

Fusion, Deansgate

PROOF OF EVIDENCE

Tree Planting Feasibility Report

GM11393

08.03.22



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1.0 EXPERIENCE

My name is James Dalrymple, and I am the senior Technical Advisor at GreenBlue Urban Ltd. have been advising on urban tree planting projects for over 20 years.

Over the last two decades, I have been involved with the detailed design of the structural aspects of the patented RootSpace system working in collaboration with material engineers and independent load test laboratories. I was a member of the British Standard steering group for the recently completed PAS115 which specifies the requirements for the recovery of growing media and soil amendments through recovery from road sweepings and inert gully waste.

I currently sit on the new BS8640 steering group for structural soils. I have advised on city centre tree planting projects across almost all of the major cities within the UK ranging from the wind mitigation project at 'Hale Wharf' in Tottenham to the major 'Avenues' project on Sauchiehall Street in central Glasgow.

Major success stories such as the St Peter's Square project in Manchester has led me to also give detailed design advice to the team working on the refurbishment of Albert Square which is being installed currently

I have experience of working internationally having been involved with major urban greening projects both in North America, Europe, and the Middle East. I supplied text and illustrations which were included within United Utilities document ref: 'Standard Conditions for Works Adjacent to Pipelines' Document ref. 90048 Issue 3.1. Section 6 refers.

GreenBlue Urban has unparalleled global experience with the successful installation of trees within highly constrained urban areas. There would be almost no scenario that we have not experienced. Ranging from the arid climates of Dubai to the Northern environments of Northern Canada and Scandinavia. GreenBlue Urban have over one hundred published case studies viewable on our website. We have published two unique documents 1) Utilities & RootSpace Guide and 2) Urban Trees, Highways & Utilities.

DECLARATION

The evidence that I have prepared and provided for this appeal is true and I confirm that the opinions expressed are my true and professional opinions.



2.0 PROOF OF EVIDENCE

In this Proof of Evidence I respond to Manchester City Council's refusal of planning permission on the grounds outlined in point 6 below:

In particular, I respond to the Council's Statement of Case (CD-C4) points on need:

6) The proposed building by reason of its scale, massing and height would have a detrimental impact upon the wind environment around the building, requiring mitigation. The applicant has failed to demonstrate that the mitigation measures put forward are capable of implementation and no alternatives have been put forward. Therefore, it is considered that the proposed building, by reason of its scale, massing and height, could have a detrimental impact on the safety and comfort of pedestrians and cyclists, thereby being contrary to policies EN2 and DM1 of the Manchester Core Strategy.

In this report we provide evidence of the feasibility of the proposed trees in the locations as shown that are required for the wind mitigation proposals.

3.0 EXISTING CONDITIONS

Site Analysis

The site sits at the junction of Deansgate South, Bridgewater Viaduct (A56) and Chester Road. It is currently vacant and being temporarily employed as a works area for the adjacent Deansgate Square development. The surrounding area primarily consists of residential and office developments, with a number additional high-profile residential schemes due to complete within the next 12-24 months. Most notably the Deansgate Square development to the South, Castle Wharf to the North and Elizabeth Tower to the West. Other prominent buildings within the immediate surroundings include the Castlefield Congregational Chapel and Beetham Tower to the North. Current Planning Policies highlight the area as somewhere where residential-focused development is to be encouraged. The site also sits within the Great Jackson Street Development Area, which promotes the establishment of a number of tall building developments on and around the site with heights ranging from 30 - 60 storeys throughout.



Aerial View of existing site.

4.0 TREE PLANTING FEASIBILITY

- Wardell Armstrong have reviewed the survey information (received from Cushman & Wakefield) alongside the Corstorphine + Wright landscape proposals of tree planting within the footpaths along Bridgewater Viaduct and Deansgate South, and can confirm that this tree planting is feasible.
- The attached drawings from GreenBlue Urban illustrate how a cellular tree pit system (RootSpace) can be used for successfully planting trees in these areas. The systems are designed to provide sufficient soil volumes to ensure the trees establishment and long term survival, whilst also being able to be installed around existing or proposed underground services. The attached drawings illustrate the area required (shown as red grid) and a section through the suggested system showing the integration of services. The exact design of the system would be refined by GBU once works have begun on site and the utilities are able to be uncovered to show their exact location within the footway, as survey information is not always reliable. The system allows for adaptability, and can work with variations in the locations of services, from paper to site. The Rootspace product has the capacity to accommodate the services in this area with relatively low risk.
- There is sufficient space in the width of the existing footpaths to ensure that the trees are located to provide a minimum of 1.2m path between the building edge and the stem of the tree, however in most instances this is 1.8m width. The tree spacing also prevents them impeding on the movement of people along the side of the road or those crossing. Analysis of the surrounding area has shown that the clear space proposed here is already in place in multiple other locations in the city, meaning access here will reflect that elsewhere in the surrounding area.
- The trees proposed should be specified to have a minimum 2m clear stem to retain clear pedestrian sight lines along the street and not obstruct movement. An Engineer would be required to confirm whether vehicular sight lines are impacted along the street from the introduction of trees. An engineer will also provide an initial audit of retaining sufficiently safe sight lines for the extension work.
- The trees (including root system) should be included in a landscape maintenance schedule, including an irrigation and pruning regime, to ensure they do not cause issues in the long term through lack of maintenance.
- This information should provide sufficient proof to the planners that this proposal is a feasible solution for wind mitigation for the proposed building
- We make every effort possible to provide the trees with optimum rooting conditions to enable them to reach sustainable maturity, whilst avoiding direct integration with sub-surface utilities where possible. This has meant providing bespoke size and depth tree pits to form irregular shapes whilst still maintaining the required minimum rooting volumes. Tree pits as shown will have an extremely durable root barrier membrane to the perimeter of the structural RootSpace soil cells preventing any roots getting beyond this zone for the long term. Although some shallow utility ducts/conduits can pass within the cell structure, every effort will be made on site to simply keep these out with this zone due to their flexible nature. In the event of a utility passing with the RootSpace structure, this can be securely wrapped with a tough but flexible root barrier local to within the cell structure. Should access from above ever be required, the area can be safely excavated, the lid of the RootSpace structure removed and the soil sucked out within the vicinity of the issue as shown in the diagrams below.

PROPOSED GBU CELLS

The differences between Option 1 and Option 2 are:

Option 2 retains the trees in the original positions and avoids direct interface with utilities based on the depths shown. Utilities are now in closer proximity (than Option 1) to the tree but are protected by the measures stated below.

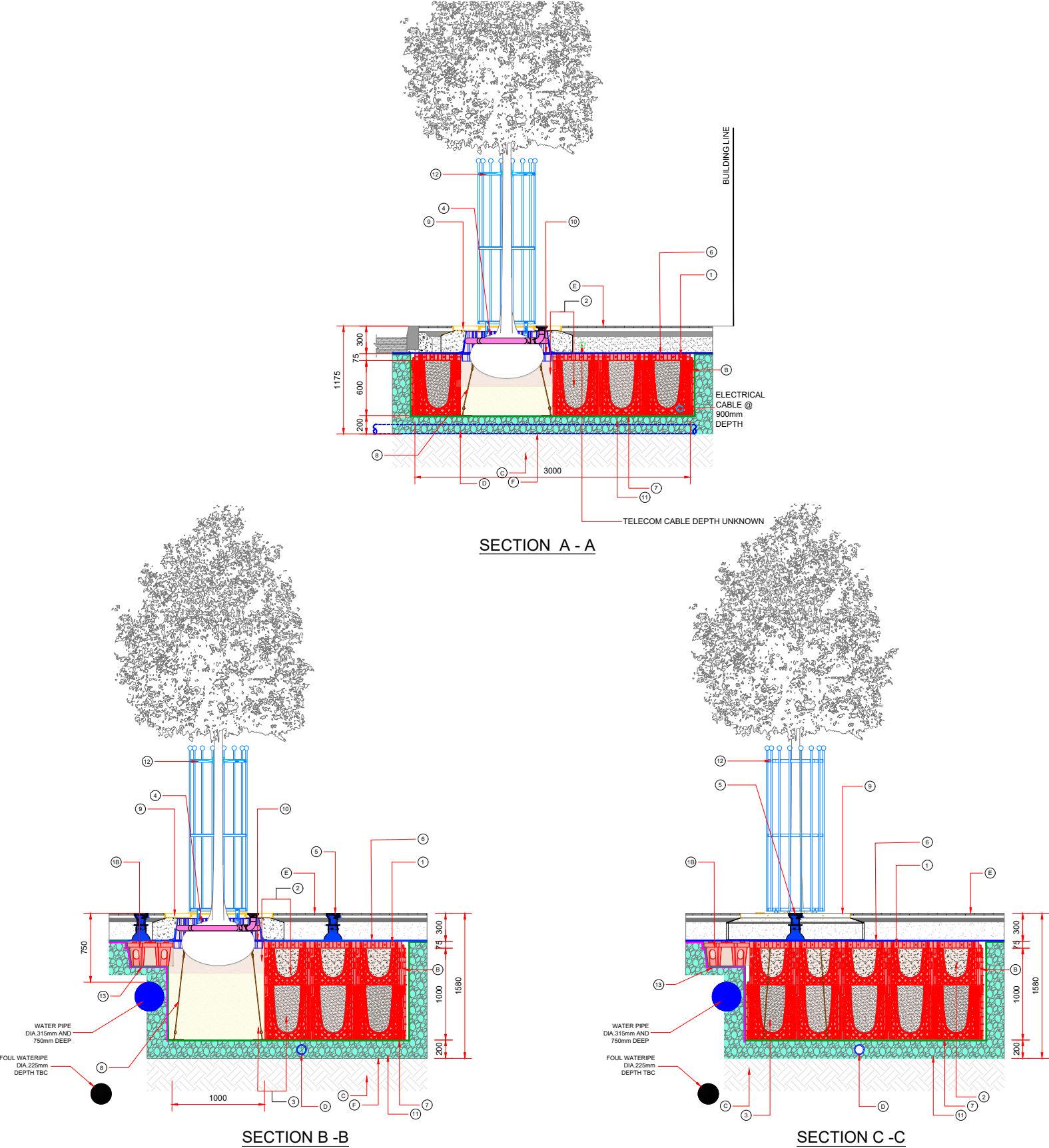
Both Option 1 and 2 relate to the trees shown on the southeast side of the plan drawing on Deansgate. With Option 1 and 2, it is section B-B and section C-C which apply. The utilities have been shown at NJUG (Nation Joint Utility Group) recommended depths, where the depths are not accurately known from the survey.

Option 1 avoids any utilities running through the tree pit zone and the use of heavy-duty root barrier will leave a root exclusion zone around adjacent utilities.

The precise tree positions vary slightly (1 – 500mm) from option 2 to accommodate the co-ordination of surface details (tree grilles etc) with the structural underground infrastructure.

5.0 MITIGATION PROPOSALS

OPTION 1 SECTIONS



PACKAGE INCLUDES THE FOLLOWING GREENBLUE URBAN PRODUCTS PER TREE:

- ① ROOTSPACE 800mm DEPTH (2 UNITS DEEP) C/W TWIN WALLED GEONET & OPEN REINFORCING MESH - GBURS42A
- ② STRATACELL @ 250MM DEPTH (1 UNIT DEEP) C/W TWIN WALLED GEONET & OPEN REINFORCING MESH - GBUSC301A
- ③ ROOTSOIL 20 TOPSOIL FOR USE WITHIN TOP 600mm OF SOIL PROFILE - ROOTSOIL20
- ④ ROOTSOIL SUB SUBSOIL FOR USE WITHIN SOIL PROFILES 600mm OR DEEPER - ROOTSOILSUBA
- ⑤ ROOTSTART PROFESSIONAL MYCORRHIZA FUNGI ALLOW 200g PER TREE - RSPMF2.5LA
- ⑥ ROOTRAIN ARBORVENT CAST ALUMINIUM TRAFFICABLE AERATION INLET WITH 150mm SQUARE TOP AND MANIFOLD - RRARBV150B
- ⑦ TWIN WALLED STRUCTURAL GEONET (INCLUDED IN ITEM ①) SEE NOTE (A) - GLTWGNA
- ⑧ 20mm OPEN REINFORCING MESH (INCLUDED IN ITEM ①) SEE NOTE (A) - GRN20A
- ⑨ ARBORGUY ANCHORPLATE STRAPPED ANCHOR SYSTEM - SASAP08A
- ⑩ ADUR DESIGN CAST DUCTILE TREE GRILLE 1200mm SQUARE WITH 600mm CENTRAL APERTURE WITH GALVANISED SUPPORT FRAME. INCLUDING ROOTRAIN HYDROGRILLE IRRIGATION SYSTEM - ADUR12A
- ⑪ MEDIUM ROOTDIRECTOR WITH ROOT DEFLECTING RIBS - RD1000-RSA
- ⑫ 10 - 20mm CLEAN ANGULAR DRAINAGE AGGREGATE - GBUDRSA
- ⑬ ULLSWATER VERTICAL STEEL TREE GUARD 1800mm HIGH X 600mm Ø, INCLUDING TREE GUARD TIE - ULLSSP6A
- ⑭ REROOT 2000 ROOT BARRIER 2mm THICK X 2000mm FLAT BARRIER WIDE. USE RERUTA REROOT JOINTING TAPE FOR ANY OVERLAPS - RER220X2.0A

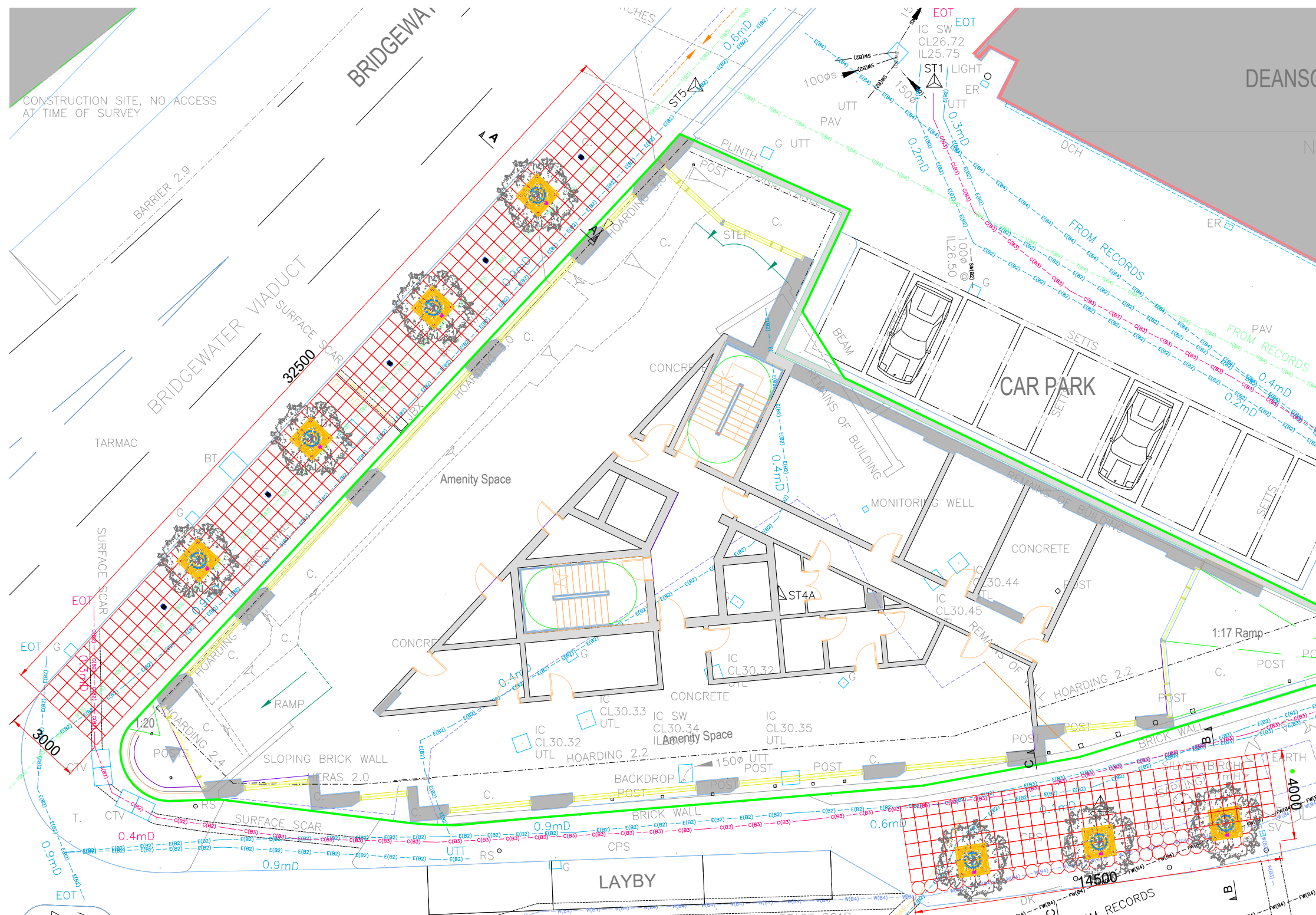
NOTES:

- (A) ALLOW 20% ADDITIONAL FOR GEOTEXTILE AND REINFORCED GEOGRID FOR OVERLAP AND CUTTING REQUIREMENTS
- (B) INSTALL ROOTSPACE SIDE PANELS TO INSTALLATION AS DIRECTED BY ENGINEER
- (C) EXISTING GROUND
- (D) POSITIVE DRAINAGE PIPE (110mm PERFORATED PIPE)
- (E) BUILD-UP TO SUIT ENGINEER DESIGNS AND REQUIREMENTS

STRUCTURAL ENGINEER'S NOTE:

- (F) ADDITIONAL TWINWALL GEONET (GLTWGNA) TO BE INSTALLED WHERE SUB-BASE IS INSTALLED BELOW 3% CBR - MINIMUM 2% CBR OF FORMATION LEVEL TO BE ASSESSED BY ENGINEER

5.1 MITIGATION PROPOSALS OPTION 2 PLAN



Option 2

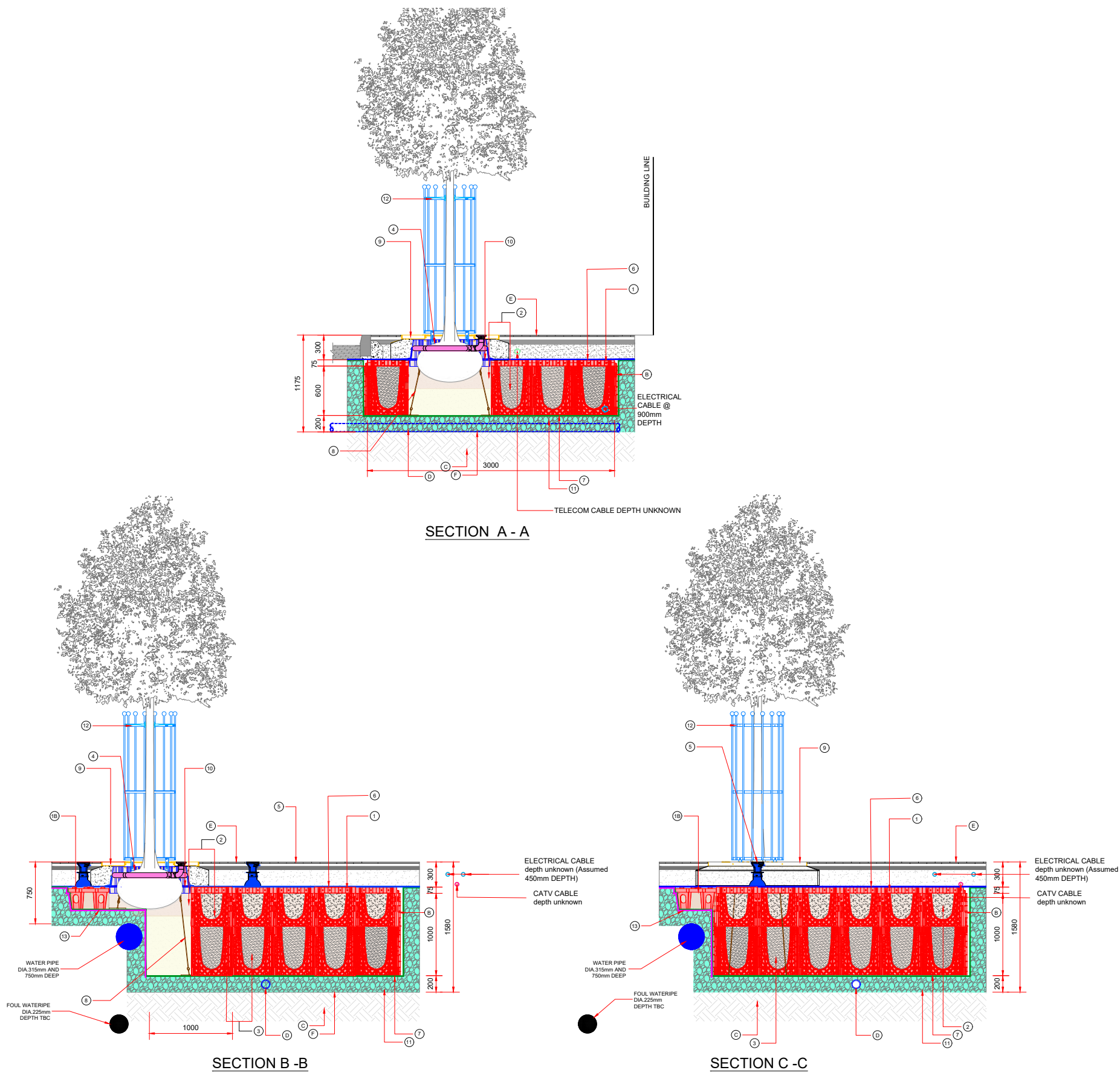
The tree positions have remained the same as the original layout.

Section B-B shows the tree on the far eastern side of the plan drawing has a water pipe running partly below the tree rootball. Again, this is outside of the immediate rooting zone and will be protected by a heavy-duty root barrier material.

The electricity and CATV cables have been assumed at 450mm depth (NJUG depths apply) and these will simply run above the top layer of the RootSpace lids. These will not be susceptible to interference from roots as the roots are contained within the RootSpace Units by the physical airspace within the lids and the twinwall geonet material laid directly over the lids.

5.1 MITIGATION PROPOSALS

OPTION 2 SECTIONS



- PACKAGE INCLUDES THE FOLLOWING GREENBLUE URBAN PRODUCTS PER TREE:**
- ① ROOTSPACE 800mm DEPTH (2 UNITS DEEP) C/W TWIN WALLED GEONET & OPEN REINFORCING MESH - GBURS42A
 - ② STRATACELL @ 250MM DEPTH (1 UNIT DEEP) C/W TWIN WALLED GEONET & OPEN REINFORCING MESH - GBUSC301A
 - ③ ROOTSOIL 20 TOPSOIL FOR USE WITHIN TOP 600mm OF SOIL PROFILE - ROOTSOIL20
 - ④ ROOTSOIL SUB SUBSOIL FOR USE WITHIN SOIL PROFILES 600mm OR DEEPER - ROOTSOILSUBA
 - ⑤ ROOTSTART PROFESSIONAL MYCORRHIZA FUNGI ALLOW 200g PER TREE - RSPMF2.5LA
 - ⑥ ROOTRAIN ARBORVENT CAST ALUMINIUM TRAFFICABLE AERATION INLET WITH 150mm SQUARE TOP AND MANIFOLD - RRARBV150B
 - ⑦ TWIN WALLED STRUCTURAL GEONET (INCLUDED IN ITEM ①) SEE NOTE (A) - GLTWGNA
 - ⑧ 20mm OPEN REINFORCING MESH (INCLUDED IN ITEM ①) SEE NOTE (A) - GRN20A
 - ⑨ ARBORGUY ANCHORPLATE STRAPPED ANCHOR SYSTEM - SASAP08A
 - ⑩ ADUR DESIGN CAST DUCTILE TREE GRILLE 1200mm SQUARE WITH 600mm CENTRAL APERTURE WITH GALVANISED SUPPORT FRAME. INCLUDING ROOTRAIN HYDROGRILLE IRRIGATION SYSTEM - ADUR12A
 - ⑪ MEDIUM ROOTDIRECTOR WITH ROOT DEFLECTING RIBS - RD1000-RSA
 - ⑫ 10 - 20mm CLEAN ANGULAR DRAINAGE AGGREGATE - GBUDRSA
 - ⑬ ULLSWATER VERTICAL STEEL TREE GUARD 1800mm HIGH X 600mm Ø, INCLUDING TREE GUARD TIE - ULLSSP6A
 - ⑭ REROOT 2000 ROOT BARRIER 2mm THICK X 2000mm FLAT BARRIER WIDE. USE RERJTA REROOT JOINTING TAPE FOR ANY OVERLAPS - RER220X2.0A
- NOTES:**
- (A) ALLOW 20% ADDITIONAL FOR GEOTEXTILE AND REINFORCED GEOGRID FOR OVELAP AND CUTTING REQUIREMENTS
 - (B) INSTALL ROOTSPACE SIDE PANELS TO INSTALLATION AS DIRECTED BY ENGINEER
 - (C) EXISTING GROUND
 - (D) POSITIVE DRAINAGE PIPE (110mm PERFORATED PIPE)
 - (E) BUILD-UP TO SUIT ENGINEER DESIGNS AND REQUIREMENTS
- STRUCTURAL ENGINEER'S NOTE:**
- (F) ADDITIONAL TWINWALL GEONET (GLTWGNA) TO BE INSTALLED WHERE SUB-BASE IS INSTALLED BELOW 3% CBR - MINIMUM 2% CBR OF FORMATION LEVEL TO BE ASSESSED BY ENGINEER

6.0 TREE SPECIES PROPOSAL

Species:
Carpinus betulus 'Frans Fontaine'

Common Name: Hornbeam

Maximum Height: 15m

Maximum Spread: 4m

Minimum Clear stem: 2m

Seasonal Interest:

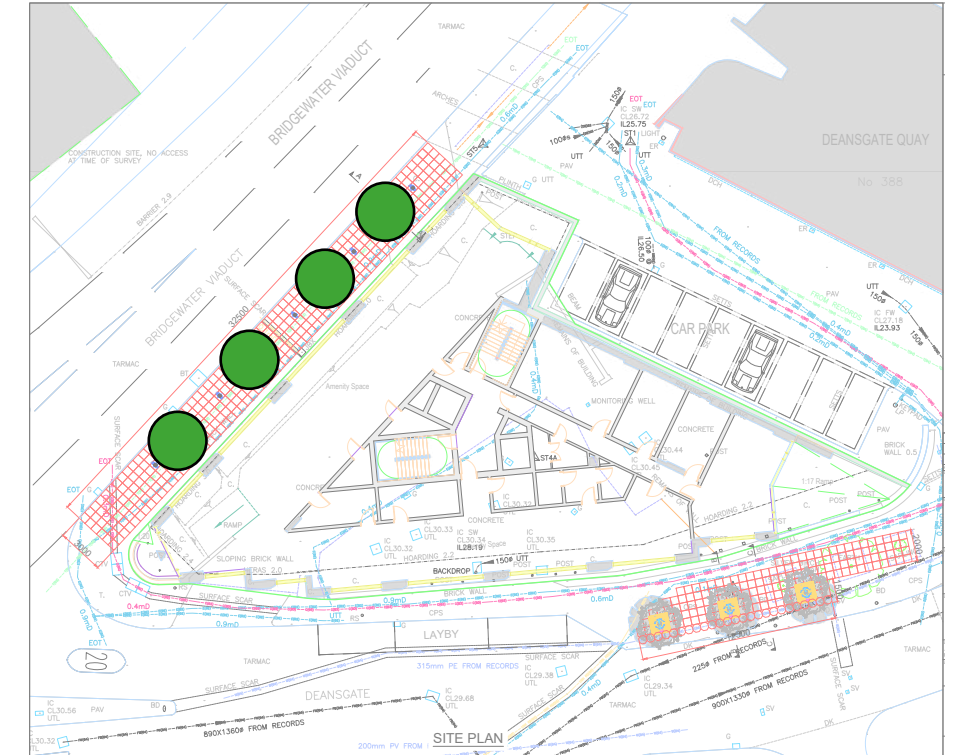
-  Spring
-  Summer
-  Autumn
-  Winter



Carpinus betulus 'Frans Fontaine'



Carpinus betulus 'Frans Fontaine' leaf



Location 4 no. *Carpinus betulus* 'Frans Fontaine'

Species:
Acer campestre 'Streetwise'

Common Name: Maple

Maximum Height: 7m

Maximum Spread: 3m

Minimum Clear stem: 2m

Seasonal Interest:

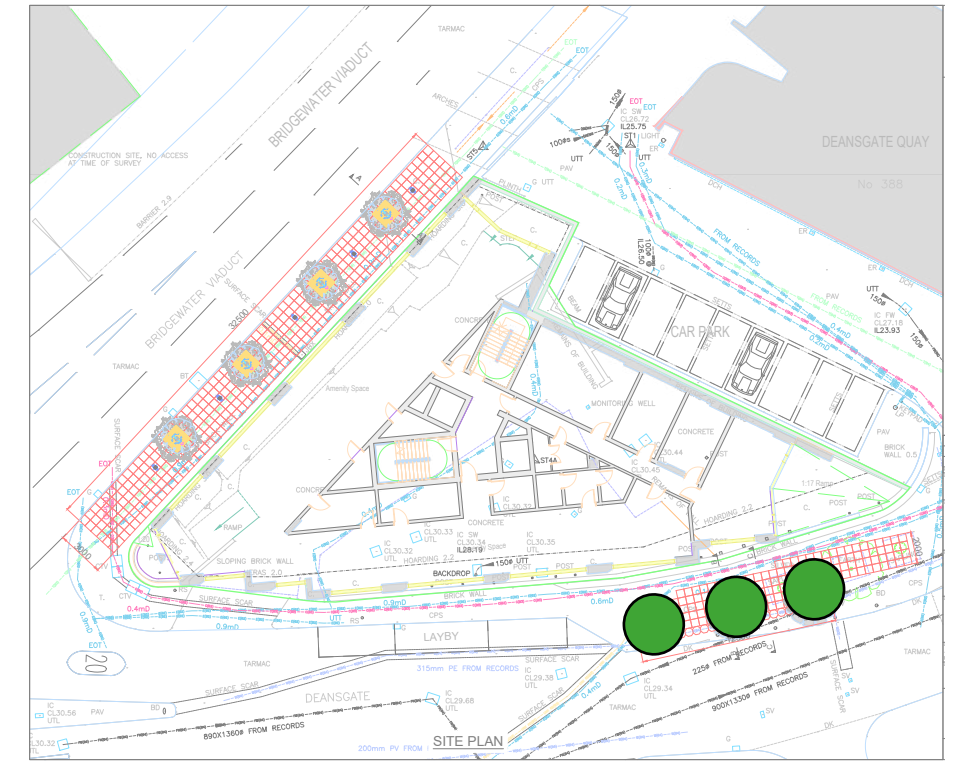
-  Spring
-  Summer
-  Autumn
-  Winter



Acer campestre 'Streetwise'



Acer campestre 'Streetwise' leaf



Location 3 no. *Acer campestre* 'Streetwise'

7.0 TREE PLANTING & UTILITIES

GreenBlue Urban tree planting systems have been utilised widely across central Manchester from the iconic scheme in St. Peter's Square facilitating a large number of mature trees to Whitworth Street West, where many utilities were worked around at a sub-surface level.

The RootSpace system is the most advanced structural soil system in the world. Its manufactured here in the UK from 100% recycled material and its design leaves the maximum open space together with structural abilities to withstand over 30 tonnes per square meter and a life span in excess of 120 years.

The 'U' shaped design within the structural uprights maximises space for both the proliferation of tree roots within the system together with the incorporation of existing underground infrastructure such as a utility duct.

The system is manufactured in two different depths which are interchangeable with each other. This gives the system the ultimate flexibility in terms of facilitating utilities of different diameters at different depths within the ground.

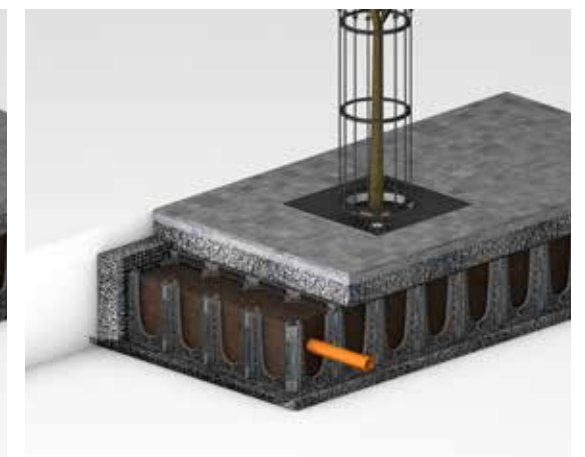
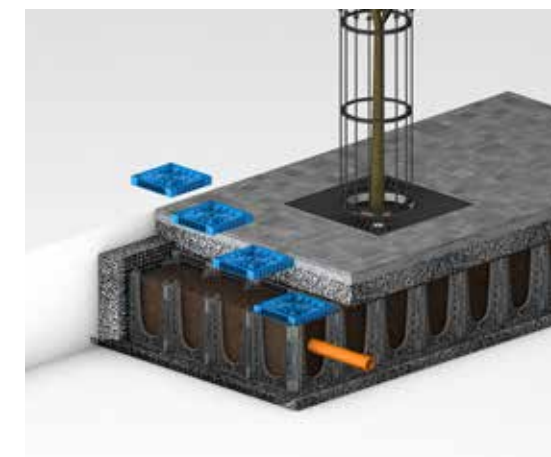
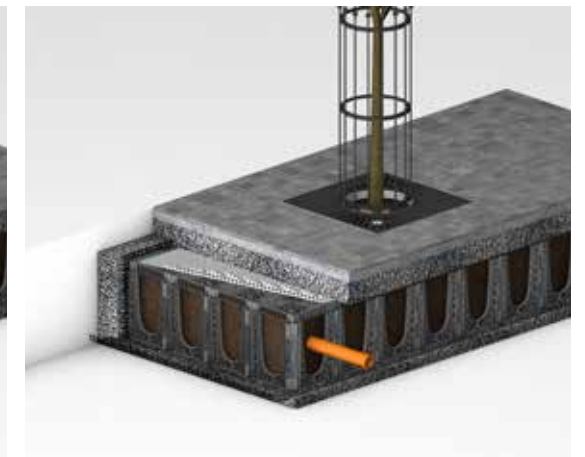
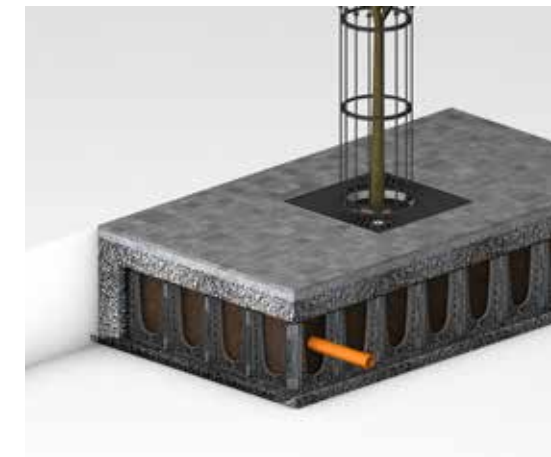
When the accurate location of the utilities are determined, which is often as late as the time of excavation, the situation is re-assessed based on the design details and the situation on site.



RootSpace Utility Integration at Kings Crescent, Hackney.



RootSpace Utility Integration at King's College, London.



Accessing utilities within the RootSpace ArborSystem.



Archway Gyratory, Islington.



Jack Layton Ferry Terminal - Toronto, ON

8.0 PRECEDENT STUDIES

St. Peter's Square, Manchester



8.0 PRECEDENT STUDIES

Manchester, Whitworth Street West



Whitworth Street West - Photographed 2013.



Whitworth Street West - Photographed 2021.

8.0 PRECEDENT STUDIES

Huddersfield Station Gateway Improvements



9.0 CONCLUSION

Conclusion

We are fortunate that with both Option 1 and 2 we have avoided the utilities running within the direct rooting zones of the trees. You will have seen from example images supplied within this document that running pipes/ducts etc within the direct rooting zone is widely carried out within our urban areas.

There is an almost infinite number of on-site scenarios which can be carefully managed to allow the successful incorporation of street trees whilst co-existing with utility company infrastructure. At GreenBlue Urban we are more than happy to co-ordinate on-site installations to ensure the best practise of protecting utility infrastructure and ensuring optimum conditions for successful tree establishment. In the extremely unlikely event of access to a utility being required within the vicinity of the tree, the underground tree infrastructure can be easily removed and replaced as required.

The current options provide excellent uncompacted shared rooting volumes for the trees to thrive and establish. Subsoil and topsoil have been carefully specified to mimic rooting conditions found within the natural environment. Successful urban trees are one of the very few assets within our urban realm that increase with value as time goes on.



Illustrative Plan of public realm (and proposed building roof terraces)