

VITAL ENERGI UTILITIES LIMITED

Manchester Civic Quarter Heat Network Lower Moseley Street Energy Network Extension Final Construction Management Plan

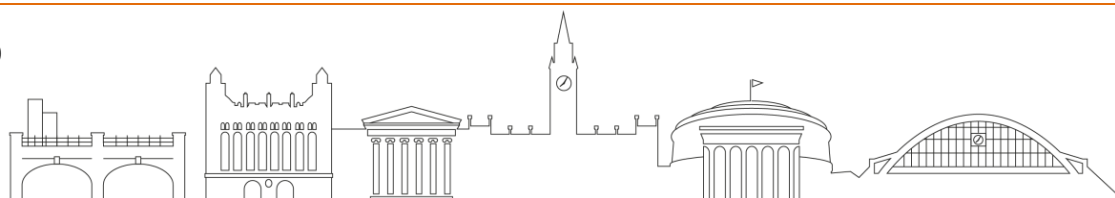
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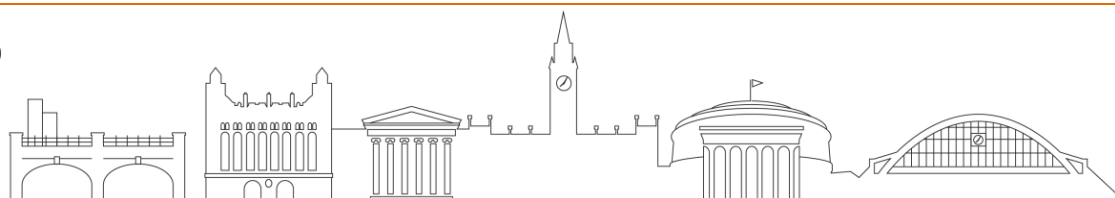
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1 Background

Vital Energi has been appointed by Manchester City Council for the delivery of the Manchester Civic Quarter Heat Network (MCQHN).

Full planning permission for the MCQHN (LPA ref. 118869/VO/2018; “the Original Permission”) was approved on 14 March 2018 and comprises two principal elements:

- 1) An energy centre housing combined heat and power (CHP) boilers with a total capacity of approximately 27MW fueled by natural gas, along with a dispersion flue. This would be located at Manchester Central beneath the railway viaduct which carries the Metrolink service across the junction of Lower Moseley Street with Great Bridgewater Street. The flue for the CHP energy centre would have a height of approximately 38 meters (“the Energy Centre component”).
- 2) A network of insulated heating pipework, electrical cabling and communications cabling to be placed in trenches within the public highway. It is intended that the heat network would initially serve the Town Hall Extension; Central Library; Manchester Central and the Bridgewater Hall. The following buildings would also have an electrical connection: Manchester Central, Town Hall Extension, Heron House and the Bridgewater Hall (“the Heat Network component”).

All pre-commencement conditions attached to the Original Permission have subsequently been discharged, both in relation to the Energy Centre (LPA ref. CDN/19/0648) and the Heat Network (LPA ref. CDN/19/0478).

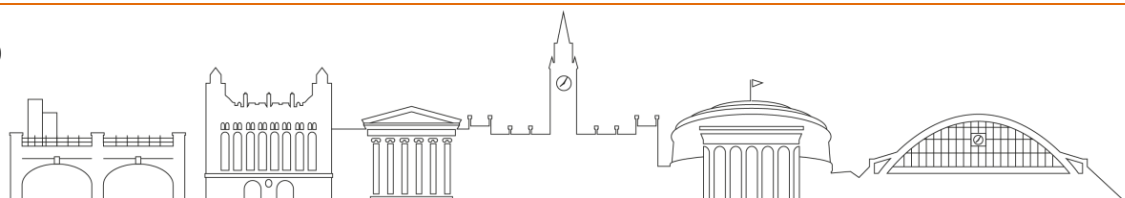
Further to the above, full planning permission for the installation of underground insulated heating pipes, electrical cabling and communications ducting beneath sections of the adopted highways of Albert Square and Princess Street as part of the Civic Quarter Heat Network was approved on 21 August 2019 (LPA ref. 124260/VO/2019; “the Albert Square Leg”). This allows for the future connection of Manchester Town Hall. All pre-commencement conditions attached to the Albert Square Leg have also been discharged (LPA ref. CDN/19/0896).

The Original Permission was amended in June 2020 to enable design amendments to the Energy Centre component only (LPA ref. 126436/JO/2020; “the Revised Permission”).

A separate full planning permission for the installation of underground insulated heating pipes, electrical cabling and communications ducting beneath sections of the adopted highways of Lower Mosely Street and Bale Street was approved in July 2020 (LPA ref. 127392/FO/2020). This application approved an alternative cable route and comprises part of the wider MCQHN development.

Vital Energi have the responsibility for the design, construction, operation and maintenance of the heat network and the energy centre.

The energy network has been designed to accommodate extension to future buildings. This construction management plan relates to the amendment of the Library HV Route and entry point from the Mount Street Side of the Building to the Peter Street side of the Building.



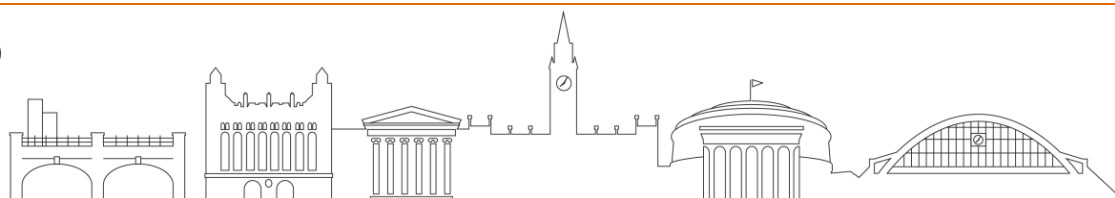
2 Introduction

This document presents the Final Construction Management Plan for the extension of the Energy Network to connect the Grade II* Listed Central Library to the HV network within Peter Street, replacing the previously approved connection via Mount Street.

This construction management plan is specifically for the extension of the energy network along Peter Street and St Peter's Square. Separate documents relating to the wider energy network and the energy centre facilities have been approved as follows:

- Heat Network – Final Construction Management Plan (ref. 50467-VE-EC-XX-RP-Z-SE01 Issue No: 06), approved under LPA ref. CDN/19/0478.
- Energy Centre – Final Construction Management Plan (ref. 50467-VE-EC-XX-RP-Z-SE02 Issue Number P3), approved under LPA ref. CDN/19/0684.
- Lower Mosley Street Energy Network Extension - Final Construction Management Plan (ref. 50467-VE-OC-XX-RP-Z-SE01 Issue No: P3), approved under LPA ref. 127392/FO/2020).

Within appendix 15.1 of this CMP there is a programme indicating the timescales and proposed works sequences for the Energy Network respectively.



3 Site Location

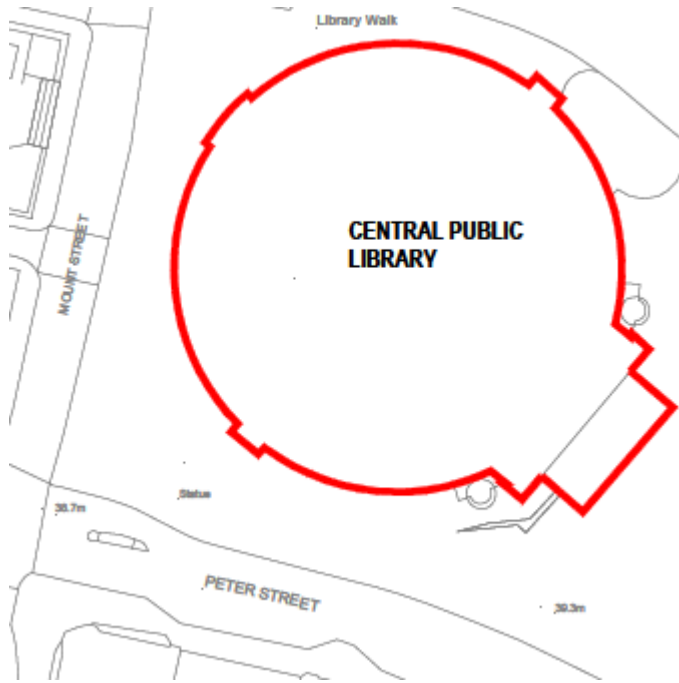
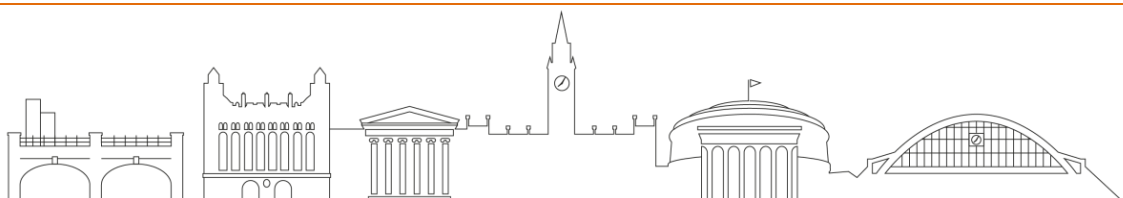


Figure 1 – Central Library



4 Proposed Development

The proposed HV route will utilize the approved route along Mount Street and then be installed via Peter Street to the South East corner of the Library. It is proposed to utilise existing Electricity North West ducts running along Peter Street to carry the HV cable for the majority of the route, following agreement with ENW. Two new sections of 3m ducting will be installed at either end of the existing ducts to connect to the approved route and onward connection to the Central Library. From the Eastern section of ducts the route will then proceed across the small section of pedestrianized area to the Library core which is directly over the plant room area.

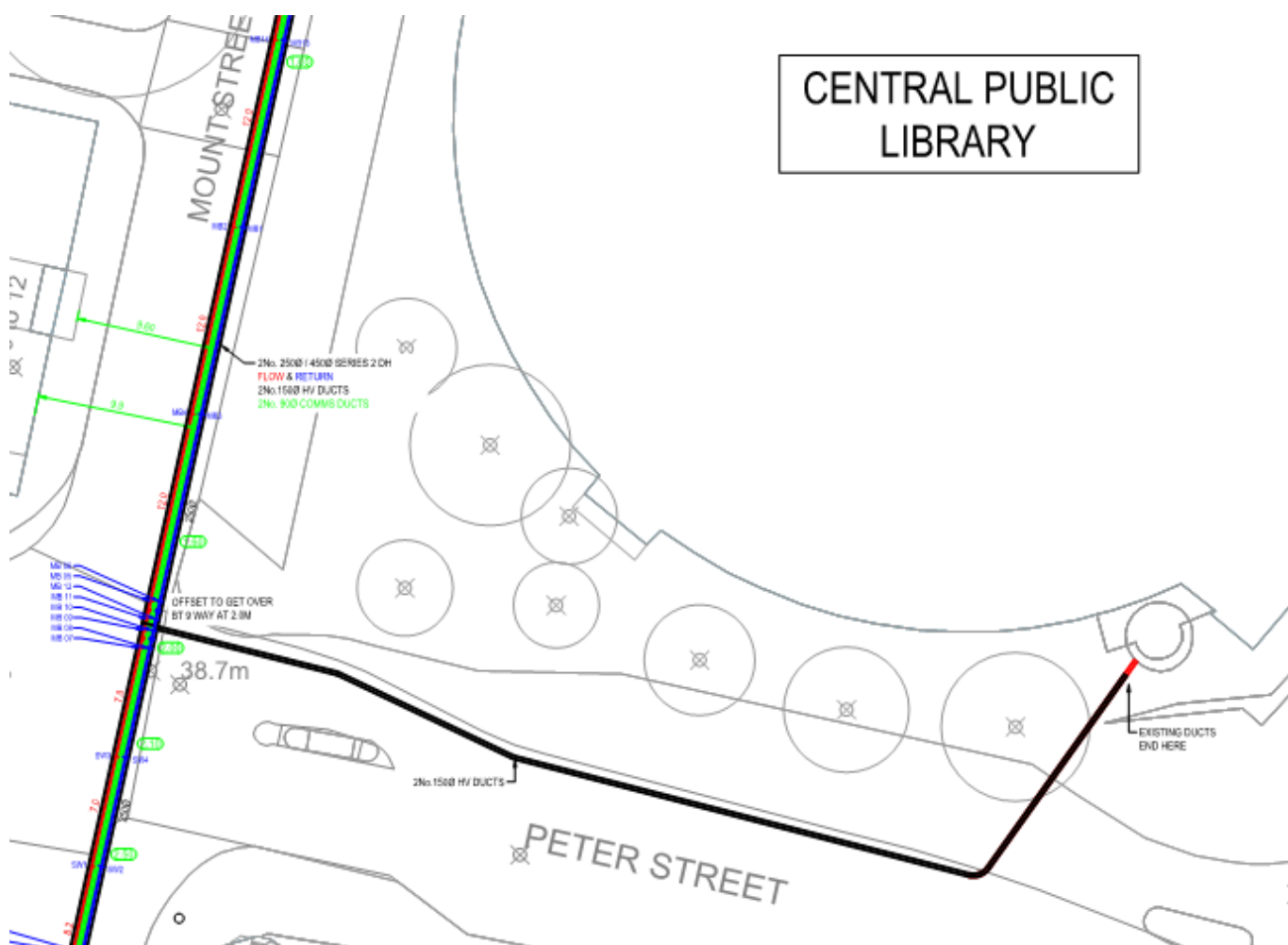
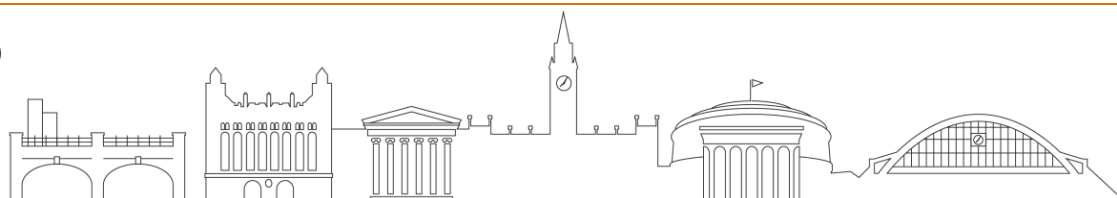


Figure 2 – Diversion route noted above from Mount Street along Peter Street. Note some of the route is utilising existing ducts.



5 Heat Network Final Construction Management Plan

4.1 Site Set Up

5.1.1 Main Sites Facilities

Vital Energi sites offices will be based at No 19 Albion Wharf Manchester, the site welfare arrangements will be located at the energy centre site located off Great Bridgewater Street and also at Excalon office/storage facilities located at Duncan Street, Salford, M5.

Facilities will include meeting rooms, canteen, drying room and toilets.

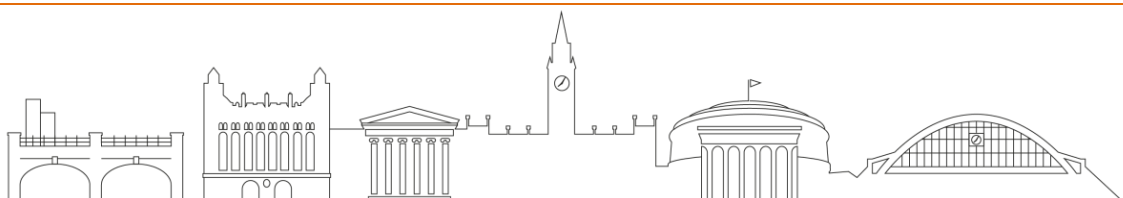
5.1.2 The Main Site Compound

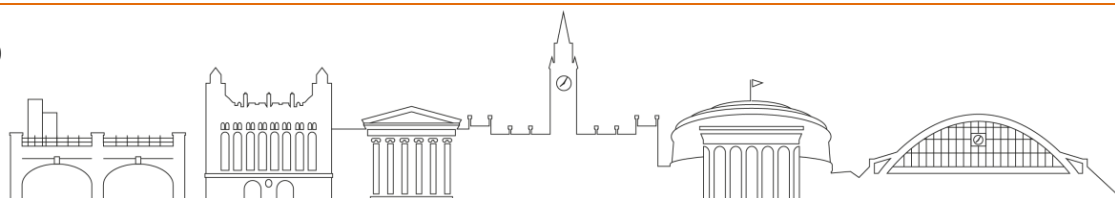
The storage compound for the project will be based within the Vital Energi site compound at Excalon, Salford. This compound will be used for:

- Arranging the just in time deliveries
- Contractor parking
- Storage of materials
- Storage of pipework
- Temporary storage of spoil from trench excavations
- Materials for backfilling

Staff will enter via a pedestrian turnstile gate located on Shuttle Street that is locked at all times and protected by a solid panel hoarding, with only fully inducted personnel allowed access. There will be combination padlocks on the access gates. Vehicular access will be via a separate gate that is also locked at all times. Operatives will sign in and out daily at the main site compound before entering any other work areas.

The images below illustrate the location of the Excalon storage facilities and the route from these facilities to site for construction delivery vehicles





Manchester Civic Quarter Heat Network

Final Construction Management Plan

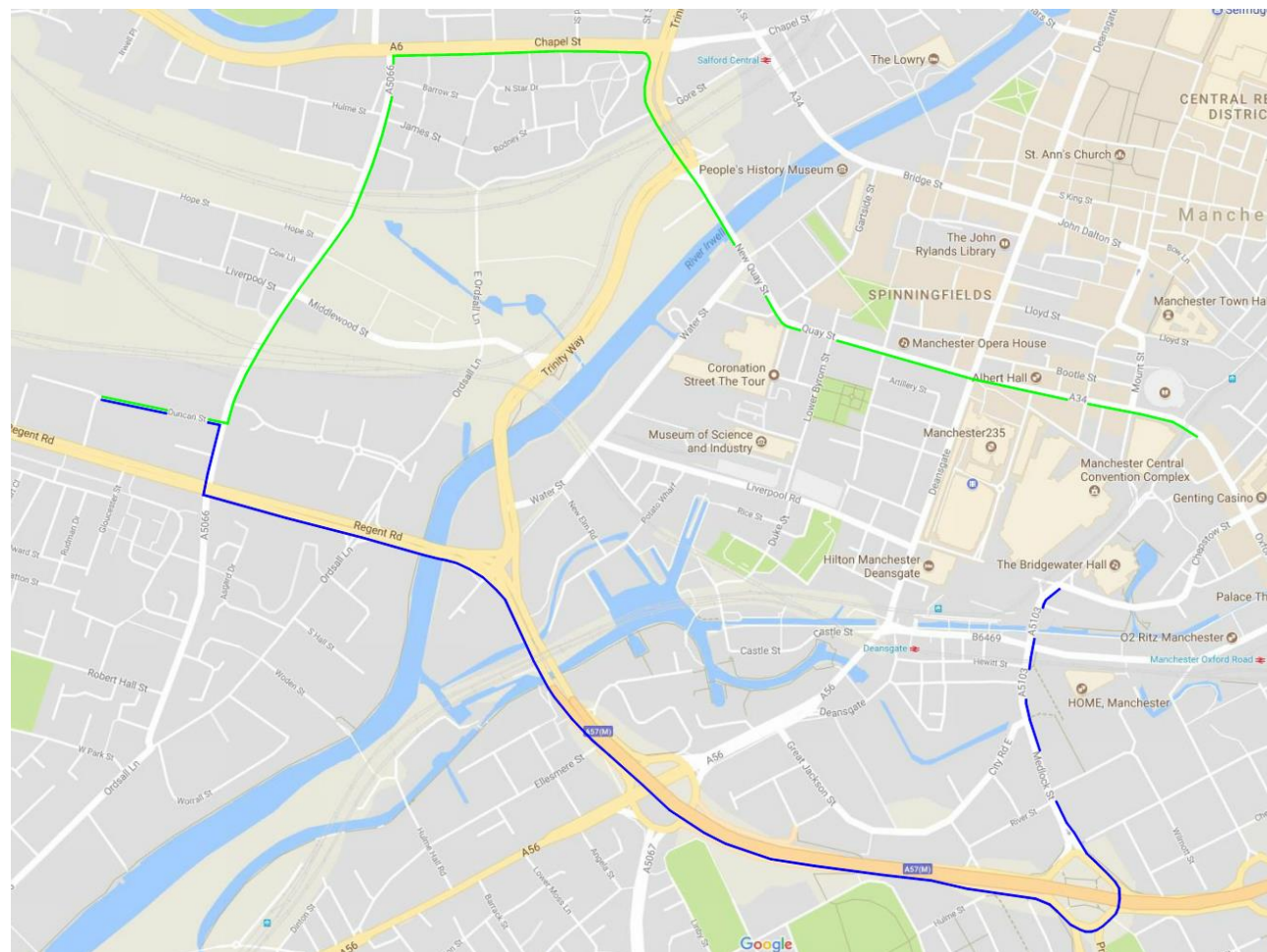
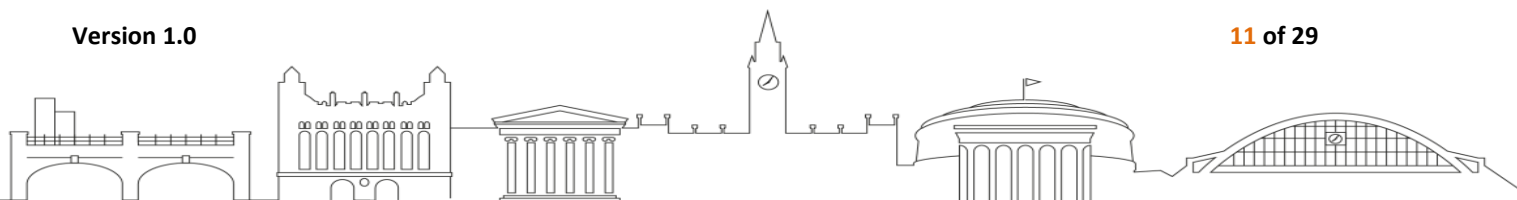


Figure 3 - Route to worksite from Excalon Yard (East)



Manchester Civic Quarter Heat Network

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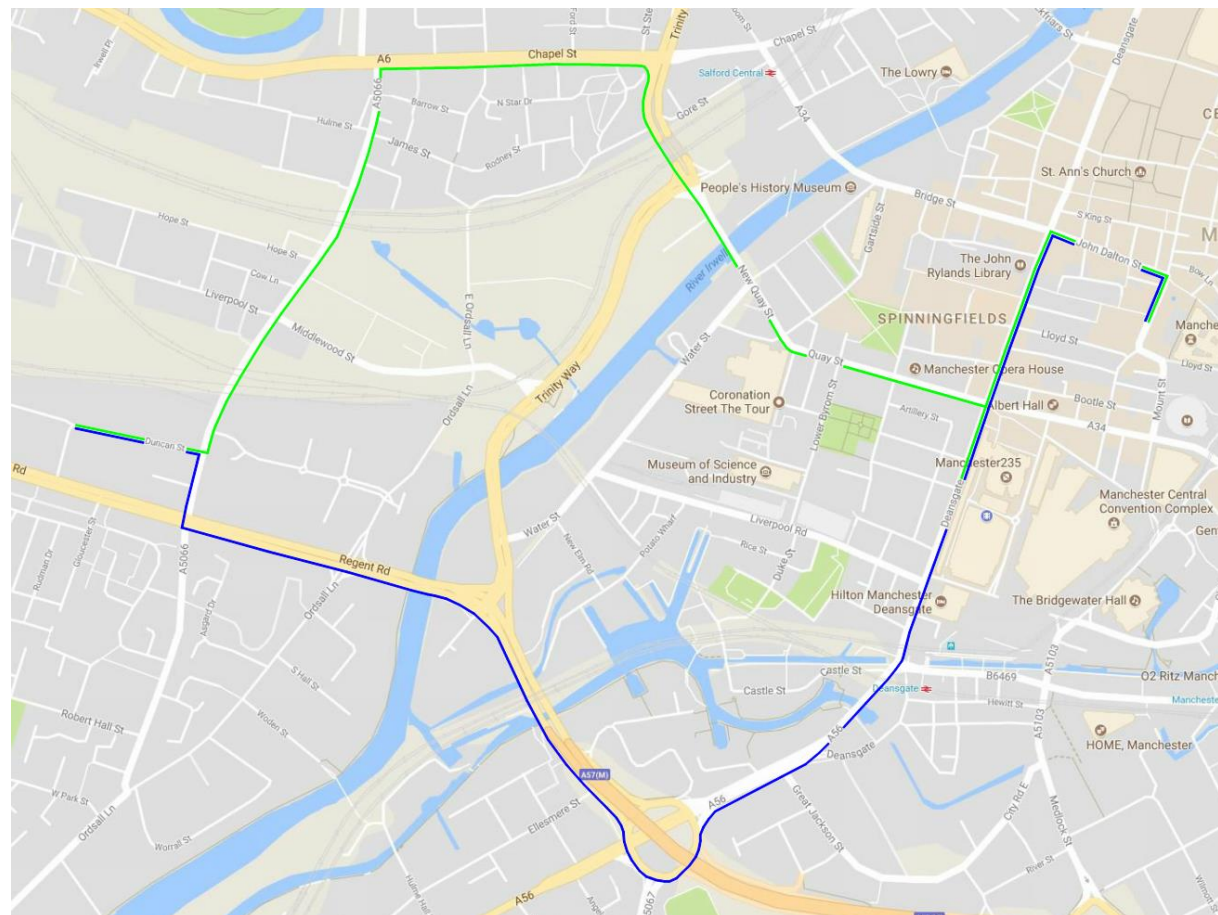
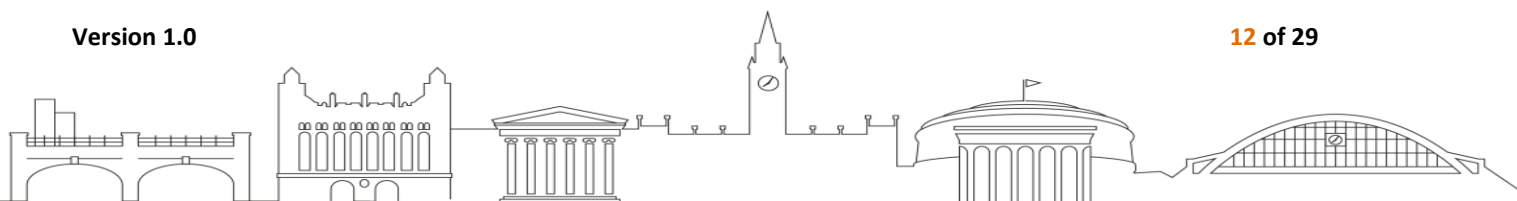


Figure 4 - Route from Excalon Yard (West)



4.2. Site Operation

Vital Energi and the Contractor Excalon have liaised with Manchester City Council Highways throughout the development of the Traffic management plans and route planning.

Vital Energi will continue to co-ordinate with MCC Highways to ensure disruption is kept to a minimum – being proactive, responding to changes and pre planning work with the council.

To minimize disruption and to complete the project in the safest and shortest possible time, the Lower Moseley Street extension will be constructed by Vital Energi following zone 14 between August and October 2020.

It is planned that 8 operatives will be required and involved in the construction of the heat network extension.

A summary of the construction sequence and durations are presented within appendix 15.1.

A fully recorded visual survey of the highway along Lower Moseley Street and Bale Street has been carried out as well as a photographic survey which will be carried out prior to all works commencing on site and sent to highways for observation. A dilapidation survey can be found in Appendix 15.3.

Details of the heat network construction are presented on drawing 50467-VE-SW-BG-DR-M-5628 which can be found in Appendix 15.4.

4.3 Environmental Protection

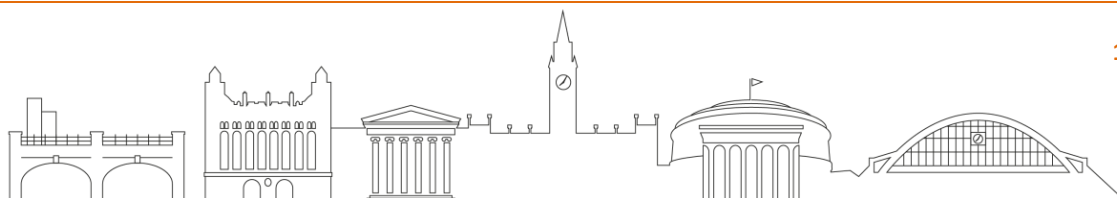
- Proposed times of working

All times of working will be coordinated with buildings in the locality of the work zone. Large Deliveries, road closures and matters effecting highways have been pre-planned with MCC Highways.

Construction/demolition works shall be confined to the following hours unless otherwise agreed in writing by the City Council as local planning authority:

- Monday - Friday: 07:30 - 18:00
- Saturday: 8.30 - 14:00
- Sunday / Bank holidays: No work

Noise to be kept to a minimum in the first hour. Any Night-time working/working outside of these hours will need to be discussed and agreed with Environmental Health via Contact Manchester (Tel. 0161 234 5004) prior to commencement of works of this nature. This includes construction and demolition of the temporary fencing adjacent to the metrolink line.



- Details of plant and equipment likely to be used during construction

The range of plant will be extensive; however, the most common plant and their noise ratings will be;

Plant/Machinery Usage Durations		
Plant/Machinery	DbA Level	Daily Usage (hours)
Mobile telescopic crane	78	8
Mini Piling Rig	76	8
Concrete delivery vehicle	77	4
Breaker	83	4
Excavator	76	8
Dumper	76	8
Compactor/Roller	78	8
Generator	76	8

These noise levels represent worst case sound levels. Sound mufflers will be used on plant and machinery where possible to do so.

- Hazardous Materials

All material to be used onsite will be COSHH assessed and managed under Vital Energi's ISO14001 policies.

All hazardous material will be kept in COSHH lockable cupboard with split kits on site. All drains to be protected.

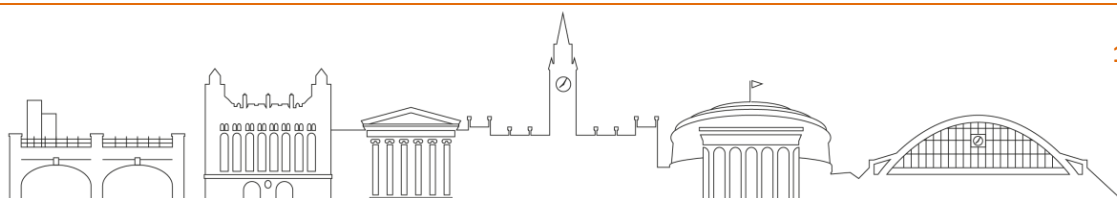
Details of the waste handling can be found within appendix 15.5 – Waste Management Plan.

- Control of dust emissions.

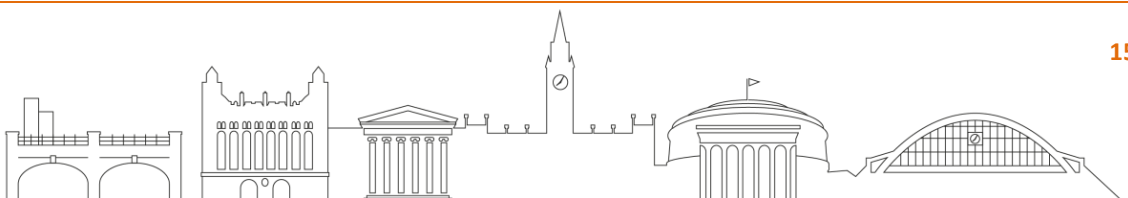
The key to effective dust control is prevention. Vital utilise the following control and mitigation measures;

1. Monitoring

- The work supervisor reviews the worksite at the start of the shift to establish site conditions. Photos are taken showing the condition of the site.
- The work supervisor undertakes an initial review with the works for wetting down the site and what would be required for prevention of dust.



- The work supervisor continually monitors the site. If the mitigation measures are not working, they will take action to review and implement further dust control measures
- 2. Site layout, housekeeping and operations :**
- designing the layout of your site to prevent emissions and limit the emissions sensitive receptors are exposed to - for example shops, entrances, junctions
 - using good housekeeping practices to make sure your site is clear of dust, mud, litter and other debris – regular daily walk rounds and end of shift checks
 - using road sweepers to remove dust, mud, and other debris
 - erecting micro-netting around the site fences lines
 - avoiding activities that could spread dust and particulates, mud or litter etc.
 - Where possible material will be Pre-fabricated off site in a controlled environment.
- 3. Vehicle Movement**
- using enclosed skips or containers wherever possible, or covering them if this is not possible (unless they're empty)
 - enforcing speed limits and reducing vehicle movements and idling on site
 - minimising the number of access points to site from public roads
 - surfacing roadways to make them easy to clean
 - making sure vehicles keep to roads
 - regularly cleaning and dampening roadways
 - using wheel wash systems to slow trucks - wash wheels and keep roadways damp
 - making sure road-going vehicles do not enter 'unmade ground' and muddy areas (including the tipping piles) to reduce muddy track-out
- 4. Dust suppression**
- using appropriate dust suppression systems (such as water mist sprays, bowsers, chemical suppressants etc.) at appropriate locations and times
 - Water suppression will be used on cutting tools and to wet down the general area.
- 5. Stockpiled wastes on open ground**
- keep stockpile levels at least 0.5m below the top of structures holding the waste to minimise wind-whipping at all times.
 - controlling the moisture content of the muck away material in the stockpile to prevent materials becoming friable
 - not positioning stockpiles outdoors or leaving them uncovered – particularly in dry or extremely wet weather
- If we cannot avoid positioning stockpiles outdoors, or leaving them uncovered, we should take steps to prevent material escaping from them. For example by:
- using sprays and binders
 - appropriately positioning bay walls or windbreaks
 - making sure stockpiles do not face the direction of the prevailing wind
 - minimising waste storage heights and volumes associated with DH

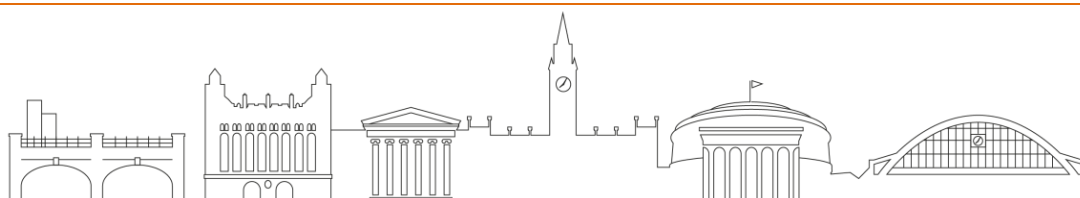


- Liaison during construction period

Vital Energi will as a minimum provide weekly meetings and bulletin with Manchester Central, TfGM, local businesses and residents.

4.3 Crime Impact Assessment

- As part of the construction process the advice of Greater Manchester Police will be followed. This will include the following activities;
 - Having a tidy site
 - Secure site curtilage, pedestrian and vehicular entrances/exits.



4.4 Energy Link Extension Installation Schedule

A copy of the Traffic/Pedestrian Management Plans can be found within Appendix 15.13. The Excalon RAMS give further detail within appendix 15.7.

A programme of works can be found within appendix 15.1.

The total construction time will be 6 weeks. Bale Street commencing in August for 2 weeks of Excavation 2 weeks pipe install and 2 weeks backfill and reinstatement.

4.4.1 From Peter Street carriageway to Manchester Library

- Excavation length will be 15m to either end of the existing ducts in Peter Street. The section of excavation on the footpath will be 20M.
- Access to be Heras fenced/ Chapter 8 Barriers as applicable
- Road closure required to Peter Street, this will be at weekend as agreed with MCC Highways to mitigate traffic disruption.
- Footpath to remain open/ plated to suit however access will be maintained at all times.
- Traffic management as per appendix 15.13.

4.5 Stages of Cable duct installation/ Cable installation

Installation of the HV Ducts and Cabling will follow a well-established sequence of activity. Due to spatial limitations, third party activities and environmental constraints at the works site, proximity working arrangements will be in place to closely manage, monitor and eliminate site the specific hazards during installation.

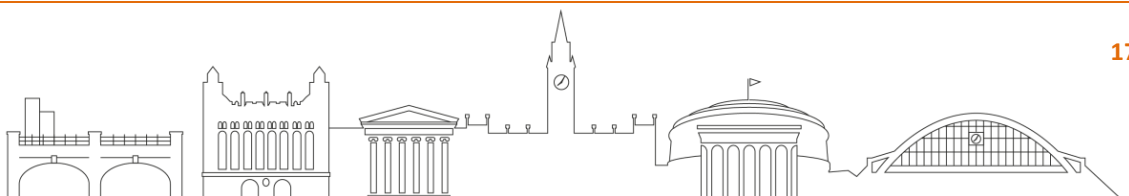
Stage 1 – Pre-warning / Fenced off area / highway set up

The working area will be enclosed using Mass Siteguard system and/or Heras fencing on both sides of the excavation. Along the Peter Street/ Mount Street section.

Stage 2 – Trial Holes

Trial holes will be carried out with the use of hand tools to locate all known / identified services along the route in compliance with HSG47. Final exposure of services will be made by horizontal digging to reduce any applied force. Use of graft shovels in a “hacking” action is deemed to be blind, uncontrolled penetration of the ground and is to be avoided unless absolutely sure of the absence of buried services.

Any utility found to be or looks to be damaged will be reported to the operative’s supervisor and asset owner. Where electric cables are found with bare conductors, the area will be made safe with approved barriers, where practicable covered. The operatives will remain on site until the cables are proved dead and capped in line with ENWL procedures.



Stage 3 – Excavation:

The existing tarmac road surface will be cut and stone slabs will be uplifted to allow an excavation zone of at least 1.2 m. The required trench extents will be marked out and then excavated with the correctly sized excavator. The spoil will be taken to one end of the fenced area and removed by Grab Wagon.

Stage 4 Removal of Spoil:

Spoil is taken away at regular intervals by 20 ton tipper lorry and using the excavator to load the arising's into the lorry.

Stage 5 Duct Installation:

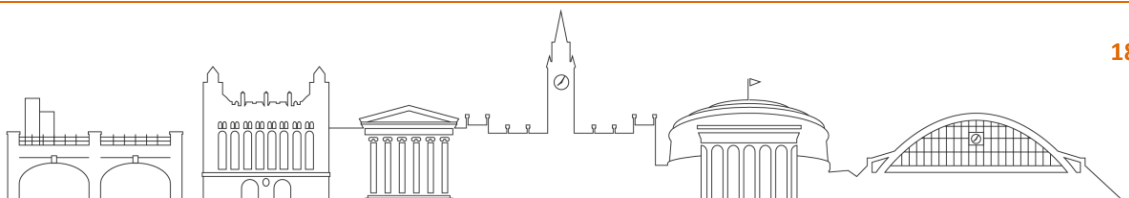
The 150mm HV ducts will be offloaded by wagon into the works area. They will be positioned into the trench by two operatives due to their lightweight nature. At the entry point to the building there will be a requirement to core drill 2 x 200mm holes into the existing plantroom retaining wall in accordance with the details and approved previously for the previously entry point on Mount Street. The wall will be scanned to show locations of any reinforcement and the holes positioned to suit to mitigate the penetration of any reinforcement.

Stage 6 Cable installation:

The cables will be pulled from St Peter Square towards Manchester Central and Back towards Heron House in accordance with the RAMS. The cables will be jointed externally from the 300mm cable to the 185mm cables and then pass through the core holes into the building. The entry points to the building will be sealed to prevent water ingress through the entry point.

Stage 7 Reinstatement:

The reinstatement of the areas will be undertaken in accordance with the requirements of MCC Highways street works design details and all previously removed flags, street furniture and white lining will be reinstated.



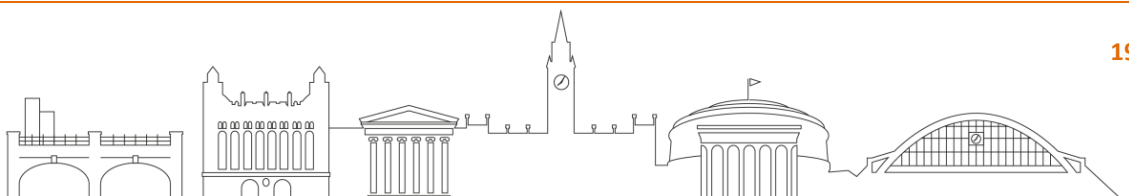
Manchester Civic Quarter Heat Network

Construction Management Plan

A risk assessment is carried out in advance of all excavation and installation works. An example of the risk assessment format is given below.

MATERIALS, PLANT AND EQUIPMENT DELIVERIES																			
Contract Name:			0			Contract N°			0			Risk Assessment ID N°			RA003-ENG				
Likelihood	5	4	3	2	1	Likelihood		Severity		Overall who is at risk? <i>tick as appropriate</i>				Estimate N° of Persons at Risk		Assessment Completed By			
	5	4	3	2	1	Rating 1 = Very Unlikely	Rating 1 = First Aid injury or illness / little to no environmental impact	Employees	✓	Humans									
	4	3	2	1		Rating 2 = Unlikely	Rating 2 = Minor injury or illness / some damage or disruption	Operatives	✓	Wildlife									
	3	2	1			Rating 3 = Likely	Rating 3 = 1-7 Day injury or illness / breach of legislation or policy	Other Workers	✓	Plants									
	2	1				Rating 4 = Very Likely	Rating 4 = +7 Day or major injury / illness / serious environmental impact	Public / Visitors	✓	Air									
1						Rating 5 = Almost Certain	Rating 5 = Disabling injury or Fatality / long term irreparable impact or prosecution	Young Persons		Land									
Severity										Expecting Mothers					Watercourse				
Identified Hazards - <i>tick as appropriate</i>																			
Slips, Trips & Falls	✓	Sharp Objects	✓	Explosion / Fire	✓	COSHH	✓	Falls from Height	✓	Noise	✓	Emissions to Air	✓						
Manual Handling	✓	Moving Parts	✓	Hot Works / Burns	✓	Flammable Substance	✓	Work Equipment	✓	Dust / Fibre Particles	✓	Wildlife & Vegetation	✓						
Traffic Management	✓	Vibration	✓	Hot Water	✓	Explosive Substance	✓	Lifting Equipment	✓	Lighting	✓	Archaeology / Heritage	✓						
Housekeeping / Welfare	✓	Electricity - LV	✓	Hot / Cold Surfaces	✓	Hazardous Substance	✓	Falling Objects	✓	Waste	✓	Weather	✓						
Stress	✓	Electricity - HV	✓	Excavation	✓	Asbestos	✓	Confined Space	✓	Leak / Spill	✓	Temperature	✓						
Lone Worker	✓	Pressurised Systems	✓	Temporary Works	✓	Workstation	✓	Restricted Access / Egress	✓	Contamination	✓	Other - Note Below	✓						
N°	Hazard				Affected Party(s)		Initial rating L x S		Action to Mitigate risk As Low As Reasonably Practicable (ALARP)				Residual rating L x S		Additional control measures to specifically mitigate residual risk and role of Person Responsible for implementing as above				
1	Vehicle/plant movement with pedestrian interface May suffer serious injuries if struck by moving vehicles				E / O / OW / PV		3	4	1. Delivery drivers to follow the highway code and be aware of other road users and pedestrians when entering and leaving site 2. Site vehicles must adhere to the site Traffic Management system and follow directional traffic signs and speed limits 3. Client/Principal Contractor to provide adequate parking and delivery are facilities 4. Traffic marshal/banksman in attendance 5. Reversing vehicles/plant accompanied by a traffic marshal or banksman at all times 6. Drivers should travel at no more than 5mph or observe the site speed limits whichever is the less ad pay particular attention to vehicles emerging from behind buildings 7. Drivers to wear appropriate PPE whilst on site 8. Switch of engine and remove keys when leaving the vehicle unattended				1	4					
2	Lifting operations Bulky and heavy loads; slips, trips and falls and pipe burns				E / O / OW / PV		3	5	1. Trained, competent and authorised crane/telescopic handler/hoist/MEWP operators plus slingers and signallers/banksman and traffic marshals 2. All lifting operations to be carried out in accordance with the Lifting Plan/Lifting Operations Risk Assessments 3. All offloading to be supervised by driver 4. Tested Thoroughly Examined Lifting Equipment/Accessories required (Current Certificates) 5. Ensure all operatives use correct manual handling techniques, and do not lift more than they are capable off 6. Loose materials to be boxed/bagged into small loads 25kg or less 7. Materials are to be stored in a safe, neat designated area where possible 8. Materials are not to be left where they cause possible rip hazard 9. Whilst moving items around site due consideration to be given to ground conditions, and where possible pipe trolleys are to be used 10. Whilst moving around site due consideration to be given to other trades working in the vicinity and off duty personnel accessing site offices, canteen and welfare facilities				2	5	10				
3	Working at height Lorry/trailer beds, trapping or crushing, falls from height				E / O		2	5	1. Remote off-loading methods when possible/practical 2. Fall prevention (edge protection) to be provided on lorry/trailer bed when personnel access is required 3. Fall restraint to be used as a last resort solution if no edge 4. A safe/secure means of access (podium steps preferred) to the lorry/trailer bed 5. Fully briefed off-on-loading team				1	5	5				
4	Poorly loaded or unstable loads Collapsing or toppling loads, leaking COSHH containers				E / O / OW		3	5	1. Vehicle to be instructed to leave site and return with a safe load 2. Discuss site constraints with suppliers prior to scheduled deliveries; eliminating unsafe loads				1	5	5				
5	Weather and site conditions Freezing conditions, rain, high winds, fog, heat and humidity				E / O		2	5	1. Assess weather conditions on a regular basis 2. Ensure that conditions underfoot (risk of slips and falls) are suitable for safe working 3. Avoid crane loading/unloading in high winds 4. Adequate visibility required 5. Ensure appropriate PPE is compatible with weather conditions 6. Brief unloading team at least daily				1	5	5				
6							0	0					0	0	0				
7							0	0					0	0	0				
8							0	0					0	0	0				
9							0	0					0	0	0				
10							0	0					0	0	0				

This system of work MUST be reviewed before starting work, if there is significant change in, what has to be done, or change in site conditions or the method of work used may result in a serious personal injury, an accident or a case of ill health or an irreparable environmental impact



4.7 Street Works Facilities and Traffic Overview

Pedestrian / traffic management plans can be found within appendix 15.13.

Machinery will be stored within the enclosed, locked off work area taking into consideration access for any emergency vehicles overnight and will include:

- 1 small mini excavator

The only traffic to the street works site will be:

- 1 no. medium sized van (civils) when required for movement of material
- 2 no. small van (civils) when required for movement of tools.
- 1 no. 8 wheel 20 tonne lorry (civils) up to 5 visits a day / when required to removal spoil and delivery of backfill material and ducts.

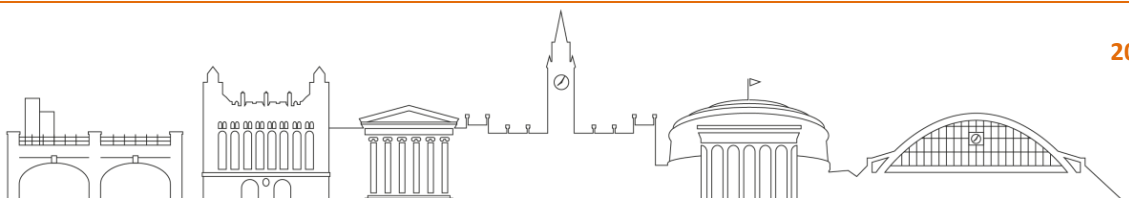
A detailed description of the sequence of works to excavate the trench, install the HV Ducts, backfill and reinstate the pavement surface, it should be noted that:

- A safe and suitable diversion will be given where footpaths / areas of public realm are affected.
- Daily inspections will be carried out on all signs, barriers and work area fencing.
- Contact details for a dedicated telephone will be provided on signs fixed to work area fencing at frequent intervals and the details posted to residents in advance of works commencing.
- Appropriately trained, qualified and certified banksmen will be used for guiding/unloading vehicles
- Swept path analysis for site vehicle/plant access which was undertaken by EXCALON can be found in Appendix 15.6.
- No contractor private vehicles will be parked in the surrounding streets

4.8 Noise and Vibration Pollution

- Refer to section 4.3 for details of plant noise levels.
- A baseline noise level reading will be taken over the course of a week at the satellite work area prior to the commencement of any Civils works. Following the start of the works a further week of noise monitoring/recording will take place to allow the results to be compared and any excessive noise to be addressed should this be deemed necessary (use of attenuation blankets etc.)
- Due to the nature of the project, vibration will occur during excavation/breaking works etc. as part of the site management strategy local business/residents will be kept updated on any works in proximity to their properties. Contact details along with information in relation to the location of our Manchester city center site offices will be provided to all so that any concerns can be addressed immediately and any vibration/sound issues reviewed and addressed directly.

4.9 Reinstatement Strategy



We will aim to reutilize all existing paving slabs and pavers. It is anticipated that there will be a 25% breakage rate and as such we will aim to match the specification and colour of the existing finishes wherever possible.

With reference to HAUC – New Roads and Street Works Act 1991 section S8.1. Reinstatement Methods, Method B will be adopted for these works, i.e.;

- 1) In flexible structures, the backfill, sub-base and the binder course shall be reinstated to permanent standard at the first visit.*
- 2) The permanent binder course material, or an alternative interim material, shall be extended to the running surface, with or without a thin separating medium at the binder course/surface course interface. The alternative interim material may be a bituminous mixture.*
- 3) On the second visit, all interim surfacing materials shall be removed, to the top of the binder course, and an appropriate permanent surface course laid.*

Excalon have been chosen to undertake the works due to their knowledge and previous experience of working within Manchester City Centre in particular working with the reinstatements we are due to encounter.

An example of the re-instatement standard specification can be found in Appendix 15.8 (Roads and Street Works Act Specification 1991).

Reference will be made to Appendix 14.10 of planning application 118869/VO/2018 (VITM3003 External Works Reinstatement statement_FINAL). This describes environmental impact in the re-instatement of the works.

4.10 Access Strategy

4.10.1 Pavements

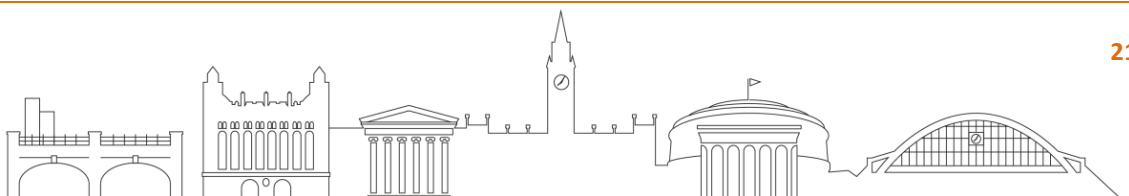
The fence closing off the working area to the public in the Lower Moseley Street and Bale Street sections will be offset from the pavement and the frontage of the hotel. An opening will be left at the hotel and commercial entrances to allow for entry and exit of the building. An appropriate level of demarcation will be left to inform the public of the ongoing works and where appropriate, suitable diversions will be set up.

4.10.2 Disabled access

Disabled access to be provided at all temporary road closures. Also disabled access to always be maintained around work areas.

4.10.3 Emergency access along the energy link

Vital Energi will work closely with its traffic management contractor to ensure emergency access is maintained at all times. This will require a gated system within the fencing with a coded padlock and the



code provided to emergency services, as well as TfGM and Metrolink maintenance teams to facilitate access for LV Power, Signaling and communication cable for Metrolink

4.10.4 Refuse collections

Refuse collections will operate on the normal days. Vital Energi will work with the refuse collection teams where possible to ensure no disruption takes place i.e. relocating of collection points/ assisting movement of bins.

4.10.5 Car parking

Site operatives will park in Excalons yard and site vehicles will taxi to the work areas, nearby Manchester Central NCP Carpark will also be utilized by visiting staff and on occasions operatives who do not utilize Excalon parking facilities, VE visiting staff as well site operatives will also utilize GM Public Transport such as the Metro link and train to enter the city centre and walk to the designated work face.

4.10.6 Deliveries

Vital Energi staff will assist with deliveries where possible. Delivery vehicles will park at the nearest point of delivery and complete their deliveries on foot as the pavements are being kept open. Vital Energi staff will assist delivery staff as much as possible. Large parcels and other heavy items will be assisted by the workforce who will have been specifically briefed to this effect.

4.10.7 Work access

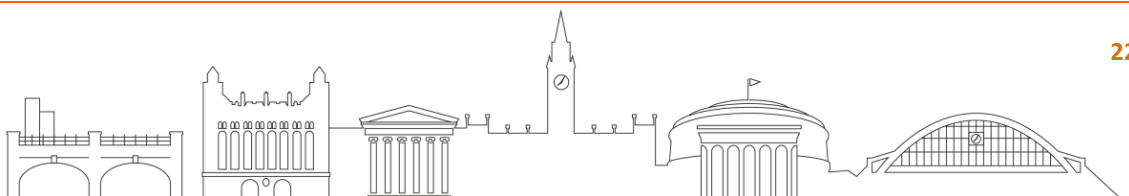
Each end of the fenced area will have an access point to allow plant/machinery access and egress and in the event of emergency, emergency vehicles will also utilize these points.

6 Ecology Protection

Vital Energy have engaged an independent Ecologist (TEP) to advise on the best practice for protection of the site ecology. As part of Vital Energi's ISO 14001 accreditation, we are committed to environmental protection, assessment and audit throughout the construction process.

Below are examples of mitigating actions proposed to avoid ecological damage;

- Construction compounds and storage will be sited on hard standing, away from any urban trees and associated root protection zones.
- Construction will be carried out in accordance with current best practice to avoid possible pollution or siltation of surface waters and sewers.
- VITAL Energi Environmental Policy can be found within appendix 15.9.



7 Communication Plan

- Comms Resource & Plan
 - Project website set up with background to project, benefits, contact information email phone, FAQs and regular project updates
 - Twitter/social media will be regularly updated
 - Local business and resident forums will be setup
 - Vital Energi will employ a local liaison officer as a central point of contact for local businesses /residents
 - A dedicated telephone will be used and details distributed
 - Control of customer satisfaction and complaints procedure can be found within appendix 15.10.
- Meetings with Highways
 - Weekly meeting will be held with Highways to provide updated progress.
 - Vital Energi to hold weekly meetings with public transport providers where required.
- Project Initiative with Highways
 - New temporary signs on roads into Manchester and road closure dates
 - Proposed dot matrix signs as per traffic management plans
 - Closures and restrictions to be phased to minimize disruption

8 CDM Arrangements

The construction industry is heavily regulated by standards pertaining to health and safety in form of The Construction Design and Management Regulations 2015.

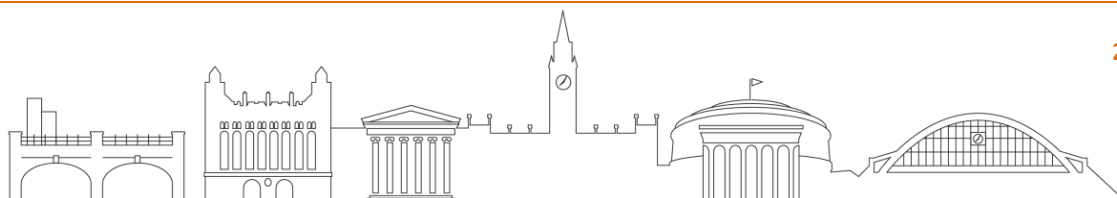
This project started with the design of the Energy Centre and district heating networks. Therefore, Vital Energi have appointed a Principal Designer during the design phase to ensure compliance with the CDM 2015 regulations. This includes identification and mitigation of risks to the project.

The distribution network extension has been designed to applicable HSE, International and British Standards, European standards and IGEM standards in order to follow best practice in respect to reducing risks through design. The application of these standards is subject to our quality systems in accordance with ISO9001, ISO 14001 and OHSAS18001.

9 Health and Safety

Vital Energi is committed to implementing a world class level of process safety, this is delivered through five distinct areas: -

1. Policy – this defines the responsibilities of our safety, health and environmental organisation.
2. Process – this incorporates robust safety, health and environmental risk management; up to date plant and process information; rigorous safe systems of work and proactive emergency planning and response.



3. Plant – this ensures that operation and maintenance procedures are in place and accurate; any plant and process changes are risk assessed and fully integrated with in the process safety framework. This also includes asset integrity in which we assess all safety instrumented systems, conduct periodic asset life assessments and so on.

4. People – this includes personnel training and competence, management of organisational change and human factors. These elements also capture contractors working on behalf of Vital Energi.

5. Performance – this includes incident reporting and investigation, management review and a comprehensive audit program.

The identified risks and controlling measures will be communicated via the project and will be included in a project specific construction management health and safety plan.

This plan has been developed for use on Vital Energi projects when acting as either CDM Principal Designer, Contractors or as a Sub-contractor. The plan format has been developed giving regard to The Construction (Design and Management) Regulations 2015 and should be developed and read in conjunction with all design information and all pre-construction information prepared by the Principal Designer and other members of the project team.

10 Security

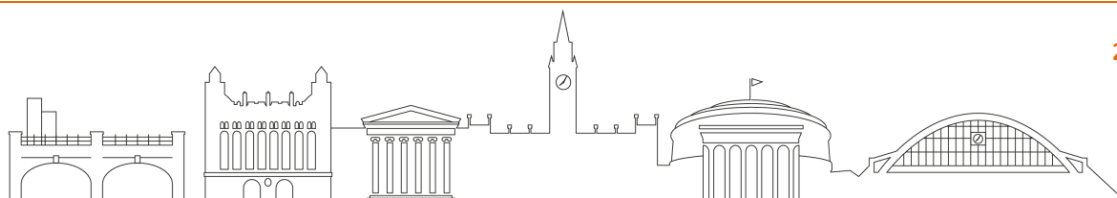
- Fences will be double clipped and warning notices displayed.
- Fences will be checked daily (morning & evening) and at regular intervals.
- An emergency number will be circulated and will be displayed on site fencing. This number will also be given to the emergency services.
- Gates will be a combination lock with a code provided to the emergency services for access out of hours.
- No requirement for any additional lighting
- Mass barriers and fencing fixed to the surface to be utilized in all working areas on highways.

11 Road Cleaning

Plant and machinery working around the trench will be restricted to movements on the existing stone slabbed surface. Therefore, it is anticipated that only the collection of spoil will occasionally leave mud on the tarmac road surface. A road sweeper will be hired to clean the roads as often as is required. Also, regular drain cleaning will be carried out in working areas to eliminate any risk of flooding due to spoil.

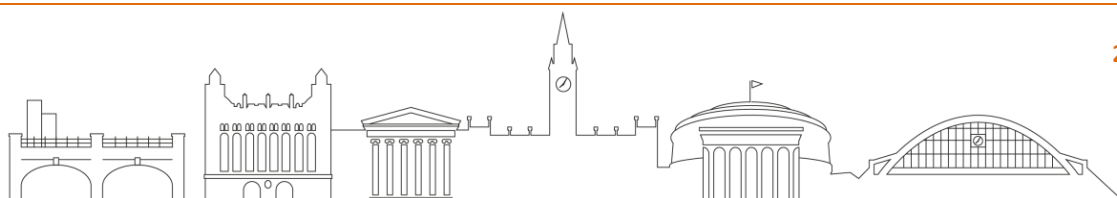
12 Arboricultural Method Statement

TEP Arboricultural Method Statement from can be found in Appendix 15.11 from planning application 118869/VO/2018.



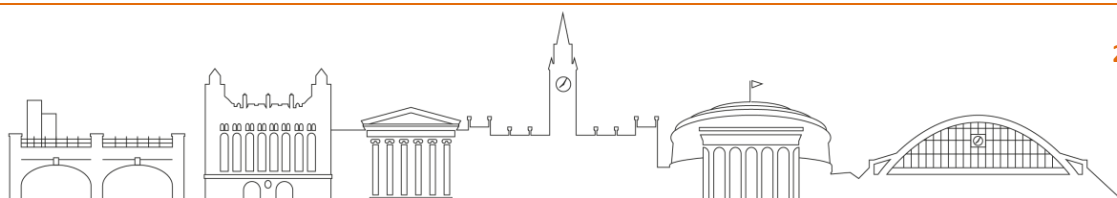
13 Archeological Written Scheme of Investigation

VITAL Energi District Heating site operatives, including sub-contractors will be briefed on the updated WSI that has been produced by TEP prior to commencing on site and also at induction stage to ensure that all persons working within the excavation are fully aware of their roles and responsibilities in such instances as finds i.e. human remains or artefacts deemed as "treasure", protocols for discoveries outside the targeted watching brief areas and also the understanding and acknowledgment of authority possessed by the archaeologist should the project be need to be halted due to a discovery. TEPs updated WSI can be found in Appendix 15.12.

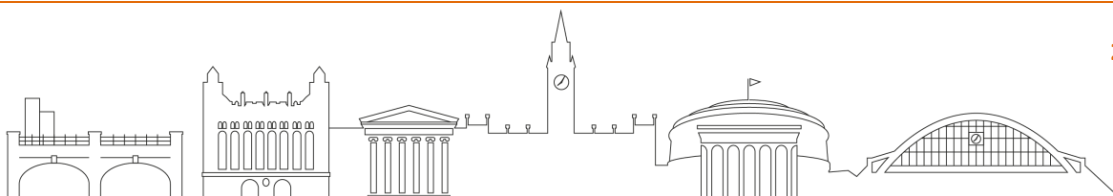
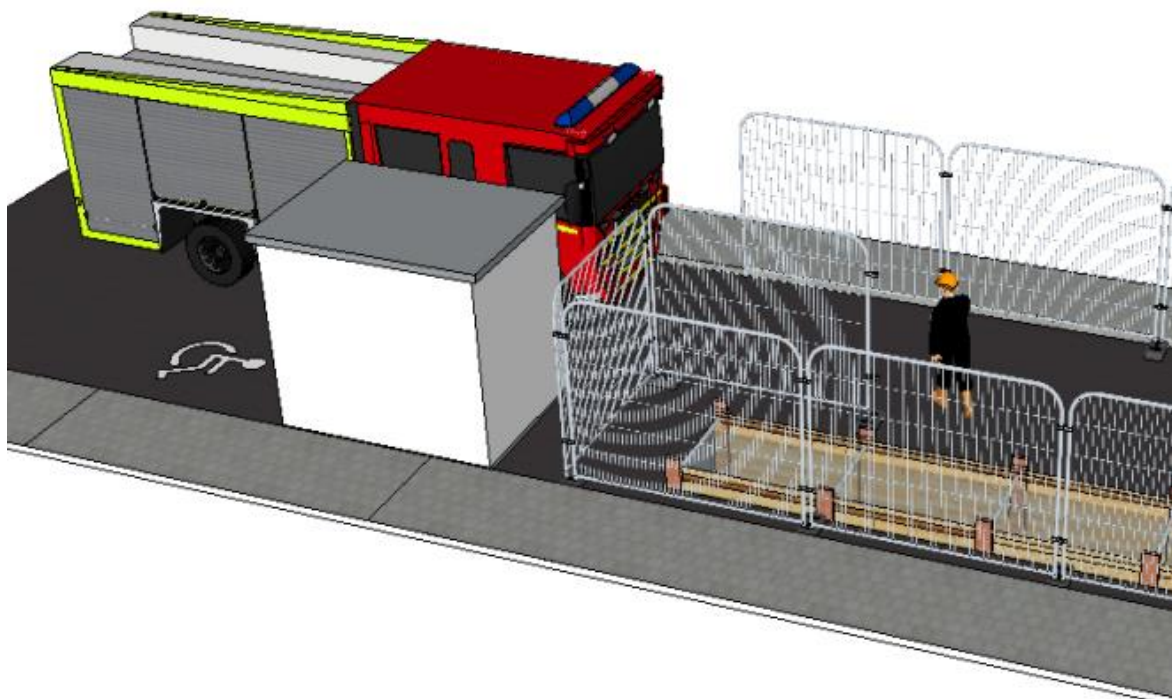


14 Traffic & Personnel Risk & Control Measures

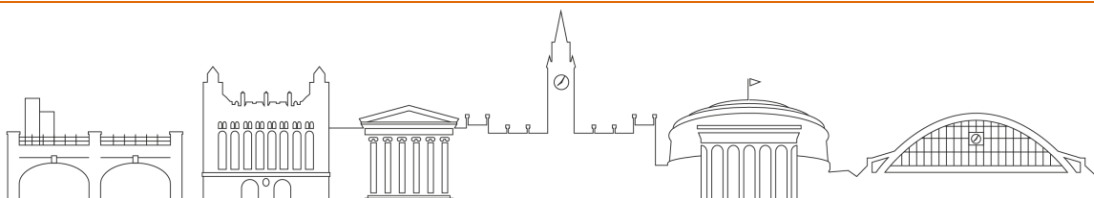
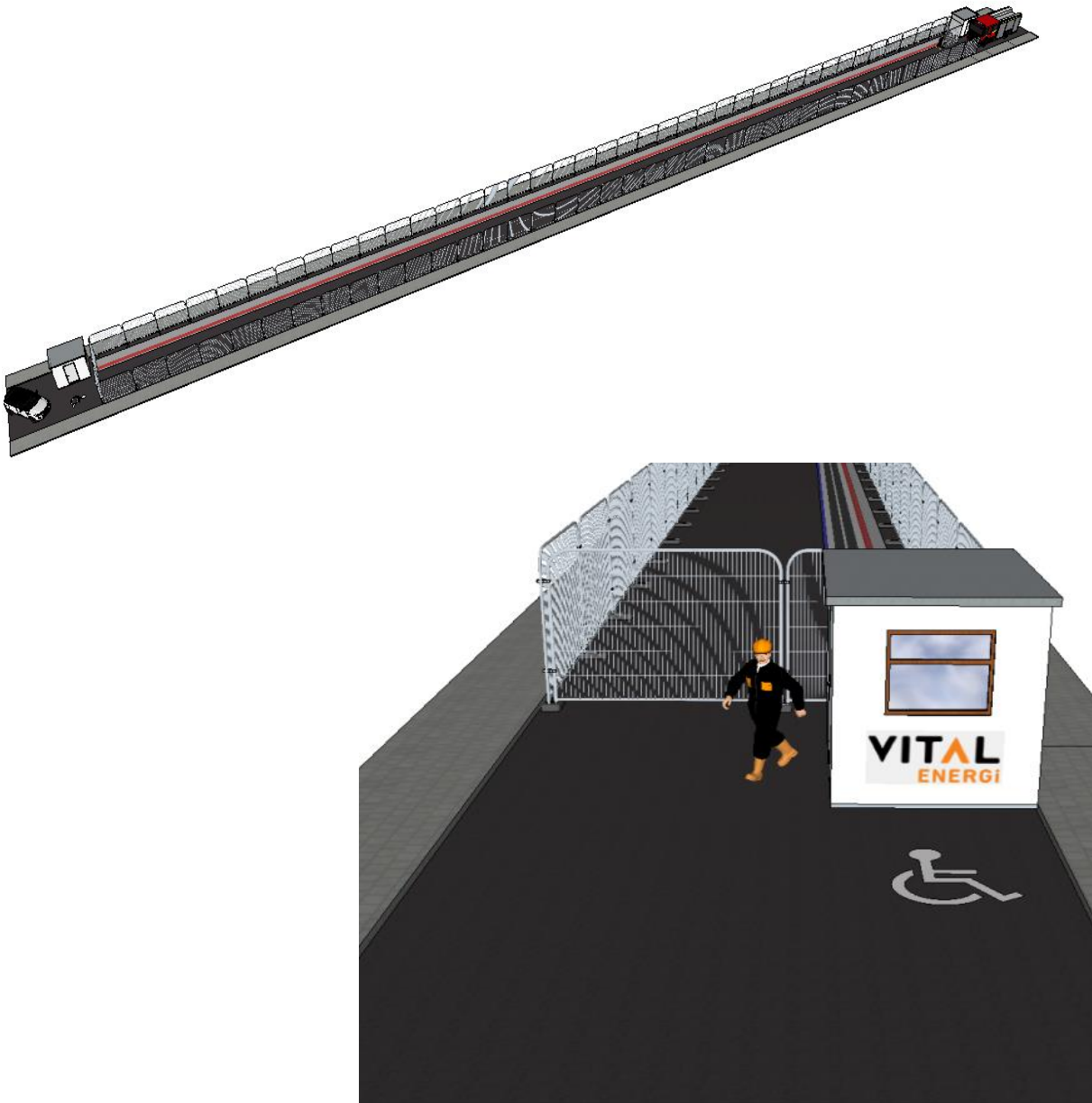
Hazards (1)	Risk(s)	Risk (3)			Control Measures (4) (list control measures that are provided and required)	Risk (5)		
		L	S	R		L	S	R
Vehicle/plant entering site	Injuries to pedestrians/cyclists	4	10	40	Procedures outlined in this document to be enforced and monitored/ Banksman	1	10	10
Vehicle/plant Exiting site	Crushing injuries to site workers collision with site traffic insurance claims damage to property, pedestrians and cyclists	5	10	50	Procedures outlined in this document to be enforced/ Banksman.	1	10	10
Road traffic accident due to site vehicle movement	Injuries to drivers, passengers, insurance claims, damage to property, pedestrians and cyclists	2	10	20	Traffic warning signs to be used around site entrance	1	10	10
Damage to signage	Improperly signed entrance	5	3	15	Site management to check condition of signs daily and report any damage to PMs, Signs to be kept clean and weighted down when in use	1	3	3
Placing traffic signs	Injury to operative from passing vehicle	2	6	12	Operatives to face traffic when placing signs and wear hi-vis clothing, be aware of traffic nearby, use traffic management vehicle as protection from oncoming traffic	1	6	6
Disturbance to local residents		3	3	9	On site deliveries will be between the hours of 9.00am & 4.00pm throughout the week drivers will be requested to call ahead with time of arrival. Deliveries to be brought directly into site so as not to cause traffic backing up	1	3	3
Risk Rating (1-100) = Likelihood (1-10) x Severity (1-10)								
(1-9) Insignificant	(10-24) Acceptable			(25-39) Undesirable	(40-100) Unacceptable			



14.1 Access for Emergency Vehicles

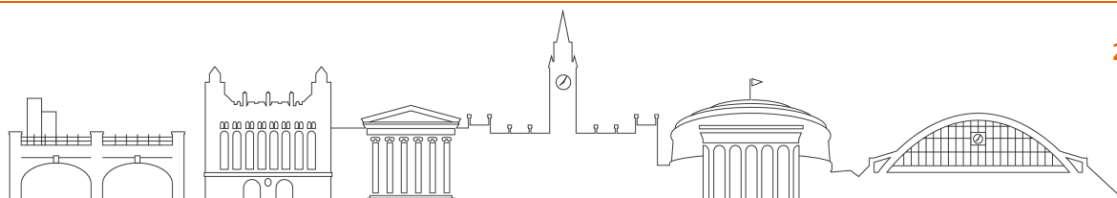


14.2 Site Security



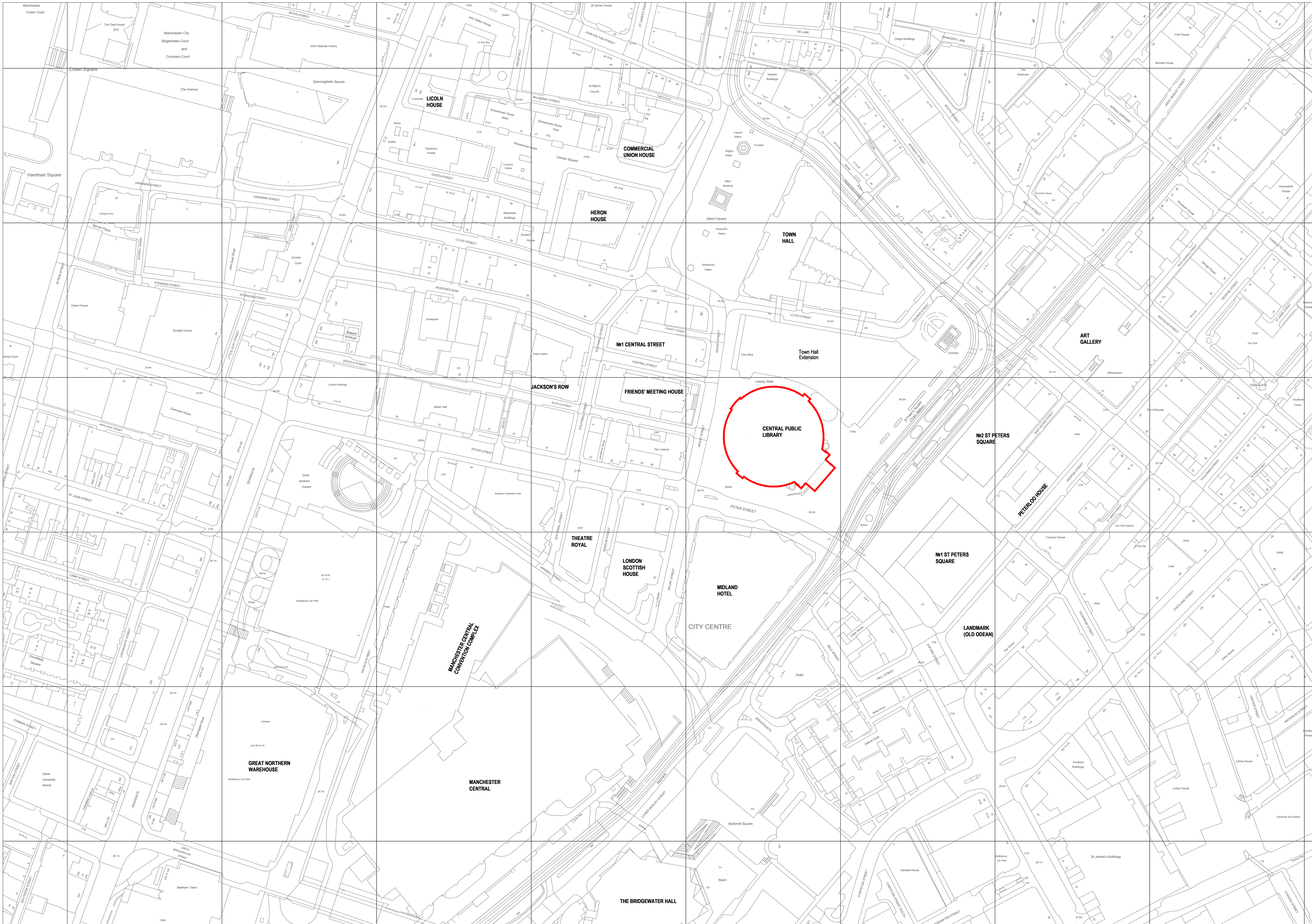
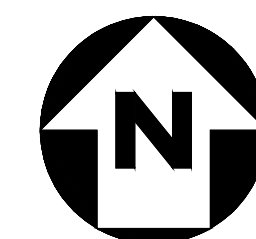
15 Appendices

- 15.1** *Energy Network Programme*
- 15.2** *Site Compound Layout*
- 15.3** *Dilapidation Survey*
- 15.4** *Energy Network Route Plan*
- 15.5** *Waste Management Plan*
- 15.6** *Swept Path Analysis*
- 15.7** *EXCALON Risk Assessment / Method Statement*
- 15.8** *Roads and Street Works Re-instatement Standards*
- 15.9** *Environmental Policy*
- 15.10** *VITAL Energi Customer Satisfaction & Complaints Procedure*
- 15.11** *Arboricultural Method Statement*
- 15.12** *Archeological Written Scheme of Investigation*
- 15.13** *Traffic Management Plans*



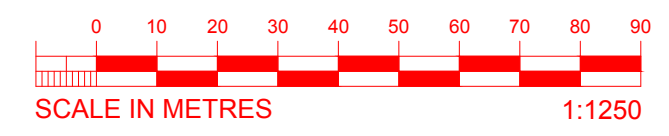
VE-A1-1.3 created by Stephen Brown on 23/01/2018 at 2:04 PM

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ISSUED FOR INFORMATION

THIS DRAWING REFERENCES THE FOLLOWING FILES:
Ref: 50467-VE-TE-00-GA-M-5001
50467-VE-TE-00-GA-M-XX01
50467-VE-TE-00-SI-M-XX01



P1	24/01/17	PRELIMINARY ISSUE	SB	RG	SJR
REV	DATE	DESCRIPTION	DRW	CKD	APP

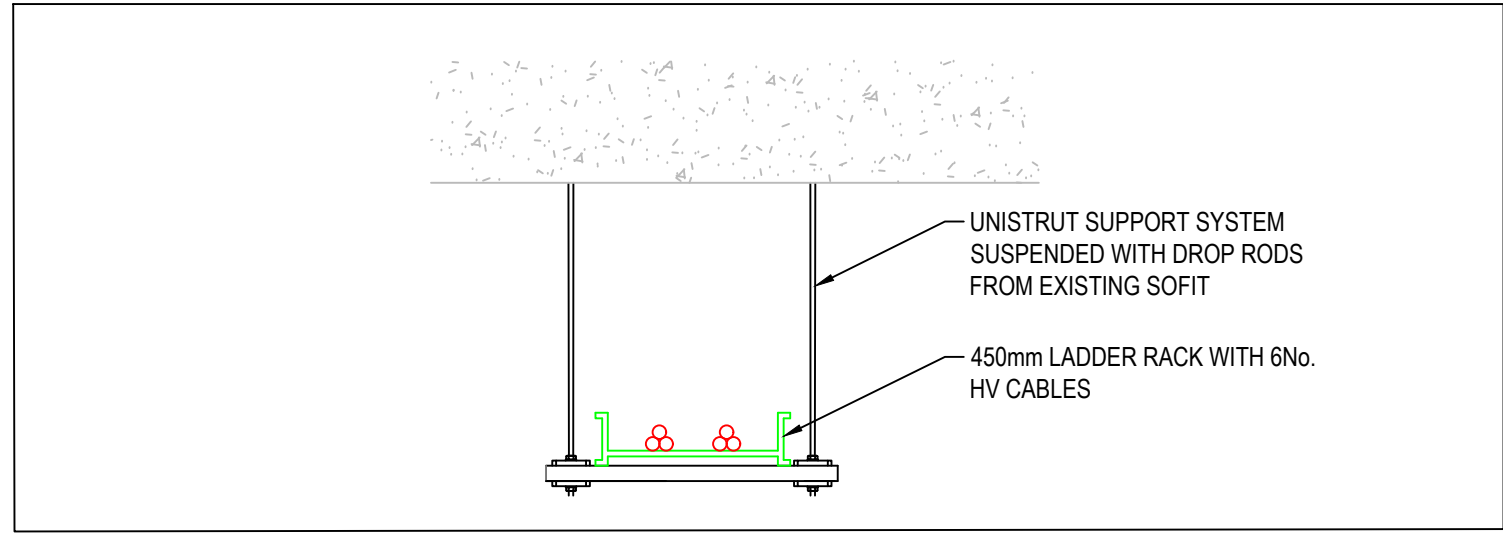


Vital Energi. Century House, Roman Road, Blackburn, Lancashire, BB1 2LD.
Tel: +44 (0)1254 296 000 Fax: +44 (0)1254 296 040

Project: CQHN - CENTRAL PUBLIC LIBRARY				
Title: SITE LOCATION PLAN				
DATE	24.01.2018	SCALE	1:1250	SHEET
INFORMATION			Status: S2	A1
50467-VE-CL-00-SI-M-XX01			Stage: 3	Rev: P1

MANCHESTER TOWN HALL EXTENSION & CENTRAL LIBRARY HV PRIVATE WIRE CONNECTION

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TYPICAL SECTION / MOUNTING DETAIL 1:20 @ A1



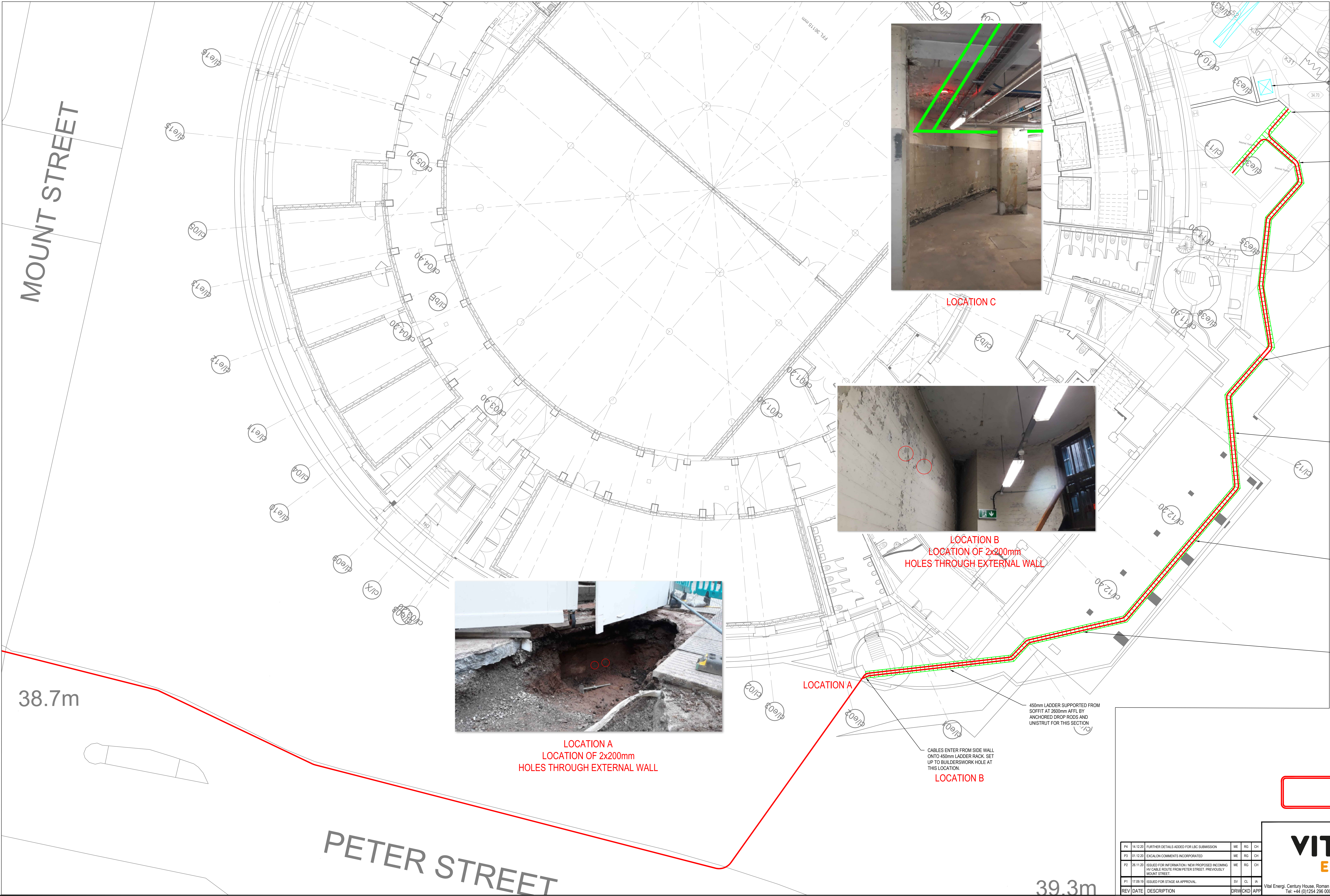
LOCATION D
LOCATION OF 2x150mm HOLES THROUGH
INTERNAL PLANTROOM WALL

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE MANCHESTER TOWN HALL AND EXTENSION & CENTRAL LIBRARY SCOPE OF WORKS SUMMARY AND CONNECTION STRATEGY REPORT (50467-VE-TE-XX-RP-E-6201).
2. CONTAINMENT ROUTES AND HEIGHTS TO BE CO-ORDINATED WITH 3D LAYOUT DRAWINGS. FINAL POSITIONS ARE TO BE COORDINATED AND AGREED ON SITE, HOWEVER IF ANY OF THE MAJOR ROUTES SHOWN ARE ALTERED PLEASE CONTACT THE DESIGN DEPARTMENT TO CHECK ANY EFFECT ON THE CABLE SIZING CALCULATIONS.
3. EVERY PIECE OF EQUIPMENT AND CONTROL GEAR SHALL BE LABELED CLEARLY BY MEANS OF ENGRAVED TRAFFOLITE LABEL, SCREW FIXED TO HE SURFACE.
4. ALL LADDER RACK, TRAY AND TRUNKING JOINTS SHALL BE LINKED ACROSS WITH EARTH STRAPS.
5. ALL PENETRATIONS THROUGH WALLS OR SOFFIT TO BE ADEQUATELY FIRE STOPPED TO MEET THE APPROVAL OF THE ASSOCIATED BUILDINGS FIRE OFFICER.

LEGEND:

- HV CABLE
- 50mm BASKET FOR COMMS FIBRE CABLE, UNLESS STATED OTHERWISE. BASKET TO BE MOUNTED ONTO GOAL POST MANAGEMENT, STRUCTURAL STEEL, WHERE POSSIBLE. (WITHIN CHP PLANTROOM)
- MEDIUM DUTY HV CABLE LADDER RACK, UNLESS STATED OTHERWISE. CONTAINMENT TO BE MOUNTED ONTO GOAL POST MANAGEMENT, STRUCTURAL STEEL WORK AND / WHERE POSSIBLE (WITHIN CHP PLANTROOM)
- ELECTRICAL EQUIPMENT



EXISTING RMU TO BE DISCONNECTED AND REMOVED, WITH EXISTING CABLES JOINTED IN THE STREET BY ENWL

HV CABLES TO TERMINATE ONTO EXISTING CLOSE COUPLED RMU TRANSFORMERS FROM BELOW EXACT CABLE ROUTE AND LADDER POSITIONS INCLUDING DROPS TO BE CONFIRMED ON SITE

HV LADDER ENTRY LOCATION TO EXISTING TRANSFORMER ROOM. 2NO. 100mmØ CORE DRILLED HOLES AT THIS LOCATION ON FIRE STOPPING. EXISTING EQUIPMENT TO BE PROTECTED DURING BUILDERSWORK FROM DEBRIS AND DUST.

2NO. 100mmØ CORED HOLES AT THIS LOCATION ON FIRE STOPPING FOLLOWING CABLE INSTALLATION. EXISTING LOCAL EQUIPMENT TO BE PROTECTED DURING BUILDERSWORK FROM DEBRIS AND DUST. COMMS TRAY TO PASS THROUGH HOLE WITH HV LADDER STOPPING EITHER SIDE OF CORED HOLES

LOCATION D

450mm LADDER SUPPORTED FROM SOFFIT AT HIGH LEVEL BY ANCHORED DROP RODS AND UNISTRUT FROM THIS SECTION ONWARDS

LOCATION C

450mm LADDER SUPPORTED FROM SOFFIT AT 200mm AFL BY ANCHORED DROP RODS AND UNISTRUT FOR THIS SECTION

DRAFT

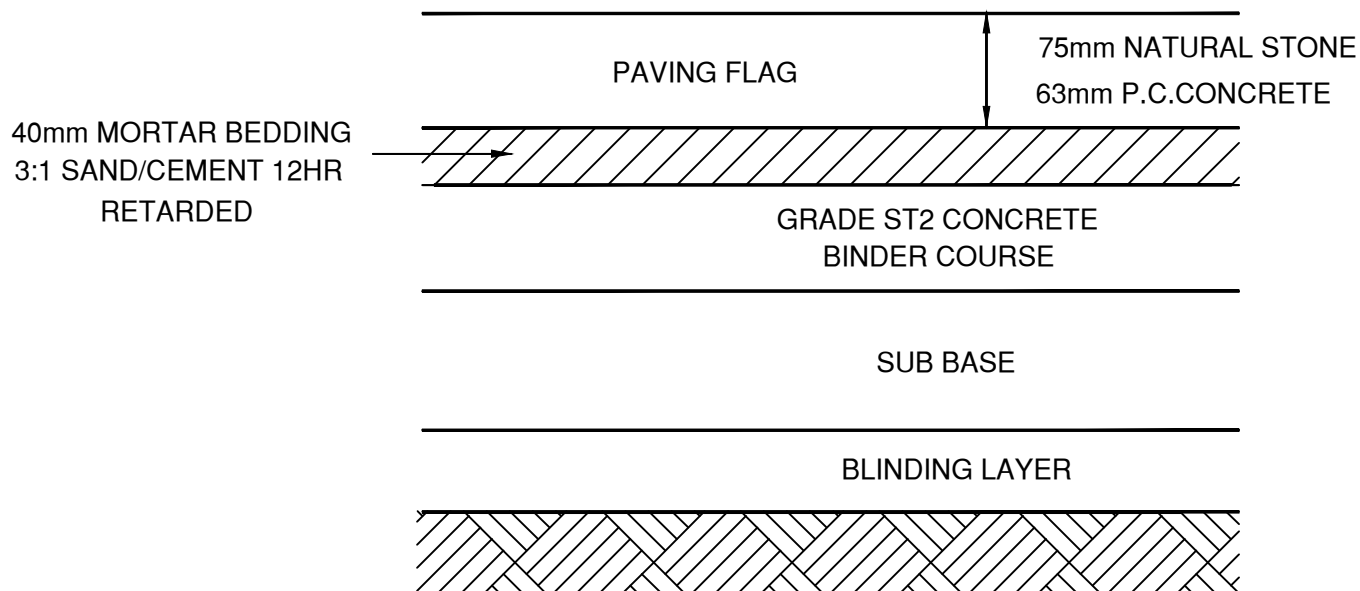
ISSUED FOR INFORMATION

REV	DATE	DESCRIPTION	BY	CHKD	APPD
P4	14.12.20	FURTHER DETAILS ADDED FOR LIC SUBMISSION	ME	SG	CH
P3	01.12.20	LOCAL COMMENTS INCORPORATED	ME	SG	CH
P2	26.11.20	ISSUED FOR INFORMATION - NEW PROPOSED INCOMING HV CABLE ROUTE FROM PETER STREET, PREVIOUSLY MOUNT STREET	ME	SG	CH
P1	17.09.19	ISSUED FOR STAGE 4A APPROVAL	BY	CS	JA

VITAL ENERGI

Vital Energi, Century House, Roman Road, Blackburn, Lancashire, BB1 2LD
Tel: +44 (0)1254 296 000 Fax: +44 (0)1254 296 040

Project: MANCHESTER COHN CEF			
Title: MANCHESTER TOWN HALL EXTENSION & CENTRAL LIBRARY HV PRIVATE WIRE CONNECTION			
DATE	14.12.2020	SCALE	1:100
INFORMATION		Status:	S2
		Stage:	4
		Dwg No:	50467-VE-TE-ZZ-DR-E-6101
		Rev:	P4



NOTES:

1. PAVING FLAGS TO COMPLY WITH AND LAID IN ACCORDANCE WITH CLAUSE 1104
2. PAVING FLAGS TO BE LAID TRANSVERSE WITH RANDOM BOND AND TO BE RANDOM LENGTH OF NATURAL STONE
3. CONCRETE TO COMPLY WITH CLAUSE 2602 TABLE 26/1
4. MORTAR TO COMPLY WITH TYPE (iii) MIX TO CLAUSE 2404
5. SUB-BASE TYPE TO BE AS DETAILED
 - a) CONCRETE AS NOTE 3
 - or b) GRANULAR MATERIAL TYPE 1 TO CLAUSE 803
6. BLINDING LAYER TO BE TYPE 6F2/6F5 MATERIAL TO SERIES 600 IF REQUIRED
7. CLAUSE NUMBERS QUOTED REFER TO THE D.Tp SPECIFICATION FOR HIGHWAY WORK AMENDED AS APPROPRIATE
8. WHERE EXISTING PAVING LEVEL IS RETAINED A REGULATING COURSE(NOT LESS THAN 75mm) SHALL BE LAID OF ST2 CONCRETE WHERE FULL DEPTH OF FINISHING LAYER CANNOT BE ACHIEVED
9. ALL MATERIALS, CONSTRUCTION DEPTHS, AND LAYERING AS DETAILED IN APPENDIX 11/1 AND IN WORKS INFORMATION



**MANCHESTER
CITY COUNCIL**

CAPITAL PROGRAMME DIVISION

Corporate Technical Services

TOWN HALL
PO BOX 532
MANCHESTER, M60 2LA

PROJECT TITLE

Standard Details
Footway

DRAWING TITLE

Flag Paved Footway

SIZE
A4

SCALE
NTS

DATE
Aug 10

DRAWN
ST

CHECKED
[]

APPROVED
[]

DRAWING NUMBER

206351H/SD/1100/004

REV

0 10 mm



MANCHESTER CIVIC QUARTER HEAT NETWORK

ARBORICULTURAL METHOD STATEMENT

July 2019

TEP
Genesis Centre
Birchwood Science Park
Warrington
WA3 7BH

Tel: 01925 844004
Email: tep@tep.uk.com
www.tep.uk.com

Offices in Warrington, Market Harborough, Gateshead, London and Cornwall

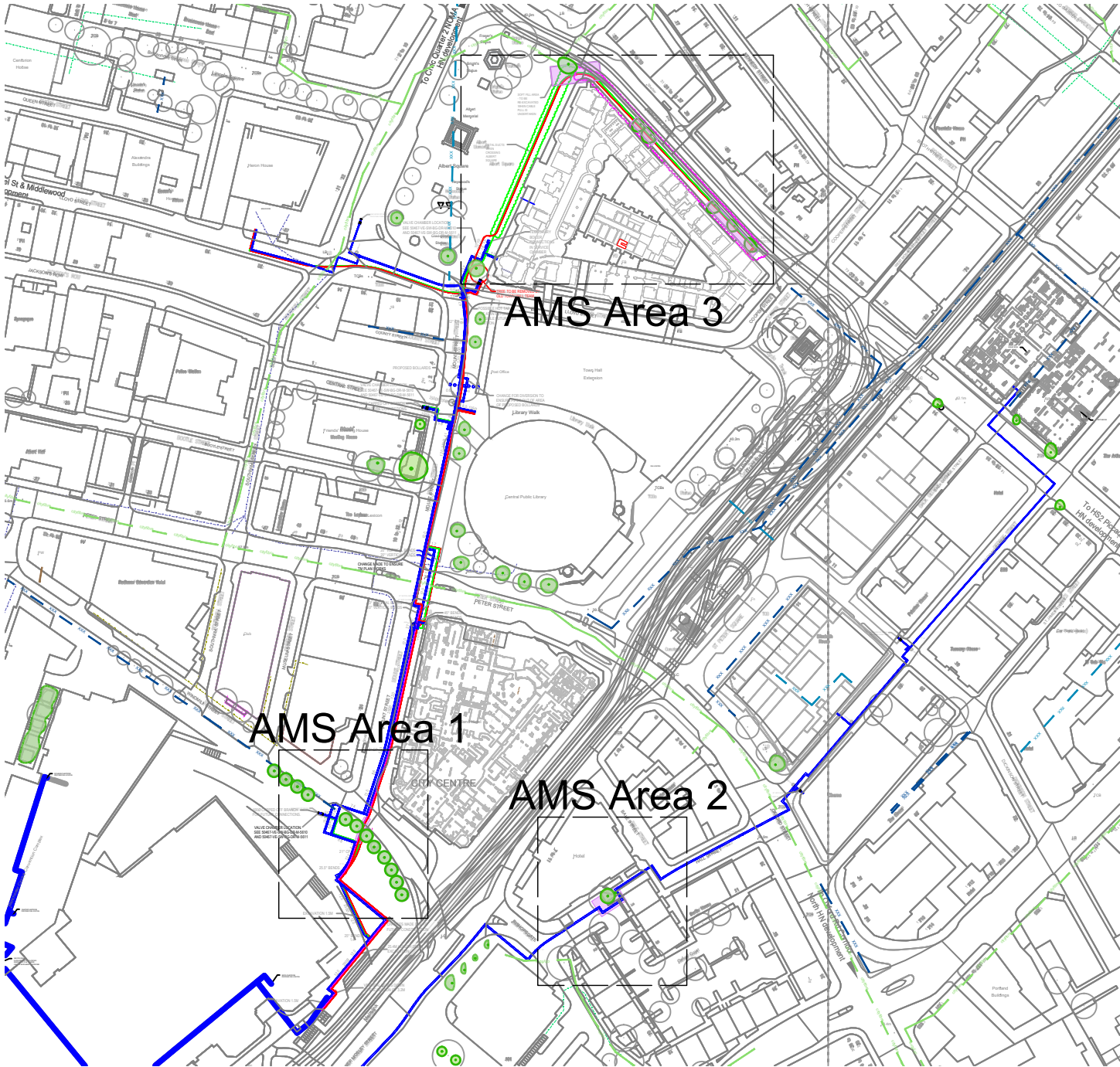
Manchester Civic Quarter Heat Network
Arboricultural Method Statement 01
Introduction and Overview

This Arboricultural Method Statement (AMS) outlines the parameters within which construction must be undertaken in two locations along the route the pipeline in order to retain existing trees in satisfactory condition. In all other locations, standard methods of construction and demarcation of the working area will provide satisfactory protection to trees.

The detail and requirements of this method statement comprise commitments to complete the construction phase of the development in a specific manner and must inform the production of all relevant tender documents and instructions to contractors. Failure to adhere to the correct sequence, manner and timing of operations detailed below may result in irremediable damage to trees, and thereby breach of planning consent.

GENERAL TERMS

- A. This document should be reproduced in its entirety, in colour and at A3 size.
- B. The site manager will read and understand this Method Statement. It will be the responsibility of the site manager to ensure compliance with this Method Statement.
- C. A copy of this Method Statement will be made available for inspection on site and introduced to all relevant contractors.
- D. An arboricultural consultant will be appointed to supervise pipe installation in the two areas covered by this document. They must be provided with contact details for the site manager and notified at least 48 hours in advance of works governed by this document.
- E. All areas outside the working compound fence is defined as a **Construction Exclusion Zone (CEZ)**, other than for the delivery of materials via the existing road and hard-surfaced infrastructure.
- F. Access, works or storage of materials to within 1m outside the canopy edge of any tree will be prohibited unless specified by this AMS.
- G. If unexpected large roots (>25mm diameter) are encountered during excavation works or if additional pruning of branches is required along any part of the network route the arboricultural consultant will be contacted.
- H. The site manager will be responsible for contacting the arboricultural consultant as required by this AMS or if any other situation arises that involves or has the potential to involve trees.
- I. Successful completion of construction in the two areas covered by this document will be signed off in the box below.
- J. It will be the responsibility of the appointed Arboricultural Consultant to undertake monthly *ad hoc* inspections of trees along the pipe network to ensure the effects of construction have not deviated from those set-out in the preceding Arboricultural Impact Assessment (Ref: 6777.001).
- K. Any deviation or necessary change from the methods prescribed in this document will be recorded in the box below and reported to the local authority Tree Officer.



Network Overview

Key

- Existing trees to be retained
- Route of heat pipe installation
- Route of voltage and communication cable ducts
- Arboricultural watching brief area

Compliance Control Box

Arboricultural Consultant:

Telephone: | Email:

Completion Sign-off

AMS Area 1	Date of completion:	Initials:
AMS Area 2	Date of completion:	Initials:
AMS Area 3	Date of completion:	Initials:

The above Method Statement elements have been discharged in full to the best of my knowledge and professional assessment. Where there has been any deviation from the specification, I am satisfied that this has not been injurious to retained trees and that all such deviations have complied with the spirit of the instruction insofar as was reasonably practicable or were approved in advance by the proper authority.

Signed:

Site Inspection Notes



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A	Additional Area	AAB	TDP	28.06.19
Rev	Description	Drawn	Approved	Date



Genesis Centre, Birchwood Science Park, Warrington WA3 7BH
Tel 01925 844004 e-mail tep@tep.uk.com www.tep.uk.com

Project
**Manchester Civic Quarter Heat Network
Arboricultural Method Statement**

Title
**AMS 01
Introduction and Overview**

Drawing Number
D6777.01.001

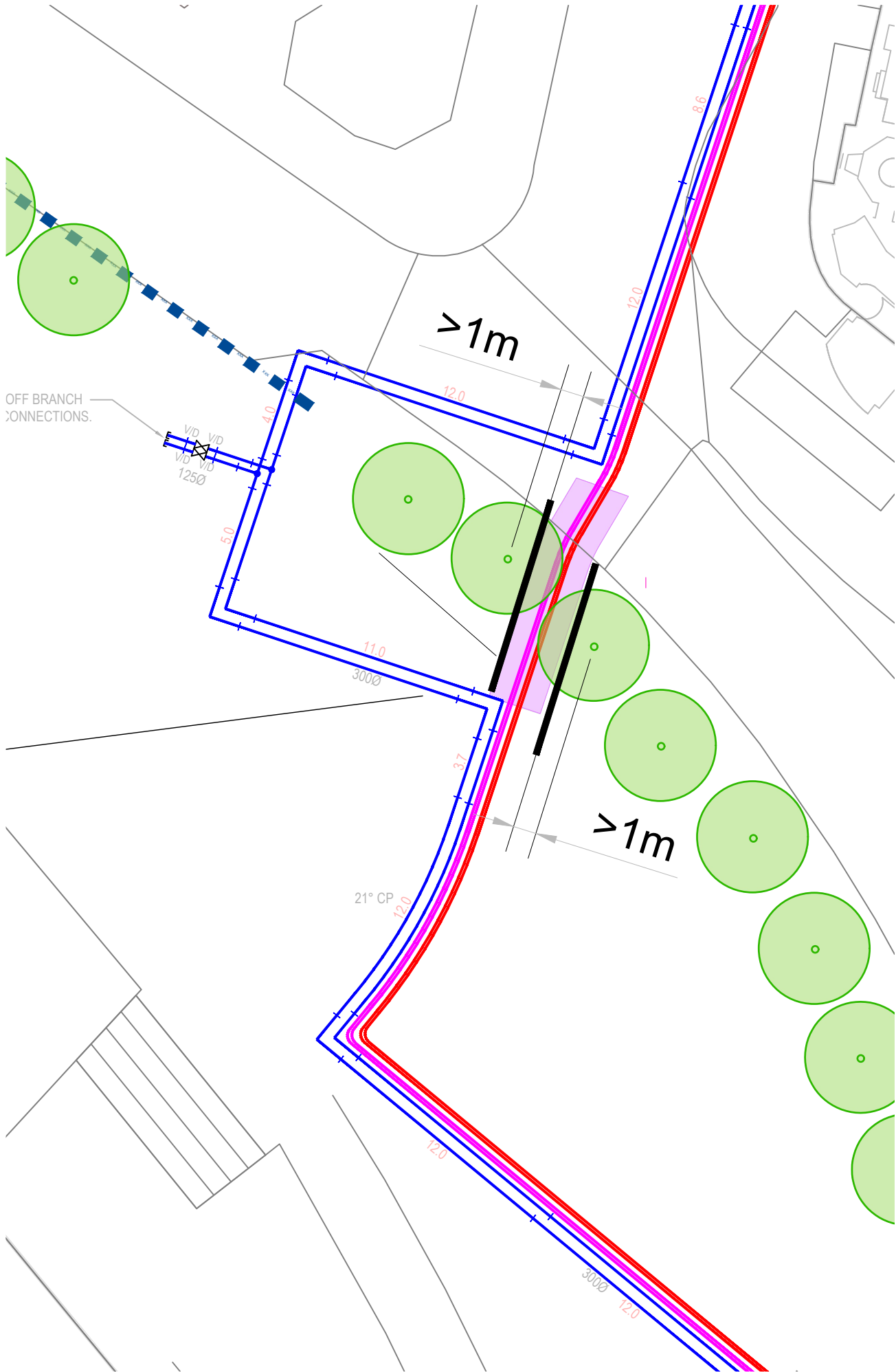
Drawn	Checked	Approved	Scale	Date
AAB	TDP	JGS	1:2500 @ A3	19/02/2019

Manchester Civic Quarter Heat Network
Arboricultural Method Statement 02
Controlled Excavation (Area 1)

The proposals require the installation of power and monitoring cables in close proximity to retained trees. The trees are within planting pits and the true spread of their roots is unknown but likely to be restricted. Excavation within this area will need to be carefully controlled in order to identify the presence of roots and to manage them in order to minimise the effect on the health of the trees.

SEQUENCE OF EVENTS

- Before work is due to begin on site in the location shown opposite, the Site Manager will arrange the installation of temporary tree protection fencing.
- Fencing will be installed according to drawing D6777.004 *Tree Protection Fencing Specification* and at the alignment shown by a thick black line opposite. 6 heras fencing panel will be required. Once in place tree protection will remain in situ for the duration of the construction or until its removal is specified by this method statement.
- Tree protection fencing will be not less than 1m from the stem of each tree.
- The Arboricultural Consultant will be notified no later than 48 hours before excavation is due to commence.
- All works between the barrier fencing will be monitored by the Arboricultural Consultant.
- The granite sets will be loosened, lifted intact and moved to the designated storage area away from retained trees.
- Where necessary, bicycle rails and any footings will be removed carefully by pulling and without excavation.
- In all trenching operations, the trench width will be kept to the minimum practicable to complete the works. The sides of the excavation will be supported where necessary but not battered back.
- The sub-base will be inspected and its depth, intactness and penetration by tree roots ascertained via excavation using hand-tools. Depending on the results of this exercise the sub-base will either be removed using hand tools or removed using an excavator fitted with a hydraulic breaker.
- The inspection of the sub-base and assessment made on the need or practicality of further excavation using hand tools or mechanical means will be made by the Arboricultural Consultant.
- The purpose of the watching brief will be to identify the spread of tree roots and monitor the level of necessary root loss according to the size and density of roots and make an on-site recommendation according to the following findings:
 - No roots - Continue without constraint
 - Minor roots - Continue to monitor
 - Moderate roots - Prune roots neatly
 - Major roots - Review installation method*
- *Where major roots are found, it may be necessary to retain them via the use of excavation techniques that allow the soil to be removed whilst leaving tree roots intact (e.g. pneumatic excavation).
- Where minor and moderate roots are encountered, they will be severed neatly at the trench face. Roots smaller than 10mm in diameter will be severed using a sharp spade. Larger roots will be severed using bypass secateurs or a pruning saw as appropriate.
- A photographic record of the number and location of roots will be maintained by the Arboricultural Consultant for inspection by the local authority.
- Following cable installation the trench will be backfilled using excavated material. Any retained roots will be packed carefully to avoid damage.
- The completion of excavation and root pruning according to this Method Statement will be recorded and signed off by the Arboricultural Consultant.



KEY

[This drawing must be reproduced in colour]

- Existing trees to be retained
- Tree Protection Fencing
(may form part of wider fencing works provided the protection afforded to trees is equal to or greater than that shown opposite)
- Route of heat pipe installation
- Route of high voltage and communication cable ducts
- Arboricultural watching brief area



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Rev	Description	Drawn	Approved	Date
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Genesis Centre, Birchwood Science Park, Warrington WA3 7BH
Tel 01925 844004 e-mail tep@tep.uk.com www.tep.uk.com

Project
Manchester Civic Quarter Heat Network
Arboricultural Method Statement

Title
AMS 02
Controlled Excavation Area 1

Drawing Number
D6777.01.002

Drawn	Checked	Approved	Scale	Date
AAB	JGS	TDP	1:500 @ A3	19/02/2019

Manchester Civic Quarter Heat Network
Arboricultural Method Statement 03
Controlled Excavation (Area 2)

The heating pipework will be installed in close proximity to a retained tree within Bishopsgate. The tree is growing within a soft verge that will contain roots critical for its survival, however roots are also anticipated under adjacent paved and brick set surfaces. Excavation will need to be carefully controlled in order to identify the presence of roots and to manage them in order to minimise the effect on the health of the tree.

SEQUENCE OF EVENTS

- Before work is due to begin on site in the location shown opposite, the Site Manager will arrange the installation of temporary tree protection fencing.
 - Fencing will be installed according to drawing D6777.005 *Tree Protection Fencing Specification* and at the alignment shown by a thick black line opposite. 7 heras fencing panel will be required. Once in place tree protection will remain in situ for the duration of the construction or until its removal is specified by this method statement.
 - Existing fences at the same alignment as the tree protection fencing design opposite may be used in lieu of proprietary temporary fencing where they remain in situ throughout the works.
 - An existing tree stump to the north-east of the retained tree will be removed using a stump grinder (not an excavator). Buttress and surface roots emanating from the stump may be chased out to a maximum of 0.5m from the center of the stump.
 - The Arboricultural Consultant will be notified no later than 48 hours before excavation is due to commence.
 - All subsequent works within 6m from the tree's stem will be monitored by the Arboricultural Consultant.
 - The stone flags and brick sets will be loosened, lifted intact and moved to the designated storage area away from retained trees.
 - In all trenching operations, the trench width will be kept to the minimum practicable to complete the works. The sides of the excavation will be supported where necessary but not battered back.
 - The sub-base will be inspected and its depth, intactness and penetration by tree roots ascertained via excavation using hand-tools. Depending on the results of this exercise the sub-base will either be removed using hand tools or removed using an excavator fitted with a hydraulic breaker.
 - The inspection of the sub-base and assessment made on the need or practicality of further excavation using hand tools or mechanical means will be made by the Arboricultural Consultant.
 - The purpose of the watching brief will be to identify the spread of tree roots and monitor the level of necessary root loss according to the size and density of roots and make an on-site recommendation according to the following findings:

No roots

 - Continue without constraint

Minor roots

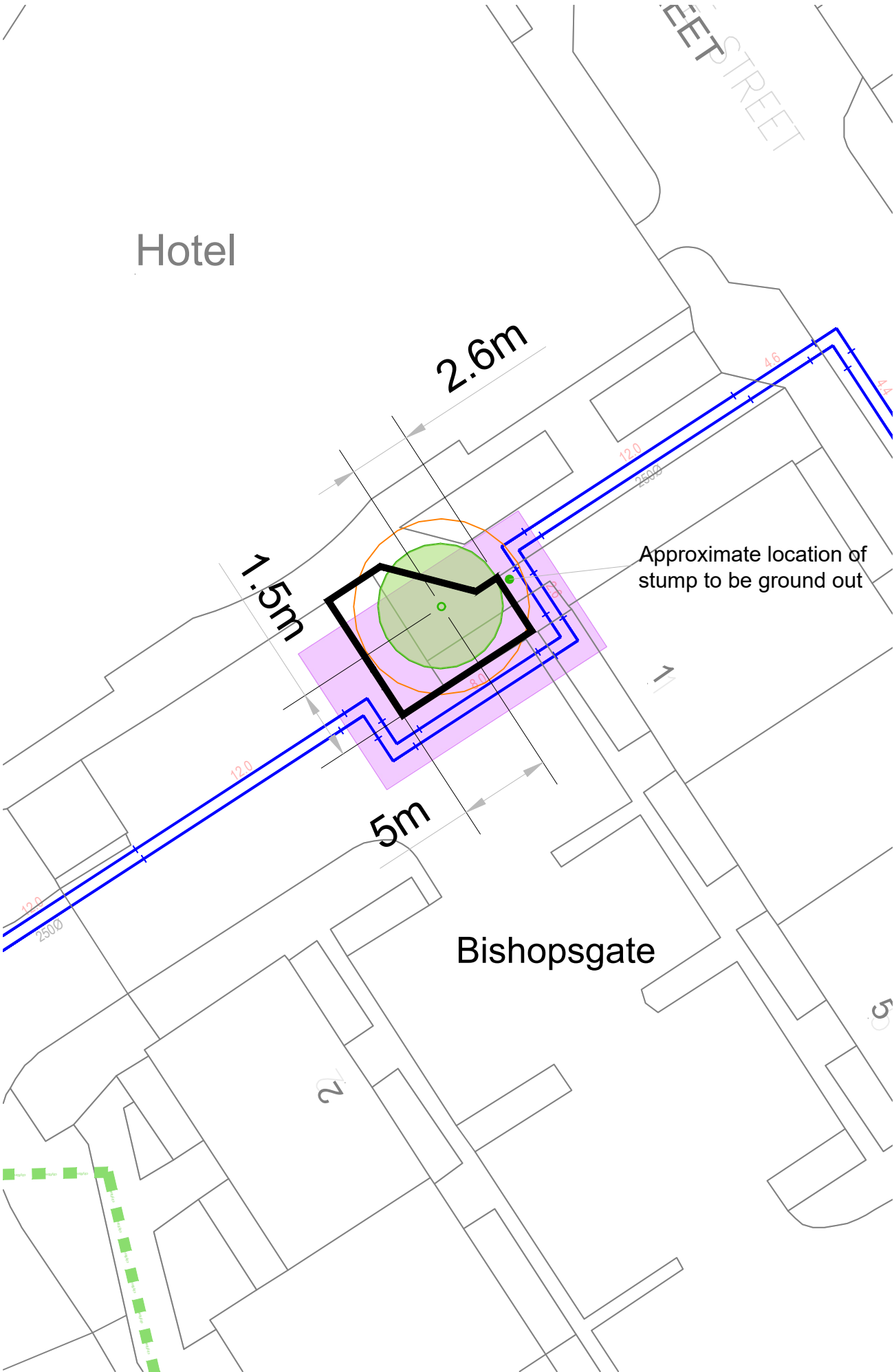
 - Continue to monitor

Moderate roots

 - Prune roots neatly

Major roots

 - Review installation method*
- *Where major roots are found, it may be necessary to retain them via the use of excavation techniques that allow the soil to be removed whilst leaving tree roots intact (e.g. pneumatic excavation).
 - Where minor and moderate roots are encountered, they will be severed neatly at the trench face. Roots smaller than 10mm in diameter will be severed using a sharp spade. Larger roots will be severed using bypass secateurs or a pruning saw as appropriate.
 - A photographic record of the number and location of roots will be maintained by the Arboricultural Consultant for inspection by the local authority.
 - Following cable installation the trench will be backfilled using excavated material. Any retained roots will be packed carefully to avoid damage.
 - The completion of excavation and root pruning according to this Method Statement will be recorded and signed off by the Arboricultural Consultant.



KEY

[This drawing must be reproduced in colour]

- Existing trees to be retained
- Tree Protection Fencing
(may form part of wider fencing works provided the protection afforded to trees is equal to or greater than that shown opposite)
- Route of heat pipe installation
- Route of high voltage and communication cable ducts
- Arboricultural watching brief area



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THE ENVIRONMENT
PARTNERSHIP

Genesis Centre, Birchwood Science Park, Warrington WA3 7BH
Tel 01925 844004 e-mail tep@tep.uk.com www.tep.uk.com

Project
Manchester Civic Quarter Heat Network
Arboricultural Method Statement

Title
AMS 03
Controlled Excavation Area 2

Drawing Number
D6777.01.003

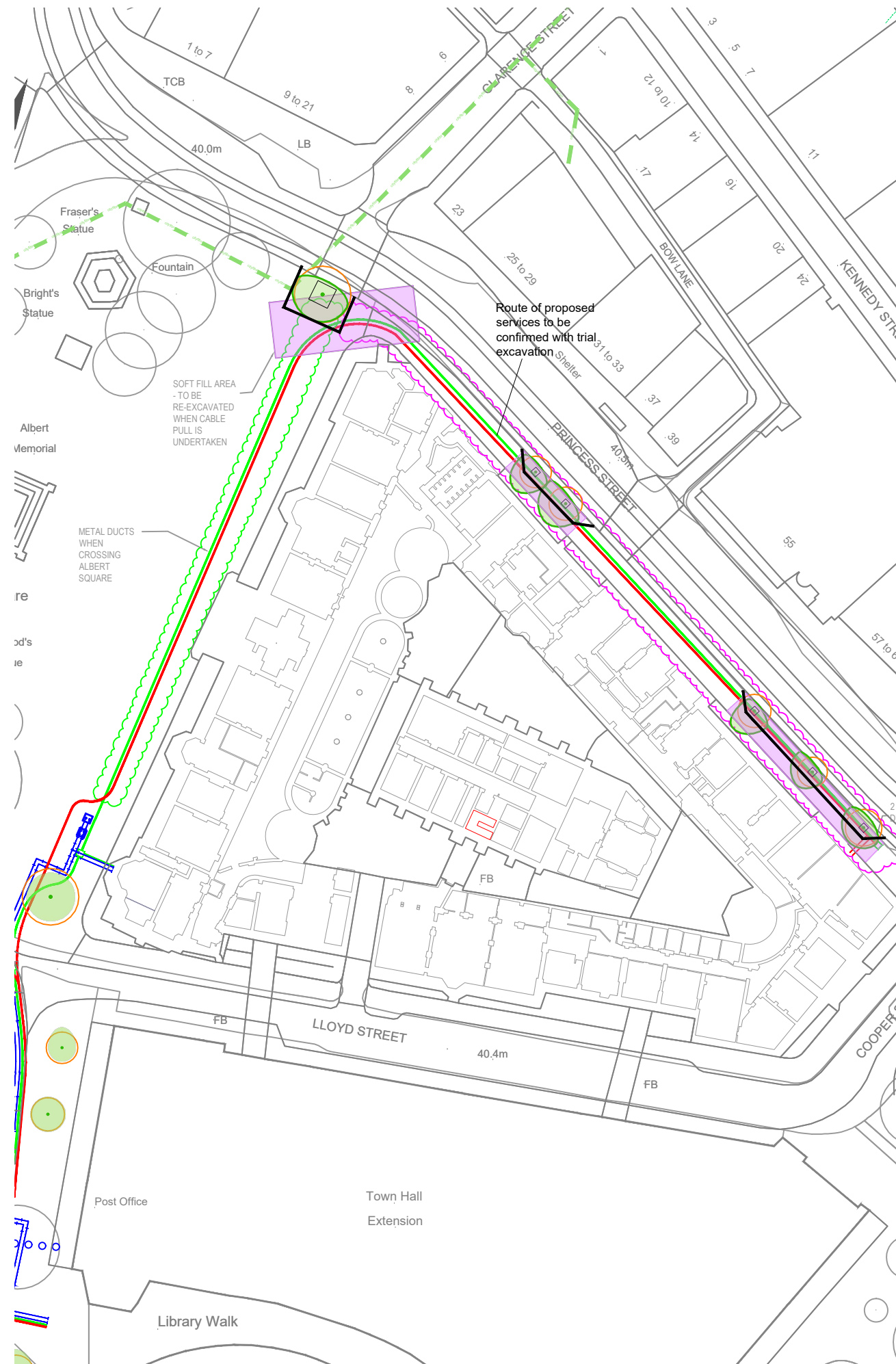
Drawn	Checked	Approved	Scale	Date
AAB	JGS	TDP	1:500 @ A3	19/02/2019

Manchester Civic Quarter Heat Network Arboricultural Method Statement 04 Controlled Excavation (Area 3)

The proposals require the installation of power and communications cables in close proximity to retained trees. The trees are within planting pits and the true spread of their roots is unknown but likely to be restricted. Excavation within this area will need to be carefully controlled in order to identify the presence of roots and to manage them in order to minimise the effect on the health of the trees.

SEQUENCE OF EVENTS

1. Before work is due to begin on site in the location shown opposite, the Site Manager will arrange the installation of temporary tree protection fencing.
2. Fencing will be installed according to drawing D6777.005 *Tree Protection Fencing Specification* and at the alignment shown by a thick black line opposite. A total of 20 Heras fencing panels will be required. Once in place tree protection will remain in situ for the duration of the construction or until its removal is specified by this method statement.
3. Tree protection fencing will be not less than 1m from the stem of each tree.
4. The Arboricultural Consultant will be notified no later than 48 hours before excavation is due to commence.
5. All works between the barrier fencing will be monitored by the Arboricultural Consultant.
6. The York stone flags will be loosened, lifted intact and moved to the designated storage area away from retained trees.
7. In all trenching operations, the trench width will be kept to the minimum practicable to complete the works. The sides of the excavation will be supported where necessary but not battered back.
8. The sub-base will be inspected and its depth, intactness and penetration by tree roots ascertained via excavation using hand-tools. Depending on the results of this exercise the sub-base will either be removed using hand tools or removed using an excavator fitted with a hydraulic breaker.
9. The inspection of the sub-base and assessment made on the need or practicality of further excavation using hand tools or mechanical means will be made by the Arboricultural Consultant.
10. The purpose of the watching brief will be to identify the spread of tree roots and monitor the level of necessary root loss according to the size and density of roots and make an on-site recommendation according to the following findings:
No roots - Continue without constraint
Minor roots - Continue to monitor
Moderate roots - Prune roots neatly
Major roots - Review installation method*
11. *Where major roots are found, it may be necessary to retain them via the use of excavation techniques that allow the soil to be removed whilst leaving tree roots intact (e.g. pneumatic excavation).
12. Where minor and moderate roots are encountered, they will be severed neatly at the trench face. Roots smaller than 10mm in diameter will be severed using a sharp spade. Larger roots will be severed using bypass secateurs or a pruning saw as appropriate.
13. A photographic record of the number and location of roots will be maintained by the Arboricultural Consultant for inspection by the local authority.
14. Following cable installation the trench will be backfilled using excavated material. Any retained roots will be packed carefully to avoid damage.
15. The completion of excavation and root pruning according to this Method Statement will be recorded and signed off by the Arboricultural Consultant.



KEY

[This drawing must be reproduced in colour]

-  Existing trees to be retained
-  Tree Protection Fencing
(may form part of wider fencing works provided the protection afforded to trees is equal to or greater than that shown opposite)
-  Route of heat pipe installation
-  Route of high voltage and communication cable ducts
-  Arboricultural watching brief area



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THE ENVIRONMENT PARTNERSHIP

Genesis Centre, Birchwood Science Park, Warrington WA3 7BH
Tel 01925 844004 e-mail tep@tep.uk.com www.tep.uk.com

Project

Manchester Civic Quarter Heat Network
Arboricultural Method Statement

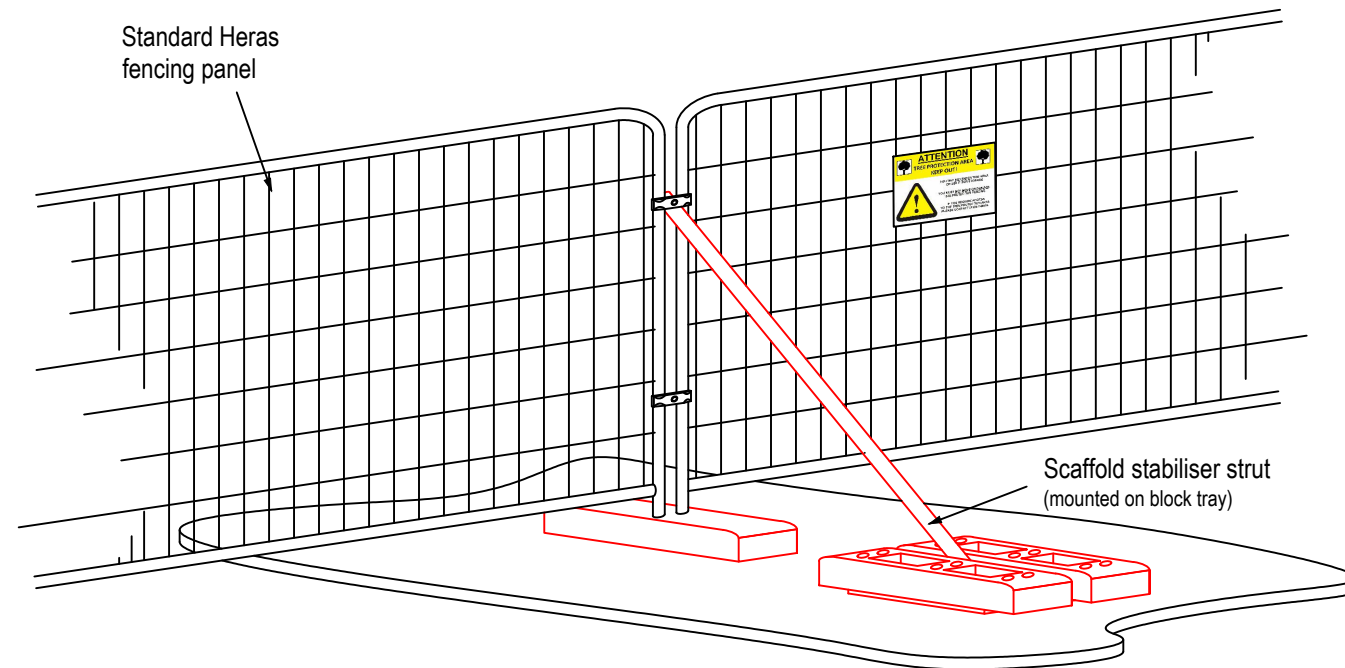
Title

AMS 04
Controlled Excavation Area 3

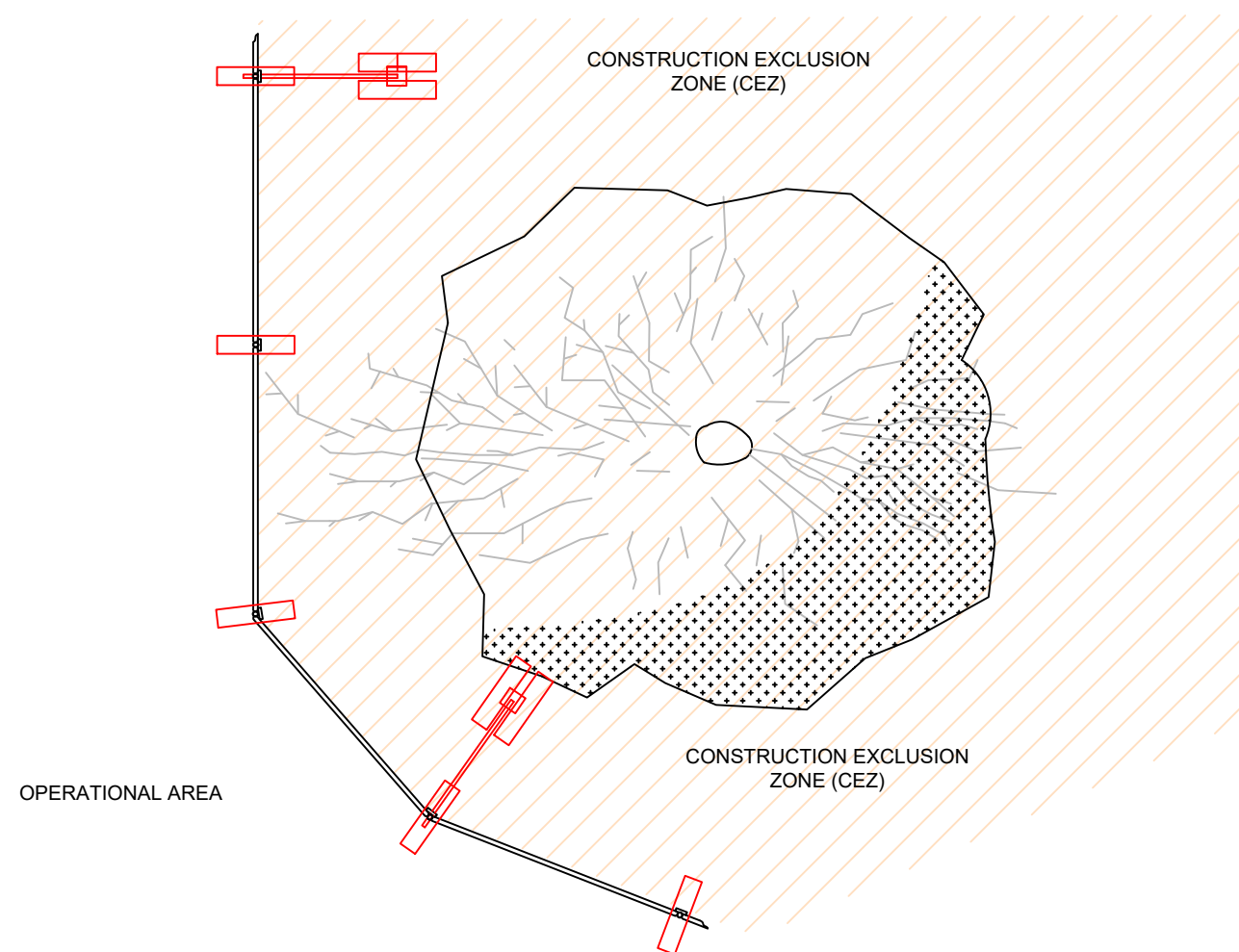
Drawing Number

D6777.01.004

Drawn AAB	Checked JGS	Approved TDP	Scale 1:500 @ A3	Date 28/06/2019
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Per 3No. Heras panels (10.5m)	
Component	Quantity
2m x 3.5m Standard Heras panels	3
Molded foot block	3
Heras security fence clip	6
Heras stabilising support bar	1
Block tray	1



Rev	Description	Drawn	Approved	Date
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THE ENVIRONMENT PARTNERSHIP

Genesis Centre, Birchwood Science Park, Warrington WA3 7BH
 Tel 01925 844004 e-mail tep@tep.uk.com www.tep.uk.com

Project
**Manchester Civic Quarter Heat Network
 Arboricultural Method Statement**

Title
Tree Protection Fencing Specification

Drawing Number
D6777.01.005

Drawn	Checked	Approved	Scale	Date
AAB	TDP	JGS	NTS	19/02/2019



VITAL ENERGI UTILITIES LIMITED ENVIRONMENTAL & SUSTAINABILITY POLICY SIGNED STATEMENT

"Vital Energi's vision is to innovate simple and reliable energy solutions that actively contribute to the sustainability agenda and provide security of supply"

As one of the first companies to provide green energy systems in The United Kingdom, we are proud to highlight our illustrious history in developing quality solutions that have contributed towards environmental prosperity and customer satisfaction over decades.

SAFEGUARDING THE ENVIRONMENT: Vital Energi are fully committed to current and future environmental protection. We not only seek to meet legislative requirements pertaining to environmental management, but strive to lead by example in developing sustainable operations where practicable. Our commitment to excellence derives from an explicit acknowledgement that we have a responsibility to future generations to sustain an environment in which they can live with security. We are therefore conscious of a wide range of socio-environmental issues, and aim to minimise the impacts our activities have while simultaneously increasing the energy and resource efficiency of our installations.

Examples of how we achieve this ambition include...

- Reducing our impact on the environment through design, installation and asset management; using less energy, water, materials and minimising waste streams.
- Creating, enhancing, maintaining and/or restoring the ecology systems and biodiversity impacted by our operations.
- Creating accessible developments that integrate with existing communities and thereby minimise the traffic impacts and transport disruptions.
- Operationally, these aspirations are mirrored in the policies and procedures the organisation works under to best ensure environmental impact mitigation.

TRUSTED PARTNERSHIPS: We work closely with a network of local, regional and national partners and stakeholders to deliver our environment and sustainability ambitions.

We develop trusted partnerships by...

Promoting long term relationships with our joint venture partners, subcontractors, suppliers and consultants based upon transparency, honesty and integrity.

Working closely with local government, housing associations and the public sector to deliver their sustainability aspirations

Engaging with local communities to ensure that their views are reflected in the way we design and deliver installations; incorporating local environmental concerns.

CONTINUAL IMPROVEMENT: Vital Energi definitively understands the importance of strong environmental awareness and effective environmental management. As such, we are fully committed to the prevention of pollution and meeting statutory requirements. Further, we commit to setting and reviewing environmental objectives and targets for annual continuous improvement in line with our vision, scope and ambition to remain a market leader in sustainable energy solutions.

Gary Fielding
Joint Managing Director
Date: March 2018

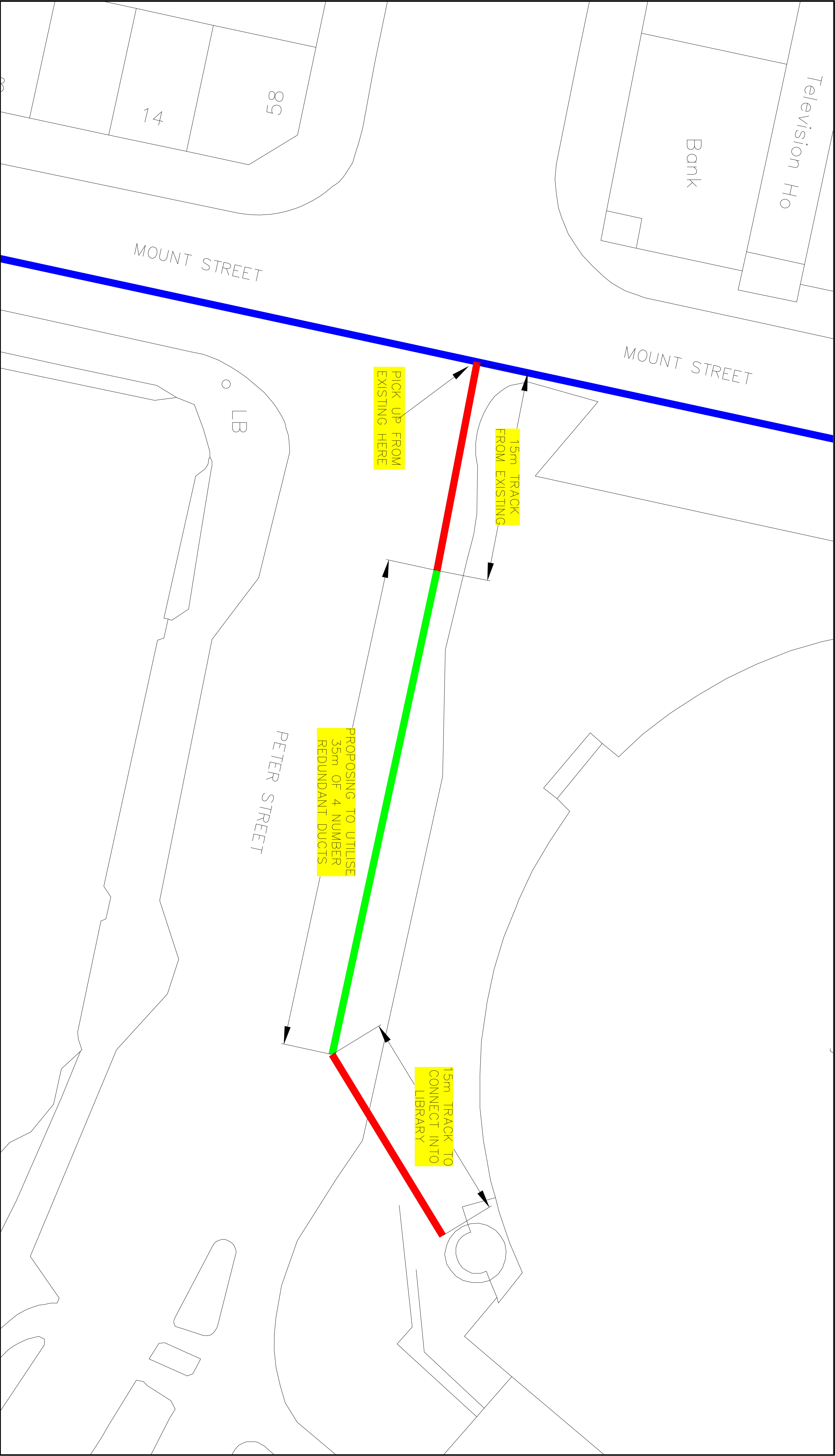
Ian Whitelock
Joint Managing Director
Date: March 2018

KEY QUOTE

"The system being installed is one of the best low carbon solutions we've found over the years and we can make significant savings, in terms of thousands of tonnes of carbon per year, and that is a major contribution to our overall targets"

DAVID BARRATT
OPERATIONS MANAGER
UNIVERSITY OF EDINBURGH

The original signed copy of this document is retained by the SHEQ Department



KEY

- EXITING DUCTS
- TRACK
- PROPOSED REDUNDANT DUCTS TO BE UTILISED



PROJECT

VIT022

DRAWING

LIBRARY CONNECTION,
PETER STREET, MANCHESTER,
EXITING DUCTS

EXCALON HEAD OFFICE EXCALON YARD, 2 DUNCAN STREET, SALFORD, M5 3SQ			
DRAWN BY:	CM	DATE:	10/11/20
CHECKED BY:	KOD	DATE:	10/11/20
APPROVED BY:	KOD	DATE:	10/11/20
DRAWING No.		REVISION	0
DO NOT SCALE FROM THIS DRAWING			

Safety Management System	
Document Reference: EXC/HSE/FORM/EXHD001/Rev 0	
Risk Assessment and Method Statement - Safe System of Works	
Project Ref: VIT022	

Manchester Hv Installation (External installation and ducting)

FOR



Ref: Excavation, Duct Installation and Cable pull.

In accordance with the Construction (Design and Management) Regulations 2015

Excalon Ltd
Sandpiper Court, 20 Modwen Road
Water's Edge Business Park, Salford Quays
Manchester, M5 3EZ

Tel: 0161 877 1300

Rev Number	Date	Section	Description
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

Pages 1-2 are for Excalon's hand over process, if these pages are still attached when the project has begun please contact the Health and Safety Manager (see contacts section).

Safety Management System	
Document Reference: EXC/HSE/FORM/EXHD001/Rev 0	
Risk Assessment and Method Statement - Safe System of Works	
Project Ref: VIT022	

Site Address:	Exhibition Hall Substation and Various		
Method Prepared by:	Name: Allan Woods	Signed	Tel: 07535648122
Approved by:	Name: Sean Aldridge	Signed	Tel: 07770990787

Scope of Works

This method statement is to control the process for activities whilst Excalon carry cable installation, jointing and termination works on behalf of Vital Energi.

There are areas along the route that have been designated sections of engineering difficulty (SED). These are as follows:

- Installation of cables onto raised containment.
- Limited access at points across the route.
- 3rd Party work activities in the vicinity.
- Communication during installation.
- Working in the Highway
- High Pedestrian Presence

Excavation will install a new 6.6kV from the Exhibition Hall substation (166341) including the installation of a new RMU, along pre-installed containment/overhead cable trays to various locations (VE energy Centre, Bridgewater Hall, Convention Centre, and the pre laid Duct system to other connection points (Heron House and the Manchester Library, Town Hall (Separate RAMS))

Joint bay/intermediate joint locations are to be confirmed, several MEWP's will be required along with a number of scaffolding towers for the installation of the cable on to the containment/cable trays and through predrilled core holes.

Set up of the cable drum and wagon to Installation of the two cables from the Exhibition Hall Substation will be carried out from Great Bridgewater Street and may require a lane closure during the cable pull.

Internal sections including the underground car park, HV switch gear rooms and Bridgewater Hall will all be conducted within the confines of the assassinated building. Where access to the public is available appropriate signing lighting and guarding will be set up and monitored through out the works, all closures (carpark and road) will be carried out by Vital Energi.

Joint bays will be required to be excavated in the highway to expose the existing ducts to all the cable to be pulled and Jointed. Heras fencing will be used to protect the public and th inclusion of temporary works if deemed required.

Project Manager and Site Manager responsibility

It is the responsibility of the Project Manager/Site Manager to ensure that these RAMS are briefed to all operational staff working on the above stated Project and to ensure that they are being followed. Any subsequent changes dependent upon the severity of the risk shall result in a revision of the original RAMS or site changes can be noted on the team's Site Specific Risk Assessment.

The Project Manager/Site Manager must ensure that RAMS are in place for the above stated SED prior to any works commencing on-site.

Safety Management System	
Document Reference: EXC/HSE/FORM/EXHD001/Rev 0	
Risk Assessment and Method Statement - Safe System of Works	
Project Ref: VIT022	

To identify Plant & Equipment to be required on site, enter a ✓ in the relevant box or add additional							
Plant & Equipment		Personal Protective Equipment		Qualifications		COSHH	
Transit Van	✓	F/R Workwear	✓	NRSWA (Supervisor)	✓	Diesel	✓
Cable drum wagon	✓	Hi Visibility Vest	✓	NRSWA (Operatives)	✓	Petrol	✓
Spill Kit	✓	Safety Boots (no Rigger boots)	✓	Confined Space *		Two Stroke Oil	✓
Fire Extinguishers	✓	Hard Hat	✓	Client Authorisation	✓	Hydraulic Oil	✓
Floor Saw/Stihl Saw	✓	Ear Defenders	*	Cable Drum Handling	✓	Anti-Freeze	*
Sign, Lighting and Guarding.	✓	Dust Masks (FFP3) Face Fit Tested	*	CSCS / CPCS Card	✓	Hand Cleaner	✓
		Goggles	*	Winch	✓	Marker Spray	✓
		Gloves	✓	Sub-Station Entry	✓		
		Wellington Boots	*	First Aid	✓		
		Wet Weather Gear	✓				
		First Aid Kit	✓				
		Eye Wash	✓				
		LEP (Light Eye Protection)	✓				
				*If required			

Safety Management System	
Document Reference: EXC/HSE/FORM/EXHD001/Rev 0	
Risk Assessment and Method Statement - Safe System of Works	
Project Ref: VIT022	

Method, Sequence & Requirements of Proposed Works

References:

Construction (Design and Management) Regulations 2015 L135 Series Guidance Document
 HAUC Specification for reinstatement
 'Safety at Street Works and Road Works – A Code of Practice' Oct 2013
 HSG47 – Avoiding danger from underground services (third edition)
 LOLER 1998
 PUWER 1998
 Health and Safety at Work Act 1974
 Risk Assessment & Method Statement generics – EXC/HSE/METH-01 – 010 & EXC/HSE/RISK-001 – 027
 Sawcon Plant Method Statement & Risk Assessment – Core Drilling
 Excalon Safety Administration Manual
 Excalon Permit to dig / Break/Shore
 HSG 151 Protecting the Public.
 Proposed Route for Duct

Site Manager Preliminary checks

Competency of HIAB Crane user
 Competency of Excavator Driver
 Safe dig prints on-site
 Utility mark-up present
 Site Specific Risk Assessment pad available
 Permit to break issued if required
 Permit to dig issued
 Heras fencing and barriers available
 Shoring equipment available
 RAMS Briefed to operatives and signatures obtained
 First aid equipment available
 Spill kits

Preparation and planning

All site personnel and visitors will receive an Excalon CDM Induction which will be specific to the site, surroundings and scope of works.

At the start of the project all operatives will be briefed on these RAMS and signatures obtained. A daily Site Specific Risk Assessment (SSRA) will be carried out by the team leader, who will then brief all other team member on the risks and controls which are to be adopted.

All operatives will wear as a minimum high visibility vest, hard hats, safety boots, LEP glasses and gloves. Other items of PPE such as ear defenders, goggles, dust masks etc must be readily available. All plant, tools, materials and equipment will be visually checked for safety, soundness and fit for purpose prior to commencement of work and recorded on Excalon's Visual inspection register weekly, which will be held at Duncan Street Depot, Salford.

PPE

The following PPE will be mandatory at all times;

- Safety boots (no Rigger boots)
- Hard hat
- High visibility vest

Safety Management System	
Document Reference: EXC/HSE/FORM/EXHD001/Rev 0	
Risk Assessment and Method Statement - Safe System of Works	
Project Ref: VIT022	

- Gloves
- Light eye protection

Further PPE will be used in line with task risk assessments e.g. hearing, goggles & RPE when operating abrasive wheels.

Welfare arrangements

Welfare facilities will be located at Duncan Street Depot, which will provide toilet, wash, drying, and eating facilities. It will also contain the relevant safety information and will be the muster point in the event of fire or emergencies.

Resources and Supervision

The Project Manager for these works will be Sean Aldridge and Site Supervised by Garry Hargreaves. The excavation, duct/cable installation, intermediate jointing backfilling and reinstatement shall be undertaken by;

Excavation Team 1			
Tommy Farragher	Team Leader	Pete Thompson	
		Luke Ashworth	
		Josh Buckley	

Site supervision will be carried out daily.

Plant and equipment:

- 1.5 up to 5 tonne 360° Excavator
- 3 up to 6 Ton forward or swivel tipping dumper
- 32 Ton Grab Lorry
- 32 ton muck away wagon
- Whacker Rammer, Ramax, forward reverse compaction plate
- Timber polling boards
- Whaler units
- Acrow Struts
- Steel sheet piles
- Ladder (timber)
- Insulated Hand tools
- CAT and Genny
- 110 volt Generator with Pump
- Floor saw
- Hot Box /Insulated 16 to 24 tonnes lorry
- JCB and Breaker
- Ride on Roller
- Temporary traffic signals

} *If Required*

All plant will be serviced and hold a current test / calibration certification with records kept within the site file. Plant & equipment will be visually inspected before use with any defects reported under Excalon's inspection procedure. Defective plant will be removed from site.

Loading/unloading of plant and material deliveries

Loading and unloading of plant will be a controlled operation. All proposed deliveries will be run through the Site Agent in advance so they can cater for our needs. Excalon will provide a storage area in which to store

Safety Management System	
Document Reference: EXC/HSE/FORM/EXHD001/Rev 0	
Risk Assessment and Method Statement - Safe System of Works	
Project Ref: VIT022	

materials. Excalon envisage the following deliveries of plant/materials at the start of the project which are identified within the risk assessment; Plant and materials will be delivered by heavy goods vehicles (HGV) i.e. beavertail truck and 32 ton grab wagon. No lifting equipment (chains and slings) will be used unless it has been tagged and inspected.

All operations shall be a controlled operation and supervised by the Site Agent or a competent operative.

Traffic and Pedestrian Management

The majority of excavations will be carried out within an approved Excalon barrier system as per 'Safety at street works and road works, October 2013 – A code of practice as a minimum. Monitoring of signing, lighting and guarding shall take place throughout the duration of the working day and recorded daily on the excavation inspection pro former.

There are a mixture of commercial and residential buildings along this route and whilst some access will be restricted whilst we excavate / lay and reinstate the track we will work with the residents and business owners to keep restricted access and disruption to a minimum, but keeping the work in line with Ch. 8 and conditions imposed by the Council

Access will be restricted to the underground carpark during part of the works as per agreement with the asset owner.

Route proving

A full set of utility plans and trial hole reports will be available for the proposed route, a copy of which will be stored within in the site office and one given to the team carrying out the excavation works.

The route will be proved by using a combination of utility location, marking (CAT & Genny) and trial holing in accordance with HSG47. All underground apparatus should be treated as live unless certified as 'dead' by the asset owner.

Trial holes will be taken at frequent intervals and excavated by hand along the proposed route to prove the intended installation, dependent on the subsequent Trial Hole reports, the installation may be moved from one surface category to another (e.g.-footpath to carriageway) by instruction in writing from the client

The Operations Manager and Project Manager will arrange the locations of the trial holes and produce reports that will be available in the project file

Excavation, Breaking Hard Ground

Prior to breaking / cutting into the surface finish a permit to break ground (PTBG) will be completed and issued to the works team. The holder of the PTBG will supervise the works and remain at point of work for the duration of the activity.

The Foreman must take into account the environment, task and suitability of manpower and the following hierarchy of control must be followed.

- All operators will be fully trained and competent in the use of applicable equipment
- All plant will be in good serviceable order
- Safe system of work will be detailed in the method statement
- Briefing of these RAMS
- Suitable dust suppression must be used
- Provided and ensure suitable PPE & RPE is worn

In conjunction with the above, a hot works permit will be issued and briefed to all involved in the work activity, prior to any works that create sparking e.g. cutting metal. A suitable area will be chosen for refuelling, which will include drip tray and spill kits.

Safety Management System	
Document Reference: EXC/HSE/FORM/EXHD001/Rev 0	
Risk Assessment and Method Statement - Safe System of Works	
Project Ref: VIT022	

General Excavation, shoring and duct installation.

All works will be supervised by an Excalon Site Supervisor who will be under control of an Vital Energi Project Manager. The supervisor shall issue a permit to dig certificate to the team leader for each section before commencement of any excavation.

Briefings to the Excavation / reinstatement / jointing teams will be carried out daily by the supervisor in conjunction with this method statement / Risk Assessment and any additional safety information.

All areas of excavation along the route will be set up as per the COP the red book, Safety At Street Works & Road Works including HERRAS Style Fencing for any areas requiring deep excavations passed existing utilities or structures affecting the construction to ES400E

Trial holes will be carried out with the use of hand tools to locate all known / identified services along the route in compliance with HSG47.

Final exposure of services will be made by horizontal digging to reduce any applied force. Use of graft shovels in a "hacking" action is deemed to be blind, uncontrolled penetration of the ground and is to be avoided unless absolutely sure of the absence of buried services.

Footpath excavations will be carried out with the use a mini digger and operated by a trained and competent person (CPCS Accredited) If required due to access hand digging techniques will be used.

Should the risk assessment identify or depths to cross underground plant fall below 1.2 metres, trenches will be supported by a competent person in 2 stages by either trench sheets or timber poling boards which will have a toe of 300mm with Whaler Units. Sheet piles will be situated 1meter above ground level to aid as edge protection when practicable or standard timber temporary designs (false work) see *appendix drawings & flow chart. Reference must be made to HSE/EXC/FORM/055(included within the site safety file)*

All Trench Support (Shoring) will be as per Excalon's TEMPORARY EXCAVATION SUPPORT STANDARD DESIGNS C14058-NW-110-A/111-A/112-A/113-A.

If site conditions permit a stepped or battered trench is an option that can be considered.

All exposed services will be presumed live unless proved otherwise by the relevant asset owner. Any utility found or looks to be damaged will be reported to the operative's supervisor and asset owner. Where electric cables are found with bare conductors, the area will be made safe with approved barriers, where practicable covered. The operatives will remain on site until the cables are proved dead and capped in line with ENW reporting procedures.

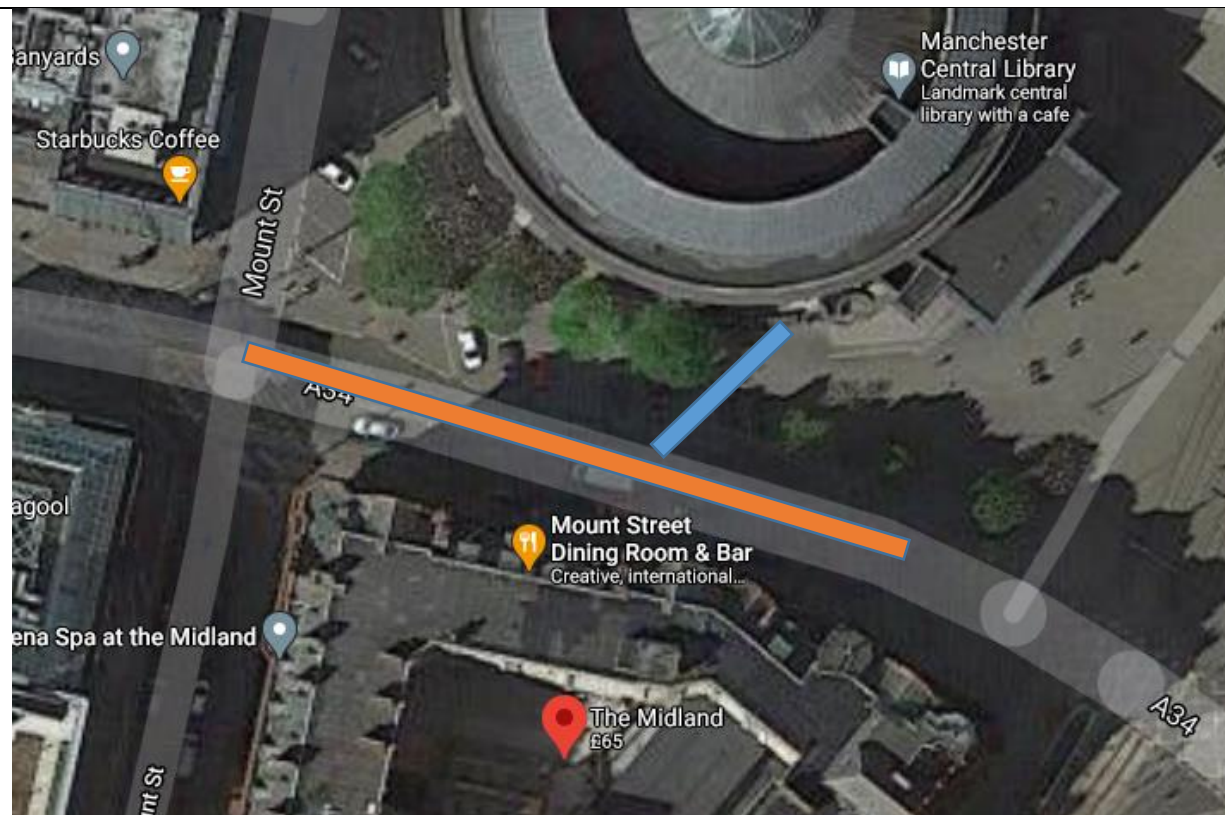
All existing utilities within the excavation will be supported to prevent sagging or failure throughout the excavated trenches until backfilling has been completed.

De watering will not be discharged directly into a watercourse and should be treated through a settlement system. This will be across grassed areas where practical with gullies protected with sand bags, through a series of lagoons or a settlement tank. For de watering into a water courses discharge consent will be applied for from the Environment Agency.

Manchester Library

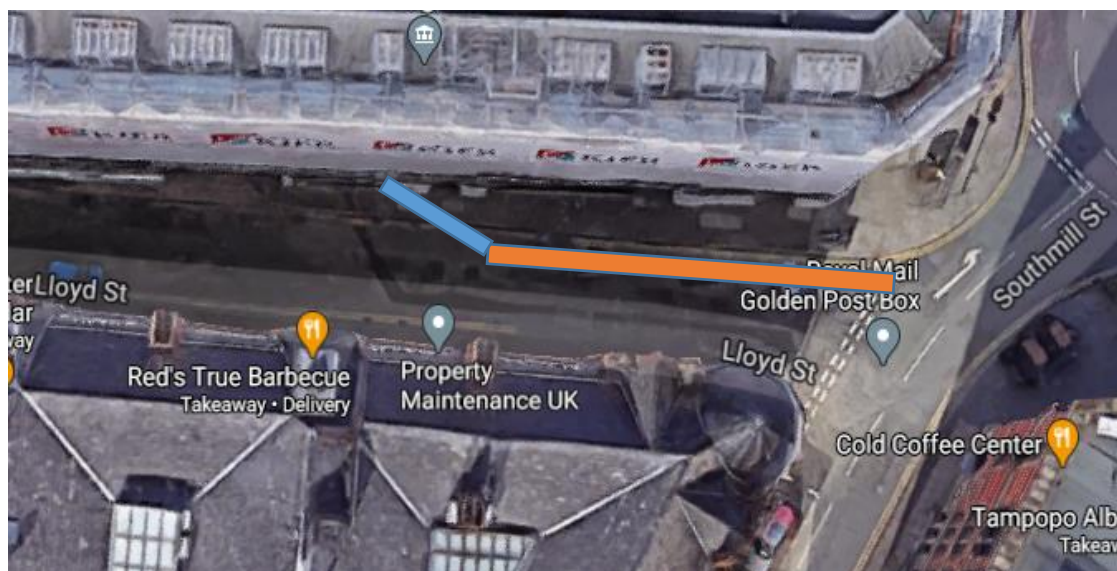
Additional ducting will be installed to aid cable installation to Manchester Library, excalon will utilise spare ducts on Peter Street and divert the required to in below location. (orange = existing Ducts, blue = new section) (further RAMS will be produced for internal works)

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Heron House

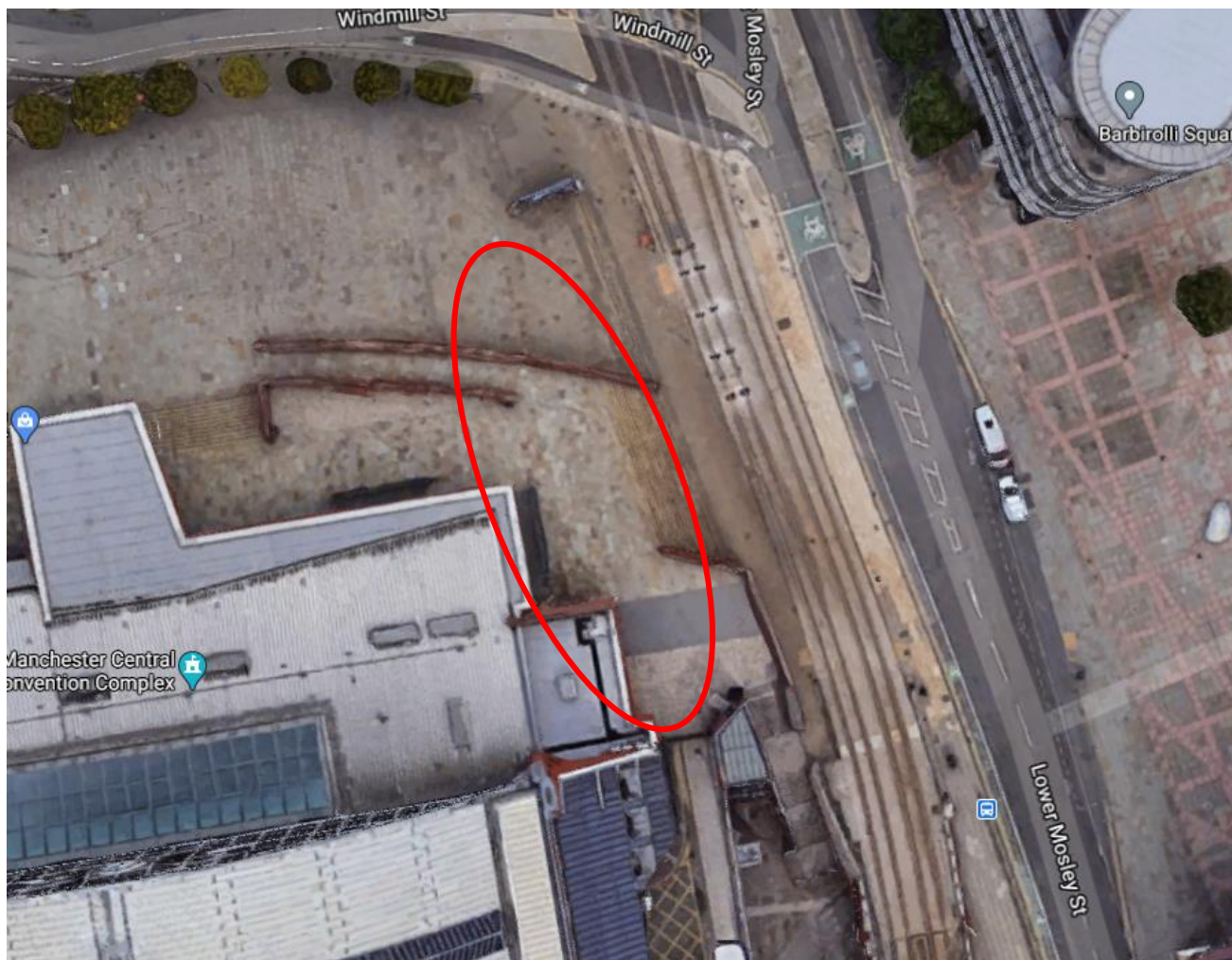
Pre-installed Ducts have been ended in the carriageway on Lloyd street and will be picked up and pieced into Heron house, the works will require a foot path closure to allow the ducts to be installed to the building. (further RAMS will be produced for internal works) (orange = existing Ducts, blue = new section)



Manchester Central

A joint bay will be excavated to aid the cable pull for the works, exact location is to be confirmed, method will be as per "general excavation, shoring and duct installation" approx. vicinity is detailed below.

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Joint bay excavation adjacent to Manchester Central will be carried out under NHS Land, agreed point of access and egress will be pre agreed prior to the works starting, all movement of plat from the access point will be banked via a trained operative.

Demarcation will be set up with heres fencing around the works area to prevent unauthorised access and locked outside of working hours.

Works in close proximity to business premises

Excalon will give all property owners prior notice of intentions to work along the relevant streets, by posting notification letters and advanced signage, both of which will give details of upcoming works. In conjunction Excalon will ensure:

- Safe pedestrian and vehicular access to property
- Assist, on request, any person with mobility restrictions
- Install and maintain Signing and guarding compliant with the red book, Safety at Street Works and Road Works.
- Be polite and courteous when approached by any resident or member of the public
- Refrain from bad language / swearing
- Keep a good standard of house keeping
- Ensure excavations are either back filled or suitably secured when the site is vacated

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Duct installation.

All ducts will be situated at designated points along the route and contained within a barrier system.

Ducts will be carried below waist height to the intended trench. Trenches below 1.2 or where the risk assessment has identified will have poling boards and acrow's implemented before operatives enter the trench to knock the ducts into the collars.

Backfilling.

Any installed trench protection must firstly be removed in a staged manner and stored in a suitable place to prevent any obstruction.

Sand will be installed over the installed ducts via a 32t grab lorry with a clam shell bucket (or dumper if access & egress restricted) and banked by an operative at all times throughout the operation.

Trenches will be compacted in layers no greater than 200mm to minimise surface settlement in line with the passes identified in 'Specification for The Reinstatement of openings In Highways Appendix A8 Compaction Requirements'.

A "Whacker Rammer" or appropriate compaction equipment will be used to compact the layers of backfill material, operatives must wear suitable PPE whilst using this item of equipment.

Cable Installation

Set up

All Joint bay positions and positioning of the winch, cable drum and associated equipment will be agreed on-site with the Excalon Project Manager as set down in drawings. Usually at 250m intervals but not exclusive too. Any risks associated will be noted on the team's site-specific risk assessment in conjunction with the projects generated risk assessments and SWRA. At the Intermediate Joint Bay Locations, the areas will be guarded by an approved Excalon barrier system or HERRAS fencing.

Bell mouths will be placed on each duct entry in which the cable will be inserted with leading rollers to prevent cables contacting the ground and becoming damaged. Open trenches will have rollers situated within the trench. An approved biodegradable cable lubricant will be used to assist with installation; this will be painted on with a Turks Head (bush) throughout the operation within the inception pit (joint bay).

Cable Drum

As noted above the positioning of the cable drum will be determined on-site with the Excalon Project Manager and the Vital Energi PM and as set down on drawings. All equipment will be contained within Excalon's barrier system.

Cable Pulling

The winch pulling tension will be set on the dynamometer before commencement of installation as per the cable manufactures or designers' specification.

The team leader (in control of operations) will give permission for the pull to commence when satisfied that the set-up is per the method statement.

On entering the bell mouth, duct lube will be applied to the cable throughout the pull to reduce friction

The cable installation will be continuous unless stopped by the team leader or the operatives situated at the drum or winch in cases of emergency.

Personal Protective Equipment must be worn, and a hot works permit must be issued when using LPG Blow Laps in the short cap ending process.

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Working under car park will be classed as an area of engineering difficulty. To this end specific control will be employed to ensure there is no damage to the structure and subsequent failure, which are as follows:

- Works will not commence until the asset owner have issued an opening notice and lane closure approval.
- Works will not commence until the asset owner has approved the works.
- Daily Point of work Risk assessment will be completed to supplement these RAMS
- The cable installation team will include for New Road and Street Works qualified operatives and access to a street works Supervisor.
- All persons involved in the work activity have been briefed on the contents of these RAMS

The cable lorry will be positioned under the bridge which will require a temporary lane closure, all sections of the cable within the car park will not be ducted therefore not require a rope and brush, the winch cable to directly be connected to the cable.

****SEPARATE RAMS WILL BE ISSUED FOR CABLE JOINTING****

Re-instatement.

Reinstatement works will be carried out within an Excalon approved barrier system and to the ACOP Safety At Street Works & Road Works (Red Book).

The sides of the hard surface (Base & Wearing courses) will be cut back with vertical faces with the use of a floor saw. An approved sealant will be used on both the base and wearing courses before each layer of hot bitumen macadam is laid.

Floor saws and stihl saws will be operated by a competent person with full PPE and water suppression at ALL TIMES

Materials will be laid via a twin drum roller and operated by an accredited CPCS driver

On completion of the works all surplus materials & plant will be removed before the dismantling of any signing / guarding & traffic management takes place.

Environmental Considerations.

Spill kits are to be placed on-site with every item of plant/machinery.

No plant/machinery to be stored on-site, however drip trays will be readily available for all small plant items such as generators.

Re-fuelling operations shall only take place in the yard in accordance with the RAMS for re-fuelling.

Stop, contain and divert policy shall be adhered to for any leaks: - **Stop** the leak at the source, contain the leak by placing a mound of earth over it and **divert** any leaks away from the watercourse.

Working Hours.

Excalon's proposed working hours are 07.30am – 5.00pm Monday to Friday; however, Saturday hours may be worked which will be agreed before with the client and local authority.

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Emergency procedures/contact details

Personal Accident / Incident

- In the event of an accident or injury, a team member will contact where necessary the appropriate Emergency Services by using the nearest telephone (on site mobile phone) and dialling 999, he / she will then contact the Excalon incident line (Tel: 0161 877 1300), who will inform the relevant operational manager and safety personnel.
- Details of the accident must be recorded in the Excalon site accident book at the earliest opportunity.
- The site must stay undisturbed following an accident / incident until permission has been given by a member of the Safety Team to continue working.

For out of hours working the following number should be contacted in case of Utility strike;

UTILITY DAMAGED	PROVIDER	EMERGENCY CONTACT NUMBER
GAS DAMAGES or GAS ESCAPE	NATIONAL GRID	0800 111999
ELECTRIC	ENWL	0800 1954141
	SCOTTISH POWER	0845 2727999
	PLANT PROTECTION	0141 7762877
WATER	UNITED UTILITIES	0800 330033
	SCOTTISH WATER	0845 6008855
BT DAMAGES	OPENREACH	0800 0232023
CABLE TV	VIRGIN MEDIA	0800 5196929

ENWL Control centre: 0161 257 4705

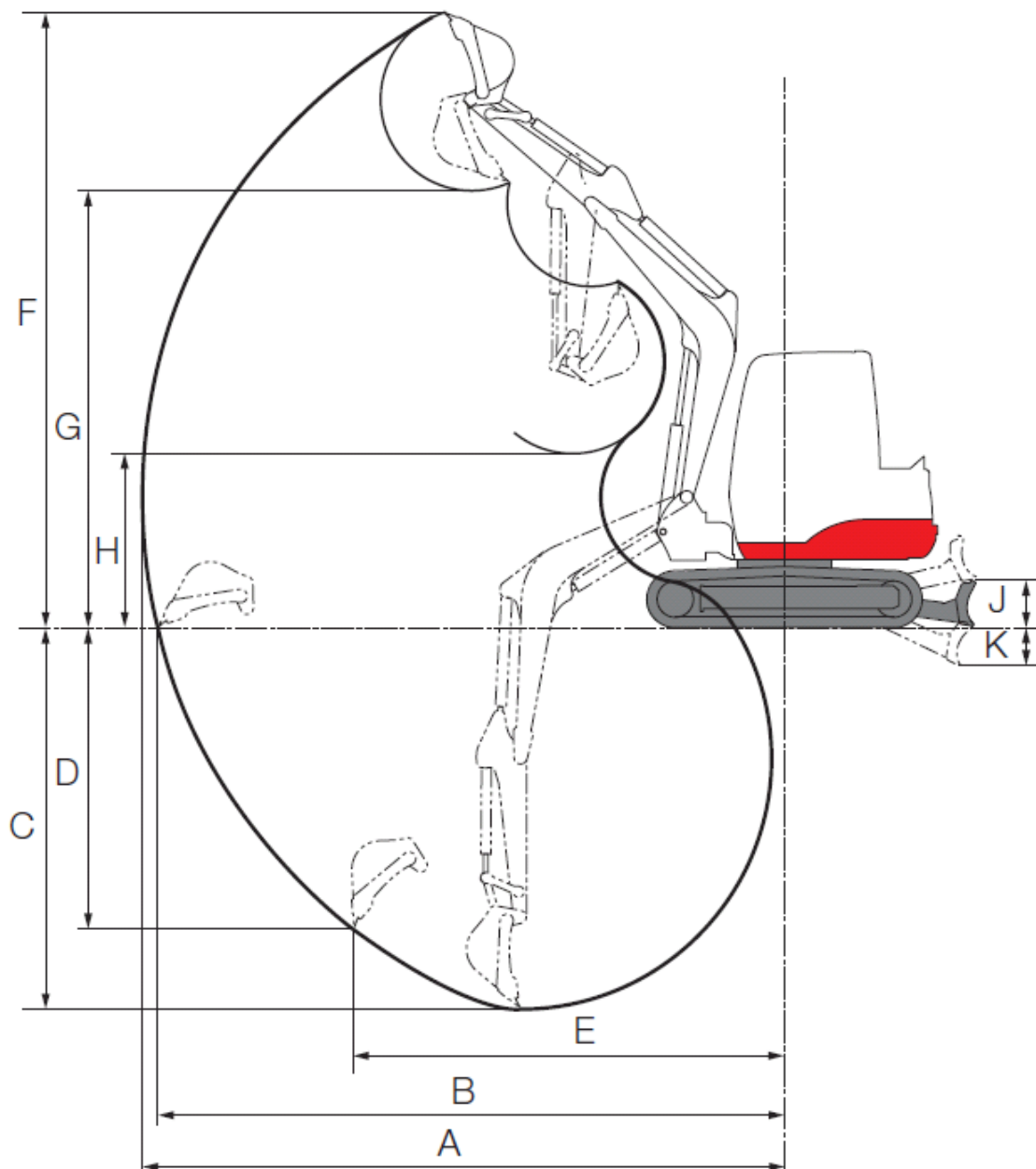
For Gas and Electric strikes all operatives are to make the area safe and evacuate until a member of the utility company deem it safe to re-enter the work area.

POSITION	NAME	COMPANY	EMAIL ADDRESS	TELEPHONE
Site Manager	Garry Hargreaves	Excalon	Garry.Hargreaves@excalon.com	07780481100
H&S Advisor	Allan Woods	Excalon	Allan.woods@excalon.com	07535648122

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Safety Data Information for Plant

Takeuchi TB228, TB235 and TB250



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Operating Ranges

3t	3.5t	5t
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	Item	TB228	TB235	TB250
A	Maximum Reach (mm)	4850	5465	6135
B	Maximum Reach at Ground (mm)	4720	5345	5995
C	Maximum Digging Depth (mm)	2875	3400	3785
D	Maximum Vertical Digging Depth (mm)	2190	2600	2990
E	Reach at Maximum Vertical Digging Depth (mm)	3325	3680	4055
F	Maximum Height of Cutting Edge (mm)	4450	5240	5800
G	Maximum Dumping Height (mm)	3190	3815	4175
H	Minimum Dumping Height (mm)	985	1150	1295
J	Dozer Blade Maximum Lifting (mm)	250	390	435
K	Dozer Blade Maximum Lowering (mm)	280	405	355

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PROJECT		VIT022				LIKELIHOOD (L) 5. Almost Certain 4. Likely 3. Possible 2. Unlikely 1. Remote		SEVERITY (S) 5. Very High (death / permanent incapacity) 4. High (major injury / severe incapacity) 3. Moderate (injury / 3 days off) 2. Slight (minor injury / immediate first aid) 1. Negligible (no or trivial injury or illness)		
LOCATION		Various								
ASSESSED BY		Allan Woods								
Risk Factor (RF) = Likelihood x Severity Low 0-6 Med 7-11 High 12-25										
TASK / ACTIVITY	HAZARD	PERSONS AT RISK	DEGREE OF RISK (uncontrolled)			CONTROL MEASURES	REMAINING RISK (with controls)			FURTHER ACTION REQUIRED (if RF=12 or more)
			L	S	RF		L	S	RF	
			1-5	1-5	1-25		1-5	1-5	1-25	
Excavation.	Existing utilities	Workers	3	5	15	CAT Scan of proposed work area in conjunction with the utility drawings. All excavations will be carried out in accordance with HSG 47.	1	5	5	
Excavation backfilling and re-instatement	Traffic Interface	Workers / Public	3	5	15	All works carried out in accordance with and supervised by NRSWA accredited operatives and supervisors. All works will comply with the red book 'Safety at Street Works and Road works COP' Slewing of plant monitored by banks man	1	5	5	
Excavation backfilling and re-instatement .	Trench Collapse	Workers	5	5	25	Excavations to follow Excalon's deep excavation procedure. Shoring shall be implemented to suit ground conditions, ladders tagged and tied off. Excavations shall be checked daily and recorded on the excavation inspection register	1	5	5	
Excavation backfilling and re-instatement	Pedestrian interface	Workers/Public	4	4	16	Excavations to be suitably guarded using barriers or enhanced barriers i.e. Heras Style fencing. Works to be suitably guarded and checked on a regular basis. Where practicable works closed down at the end of each shift. Pedestrian management and segregation will be made within the recommendations of HSG 151.	1	4	4	
Excavation backfilling and re-instatement	Trips over objects	Workers / Public	2	2	4	Good housekeeping to be practiced on site Provision and use of safety footwear Good situational awareness & vigilance to be promoted All near misses to be reported ASAP.	1	2	2	
Excavation backfilling and re-instatement	Falling materials or plant	Excavation workers, plant operatives	2	4	8	Ensure plant and spoil are kept away from the edge of excavations Provision and use of safety helmets, safety footwear, eye protection - Mandatory on site	1	4	4	

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TASK / ACTIVITY	HAZARD	PERSONS AT RISK	DEGREE OF RISK (uncontrolled)			CONTROL MEASURES	REMAINING RISK (with controls)			FURTHER ACTION REQUIRED (if RF=12 or more)
			L	S	RF		L	S	RF	
			1-5	1-5	1-25		1-5	1-5	1-25	
Excavation backfilling and re-instatement	Road traffic	Workers / Public	3	5	15	All works to be within a road closure or under Traffic Management. All works to be segregated from traffic in compliance with the red book 'Safety at Street Works and Road works COP'	2	5	10	
Lifting, pushing, carrying and putting down	Inadequate training - leading to external injuries (cuts, bruises, crush injuries to hands, feet etc.), internal injuries (muscle and ligament tears, hernias, knee, ankle and shoulder injuries) and cumulative back injuries (slipped disc)	workers who lift, push, pull, carry and put down	4	4	16	Avoid hazardous manual operations so far as is reasonable practicable i.e. by elimination such as using a machine or rollers If manual handling is unavoidable, for each manual handling task, assess and consider the following : the load – weight, unstable, sharp, hot or very cold, difficult to grasp etc. the individual – require unusual strength, height, create a hazard to those who are pregnant, or have health problems etc. the task – does it involve poor posture, holding it away from the body, twisting the trunk, stooping, handling while seated, sudden movement etc. the environment – uneven, slippery floors, poor lighting, different floor levels, limited working space etc. Ensure there are adequate numbers of persons available to assist and supervise.	2	4	8	
Use of Abrasive Wheels ,e.g. Stihl Saw	Risk of injury due to: Improper use e.g. refuelling, management of grinding sparks,, guard not fitted or overridden, no dust suppression Poor maintenance Selection of wrong speed disc Selection of incorrect disc e.g. stone grade disc for cutting steel, Not wearing PPE that should be used to manage residual risks e.g. Noise, Dust & heat	operator or others working in close proximity	5	4	20	The works will be planed, taking into account the environment, task and suitability of manpower and the following hierarchy of control will be followed. - All operators will be fully trained in the use of applicable equipment - All plant will be in good serviceable order - Safe system of work will be detailed in the method statement - Briefing of this Risk Assessment - Provided suitable dust suppression - Provided suitable PPE & RPE In conjunction with the above, a hot works permit will be issued and briefed to all involved in the work activity, prior to any works that create sparking e.g. cutting metal. A suitable area will be chosen for refuelling, which will include drip tray and spill kits.	1	4	4	

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Excavation backfilling and re-instatement	Contact with hazardous materials	Workers	2	3	6	Provision and use of appropriate PPE. Operatives to be first aid trained. Refer to COSHH Assessments within team packs.	1	3	3	
Excavation backfilling and re-instatement	Plant movement	Workers/Public	2	4	8	All plant movements will be conducted with a banks man All operatives will maintain a 2m exclusion zone between the clam shell bucket. If there are walkways in proximity then pedestrians must be halted while the grab is operating if within the 2m exclusion zone	1	4	4	
Work site	Weather Conditions (wind) blowing over of barriers and heras style fences	Site operatives and members of the public	5	5	25	Ensure that all barriers and sign, lighting and guarding equipment has sacks containing granular materials to weigh them down to prevent them blowing over or out of position by wind or passing traffic.	2	5	10	
Excavating in the vicinity of local business and residential properties.	Risk of injury due to: moving plant, falls from height, dust from cutting, slips trips falls.	Public	5	5	25	Liaise with all parties possible effected to arrange additional control measures, enhanced fencing to be set up (heras fencing) Crossing warden if necessary.	2	5	10	
Working on narrow roads	Busy traffic, RTA's	Vehicles & workers/public	4	5	20	Suitable signing, lighting and guarding will be erected to segregate the working area, suitable traffic management to be set up in accordance with the red book	1	5	5	
Excavating near on a busy Highway,	Collisions with moving vehicles	Workers/public	4	5	20	Suitable signing, lighting and guarding will be erected to segregate the working area, suitable traffic management to be set up in accordance with the red book	1	5	5	
Cable Pulling	Use of plant	Workers	2	2	4	All workers within the working party will be trained in cable pulling operations and will follow the Safe system of work. All operators to be competent and only carry out tasks they are qualified to do. Ensure that plant is situated in demarked zones. Provision and use of 2 way radios.	1	2	2	
Cable Pulling	Manual Handling	Workers	2	3	6	Provision of adequate resources to prevent overloading for individuals. The use of winches to pull rope/bond and cable to minimise manual handling.	1	3	3	
Cable Pulling	HV Equipment	Workers	2	4	8	Managed in a way that will not encroach the safety clearance. No vehicles or equipment that could encroach safety clearances will be brought on to site. (NG Safety Rules to be applied)	1	4	4	

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Cable Pulling	Traffic Interface	Workers	3	4	12	All road works carried out in accordance with and supervised by NRSWA accredited operatives and supervisors. All road works will comply with the red book 'safety at street works and roadworks COP' Slewing of plant monitored by banksman	1	4	4	
Cable Pulling	Trench collapse	Workers	4	5	20	Shoring shall be implemented to suit ground conditions, ladders tagged and tied off. Excavations shall be checked daily(before entry) and recorded weekly on the excavation inspection register (section 17 CDM file). Excavations to be suitably guarded i.e. Heras fencing. Works to be suitably guarded and checked on a regular basis. Supervisor and Ganger to control ingress of water by use of pumps. Ground conditions to be checked prior to entering.	2	5	10	
Cable Pulling	Plant operations	Workers	2	2	4	Plant operations must take into account site specific hazards when excavating. Slewing of plant monitored by banksman. Only trained and certified operatives to use plant and machinery.	1	2	2	
Cable Pulling	Open Excavations	Workers	2	3	6	Excavations suitably guarded by Herras fencing. Deep excavation signage on fencing	1	3	3	
Cable Pulling	Slips, trips or falls (work at height)	Workers	2	3	6	Suitable guard rails will be placed and suitable access/egress arrangements, such as ladders, will be provided. Adopt a clear as you go policy.	1	3	3	
Cable Pulling	Tetanus/Weil's disease	Workers	2	4	8	Workers must use washing facilities provided and practice-good hygiene.	1	4	4	
Cable Pulling	Unauthorised access by workers or the public	Workers	3	4	12	Competent Person to be in attendance at the gate while it is open. Additional Herras fencing to be used around the plant outside the gate area.	1	4	4	

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Cable Pulling	Electrocution from impressed voltage	Workers	4	5	20	All plant and equipment to have a field earth fitted by the Competent Person. Insulated working to mitigate the risk of impressed Voltages	2	5	10	
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Please read in conjunction with Risk Assessment & Method Statement generics – EXC/HSE/METH-01 – 010 & EXC/HSE/RISK-001 – 027 contained within the Excalon team pack.

← from Manchester Royal Infirmary
to Appleyard Lees IP LLP, The Lexicon, Mount St, Man...

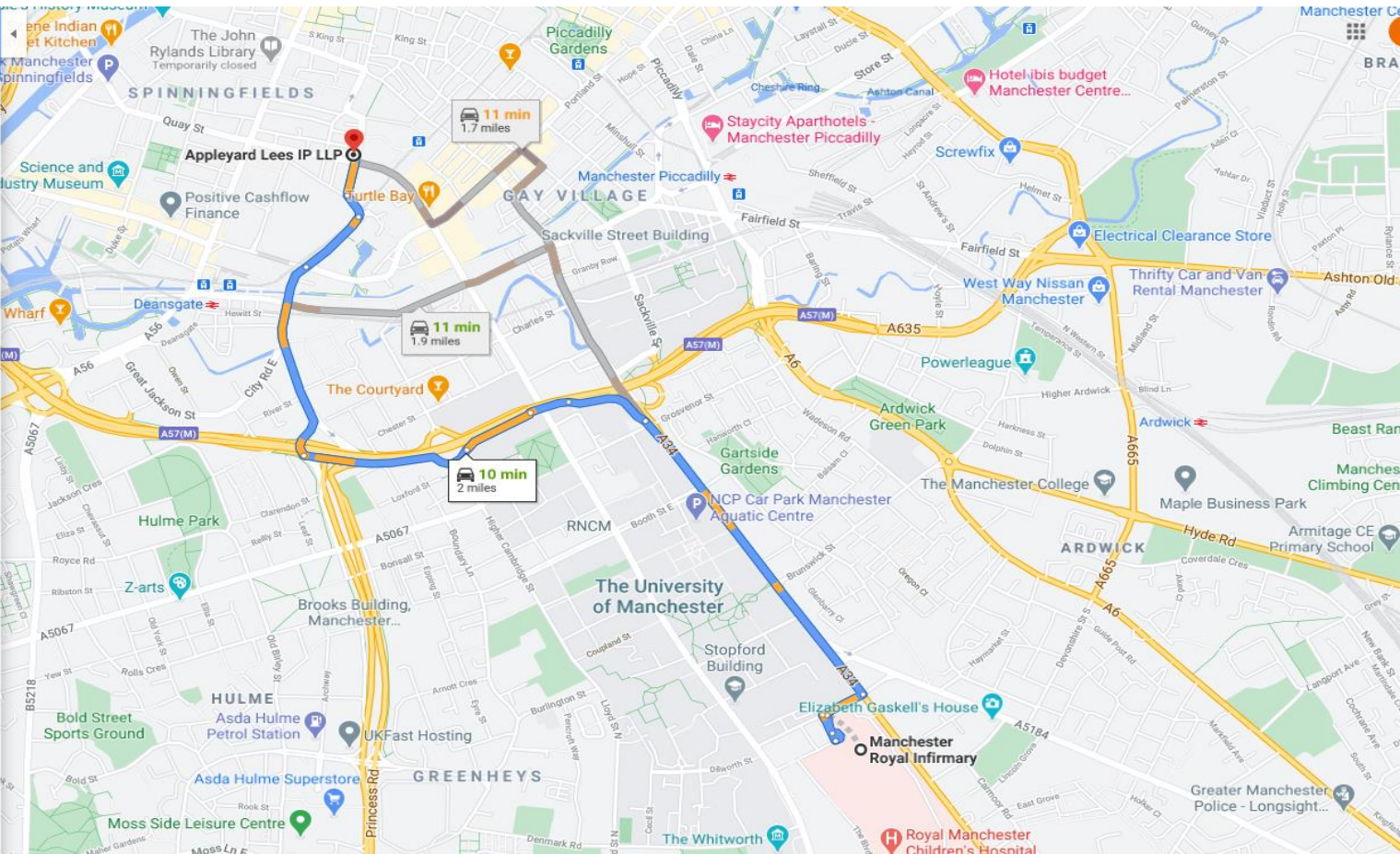
10 min (2.0 miles)
via A34 and A5103
Fastest route now due to traffic conditions

Manchester Royal Infirmary
Oxford Rd, Manchester M13 9WL

- Take Nelson St and Grafton St to Upper Brook St/A34
3 min (0.2 mi)
- Continue on A34 to Medlock St Jct/A5103
4 min (1.2 mi)
- Continue on A5103. Drive to Mount St
3 min (0.6 mi)

Appleyard Lees IP LLP
The Lexicon, Mount St, Manchester M2 5NT

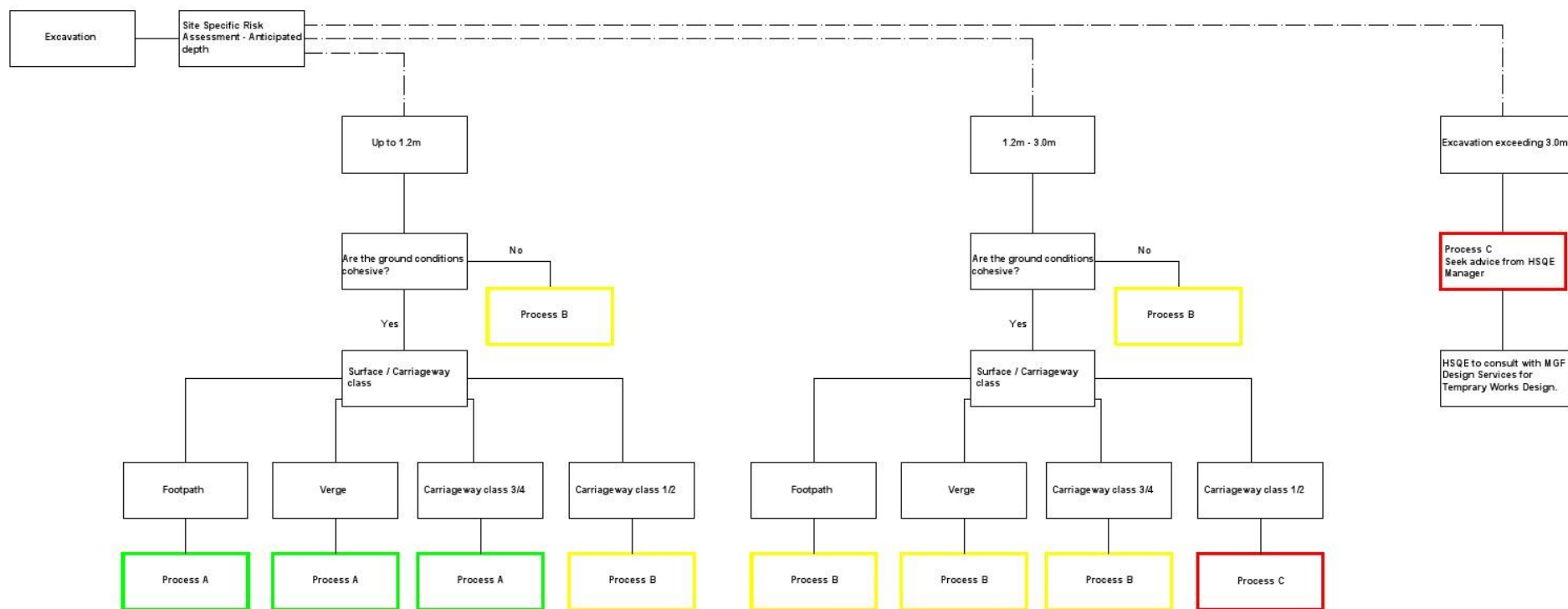
These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.



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Appendix 1

EXCALON LTD - TEMPORARY WORKS FLOW CHART



Key:

Process A - Low Risk

- Enter details on SSRA
- Erect Heras fencing
- Install edge protection
- Notify Supervisor/HSQE Manager
- Display appropriate signage

Process B - Medium Risk

- STOP WORK
- Notify Supervisor/HSQE Manager
- Enter details on SSRA
- Supervisor/HSQE Manager to decide on Temporary Works Design
- Issue "Permit to Shore"
- Competent person installs shoring
- Erect Heras fencing
- Install edge protection
- Display appropriate signage
- Excavation recorded on the live excavation board
- Daily inspection before shift and recorded.

Process C - High Risk

- Seek advice from HSQE Manager when working at these depths
- Temporary Works Design required.

Notes:

- Carriageway 3/4 - Residential / bus route
- Carriageway 1/2 - Trunk Road / Heavily trafficked

Cohesive ground conditions - Clay / hard surfaces such as tarmac and concrete. It should be noted that the stability of clay changes with the weather and should be monitored throughout excavation.

Non Cohesive ground conditions - Are formations of granular materials such as gravels and sand. Use of shoring in these ground conditions will be required.

The above shall also be documented on your Site Specific Risk Assessment.

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RAMS BRIEFING FORM

Date of Briefing:

Initial brief given by:

Date	First Name	Surname	Position	Signature

Briefed to: (by signing below I confirm that I have received, read, understood and will adhere to the method and control measures associated with the risks identified within this document)

Date	First Name	Surname	Signature	Company	Inductor



THE
ENVIRONMENT
PARTNERSHIP



ARCHAEOLOGICAL WATCHING BRIEF

MANCHESTER CQHN

ARCHAEOLOGICAL WRITTEN SCHEME OF INVESTIGATION

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Document Title	Archaeological Written Scheme of Investigation
Prepared for	Vital Energi (VE)
Prepared by	TEP - Market Harborough
Document Ref	7479.001

Author	Jason Clarke
Date	June 2019
Checked	Amir Bassir/ Sarah Hannon-Bland
Approved	Jason Clarke

Amendment History					
Version	Date	Modified by	Check / Approved by	Reason(s) issue	Status
1.0	18.03.19	AB/SHB	JC	Draft for review	Draft
1.1	27.03.19	JC	JC	Final after client review	Final
1.2	04.06.19	JC	JC	Update following addition works	Final



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Figures

Figure 1: Site location

Figure 2: Development area, showing targeted watching brief areas

Figure 3: Targeted watching brief areas, Lower Moseley and Mount Street

Figure 4: Targeted watching brief areas, Lloyd Street, Mount Street and Princess Street

Figure 5: Targeted watching brief areas, George Street

1.0 Introduction

- 1.1 This Written Scheme of Investigation (WSI) has been commissioned by Vital Energi (VE) in response to a condition of planning consent.
- 1.2 Vital Energi (VE) proposes to construct and operate the Manchester Civic Quarter Heat Network Project on behalf of Manchester City Council. This project comprises two elements:
- The first, an energy centre with heat and power boiler located at Manchester Central. In addition the building would have a dispersion flue with a height of approximately 40 meters.
 - The second, a network of insulated heating pipework, electrical and communications cabling to be placed into trenches within the public highway. The trenches will be excavated to a depth of between 1.2 metres and 3 metres.
- 1.3 Manchester Civic Quarter Heat Network (MCQHN) is to be located from Bridgewater Hall progressing north along Lower Mosley Street, crossing Oxford Street, along George Street before terminating on Princess Street. It also branches off Lower Mosley Street, crossing Windmill Street, continuing north along Mount Street before branching off and terminating along the Town Hall and Princess Street. It is located between National Grid Reference SJ837976 (South), SJ836981 (North and West) and SJ840979 (East).
- 1.4 The local planning authority is Manchester City Council. The historic environment record relevant to this site is held by the Historic Environment Team at Greater Manchester Archaeological Advisory Service (GMAAS).
- 1.5 This WSI sets out the conditioned measures as stated within a Condition of planning consent. The requirement for work states that:
- "No development shall take place until the applicant or their agents or successors in title has secured the implementation of a programme of archaeological works. The works are to be undertaken in accordance with Written Schemes of Investigation (WSI) submitted to and approved in writing by Manchester Planning Authority. The WSI shall cover the following:*
- 1. A phased programme and methodology of investigation and recording to include:*
 - a targeted archaeological watching brief*
 - 2. A programme for post investigation assessment to include:*
 - analysis of the site investigation records and finds*
 - production of a final report on the significance of the archaeological and historical interest represented.*
 - 3. Dissemination of the results commensurate with their significance.*
 - 4. Provision for archive deposition of the report and records of the site investigation.*

5. Nomination of a competent person or persons/organisation to undertake the works set out within the approved WSI."

- 1.6 This WSI provides a method for a targeted archaeological watching brief during the excavation of the heat network trenches, as well as a programme of reporting.
- 1.7 This WSI has been prepared by TEP, a Registered Organisation with the Chartered Institute for Archaeologists (CIfA). It has been authored by a full Member of the CIfA. The archaeological works will be undertaken by an appropriately qualified archaeologist.

Aims and Objectives

- 1.8 The following programme has been designed to identify any archaeological deposits or features that may be present within the targeted watching brief areas.
- 1.9 The programme of work is designed in accordance with paragraphs 189, 190, 197 and 199 of the National Planning Policy Framework (NPPF).
- 1.10 The research objectives of the programme of work will be determined by what, if any, archaeological remains are present within the development footprint. However, subsequent assessment and analysis will be in accordance with relevant objectives outlined in the North West Archaeological Research Framework (2006).

2.0 Policy, Standards and Guidance

- 2.1 Section 16 of The National Planning Policy Framework (NPPF), revised February 2019, describes the provisions specifically relating to conserving and enhancing the historic environment.
- 2.2 Paragraph 189 advises local planning authorities to require an applicant to describe the significance of any heritage assets affected by their proposal, including any contribution made by their setting, including *"where a site on which development is proposed includes, or has the potential to include heritage assets with archaeological interest, local planning authorities should require developers to submit an appropriate desk-based assessment and, where necessary, a field evaluation"*. It states that *"the level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance"*.
- 2.3 Paragraph 190 advises local planning authorities *"to identify and assess the particular significance of any heritage asset that may be affected by a proposal (including by development affecting the setting of a heritage asset) taking account of the available evidence and any necessary expertise"*. The information gathered here should be taken *"into account when considering the impact of a proposal on a heritage asset, to avoid or minimise conflict between the heritage asset's conservation and any aspect of the proposal"*.
- 2.4 Paragraph 197 states that *"The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that directly or indirectly affect non-designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset"*.
- 2.5 Paragraph 199 states that *"local planning authorities ... should require developers to record and advance understanding of the significance of any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and the impact, and to make this evidence (and any archive generated) publicly accessible"*. The request for pre-determination works attached to the planning application, and this corresponding WSI, are in accordance with this policy provision of the NPPF.

Guidance

- 2.6 The guidance most relevant to this WSI is provided in:
- Chartered Institute for Archaeologists 2014, Standard and Guidance for Archaeological Watching Brief,
 - Chartered Institute for Archaeologists 2014, Standards and Guidance for the Collection, documentation, conservation and research of archaeological materials,
 - Chartered Institute for Archaeologists 2014, Standards and Guidance for the creation, compilation, transfer and deposition of archaeological archives,
 - Historic England, 2015 Management of Research Projects in the Historic Environment (MoRPHE).

Monitoring

- 2.7 The implementation of the works outlined in this WSI will be monitored by the Senior Planning Archaeologist at Greater Manchester Archaeological Advisory Service (GMAAS) on behalf of the local planning authority (LPA). The LPA will be kept up to date with progress during all phases of the archaeological works.
- 2.8 All archaeological field work will be undertaken by suitably qualified archaeologists, working under the direction of a full Member of the Chartered Institute for Archaeologists, or equivalently qualified project director.

3.0 Background

Geology and Topography

- 3.1 The solid geology is recorded by the British Geological Survey as Triassic rocks comprising sandstone and conglomerate overlain by river terrace deposits of sand and gravel.
- 3.2 The site slopes upwards from south to north at an elevation of approximately 36m above Ordnance Datum in the south of the study area to 42m above Ordnance Datum at the north.

Historic Background

Prehistoric

- 3.3 The evidence of prehistoric activity within the study area is represented by isolated findspots of; a Neolithic flake to the north west of the development site and a Late Neolithic to Early Bronze Age barbed arrowhead to the south west. The topography of the western side of the development site, at the confluence of the Rivers Irwell, Irk and Medlock, indicates the area as an ideal site for human settlement.
- 3.4 Within the Greater Manchester area there is further evidence of prehistoric occupation and activity; including hunting, woodworking and farming. River banks were a favoured site for early farming settlements (GMAU 2009). Within the city centre the majority of evidence for prehistoric activity has been identified around the Castlefield area to the south west of the development site.
- 3.5 Early farming settlements within the wider area were probably set up in the early to middle Neolithic period, becoming established in the early Bronze Age, with woodland clearance and settlement becoming more permanent, particularly along the river valleys and defended hilltop enclosures in the uplands.

Roman

- 3.6 The focus for Roman activity and settlement in Manchester was in relation to the Roman fort of Mamucium, which is located approximately 0.4km to the south west of the development site in the Castlefield area. The fort was constructed near two major Roman roads, one running north to Ribchester and the other west to Buxton. A section of this road was uncovered during the building works of the Central Railway in the 1920s.
- 3.7 The fort was established in the first century AD, built in two phases; the first was turf and timber, and then by 200 AD the wooden ramparts had been replaced with stone. Excavations have shown a small fortified settlement (*vicus*) grew up along the road from the fort's North Gate, extending further towards Deansgate and up towards Quay Street. The settlement does not appear to have extended into the development area.

3.8 There is considerable archaeological evidence for Roman settlement activity within the area of study to the south and west of the development site, focused around the vicus, Roman road running north and fort site. Roman finds have been uncovered in several locations in the west and south-west of the development site including a bronze statuette, pottery, jewellery, ornaments and coins.

3.9 Archaeological evidence excavated from the area of Castlefield, west of the development site represents several successive phases of Roman occupation commencing during the late first century and continuing into the third century

Early Medieval

3.10 There is limited evidence for Saxon occupation within the study area. The Saxon word *gat* meaning road or way can be seen in place names such as Deansgate, which follows the line of the Roman road north. Saxon coins were found when foundations for St Matthew's Church in 1821, and Campfield Library in 1909 were excavated; both sites are located to the west of the study area

3.11 In 919, King Edward gave instructions for the repair of a fort at *Manigceastre*, in order for it to be used as a frontier defence. The Roman fort in Castlefield is one of the possible locations for this defence, the activity here evidenced by a 10th century Anglo-Saxon small settlement of four sunken-floor houses (*Grubenhauser*) excavated in the 1980's to the south west of the development site. This settlement was discovered just outside of the north Gate of the Roman fort, suggesting Saxon occupation of the fort for a short period of time. During Saxon occupation, Manchester became known as a frontier town between Mercia and Northumberland, and a new town centre along with a church was established to the north at the confluence of the Rivers Irk and Irwell.

Medieval

3.12 The Domesday Book refers to Manchester as *Mamecestre*, from the Old English 'caestre', meaning Roman fort or town, and the original Celtic name, which probably meant 'breast-like hill' (Mills 2003). It lay within the hundred of Salford, and there are no households recorded for the settlement. In contrast, Salford, to the west of medieval Manchester, was recorded to have 63 households.

3.13 The medieval town received its market and fair charter in 1227. The centre of the market town was north of the development site situated at confluence of the Rivers Irk and Irwell. The town here had St Mary's Church, thought to have been built on the site of an earlier church, as well as a manor house in the late 13th century which was possibly built over the site of an earlier 12th century castle. The development site was situated beyond the medieval town's urban parameters, most likely to be open field and park land at this time.

3.14 In 1282 a small park, called Alde-Parc, otherwise known as Aldport Park (Saxon name for the area south of Deansgate), made up the majority of the development site. The park was used by the tenants of Manchester for grazing and pannage (pasture for pigs).

- 3.15 The medieval town developed around the church, to the east and south along Deansgate. The houses were timber-framed and narrow fronted, used by the residents not only as houses but also workshops for the various trades and crafts that provided income to the townspeople.
- 3.16 By the end of the medieval period the textile industry, notably the manufacture and trade of woollen products, transformed Manchester into a successful and busy market town, as it became a hub for such activities within the region.

Post Medieval

- 3.17 In the summer of 1642, the English Civil War began, and the town of Manchester was besieged. Royalist headquarters were located in Alport Lodge on Deansgate near what is now St John Street, immediately west of the development site. The Royalists attacked down Deansgate.
- 3.18 The development land at this time was used for agricultural purposes until the encroachment of urban development, which accelerated in the 1730s, when Edward Byrom built a substantial quay on the River Irwell to the west of the development site. Near to St Peter's Church there was a farmhouse and windmill, seen on late 18th century maps, however they are no longer extant. The map of Manchester in 1750 shows that the town had expanded considerably along Deansgate. To the east, the land remains rural with a series of enclosed fields (remnants of the Aldport Park).
- 3.19 Around the development site there were many chapels and several churches built close by for the residents and workers of industrial Manchester. North of the development site the church of St James and associated graveyard was consecrated in 1788. The church closed in 1928 due to falling attendance numbers and was either demolished soon after or destroyed in the Manchester Blitz. Along with the churches, came public houses. Just south-west of the development site, The Crown Inn Hotel, now the Deansgate Public House, can be seen along Alport Road on Green's 1794 map of Manchester, and is still extant today.
- 3.20 During the Industrial Revolution, Manchester was a focal point for the textile industry and moved on to cotton manufacture which was imported along the Mersey. The weaving process was mechanised which led to the development of cotton mills, and as a centre for manufacture by 1800, Manchester had 42 mills. In 1804 the Manchester section of the Rochdale Canal opened, and was built into the fields in the east of the development site, with a new canal junction tunnel intersecting at Watson Street. The barges on the canal carried coal and cotton to the mills surrounding the waterways. The south-east and east of the development area at this time located along Lower Mosley Street functions as a large industrial building site with silk and cotton mills, chemical works and foundries dominating the landscape.
- 3.21 In 1819 after the Napoleonic Wars, widespread famine, unemployment and poor economic conditions led to the political mobilisation for parliamentary reform. A large demonstration was organised in St Peter's Field, in the centre of the development area north of Windmill Street, now the Theatre Royal and London Scottish House. What is now known as The Peterloo Massacre occurred at this site after cavalry charged the gathered crowd and 15 people were killed.

- 3.22 Between 1850 and 1920 the development site changed quickly as part of the urban expansion of Manchester, which by 1853 was officially given city status. The south-west of the development site continued at this time to have slum housing and back to back properties, however the large majority of the study area was still given over to works, factories, offices and warehouses. The Bale Street Glassworks located in the east of the development site established in 1828 was one of the first glass works in Manchester. This industrial area supported Manchester's status as the centre of national and international cotton trade. Around the development area, streets were widened and smaller houses were replaced by warehouses, hotels, theatres and civic institutes, such as the Town Hall and library. There is partial survival of gridiron street patterns in the east of the study area, along with some townhouses and workshops still extant to the west.

Modern

- 3.23 With the road improvements and establishment of public transport, workers were able to live in the suburbs of the city, and a number of Victorian and Edwardian buildings were erected to the west and east of the development site, which are now within Conservation Areas. In the early 20th century the city council set about clearing the slums, and building modern housing. Falling congregation numbers from city centre churches meant the removal or conversion of many remaining 18th and 19th century church buildings. St James's Church closed in 1928, was replaced by a garage in the 1950's, and the site is now modern commercial office buildings.
- 3.24 Throughout the modern period, the land within and around the development site has changed significantly from the earlier town of Manchester. The city was subject to bomb damage in the Second World War, including damage to the Free Trade Hall and Manchester Central Library. Cross Street Chapel, originally The Dissenters' Meeting House built as the first Non-Conformist chapel in 1694 to the north of the development site, was damaged in the blitz of 1940 and was subsequently demolished, with a replacement chapel rebuilt in 1959.
- 3.25 With the decline of the cotton industry, industrial sites were taken over, and redevelopment of the built landscape meant demolition or conversion of the run-down industrial building into offices and apartments. Rows of 19th-century housing and commercial buildings were demolished to make way for modern buildings such as the Odeon Cinema.
- 3.26 However, 19th-century street patterns are still evident within the commercial and civic centre, as building plots themselves were comparatively unchanged and so rebuilt or renovated in a similar footprint.

The proposed development

- 3.27 The development comprises the construction of the Manchester Civic Quarter Heat Network (MCQHN) Project on behalf of Manchester City Council. As written within the introduction, the works comprises two elements:
- 3.28 The first, an energy centre with heat and power boiler located at Manchester Central. In addition the building would have a dispersion flue with a height of approximately 40 meters.

- 3.29 The second, a network of insulated heating pipework, electrical and communications cabling to be placed into trenches within the public highway. The trenches will be excavated to a depth of between 1.2 metres and 3 metres.
- 3.30 The archaeological watching brief will target areas of the heating pipework network trenches only.

4.0 Programme of Archaeological Works

Archaeological Watching Brief

- 4.1 The archaeological watching brief will be undertaken by a suitably qualified archaeologist. They will work with the construction contractors and will maintain a permanent presence during groundworks of the designated areas of the development site as detailed in the WSI, (Figure 2-5). If the plans are changed then GMAAS will be consulted.
- 4.2 A written record of the archaeological watching brief will be made and supplemented with plans and section drawings. The record will also document weather, site limitations, health and safety and general site events.
- 4.3 In the event that any such finds or features are identified, the construction contractor will be immediately informed and works may be temporarily delayed while the remains are recorded. The supervising archaeologist will work closely with the site manager and excavation team to ensure any potential archaeological remains are not backfilled until the supervising archaeologist has inspected the area and handed it back to the contractor.
- 4.4 The supervising archaeologist will have the authority to halt earth moving activities if necessary to define, investigate and record any areas of archaeological (or potential archaeological) interest. Additional archaeologists maybe required on site to excavate and record any significant archaeological remains if encountered.
- 4.5 The archaeologist will do so within an appropriate timescale and will avoid any unnecessary delays to the work programme. Details of the onsite work should be agreed between the archaeologist and the contractor to identify elements of the construction which have the potential to require more time for recording.
- 4.6 If archaeological remains are encountered during excavation areas outside of the targeted watching brief areas then the contractors should contact the managing archaeologist. If required an archaeologist will attend site to record any archaeological remains.
- 4.7 Any excavations will be undertaken by hand, if safe to do so. Any archaeological surfaces that are present will be cleaned sufficiently to enhance any features, site levels will be related to the Ordnance Survey National Grid and Datum. The general site plans will be hand drawn at a scale of 1:50 or 1:100.
- 4.8 Discrete features will be half-sectioned, or fully excavated, if features are part of recognisable structures, contain deposits or artefacts of particular value, or likely to hold significant artefact or environmental assemblages. Intersections will be investigated to establish strategic relationships. Representative sections of linear and curvilinear features will be sample excavated away from intersections or other features or deposits, to obtain unmixed samples of material. Sections will be drawn at a scale of 1:10 or 1:20, as appropriate. Environmental bulk samples (usually 40 litres) will be taken where the deposit is likely to contain significant environmental assemblage. All records will be undertaken using pro form record sheets.

- 4.9 Sampling strategies will be in accordance with the archaeological sub-contractor fieldwork manual and described in their method statement as well as be the requirements of GMAAS.
- 4.10 The archaeological contractor will make appropriate pre-and post-excavation site records. Any finds and features will be accurately located and planned accurately at appropriate scales. All site photographs will be taken using a digital SLR camera with a sensor of a minimum of 12 megapixels and supplemented with black and white film photography as appropriate. All photography will be undertaken in accordance with Historic England guidance, Digital Image Capture and File Storage: Guidelines for Best Practice, 2015.

General

Finds

- 4.11 All finds or environmental samples recovered during the archaeological works will be assessed and reported on by internal and external specialists of the archaeological contractor. A list of specialists for the project will be provided in a method statement from the appointed archaeological contractor prior to works commencing.
- 4.12 All finds will be treated in accordance with current best practice as set out in Chartered Institute for Archaeologists and Historic England guidance.

Human Remains

- 4.13 If human remains are encountered during the excavation, they will be left in situ and the coroner notified. If it is deemed appropriate to excavate human remains, this will be done in accordance with appropriate Historic England and Chartered Institute for Archaeologists guidance (e.g. ClfA Technical Paper 13 Excavation and Post-excavation Treatment of Cremated and Inhumed remains). Excavation, removal from site, analysis and final placing will all be subject to the requirements of the appropriate Ministry of Justice licence.

Treasure

- 4.14 If any artefacts are encountered that would constitute 'treasure' as defined by The Treasure Act, 1996, they will be reported to the local Coroner and relevant Finds Liaison Officer. Any artefacts deemed to be Treasure should be excavated on the day they are discovered and removed to a secure site. If this is impractical then appropriate security provided until full excavation and removal can occur.

Paleo-environmental sampling and analysis

- 4.15 The paleo-environmental assessment aims to identify areas within the development footprint where conditions are such that deposits suitable for the study of past environments are preserved. These most commonly occur in the form of subsurface peat layers, but are also taken to include all waterlogged deposits. The identification of any suitable areas will take place during the archaeological evaluation.
- 4.16 Should any such deposits exist within the area of impact, samples will be taken by a suitably qualified specialist sub-contractor.

- 4.17 The samples would be assessed for their potential by internal or external specialists of the archaeological contractor, and suitable techniques applied to sub-sample from select cores to determine the preservation and taxonomic diversity within the samples. This is likely to include assessing for one or more of the following:
- Pollen (focussing on organic units)
 - Diatoms (focussing upon lithological transitions within and at the base of the Holocene sediment stack)
 - Foraminifera (focussing on mineral strata and in particular on transitions)
 - Plant macro-remains (focussing on organic units)
- 4.18 Having assessed the potential for analysis a project design will be produced that will provide a detailed proposal for analysis (including, for example, C14 dating, loss-on-ignition to measure organic carbon content, humification and mass specific magnetic susceptibility) of any present selected samples.
- 4.19 If necessary and appropriate the advice of the Historic England Science Advisor for the North West will be sought.

Programme

- 4.20 It is anticipated that the works will happen in accordance with the following programme:
- June 2019 - submit WSI for approval by GMAAS
 - August 2019 - undertake watching brief
 - +4 weeks - report
 - +8 weeks - deposit archive

Organisation and Key Personnel

- 4.21 TEP is a Registered Organisation with the Chartered Institute for Archaeologists (CIfA). The heritage team is under overall management of **Jason Clarke BSc MA MCIfA, Principal Historic Environment Consultant (TEP)**.
- 4.22
- 4.23 The archaeological works will be undertaken by an appropriate qualified archaeologist from Salford Archaeology, Salford University and will be managed by **Jason Clarke BSc MA MCIfA, Principal Historic Environment Consultant (TEP)**.

5.0 Reporting

- 5.1 In accordance with the principles of Management of Research Projects in the Historic Environment (MoRPHE) (Historic England 2015) and the Management of Archaeological Projects, 2nd Ed (MAP2) (English Heritage 1991), a programme of assessment and reporting will be undertaken, following completion of the archaeological fieldwork.
- 5.2 In the event of negative, or non-complex findings, a report will be produced detailing the results of the fieldwork within four weeks of the end of the archaeological works and archived within six months. The report will include;
- a front cover to include the NGR, and HER reference number
 - a concise, non-technical summary of the results,
 - the circumstances of the project and the dates on which the fieldwork was undertaken,
 - description of the methodology, including the sources consulted,
 - a very brief summary of the historical background of the study area,
 - a statement, where appropriate, of the archaeological implications of the impact,
 - a copy of this project design, and indications of any agreed departure from that design,
 - the report will also include a complete bibliography of sources from which data has been derived, and a list of any further sources identified but not consulted,
 - a site location plan related to the national grid,
 - appropriate plans showing the location and position of features or sites located,
 - plans and sections showing the positions of deposits and finds,
 - illustrative photographs as appropriate,
 - coordinates (latitude/longitude) of relevant sites if archaeological remains have been discovered.
- 5.3 In the event of archaeologically significant finds, the results of fieldwork will also be published in a relevant and appropriate journal, or other publically disseminated publication, as appropriate.
- 5.4 Pottery reports will refer to the appropriate type series.

6.0 Archive

- 6.1 A copy of the report provided as a PDF on disk, and as hard copies, will be submitted to the Greater Manchester Historic Environment Record.
- 6.2 An archive of the results of the archaeological work will be produced, in accordance with current English Heritage guidelines (Management of Archaeological Projects, Appendix 3, 2nd edition, 1991) and Chartered Institute for Archaeologists Standard and guidance for the creation, compilation, transfer and deposition of archaeological archives (ClfA 2014). The archive will contain any site matrices, and summary reports of the artefact record, context records, and any other records or materials recovered.
- 6.3 Greater Manchester HER will be informed of fieldwork commencing and of the arrangements made for deposition of the project archive.
- 6.4 The original record archive of projects (paper, magnetic and plastic media), and a full copy of the record archive (microform or microfiche), together with the material archive (artefacts, ecofacts, and samples) will be deposited with the relevant local archive.
- 6.5 Any relevant archive generated will be deposited with an appropriate regional depository, it is understood that a charge may be made for this and that the depository will need to be contacted to agree to the deposition of any archive in advance.
- 6.6 Details of the work will be entered on the OASIS database at <http://ads.ahds.ac.uk/projects/oasis>.

7.0 Health and Safety

- 7.1 All work on site would be undertaken strictly in accordance with the project health and safety plan and task specific risk assessments. All companies working on the project will adhere to the client's required quality, health, safety and environment controls.
- 7.2 Access routes to working areas would be specified by the client and access would only be permitted to those routes and the area of the fieldwork.
- 7.3 All site staff, including subcontractors and visitors, will prove that they have attended a site induction and have the necessary competencies (e.g. CITB training for machine operators) and any other necessary health and safety qualifications.

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Websites

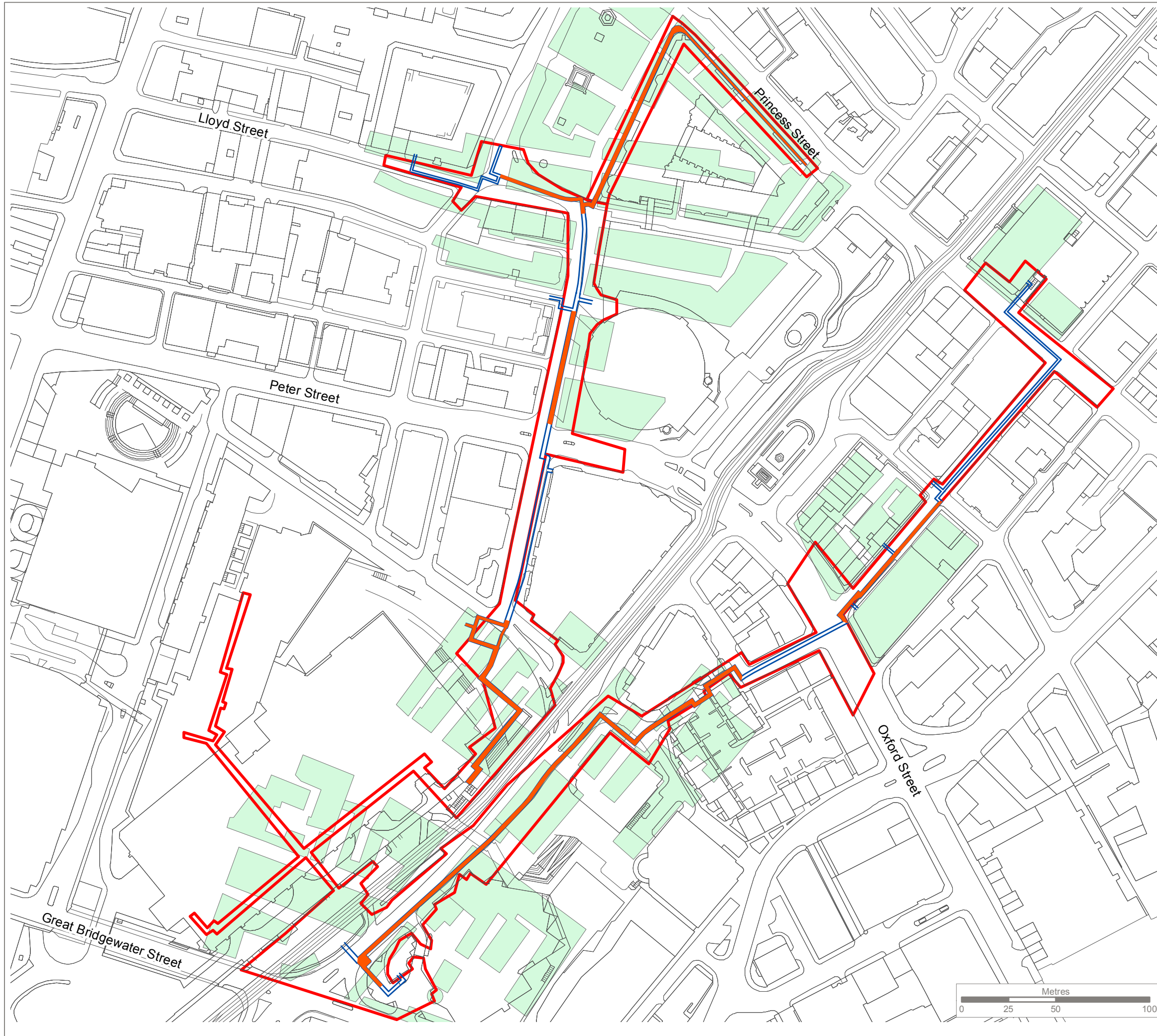
Heritagegateway.org.uk

historicengland.org.uk/listing

Old-maps.co.uk

www.british-history.ac.uk

www.pastscape.co.uk



KEY

-  Development area
-  Proposed trenching
-  Targeted Watching Brief
-  Former buildings seen on historic mapping



Rev	Description	Drawn	Approved	Date
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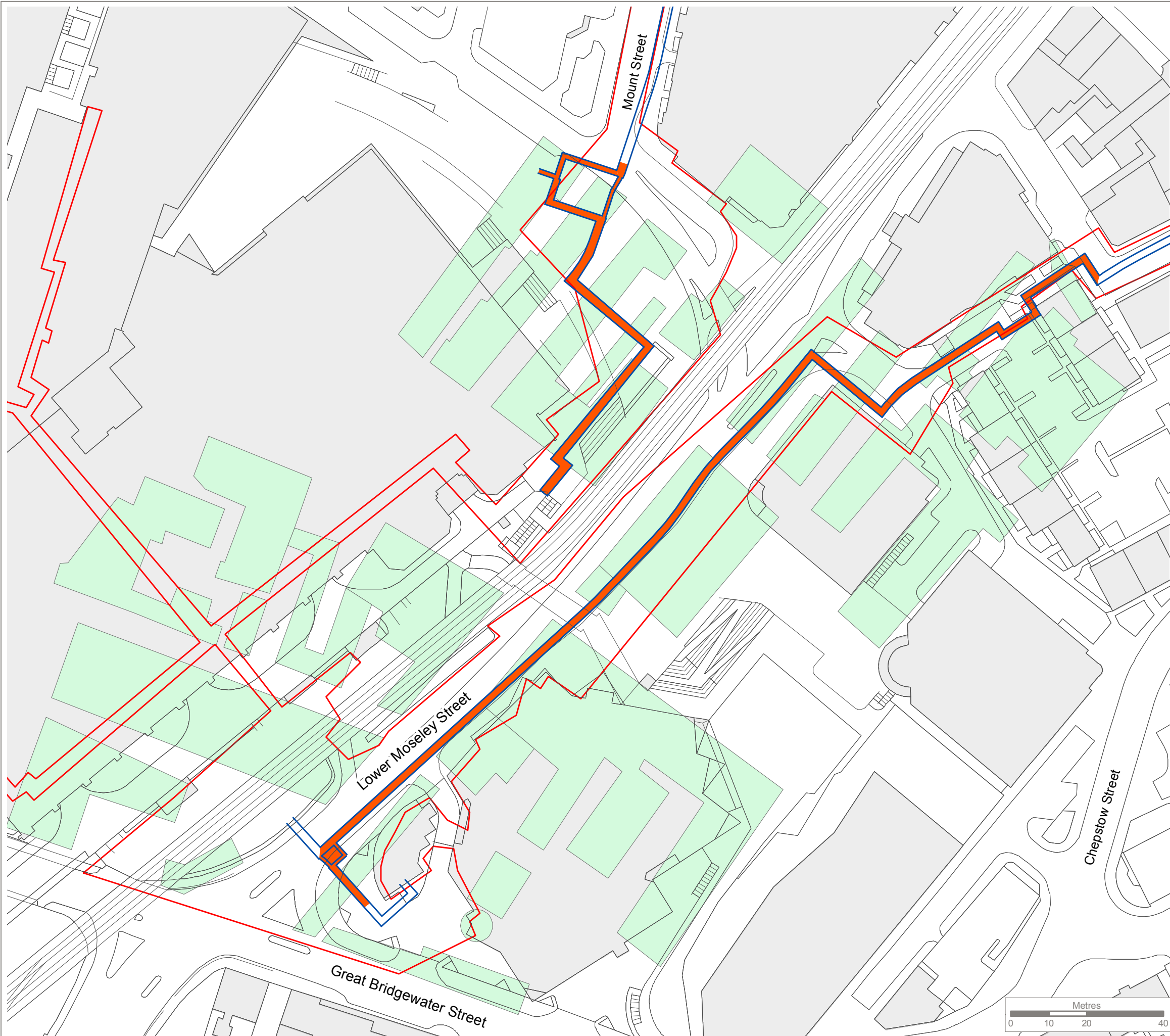
TEP | **THE ENVIRONMENT PARTNERSHIP**
No.1 The Chambers, Bowden Business Village
Leicester Road, Market Harborough, LE16 7SA
Tel 01858 353120 e-mail tep@tep.uk.com www.tep.uk.com

Project
Manchester Energy Network

Title
Development area showing targeted watching brief areas

Drawing Number
G7479.002

Drawn	Checked	Approved	Scale	Date
AB	SB	JC	1:2,000 @ A3	03/06/2019



KEY

- Development area
- Proposed trenching
- Targeted Watching Brief
- Former buildings seen on historic mapping

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Base mapping received from client

The site map shows the project location within the City Centre, bounded by Deansgate, Watson Street, Windmill Street, South Street, Museum Street, Peter Street, Lower Moseley Street, Great Bridgewater Street, and Chepstow Street. A location map of Manchester shows the project area in the south-east of the city.

Rev	Description	Drawn	Approved	Date

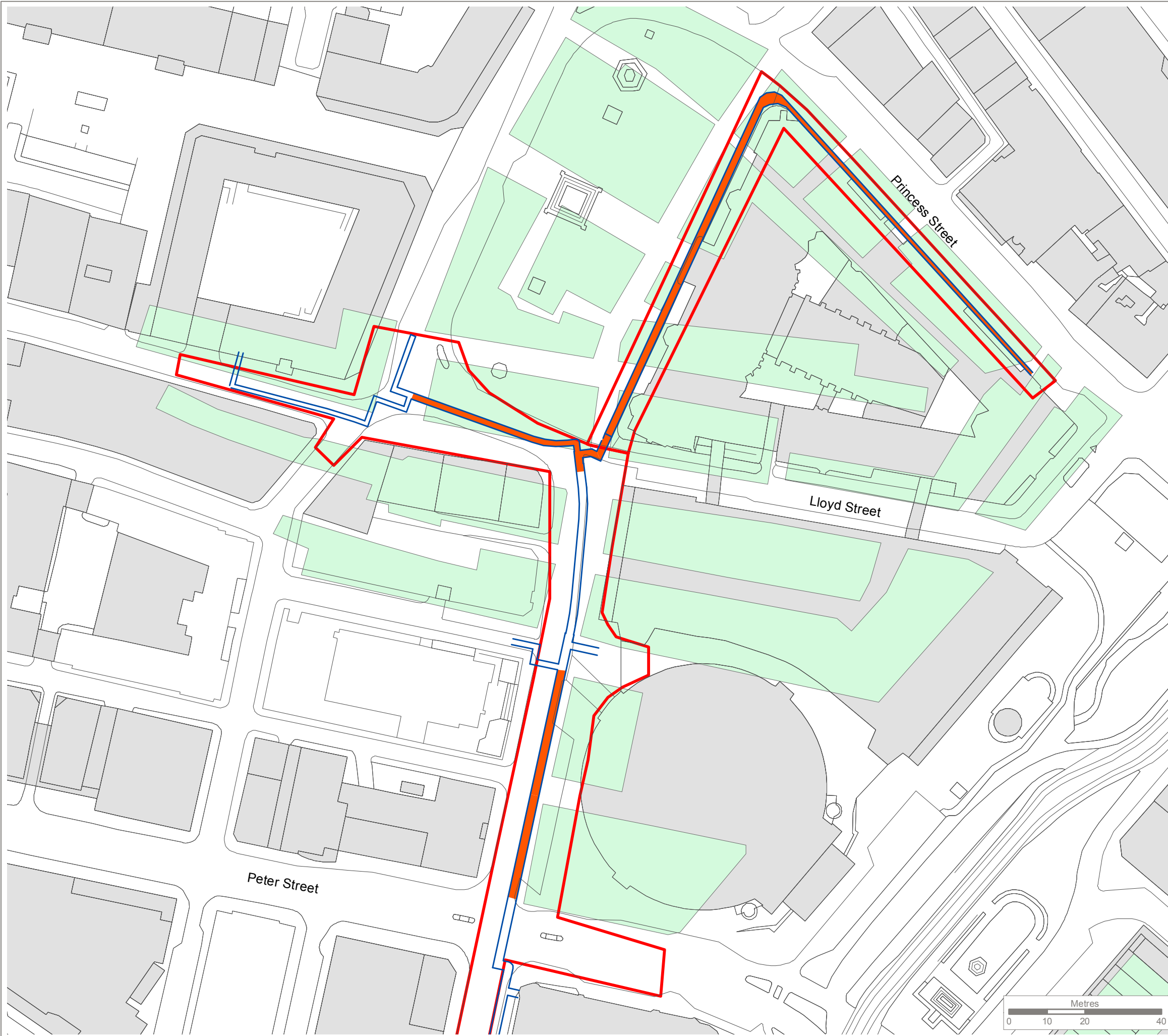
TEP | **THE ENVIRONMENT PARTNERSHIP**
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Leicester Road, Market Harborough, LE16 7SA
Tel 01858 353120 e-mail tep@tep.uk.com www.tep.uk.com

Project
Manchester Energy Network

Title
Targeted watching brief areas, Lower Moseley and Mount Street

Drawing Number
G7479.003

Drawn	Checked	Approved	Scale	Date
AB	SB	JC	1:1,000 @ A3	18/03/2019



KEY

- Development area
- Proposed trenching
- Targeted Watching Brief
- Former buildings seen on historic mapping

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Base mapping received from client

The inset map shows the location of the site within the city of Manchester, with labels for 'Police Station' and 'Library'.

Rev	Description	Drawn	Approved	Date

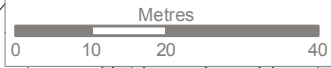
TEP | **THE ENVIRONMENT PARTNERSHIP**
No.1 The Chambers, Bowden Business Village
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Tel 01858 353120 e-mail tep@tep.uk.com www.tep.uk.com

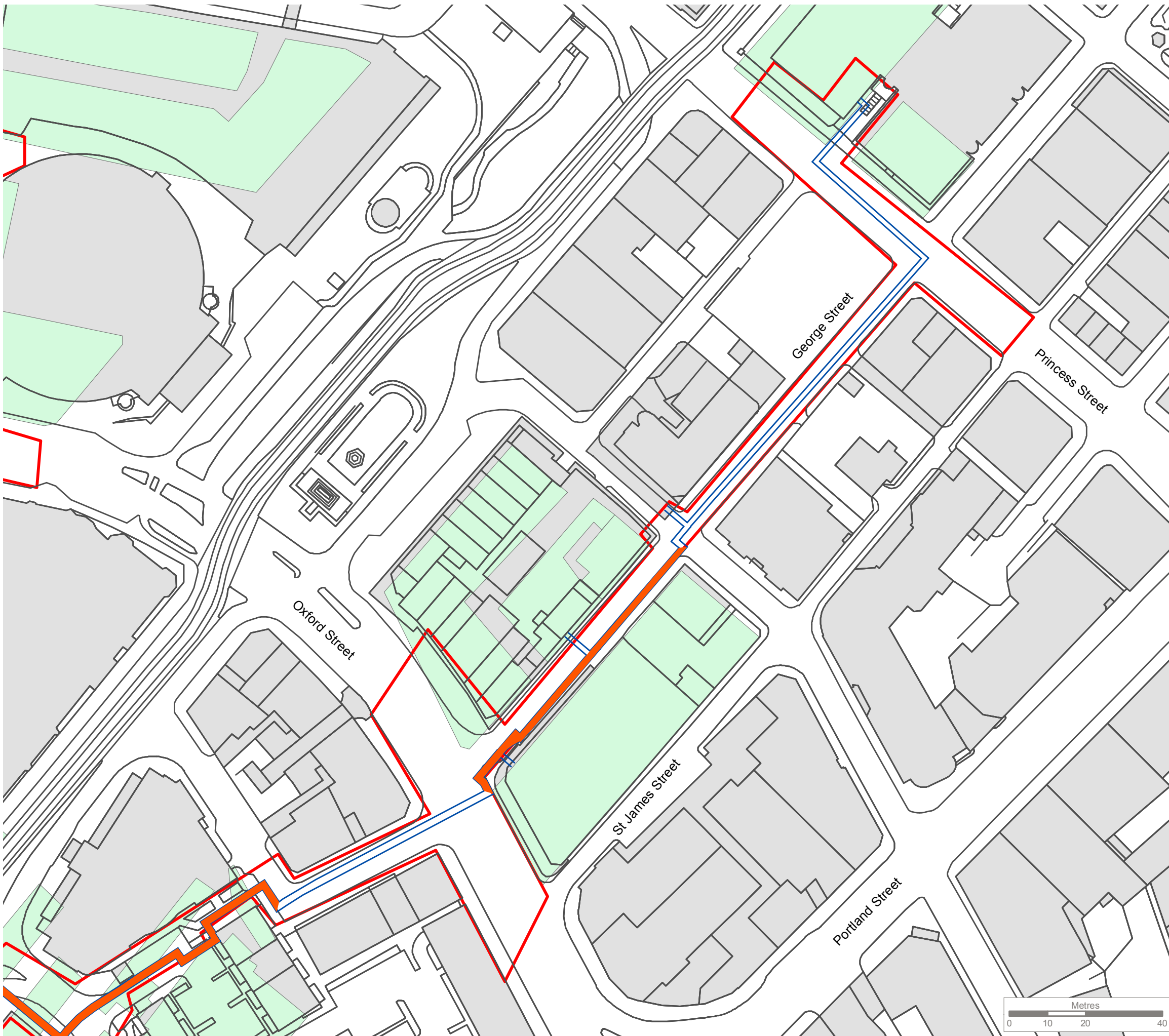
Project
Manchester Energy Centre

Title
Targeted watching brief areas, Lloyd Street, Mount Street, and Princess Street

Drawing Number
G7479.004

Drawn	Checked	Approved	Scale	Date
AB	SB	JC	1:1,000 @ A3	04/06/2019





KEY

- Development area
- Proposed trenching
- Targeted Watching Brief
- Former buildings seen on historic mapping

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Base mapping received from client

Rev	Description	Drawn	Approved	Date

THE ENVIRONMENT PARTNERSHIP

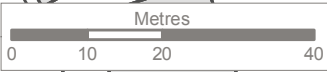
No.1 The Chambers, Bowden Business Village
Leicester Road, Market Harborough, LE16 7SA
Tel 01858 353120 e-mail tep@tep.uk.com www.tep.uk.com

Project
Manchester Energy Centre

Title
Targeted watching brief areas, George Street

Drawing Number
G7479.005

Drawn	Checked	Approved	Scale	Date
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NOTES

1. ALL SIGNS ARE AS PER CHAPTER 8.
2. DISTANCE BETWEEN SIGNS ARE NOT TO SCALE AND ARE FOR LAYOUT PURPOSES ONLY.
3. SIGNS SHOULD BE POSITIONED IN A SAFE WORKING SPACE.

KEY

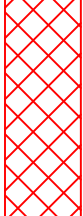
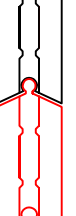
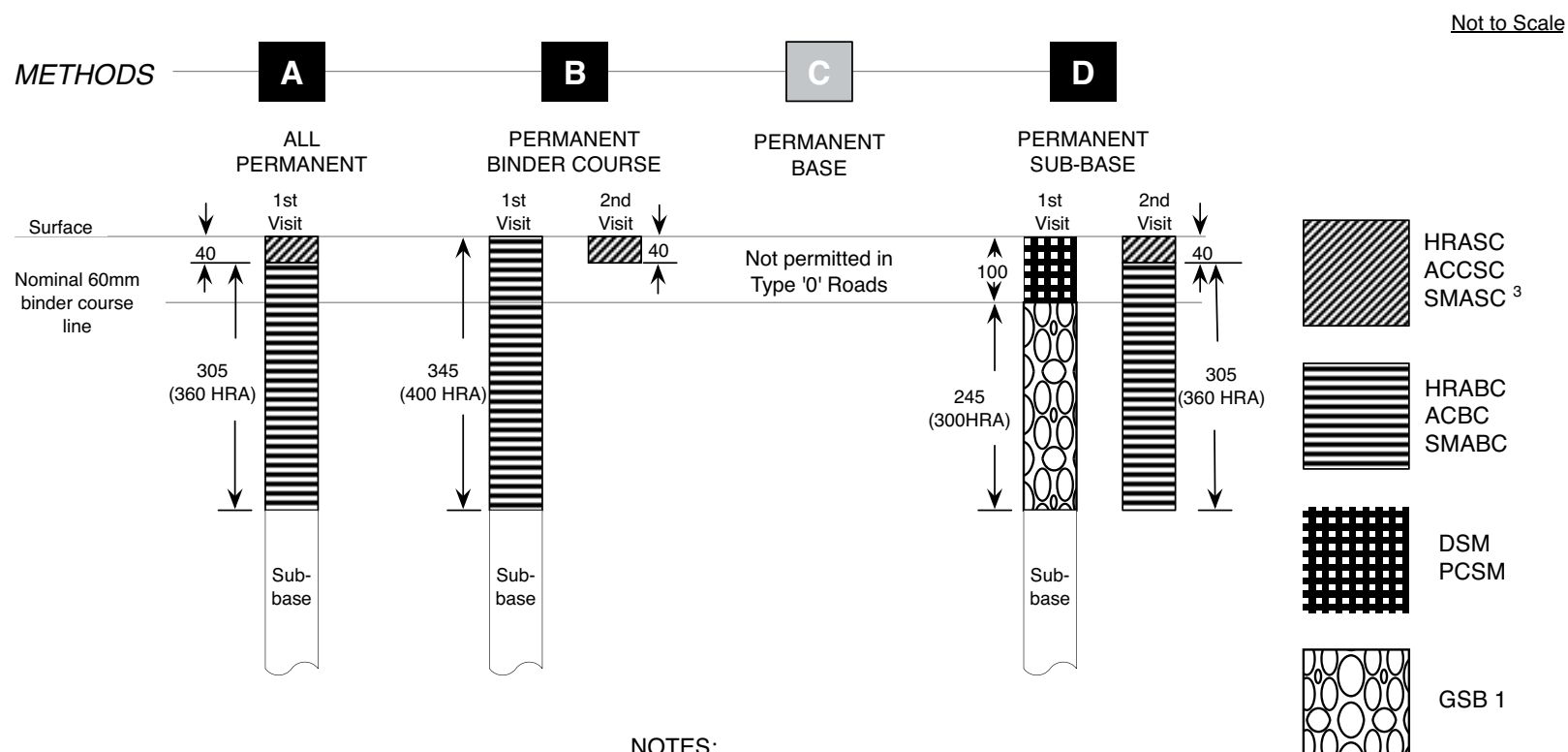
- | | |
|---|--------------------------------|
|  | SIGN POSITION AND DIRECTION |
|  | EXTENT OF ONE WAY ROAD CLOSURE |
|  | DIVERSION ROUTE |
|  | WORKING AREA |
|  | MASS BARRIER |
|  | HERRAS FENCE |



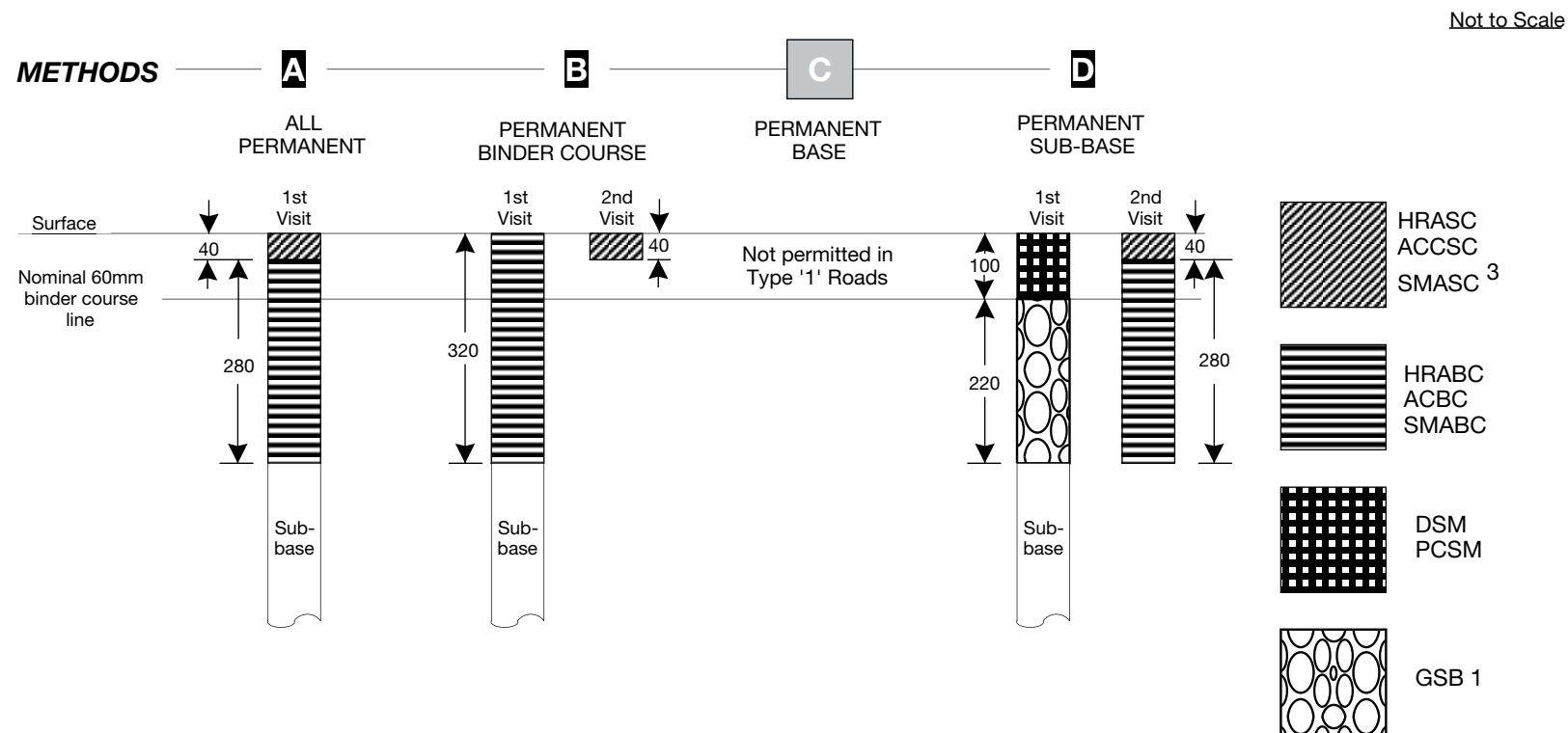
Figure A3.0 Flexible Roads Type – '0'

**NOTES:**

- 1). Sub-base in accordance with Appendix A3.5
- 2). For alternative reinstatement materials refer to Appendix A9
- 3). Where 10mm SMASC is used the thickness is reduced to 30mm and the binder course adjusted accordingly
- 4). Where HRABC is used the thickness is increased for all reinstatement methods to those indicated in the brackets, e.g. 360mm for combined Base/Binder Course for Method A

Appendix A3.0**Flexible Roads Type - '0'**

Figure A3.1 Flexible Roads Type – ‘1’



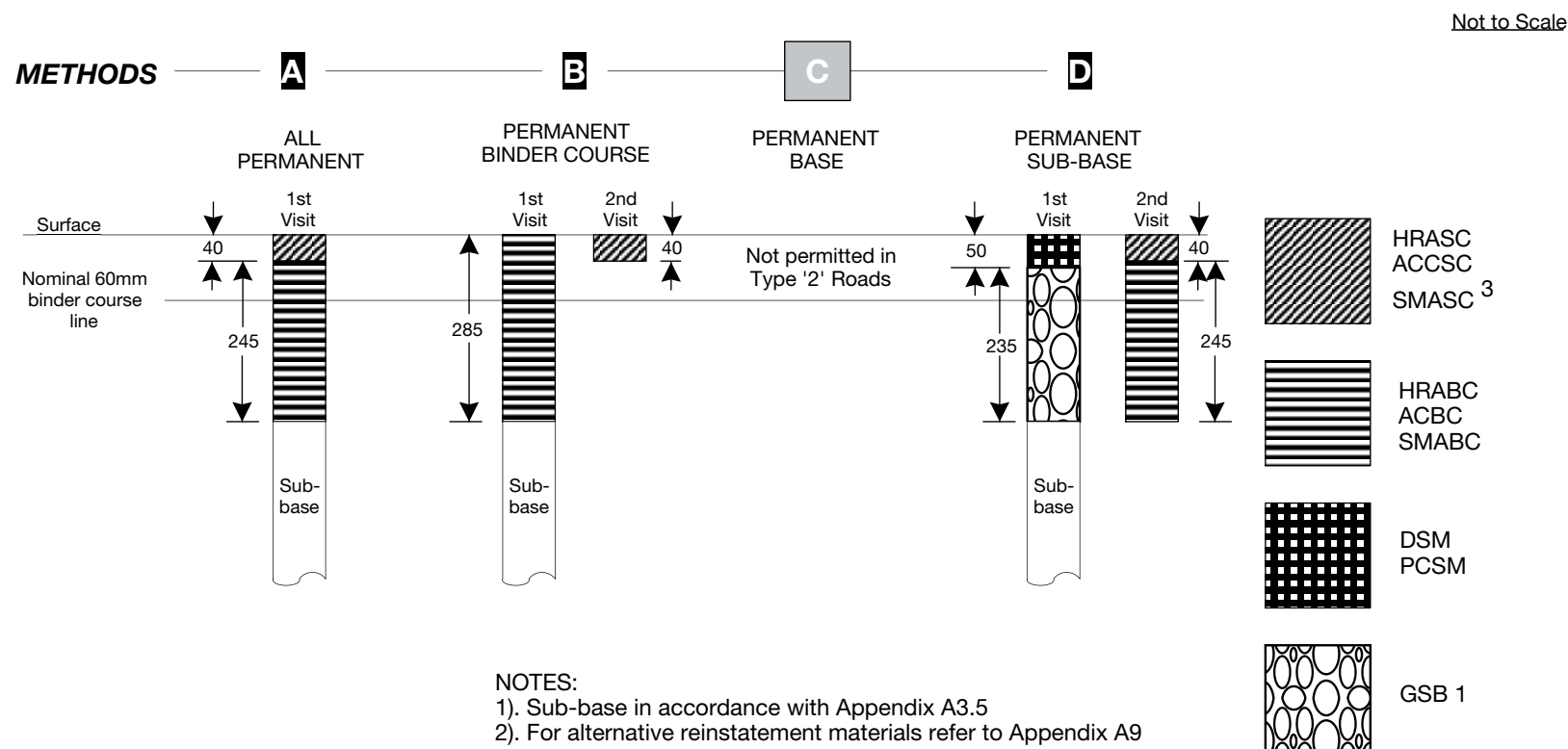
Appendix A3.1

Flexible Roads Type - '1'

NOTES:

- 1). Sub-base in accordance with Appendix A3.5
- 2). For alternative reinstatement materials refer to Appendix A9
- 3). Where 10mm SMASC is used the thickness is reduced to 30mm and the binder course adjusted accordingly

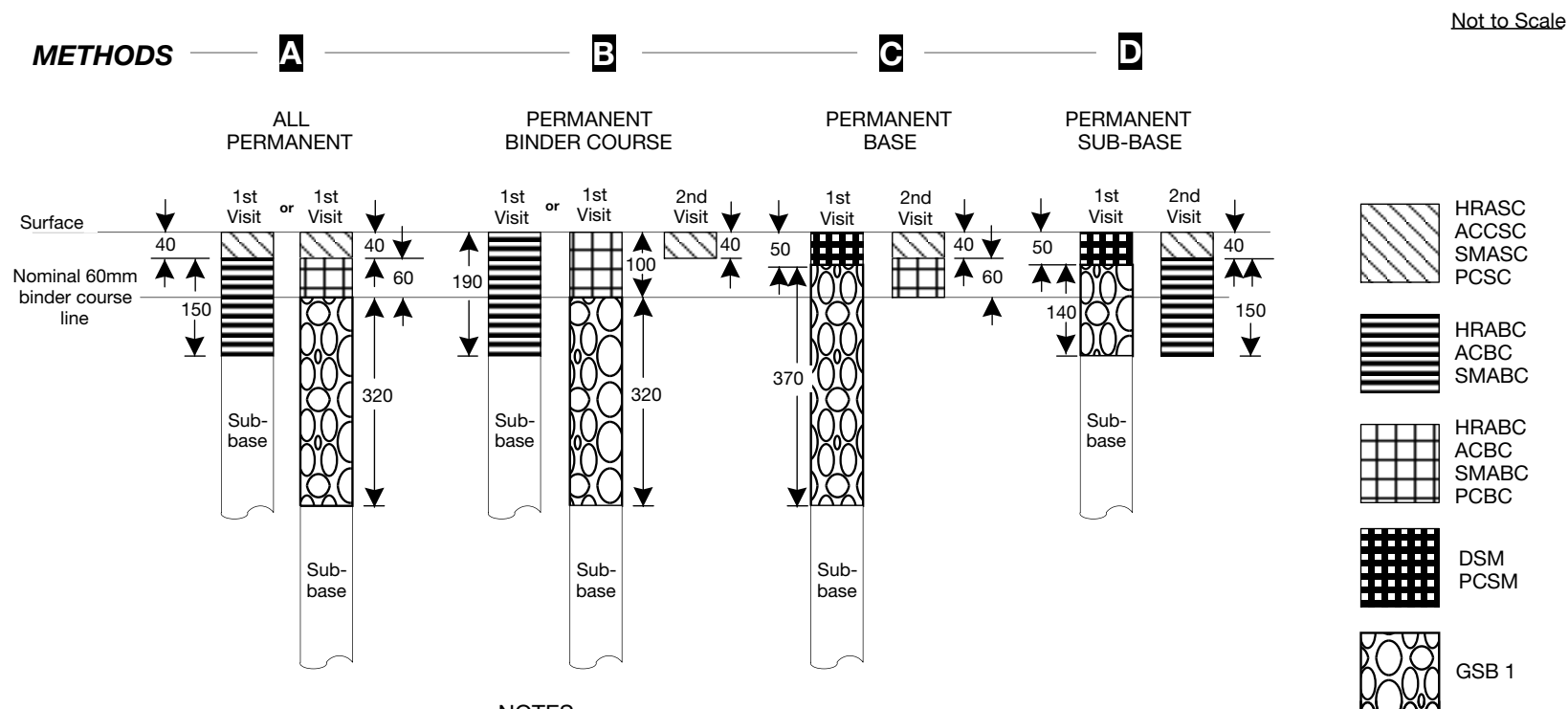
Figure A3.2 Flexible Roads Type – '2'

**NOTES:**

- 1). Sub-base in accordance with Appendix A3.5
- 2). For alternative reinstatement materials refer to Appendix A9
- 3). Where 10mm SMASC is used the thickness is reduced to 30mm and the binder course adjusted accordingly
- 4). Where a road has been constructed, by the Authority, to HD 26 design standards, and informs the Undertaker accordingly, the total asphalt thickness shall be increased to 320mm (assuming 100/150 pen) by the use of additional binder course material

Appendix A3.2**Flexible Roads Type - '2'**

Figure A3.3 Flexible Roads Type – ‘3’



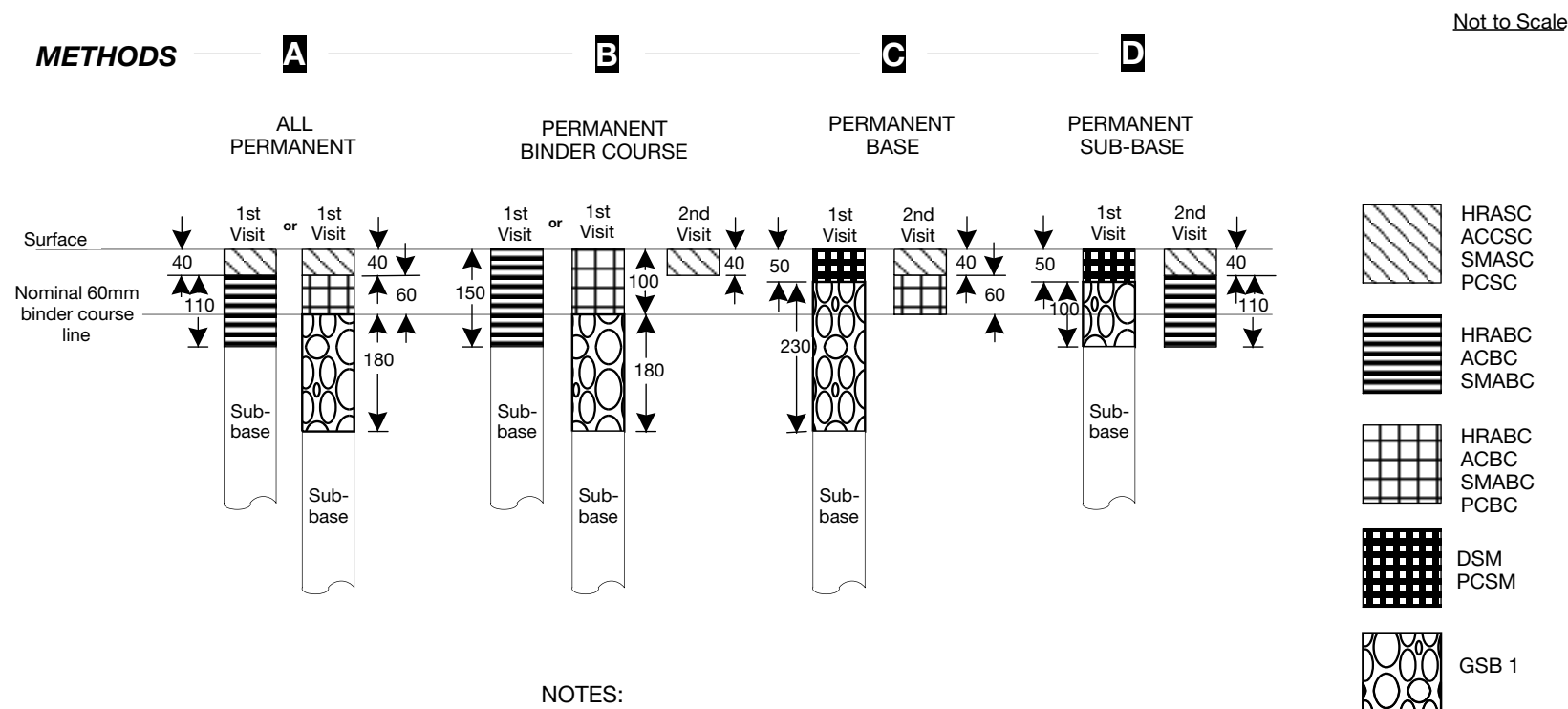
NOTES:

- 1). Sub-base in accordance with Appendix A3.5
- 2). For alternative reinstatement materials refer to Appendix A9
- 3). Where 10mm SMASC is used the thickness is reduced to 30mm and the binder course adjusted accordingly
- 4). Where a road has been constructed, by the Authority, to HD 26 design standards, and informs the Undertaker accordingly, the total asphalt thickness shall be increased to 250mm (assuming 100/150 pen) by the use of additional binder course material. In these circumstances the specified asphalt thickness may not be reduced by the additional sub base in accordance with s6.3

Appendix A3.3

Flexible Roads Type - '3'

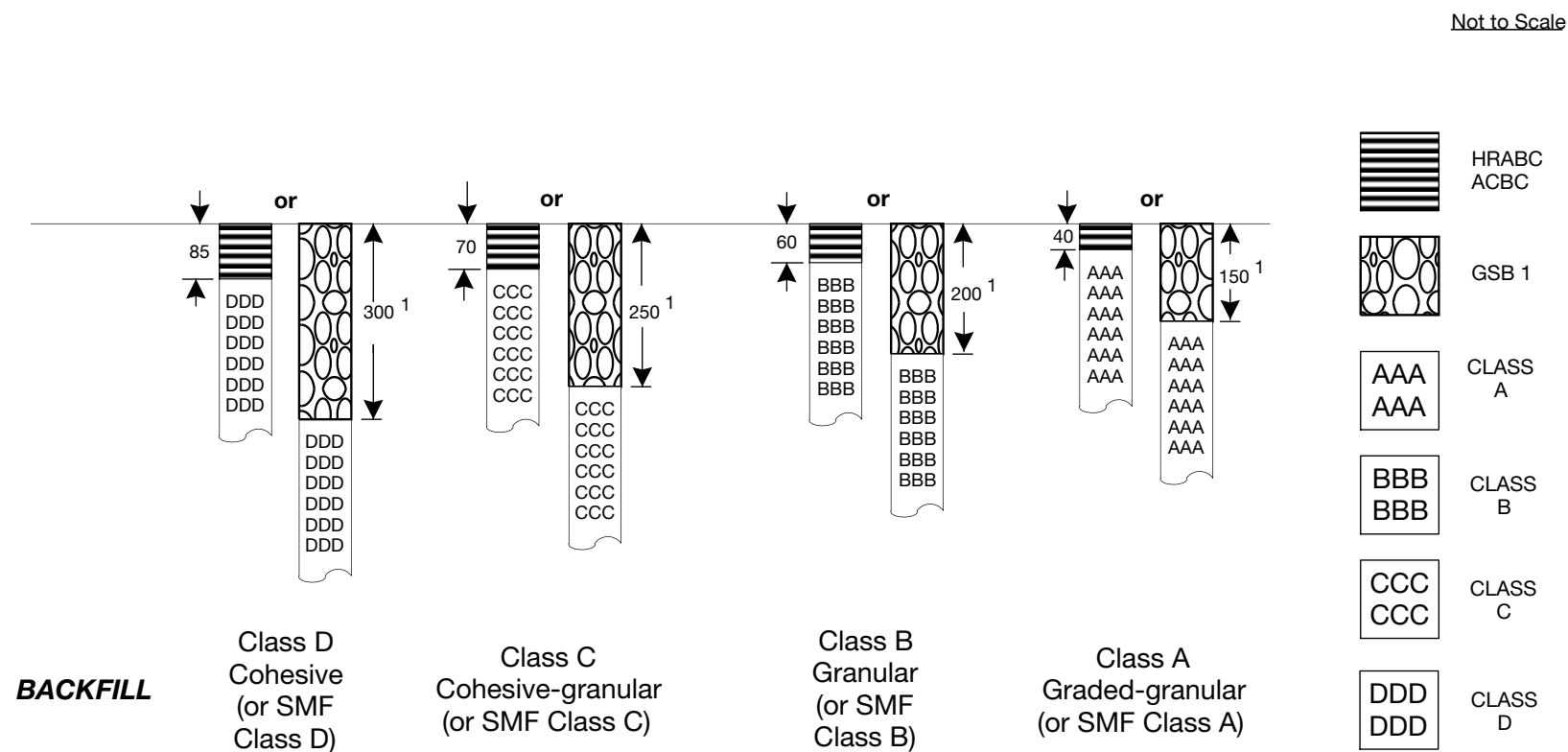
Figure A3.4 Flexible Roads Type – '4'

**NOTES:**

- 1). Sub-base in accordance with Appendix A3.5
- 2). For alternative reinstatement materials refer to Appendix A9
- 3). Where 10mm SMASC is used the thickness is reduced to 30mm and the binder course adjusted accordingly
- 4). Where a road has been constructed, by the Authority, to HD 26 design standards, and informs the Undertaker accordingly, the total asphalt thickness shall be increased to 200mm (assuming 100/150 pen) by the use of the additional binder course material. In these circumstances the specified asphalt thickness may not be reduced by the use of additional sub base in accordance with S6.3

Appendix A3.4**Flexible Roads Type - '4'**

Figure A3.5 Sub-base Construction – Flexible Roads



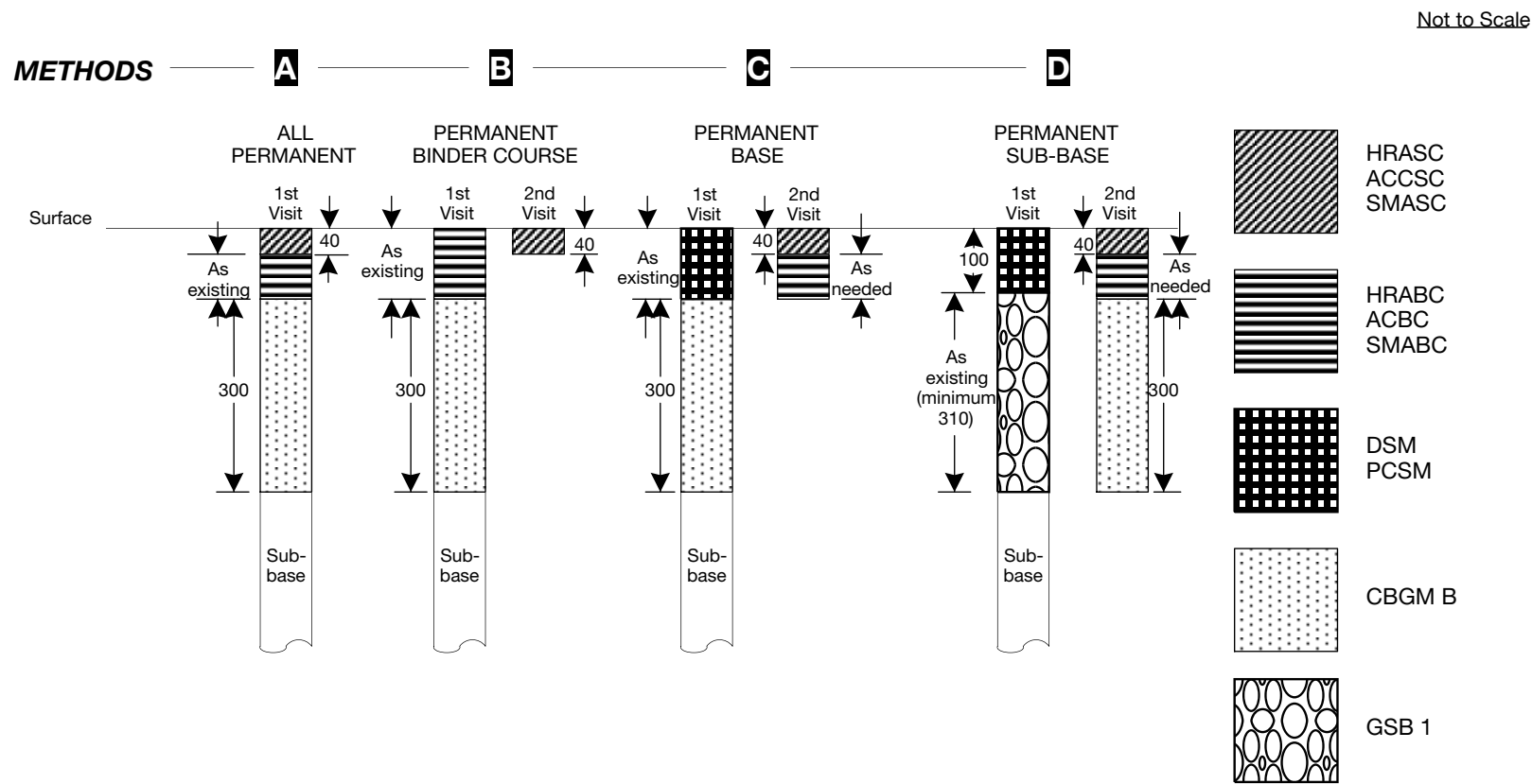
Appendix A3.5

Sub-base Construction - Flexible Roads

NOTES:

- 1). Class A Graded-granular material is permitted alternative
- 2). In addition to SMF classes A to D, for other alternative reinstatement materials refer to Appendix A9

Figure A4.0 Composite Roads Type – ‘0’



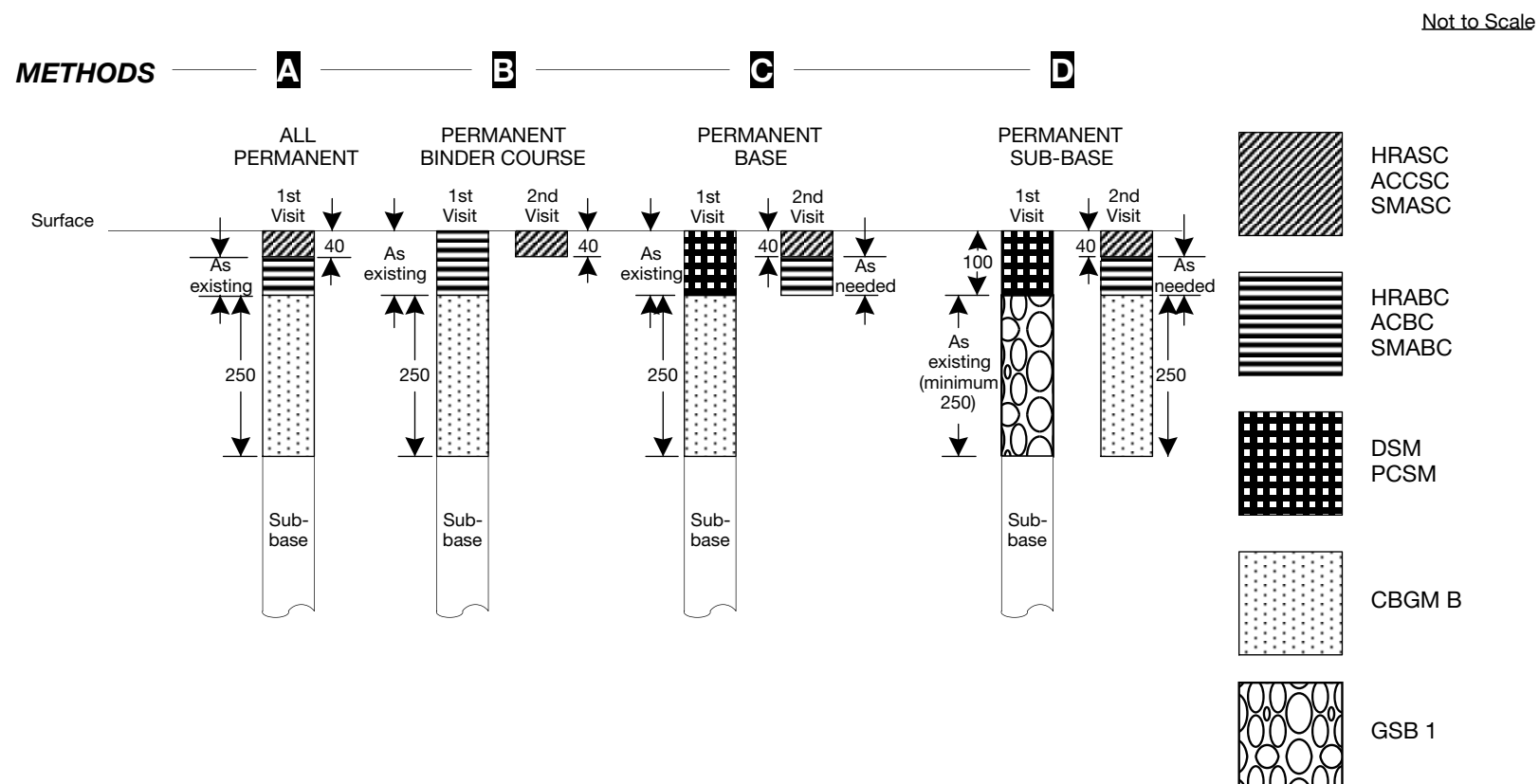
Appendix A4.0

Composite Roads Type - '0'

NOTES:

- 1). Sub-base in accordance with Appendix A4.4
- 2). For alternative reinstatement materials refer to Appendix A9

Figure A4.1 Composite Roads Type – '1'



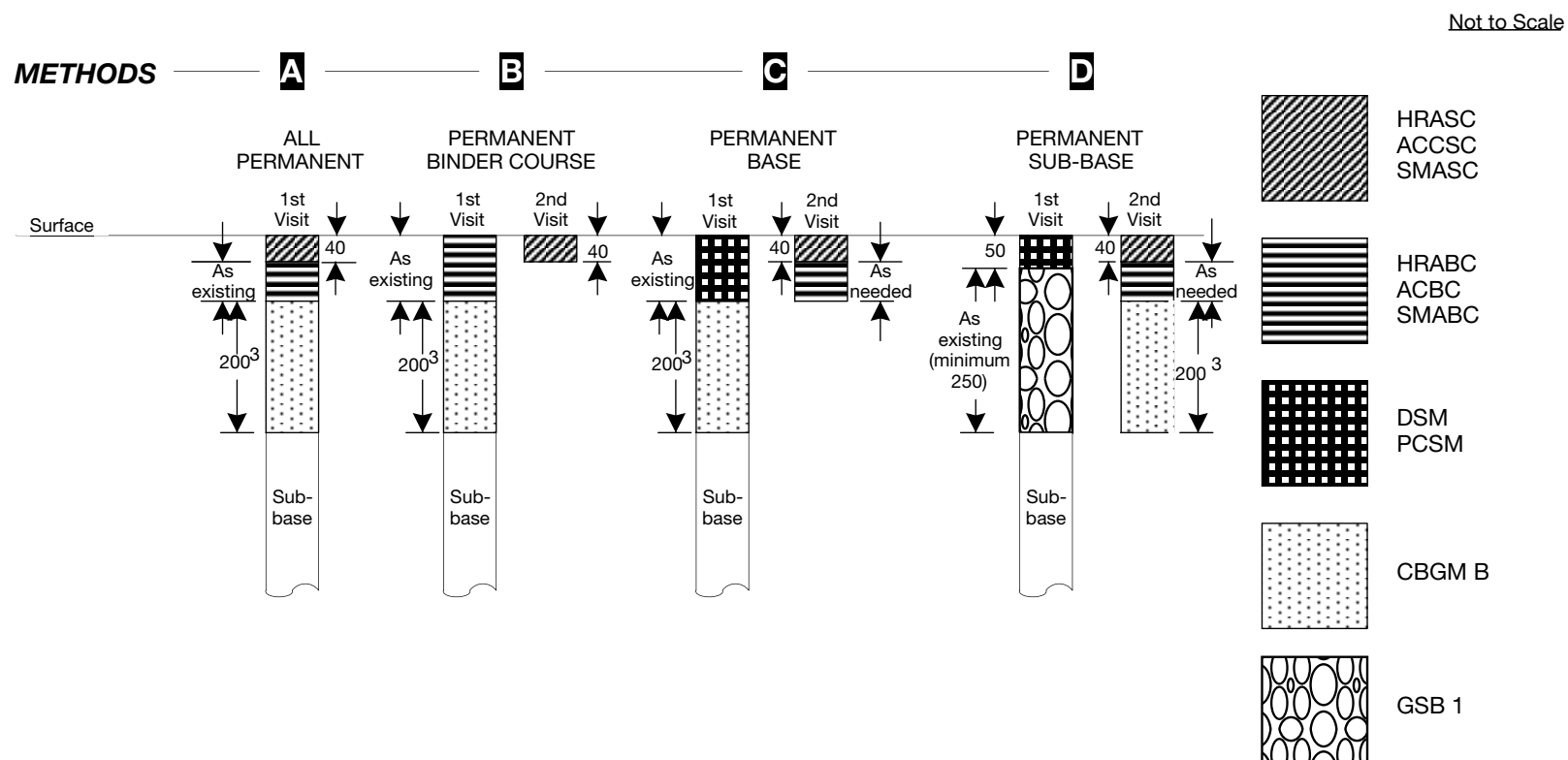
Appendix A4.1

Composite Roads Type - '1'

NOTES:

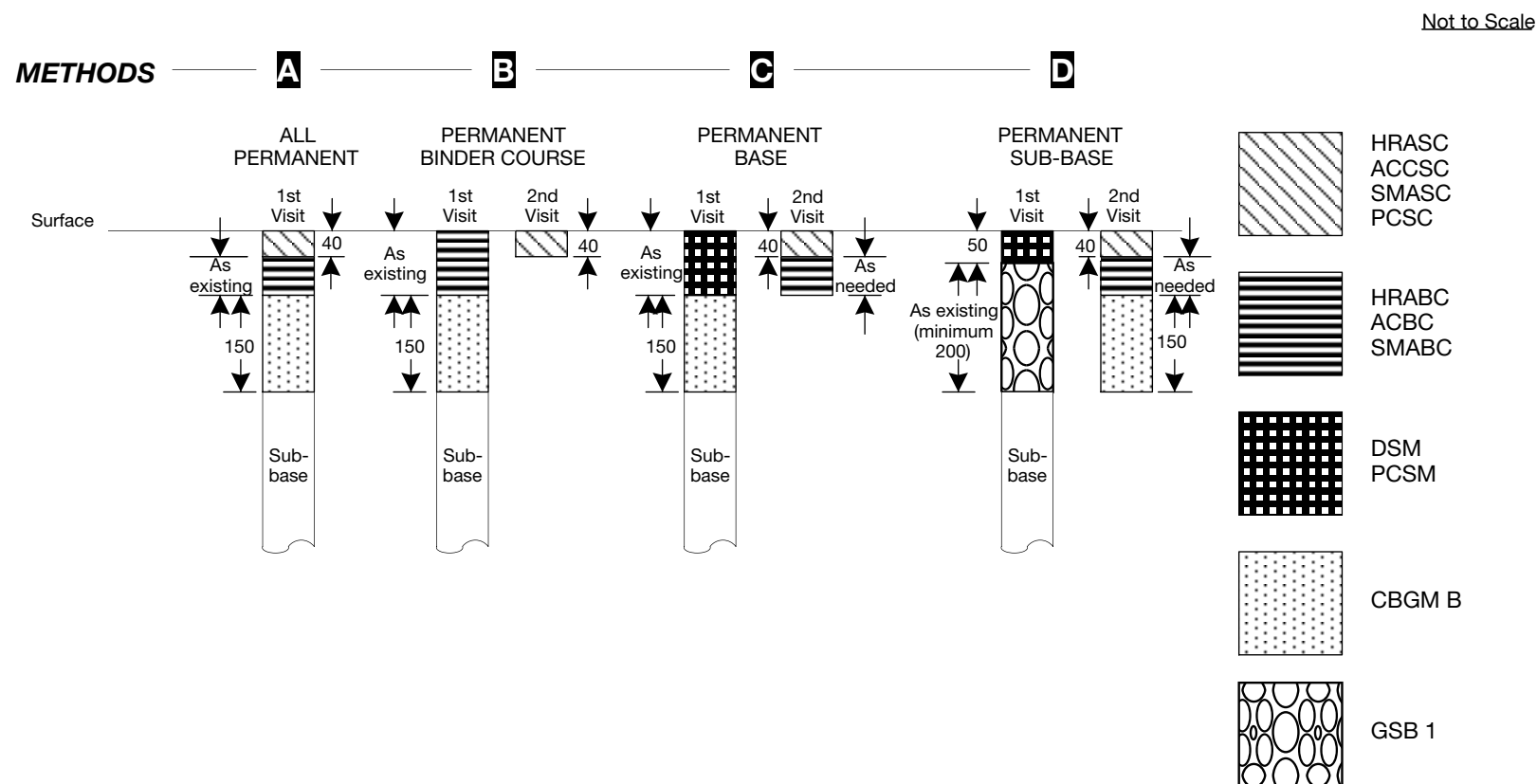
- 1). Sub-base in accordance with Appendix A4.4
- 2). For alternative reinstatement materials refer to Appendix A9

Figure A4.2 Composite Roads Type – '2'

**Appendix A4.2****Composite Roads Type - '2'****NOTES:**

- 1). Sub-base in accordance with Appendix A4.4
- 2). For alternative reinstatement materials refer to Appendix A9
- 3). Roadbase to be 250mm thick if existing exceeds 200mm

Figure A4.3 Composite Roads Type – ‘3 & 4’



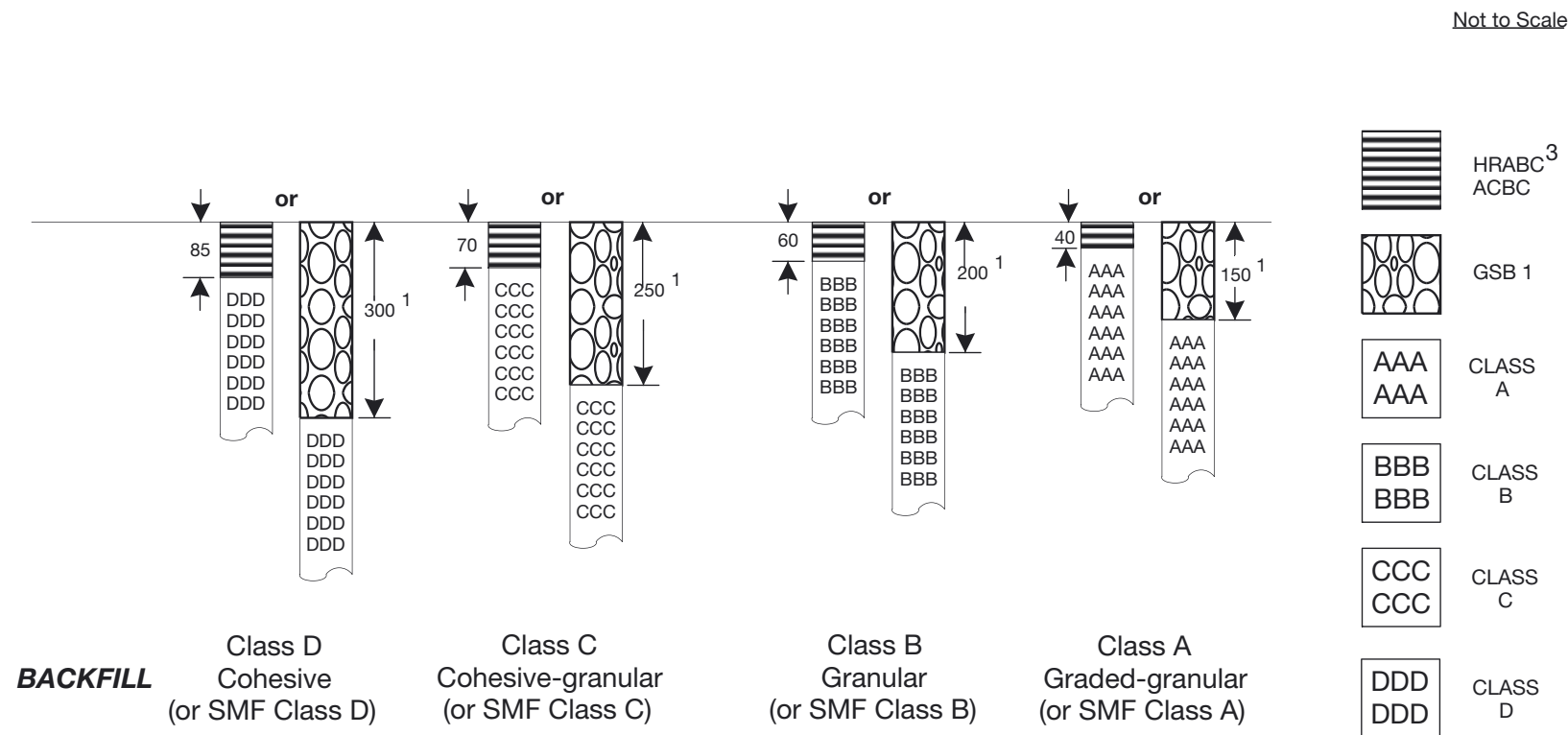
Appendix A4.3

Composite Roads Type - '3' & '4'

NOTES:

- 1). Sub-base in accordance with Appendix A4.5
- 2). For alternative reinstatement materials refer to Appendix A9

Figure A4.4 Sub-base Construction – Composite Roads – Types ‘0’, ‘1’ & ‘2’



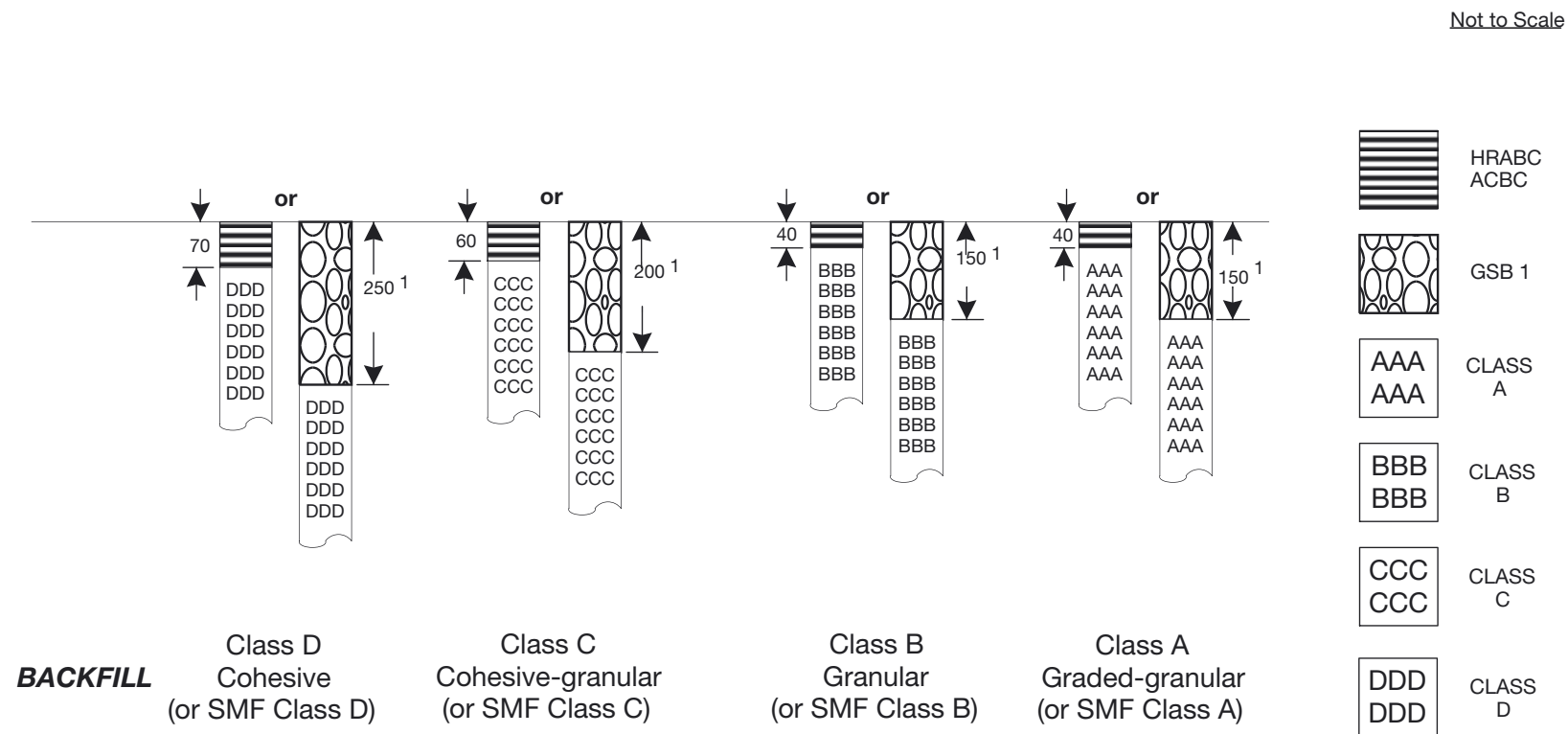
Appendix A4.4

Sub-base Construction - Composite Roads - Types '0', '1' & '2'

NOTES:

- 1). Class A Graded-granular material is permitted alternative
- 2). In addition to SMF classes A to D, for other alternative. reinstatement materials refer to Appendix A9

Figure A4.5 Sub-base Construction – Composite Roads – Types ‘3 & 4’



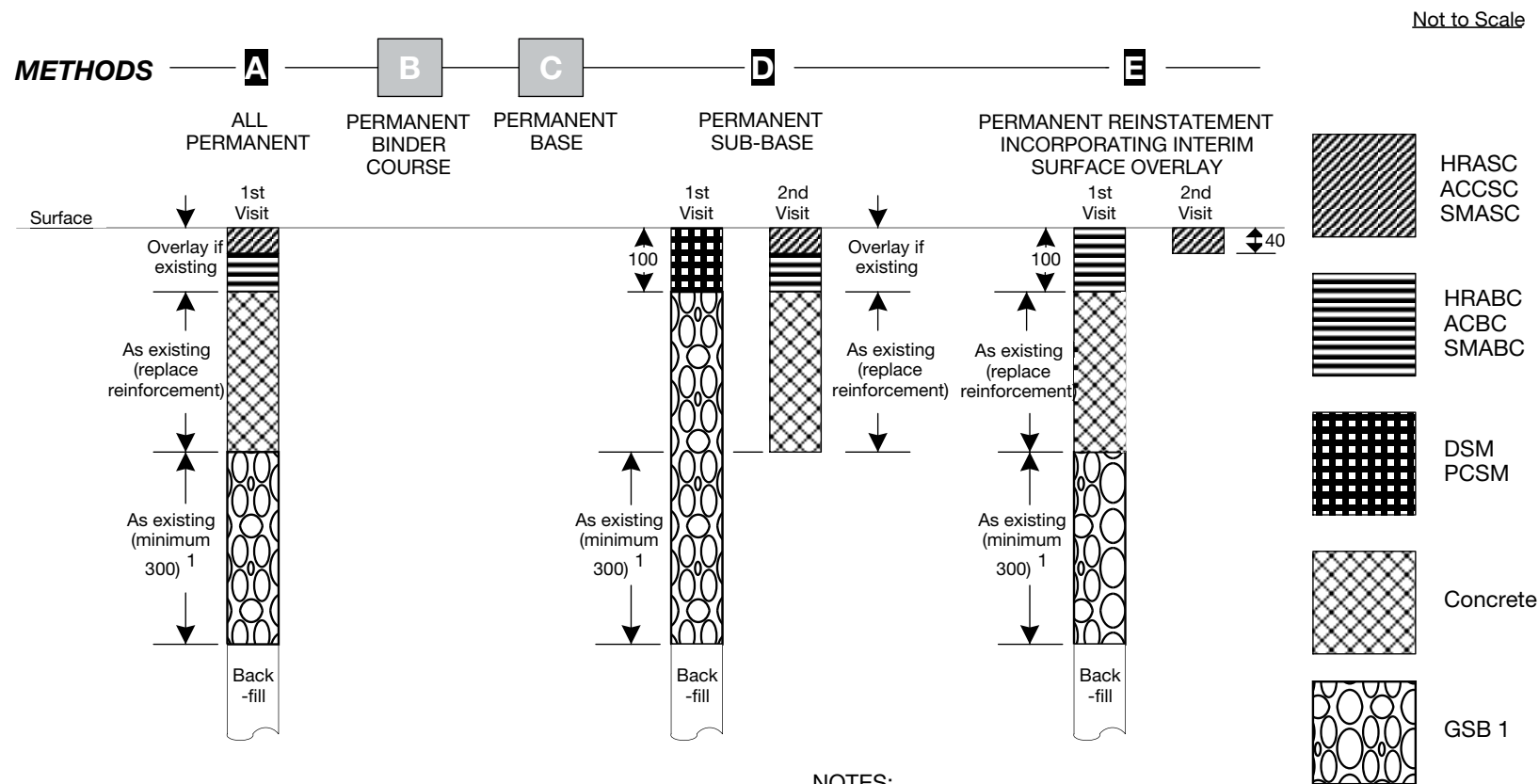
Appendix A4.5

Sub-base Construction - Composite Roads - Types '3' & '4'

NOTES:

- 1). Class A Graded-granular material is permitted alternative
- 2). In addition to SMF classes A to D, for other alternative. reinstatement materials refer to Appendix A9

Figure A5.0 Rigid Roads Type – ‘0’

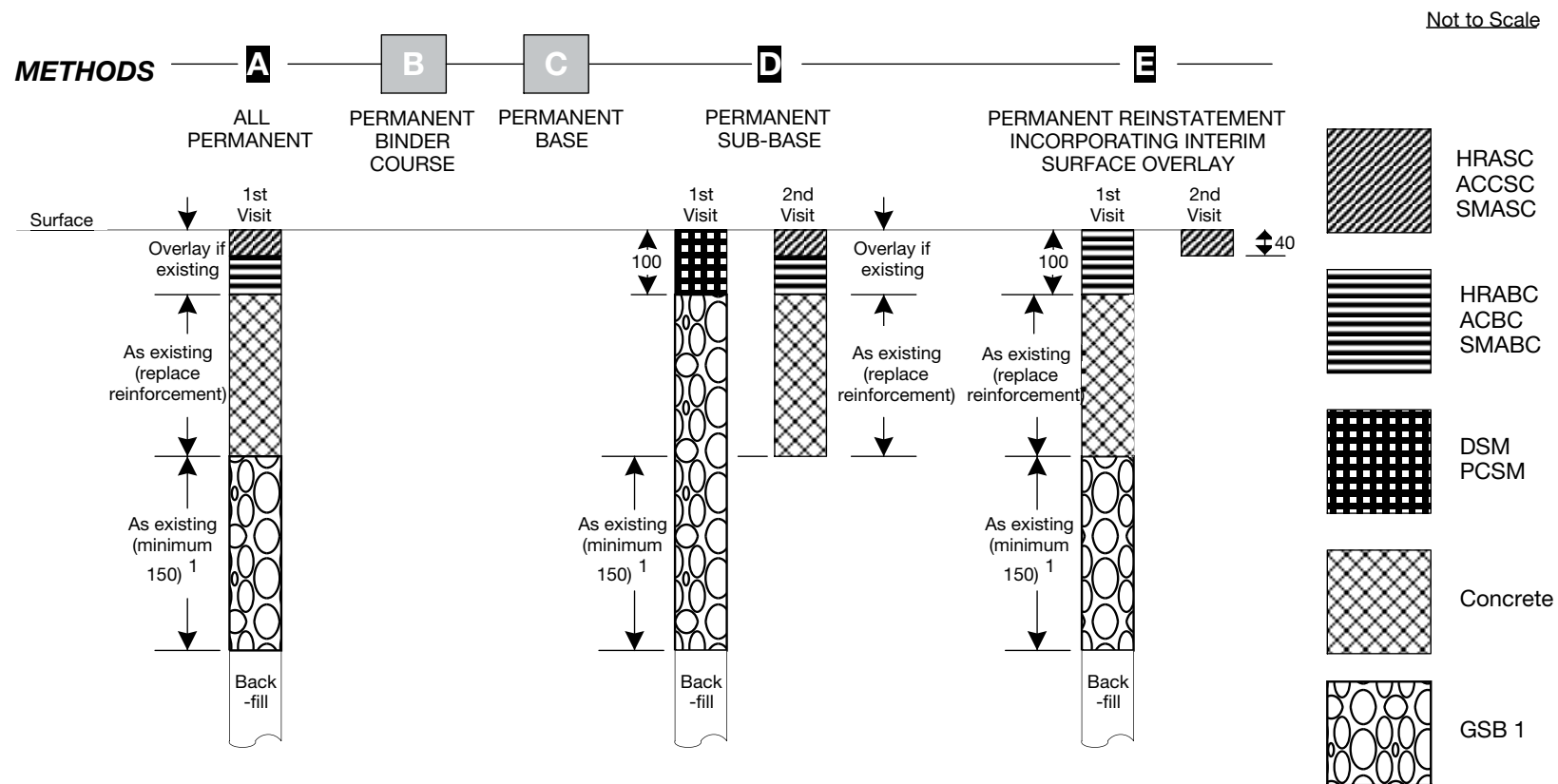


Appendix A5.0

Rigid Roads Type - '0'

- NOTES:
- 1). CBGM B if existing
 - 2). For alternative reinstatement materials refer to Appendix A9
 - 3). Method E – Permanent Reinstatement incorporating interim surface overlay is only a reinstatement method option for rigid roads

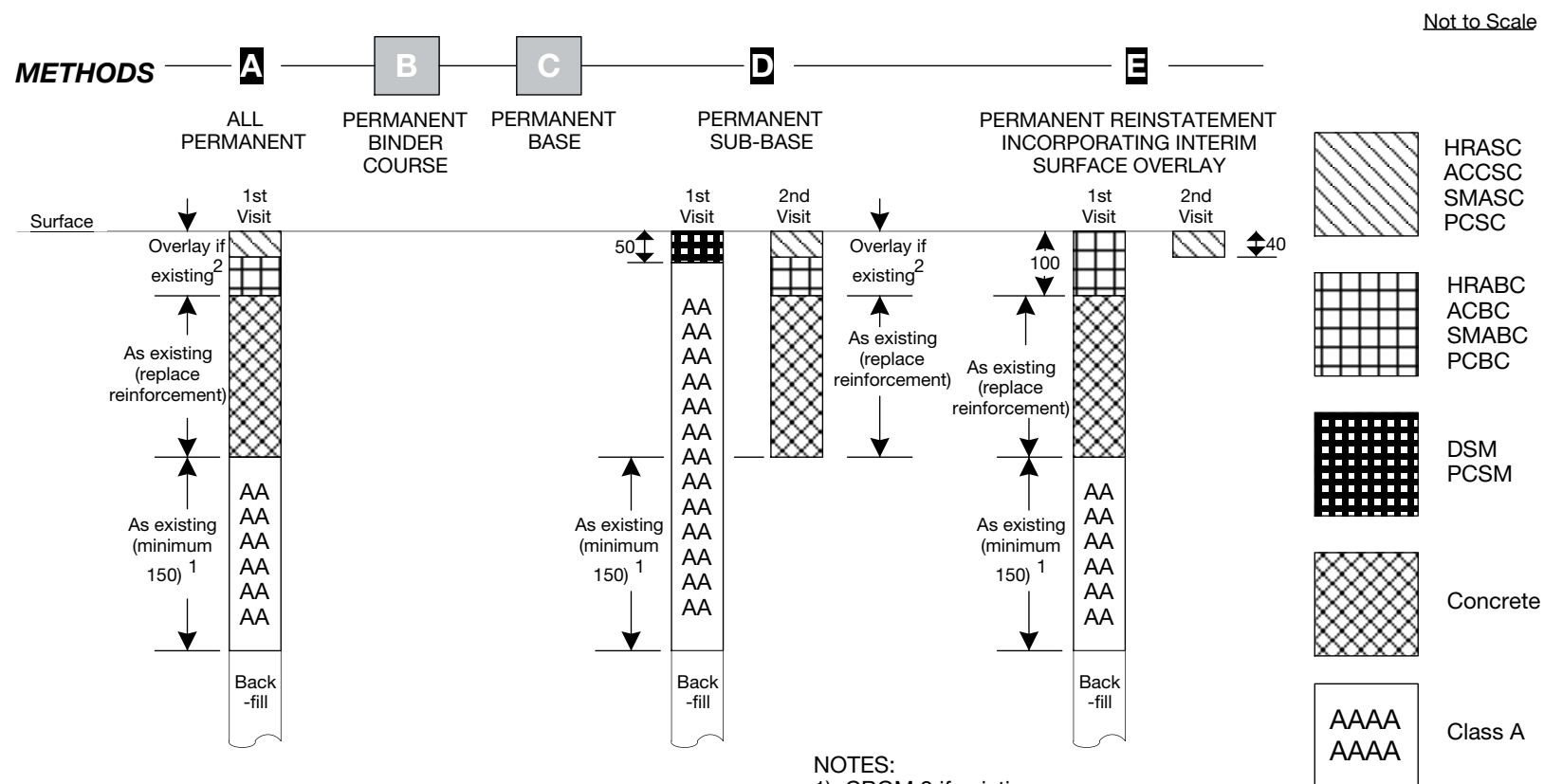
Figure A5.1 Rigid Roads Type – '1'



Appendix A5.1
Rigid Roads Type - '1'

- NOTES:
- 1). CBGM B if existing
 - 2). For alternative reinstatement materials refer to Appendix A9
 - 3). Method E – Permanent Reinstatement incorporating interim surface overlay is only a reinstatement method option for rigid roads

Figure A5.2 Rigid Roads Type – '2', '3' & '4'

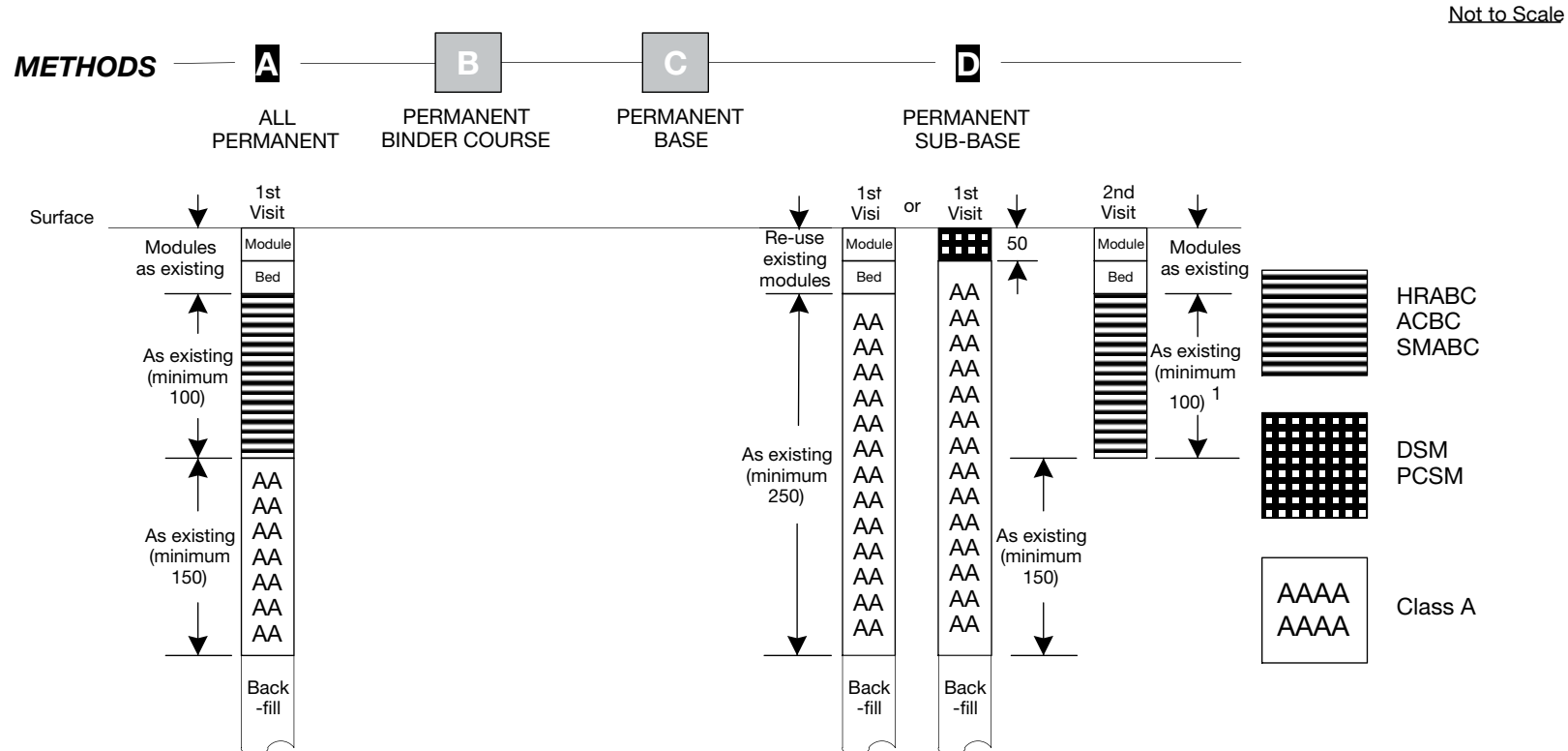


NOTES:

- 1). CBGM 3 if existing
- 2). PCSC & PCBC not permitted in Type 2 roads
- 3). For alternative reinstatement materials refer to Appendix A9
- 4). Method E – Permanent Reinstatement incorporating interim surface overlay is only a reinstatement method option for rigid roads

Appendix A5.2**Rigid Roads Type - '2', '3' & '4'**

Figure A6.1 Modular Roads (Bituminous Base) Types – ‘3 & 4’



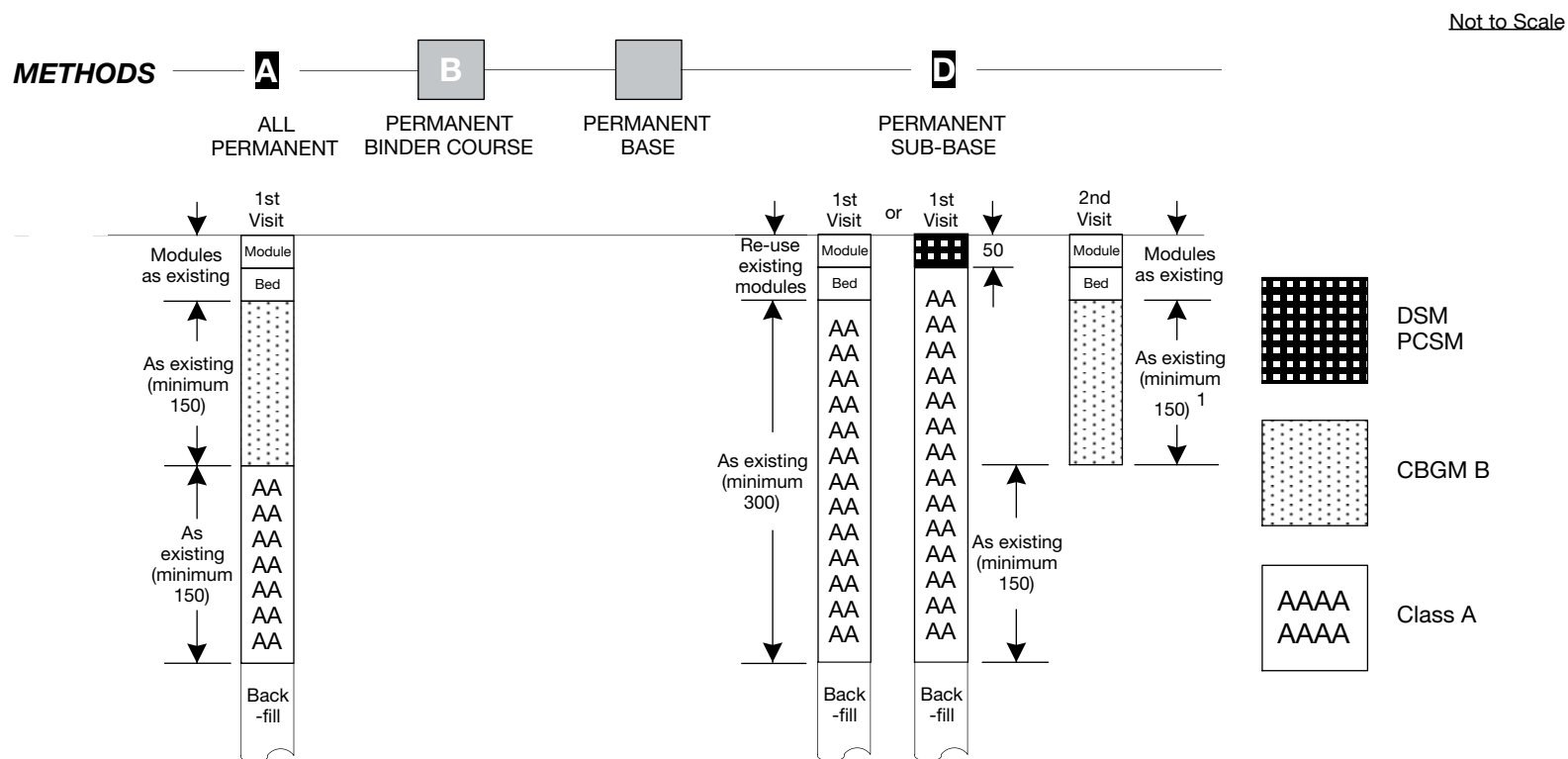
Appendix A6.1

Modular Roads (Bituminous Base) Types - '3' & '4'

NOTES:

- 1). May be permanently reinstated on the first visit
2). For alternative reinstatement materials refer to Appendix A9

Figure A6.2 Modular Roads (Composite Base) Types – '3 & 4'



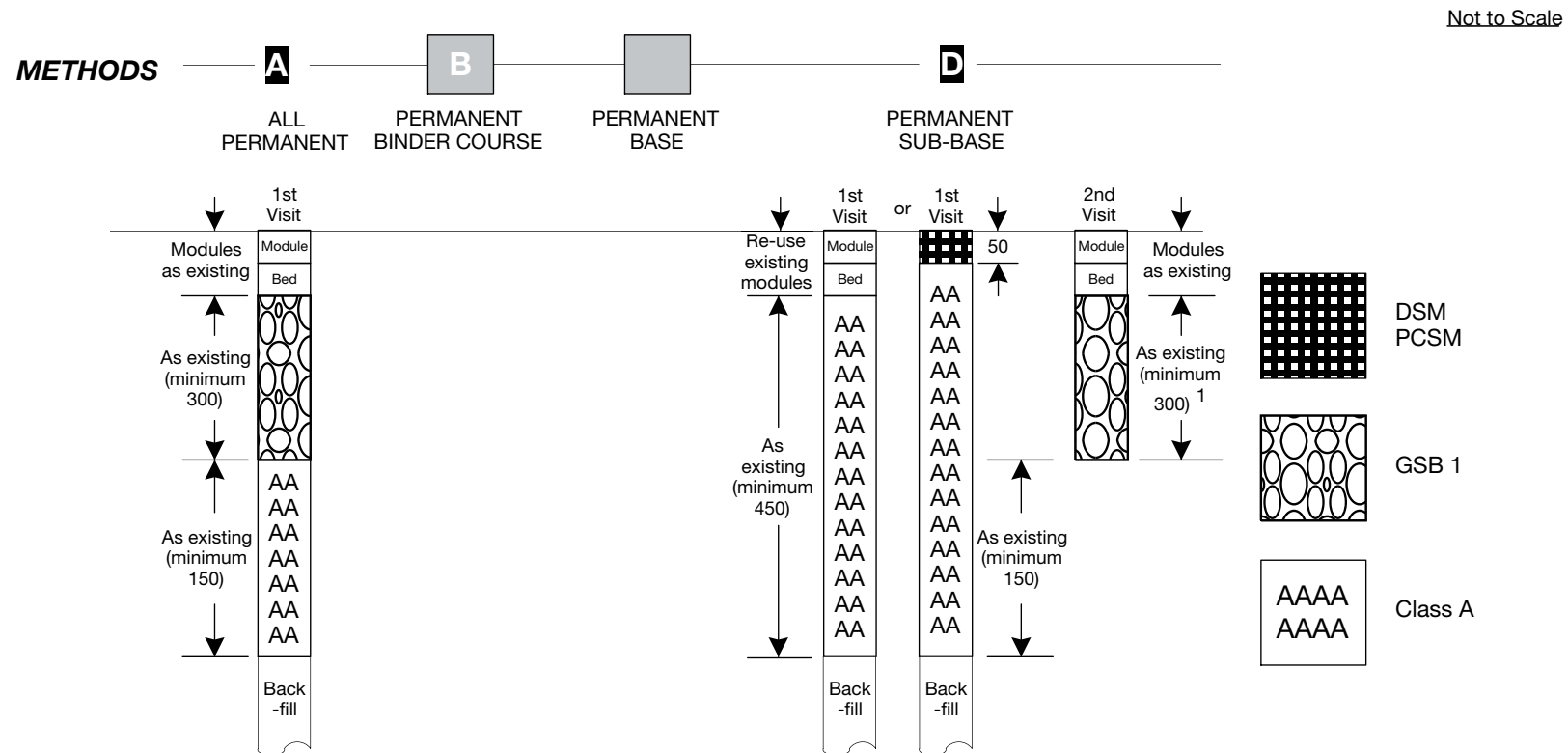
Appendix A6.2

Modular Roads (Composite Base) Types - '3' & '4'

NOTES:

- 1). May be permanently reinstated on the first visit
- 2). For alternative reinstatement materials refer to Appendix A9

Figure A6.3 Modular Roads (Granular Base) Types – '3 & 4'



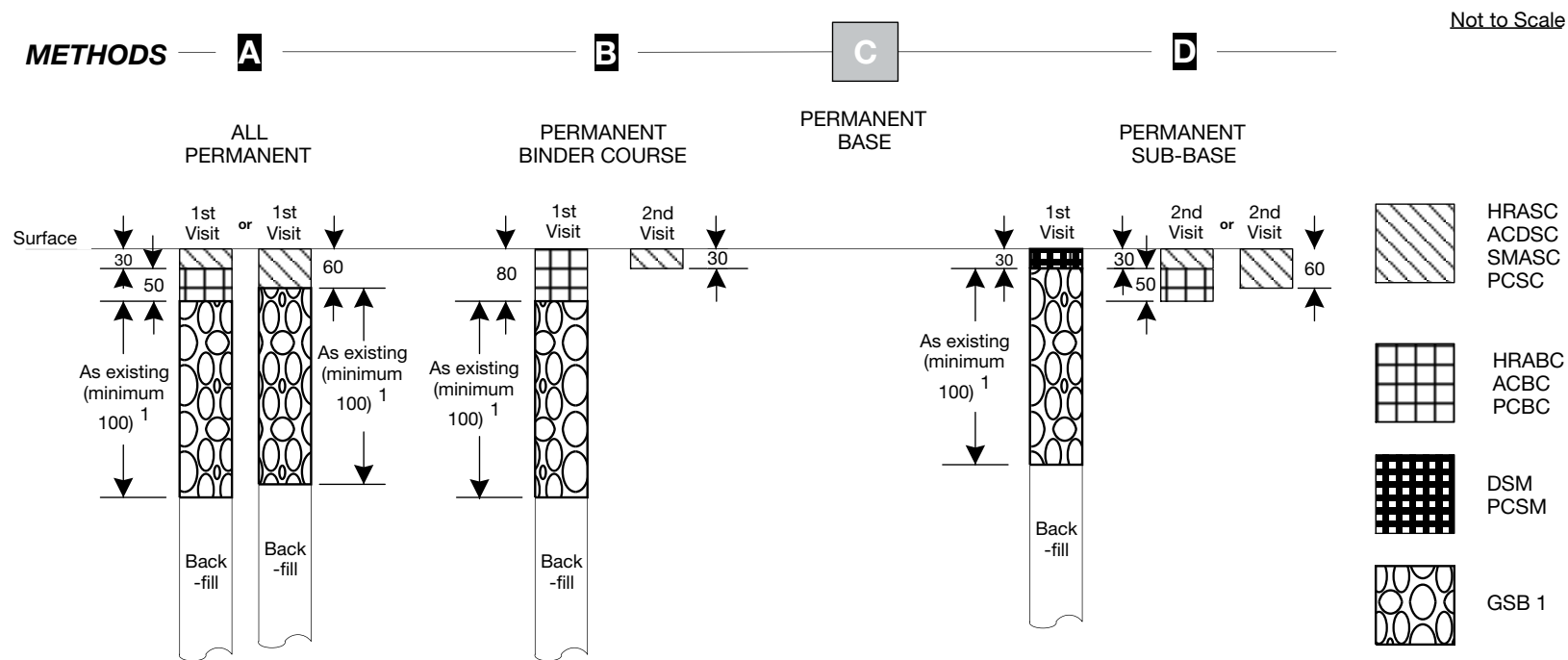
Appendix A6.3

Modular Roads (Granular Base) Types - '3' & '4'

NOTES:

- 1). May be permanently reinstated on the first visit
- 2). For alternative reinstatement materials refer to Appendix A9

Figure A7.1 Flexible Footways, Footpaths and Cycle Tracks

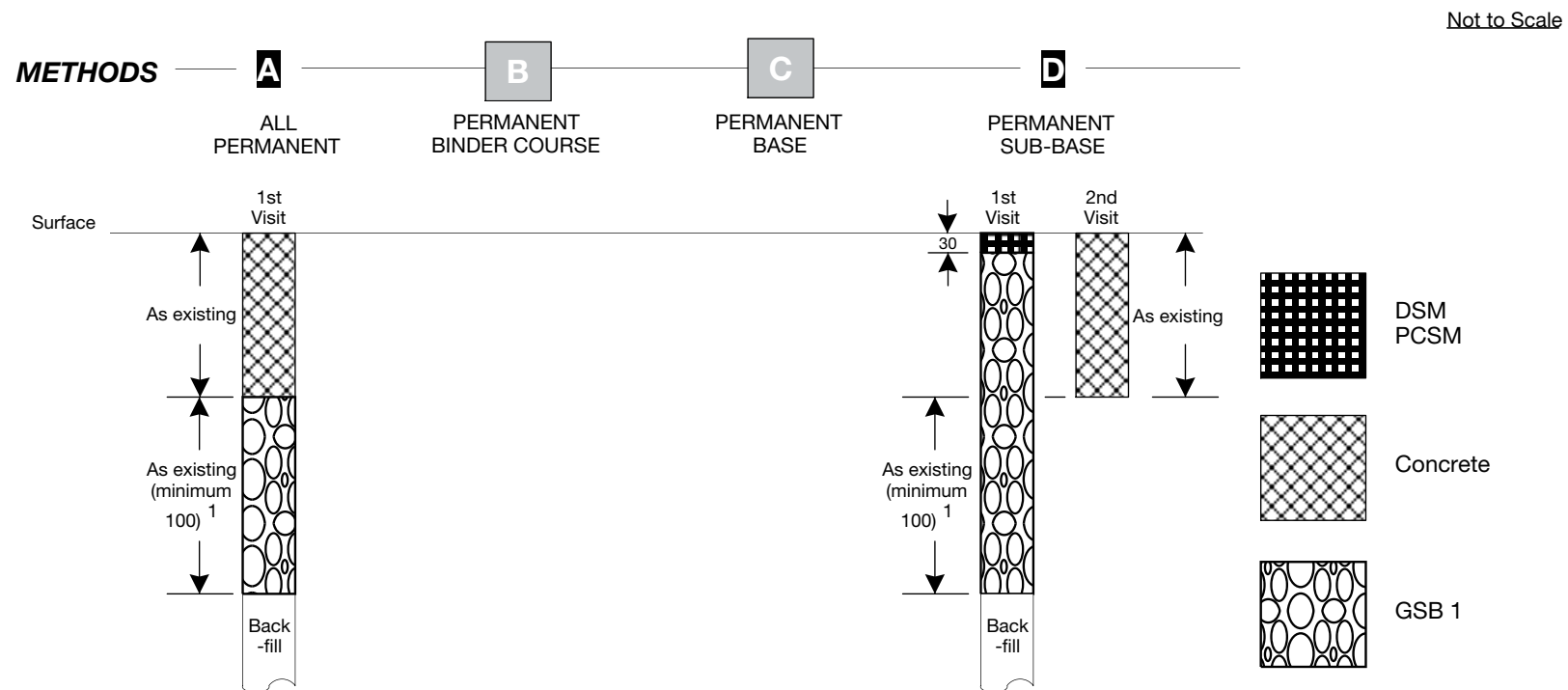


Appendix A7.1

Flexible Footways, Footpaths and Cycle Tracks

- NOTES:
- 1). Class A Graded-granular is a permitted alternative
 - 2). For alternative reinstatement materials refer to Appendix A9

Figure A7.2 Rigid Footways, Footpaths and Cycle Tracks



Appendix A7.2

Rigid Footways, Footpaths and Cycle Tracks

NOTES:

- 1). Class A Graded-granular is a permitted alternative
- 2). For alternative reinstatement materials refer to Appendix A9