 4 Screening Levels (C4SL) for public open space (POS) park.
- x. Mercury – based on elemental mercury.
- xi. PAH and TPH levels used are for 1% SOM.
- xii. Xylenes based on p-xylene (o-xylene 2600 mg/kg, m-xylene 3500 mg/kg) and is capped by its solubility.
- xiii. Value derived from LQM Sutable 4 Use Levels (S4ULs) for residential end use with plant uptake due to the volatilisation risk.
- xiv. BTEX is not SOM-related due to inhalation pathway.



REMEDIATION TARGETS – COMPARISON OF GROUNDWATER / LEACHATE ANALYSIS WITH TIER 1 SCREENING LEVELS

DETERMINAND	UNIT	EQS SCREENING VALUE ^{1, 2, 3}		DWS ^{3,4,5}
		AA	MAC	
Arsenic	µg/l	50	–	10
Cadmium	µg/l	0.08-0.25	0.45-1.5	5
Chromium (VI)	µg/l	3.4	–	–
Chromium (III)	µg/l	4.7	–	50
Copper	µg/l	1	–	2000
Total Cyanide	µg/l	1	–	50
Lead	µg/l	1.2	14	10
Mercury	µg/l	–	0.07	1.0
Nickel	µg/l	4	34	20
Selenium	µg/l	–	–	10
Zinc	µg/l	10.9	–	–
pH		6–9		
Naphthalene	µg/l	2	130	10*
Anthracene	µg/l	0.1	0.1	
Benzo[b]fluoranthene	µg/l	0.00017*	0.017	
Benzo[k]fluoranthene	µg/l	0.00017*	0.017	
Benzo(a)pyrene	µg/l	0.00017*	0.27	
Indeno(123-cd)pyrene	µg/l	0.00017*	5*	
Benzo(ghi)pyrene	µg/l	0.00017*	5*	
Fluoranthene	µg/l	0.0063	0.12	
Benzo(ghi)perylene	µg/l	1.7–4	8.2–3	
TPH C5-C6 (benzene)	µg/l	10	50	1
TPH C6-C8 (toluene)	µg/l	74	–	700
TPH C8-C10 (Ethyl benzene)	µg/l	20	–	300
TPH C10-C12 (xylene)	µg/l	30	–	500
TPH C12-C16	µg/l	2	130	90 ⁵
TPH C16-C35	µg/l	50#	50#	90 ⁵
TPH C5-C6	µg/l	–	–	15000
TPH C6-C8	µg/l	–	–	15000
TPH C8-C10	µg/l	–	–	300
TPH C10-C12	µg/l	–	–	300
TPH C12-C16	µg/l	–	–	300



DETERMINAND	UNIT	EQS SCREENING VALUE ^{1, 2, 3}		DWS ^{3,4,5}
		AA	MAC	
TPH C16 – C21	µg/l	–	–	300**
TPH C21-C35	µg/l	–	–	300**
Tetrachloroethylene	µg/l	0.4	–	10
Trichloroethylene	µg/l	10	–	10
Trichlorobenzene	µg/l	0.4	–	–
Trichloromethane	µg/l	2.5	–	–
Dichloromethane	µg/l	20	–	200
Carbon Tetrachloride	µg/l	12	–	3
Vinyl Chloride	µg/l	–	–	0.3

Notes

Solubility <0.01µg/l

AA – Annual Average

MAC- Maximum Admissible Concentration

* Polyaromatic hydrocarbons (PAH) - Benzo(a)pyrene (BaP), Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)-perylene and Indeno(1,2,3-cd)-pyrene. Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene needs to be monitored for comparison with the biota EQS or the corresponding AA-EQS in water

** There are no WHO Guideline Values for aliphatic fractions C16-C21 and C21-C35, therefore the guideline value for aliphatic fractions inclusive of C8-C16 (300µg/l) has been applied.

1. The Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations (2015)
2. Directive establishing a framework for Community action in the field of water policy (Water Framework Directive)
3. Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Dangerous Substances Directive) - List II substances
4. Council Directive on the quality of water intended for human consumption (Drinking Water Directive)
5. WHO Guidelines for Drinking Water Quality. Third edition (2004)



APPENDIX V

E3P MATERIAL IMPORT CRITERIA

SITE OF IMPORTATION ADDRESS		E3P +44 (0) 161 707 9612 info@e3p.co.uk 
Client		
Main Contractor		
Earthworks Contractor		
Haulier		
Date of Planned Import		
Overview of Planned Material Import		
Material Source (Site of Origin) and Postcode		
Site Investigation Report	Report Title and Reference: Date: Information Supplied By:	
Reason for Generation of Excess Material at Site of Origin		
Chemical Test Results for Stockpile at Site of Origin	Date: Laboratory Certificate Ref: Organisation Responsible for Stockpile Sampling:	
Geotechnical Material Classification and Testing	Delete as Appropriate: Class 1 / Class 2 / Class 6 / Topsoil	
Pictures of Material Stockpile Pending Transportation	Delete as Appropriate: Yes / No	
Person or Organisation Responsible for Ensuring Quality Control at Site of Origin		
Quantity of Material to Be Imported (m³)		
Proposed Area of Deposition (Site of Reuse)		
Waste Exemption/Permit or CL:AIRE MMP		Delete as Appropriate: U1 Standard Rules / CL:AIRE MMP (Direct Transfer) / Bespoke



APPENDIX VI CONTRACTOR PRE- COMMENCEMENT CHECK SHEET

GEOTECHNICAL ENABLING WORKS PRE-START FORM

Prior to the commencement of any site remediation or enabling works, this form will be completed by E3P, in the presence of the appointed contractor, to ensure that all pertinent remediation and enabling works activities are fully discussed and understood.

Activity	Testing Responsibility	Contractors Method Statement Required (Y/N)	Comment/Action
Deployment of Environmental Permit			Ref No:
Deployment of LAPC Part B – Mobile Plant Permit			Ref No:
CL:AIRE MMP and Qualified Person Declaration			Ref No:
Identification of All Invasive Plant Species and Production of Eradication Plan with Appropriate Supervision by Specialist			Appointed specialist:
Removal of All Vegetation			Note disposal location:
Removal of All Root Bulbs and Root Networks			Note disposal location:
Identification of Contamination Hotspots, Removal of Material and Stockpile			Rationale:
Legislatively Compliant Procedure to Deal with Contamination Excavated from Hotspot			Rationale:
Processing and Recycling of Aggregate with Geotechnical and Chemical Validation Testing			Note stockpile location and anticipated volume:
Stockpiling of Subsoil and Certification of Suitability for Reuse			Stockpile location:
Decommission of All Redundant Drainage Infrastructure			
Decommission of All Former Interceptors			
Decommission of All Former Above- and Below-Ground Tanks			
Removal of All Asbestos to a Licensed Facility			
Engineering of Plots for Shallow Spread Foundation in Accordance with E3P Geotechnical Specification			Plot Numbers



Activity	Testing Responsibility	Contractors Method Statement Required (Y/N)	Comment/Action
Engineering of Plots for VSC in Accordance with E3P Geotechnical Specification			Plot Numbers.
Engineering of Plots for Pile Foundation in Accordance with E3P Geotechnical Specification			Plot Numbers
Engineering of Plots for Raft Foundation in Accordance with E3P Geotechnical Specification			Plot Numbers
Stockpiling of Topsoil and Certification of Suitability for Reuse			Stockpile location
Engineering of Highways Bulk Upfill in Accordance with E3P Specification with Compliant Validation Testing			Upfill specification
Engineering of Highways Subgrade in Accordance with E3P Specification with Compliant Validation Testing			Upfill specification
Engineering of Highways Capping in Accordance with E3P Specification with Compliant Validation Testing			Upfill specification
Cut-and-Fill the Development Site to Clients' Required Elevation with As-Built Survey			Required formation elevations



APPENDIX VII CONTRACTOR COMPLETION CHECK SHEET

GEOTECHNICAL ENABLING WORKS COMPLETION FORM

Upon completion of all site remediation and enabling works, this form will be completed by E3P, in the presence of the appointed contractor, to ensure that all pertinent geotechnical enabling works activities are complete or, where a deviation from the specification has occurred, all future limitations and issues are documented for the client's records.

Activity	Complete			Signature
	Yes	No	N/A	(initial)
Eradication of all invasive plant species				
Removal of all vegetation				
Removal of all root bulbs and root networks				
Stockpiling of topsoil and certification of suitability for reuse				
Stockpiling of subsoil and certification of suitability for reuse				
Stockpile all recycled aggregate with geotechnical and chemical validation testing				
Removal of all relict foundations and infrastructure in their entirety				
Decommission of all redundant drainage infrastructure				
Decommission of all former interceptors				
Decommission of all former above- and below-ground tanks				
Removal of all waste materials to a licensed facility				
Removal of all asbestos to a licensed facility				
Engineering of all plots for shallow spread foundation in accordance with E3P Geotechnical Specification				
Engineering of all plots for VSC in accordance with E3P Geotechnical Specification				
Engineering of all plots for pile foundation in accordance with E3P Geotechnical Specification				
Engineering of all plots for raft foundation in accordance with E3P Geotechnical Specification				
Engineering of highways bulk upfill in accordance with E3P Specification with compliant validation testing				
Engineering of highways subgrade in accordance with E3P Specification with compliant validation testing				
Engineering of highways capping in accordance with E3P Specification with compliant validation testing				
Cut-and-fill the development site to client's required elevation with as-built survey				



POST-REMEDIATION AND ENABLING LIMITATIONS

All and every deviation from the approved specification for works should be documented by the remediation and enabling works contractor below.



