

Tree Constraints Plan showing proposed layout against BS5837:2012 tree categories & Root Protection Areas

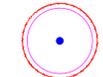
BS5837 Categories
Canopy and stem colour denotes BS5837 category. Pink denotes Root Protection Area.

- Category A (Green)
- Category B (Blue)
- Category C (Grey)
- Category U (Dark Red)

- Category A**
Trees of high quality with an estimated remaining life expectancy of at least 40 years.
- Category B**
Trees of moderate quality with an estimated remaining life expectancy of at least 20 years.
- Category C**
Trees of low quality with an estimated remaining life expectancy of at least 10 years, or a stem diameter below 150mm.
- Category U**
Trees in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years.

Tree Groups
BS5837 Category denoted by hatch colour. Red outline shows removal and yellow partial removal.

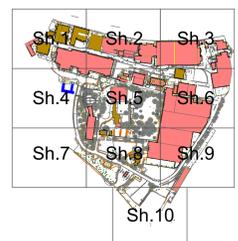
Proposed tree removals



Masterplan and Landscaping Plan

See the Site Development Masterplan and Landscape Plan within the Design and Access Statement and Landscaping Plan for details of all hatch colours not listed in this key.

Site Layout



1	552055jrJune22_TCPrpr_FV2.dwg	21/06/22
No.	Revision/Issue	Date



9 Holyrood Street, SE1 2EL
Tel: 0203 544 4000

Project Name and Address
Carrow Works
Bracondale
Norwich
NR1 2DD

Project Carrow Works	Sheet Sheet 6
Date 21/05/2022	
Scale 1 to 200 at A0	





Tree Constraints Plan showing proposed layout against BS5837:2012 tree categories & Root Protection Areas

BS5837 Categories
Canopy and stem colour denotes BS5837 category. Pink denotes Root Protection Area.

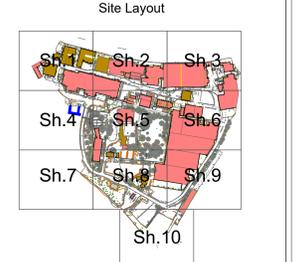
- Category A (Green)
- Category B (Blue)
- Category C (Grey)
- Category U (Dark Red)

- Category A** Trees of high quality with an estimated remaining life expectancy of at least 40 years.
- Category B** Trees of moderate quality with an estimated remaining life expectancy of at least 20 years.
- Category C** Trees of low quality with an estimated remaining life expectancy of at least 10 years, or a stem diameter below 150mm.
- Category U** Trees in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years.

Tree Groups BS5837 Category denoted by hatch colour. Red outline shows removal and yellow partial removal.

Proposed tree removals

Masterplan and Landscaping Plan
See the Site Development Masterplan and Landscape Plan within the Design and Access Statement and Landscaping Plan for details of all hatch colours not listed in this key.



1	552055jrJune22_TCPpr_FV2.dwg	21/06/22
No.	Revision/Issue	Date



9 Holyrood Street, SE1 2EL
Tel: 0203 544 4000

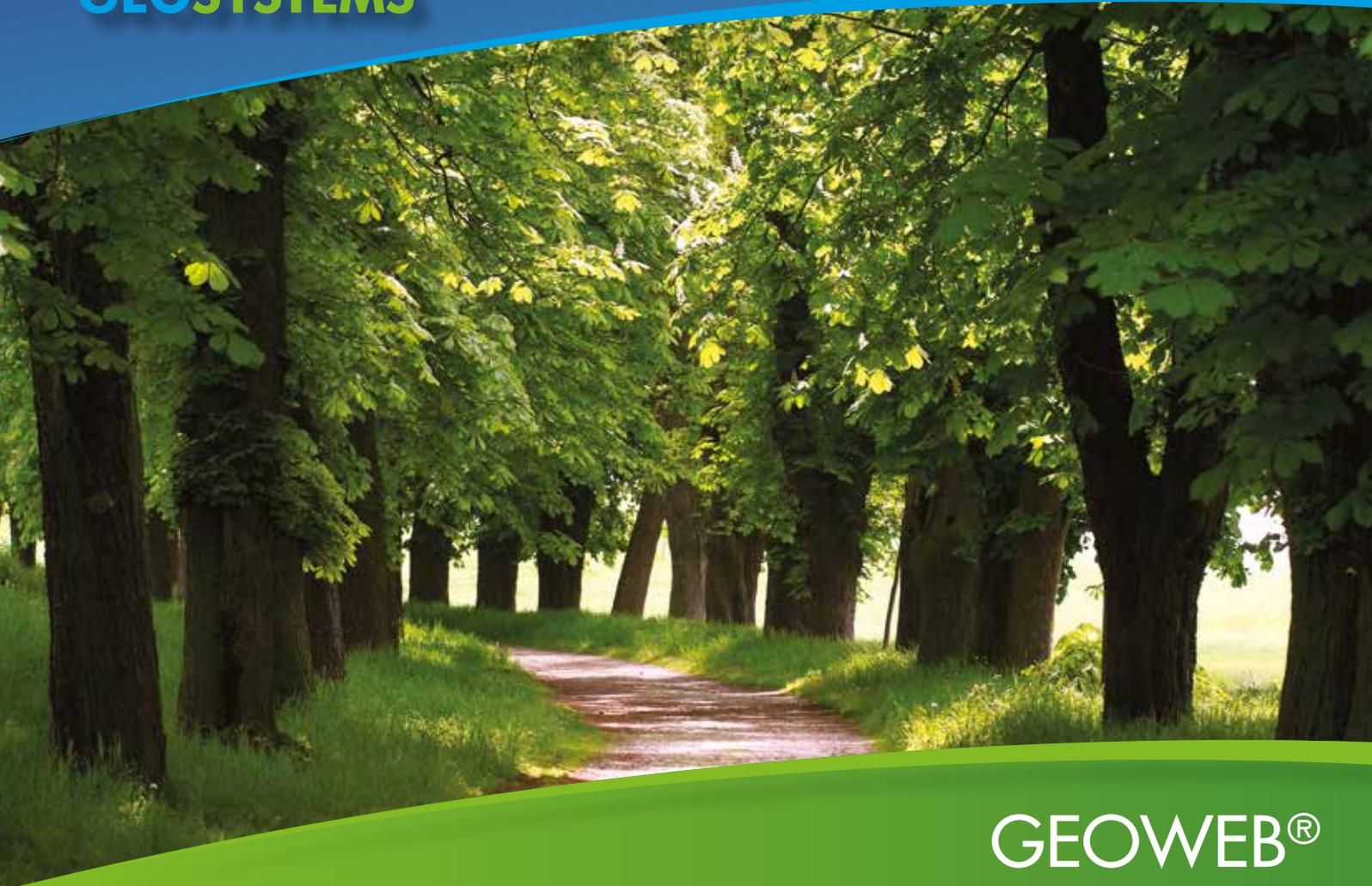
Project Name and Address
Carrow Works
Bracondale
Norwich
NR1 2DD

Project Carrow Works	Sheet Sheet 7
Date 21/05/2022	
Scale 1 to 200 at A0	

APPENDIX D GROUND PROTECTION



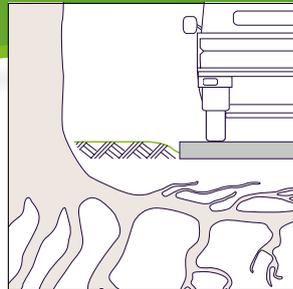
GEOSYSTEMS



GEOWEB®

TREE ROOT PROTECTION (TRP) SYSTEM

Powered by GEOSYSTEMS® technology.



defining **green** in cellular confinement

Greenfix™

SOIL STABILISATION AND EROSION CONTROL LTD

THE PROBLEM

CONSTRUCTION-RELATED TREE DAMAGE

Critical Root Zone/Tree Protection Zone is the minimum area beneath a tree that must remain undisturbed to preserve a sufficient amount of root mass in order to give a tree a chance of survival.

When construction equipment and vehicles intrude a tree's Critical Root Zone, they can cause negative impacts to the soil environment including compaction of the soil, damage to near-surface roots and ultimately endanger the structural integrity of the tree. The majority of a tree's root system is contained within the top three feet of the surface, and construction excavation and compaction can damage or even destroy roots to the point where trees may not survive.

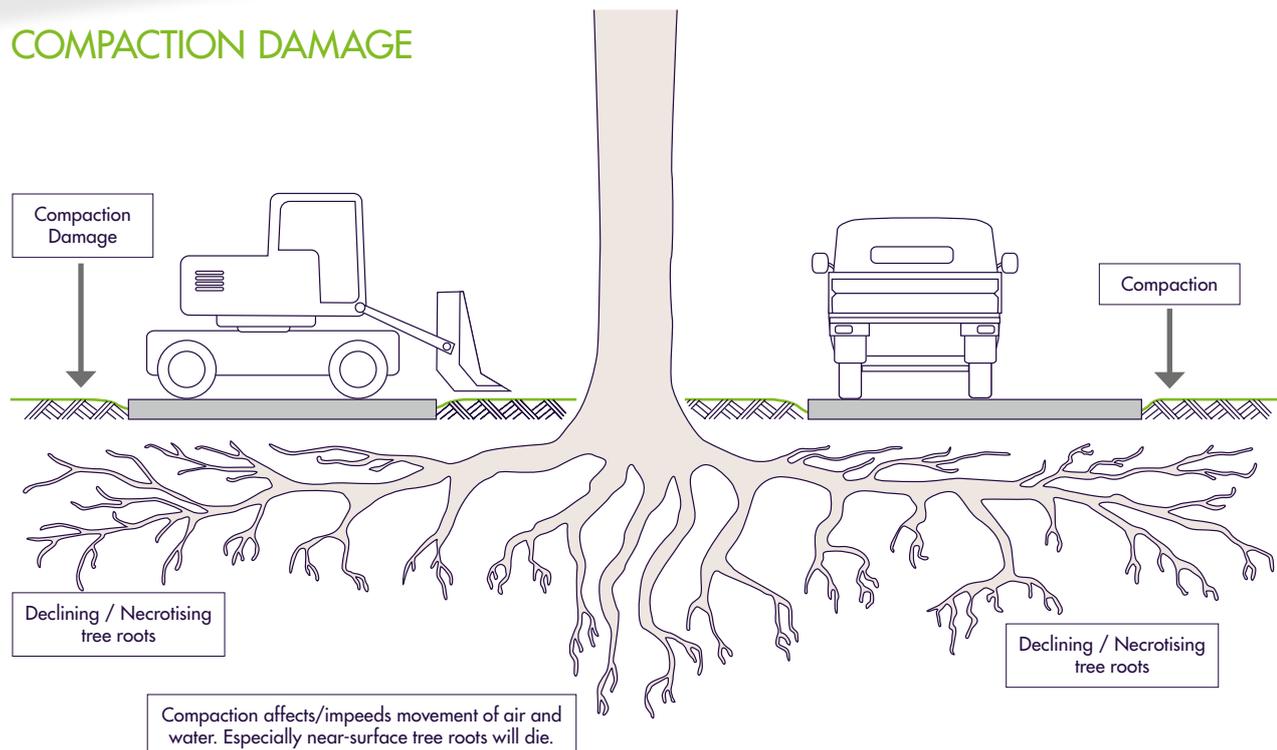
Tree Root Protection (TRP) systems should be eco-friendly as well as comply with local standards and regulations.*

*Compliance with Standards:

In the United Kingdom, Tree Root Protection systems must comply with the Arboricultural Method Statement as outlined in BS5837:2012 and may require supervision by an Arboriculturist.



COMPACTION DAMAGE



THE GEOWEB® SOLUTION

TREE ROOT PROTECTION (TRP) SYSTEM

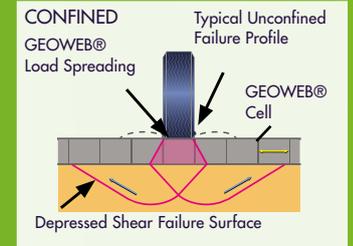
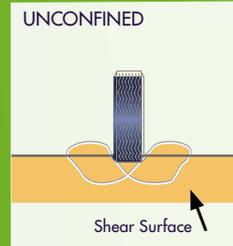


Used extensively in civil engineering construction for over 30 years, the GEOWEB® system is a three-dimensional structure that:

- provides strength to confined soils
- distributes loads laterally, not vertically
- reduces point loads
- reduces compaction of the subsoil

Manufactured from high quality, high-strength polyethylene with a textured surface and perforated walls, GEOWEB® cells with selected infill control shearing, lateral and vertical movement, and reduce subbase depth requirements.

The GEOWEB® system is a low impact development (LID) solution with exceptional load-bearing capabilities and environmental benefits. The system has a long history of solving heavy load support problems for roadways, road base support, parking lots, road shoulders, ports, trucking/intermodal terminals and railroads.



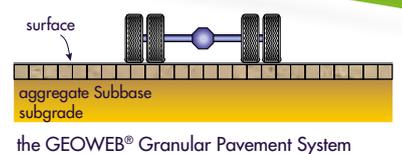
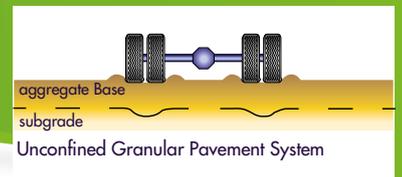
LOAD DISTRIBUTION

By distributing and bridging applied loads, the GEOWEB® TRP system reduces vertical stresses that are typically applied to the underlying soil and root zone.

The GEOWEB® system is ideally suited for tree root protection applications where weak subsoil or no-dig restrictions exist.

COST BENEFITS

The GEOWEB® TRP system is an economical solution for reducing construction vehicle impact to the tree root zone compared with other methods. Once installed, the system has minimal-to-no visibility.

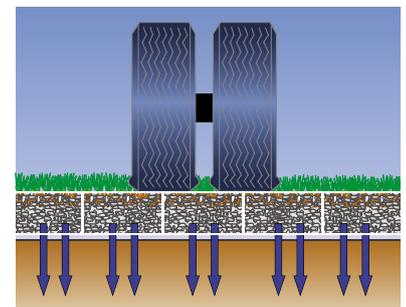


ENVIRONMENTAL BENEFITS

With permeable infill (topsoil/vegetation, aggregate, sand), perforated GEOWEB® cell walls offer environmental benefits:

- water infiltration
- lateral movement of air and water
- water and nutrient migration
- promotes root development

The tree root protection system can be a temporary or permanent solution.



GEOWEB®

TRP SYSTEM INSTALLATION

Step 1: Remove the upper grass and soft soils by hand or by machine if acceptable.

Step 2: Install a high-strength woven geotextile allowing adequate drainage as a separation layer between soft subgrade and GEOWEB® infill material.

Step 3: Expand GEOWEB® sections over the area to be protected and use temporary stakes or weights to hold sections open to prevent movement during infilling.

Step 4: Connect adjacent sections using ATRA® Keys. Position the sections so the slots are aligned, insert the key and turn 90 degrees locking the panels together. ATRA® Keys provide a long-term connection that is safer, quicker and stronger than staples or cable ties. In environmentally protected areas (SSSI in United Kingdom), ATRA® Keys can be used without the requirement for diesel-fueled compressors.

Step 5: For permeability, infill the fully connected GEOWEB® system with a well graded, crushed, angular stone such as MOT Type 1X (also known as MOT Type3). Over fill the cells by up to 30mm to allow for compaction.

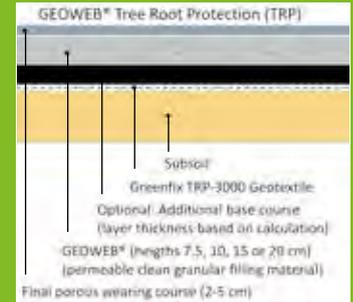
Step 6: Compact the fill material with conventional plant or non-vibratory plant when required. Fill should be maintained above the GEOWEB® system by a minimum of 10mm at all times or a permanent wearing course of blocks, porous asphalt or gravel installed.



DESIGN CONSIDERATIONS

It is important to ensure the correct GEOWEB® cell size and cell depth are specified and installed based on the anticipated pavement loads. These are calculated based on the following criteria:

- traffic type and loading
- frequency of traffic
- subgrade strength (typically CBR, Ev2, Cu or SPT values)
- infill type
- allowable settlement of the pavement



To assist you in determining the correct GEOWEB® solution for your application, Presto GEOSYSTEMS® or their network of distributors/representatives can assist with the calculation for your project. You can be confident that you will receive the most suitable and economical solution for your project.

PRESTO GEOSYSTEMS® COMMITMENT — To provide the highest quality products and solutions.

Presto GEOSYSTEMS® is committed to helping you apply the best solutions for your tree root protection needs. Our solutions-focused approach to solving problems adds value to every project. Rely on the leaders in the industry when you need a solution that is right for your application. Contact Presto GEOSYSTEMS® or our worldwide network of knowledgeable distributors/representatives for assistance.



PRESTO GEOSYSTEMS®
Appleton, Wisconsin, USA

EUROPEAN HEAD OFFICE:



SOILTEC GmbH:
Neue Finien 7a
28832 Achim | Germany
Tel.: 04202-7670-0
Fax: 04202-7670-50

E-Mail: geosystems@soiltec.de
www.soiltec-geosystems.de

DISTRIBUTED BY:

GREENFIX SOIL STABILISATION AND EROSION CONTROL LIMITED

NORTHERN OFFICE

Pennine House
Hurricane Court
Concorde Way
Stockton on Tees
TS18 3TL

Tel.: 01642 633519
Fax: 01642 618525

E-Mail: russ@greenfix.co.uk

SOUTHERN OFFICE

Willington
Shipston-On-Stour
Warwickshire
CV36 5AS

Tel.: 01608 664753
Fax: 01608 665468

E-Mail: daniel@greenfix.co.uk

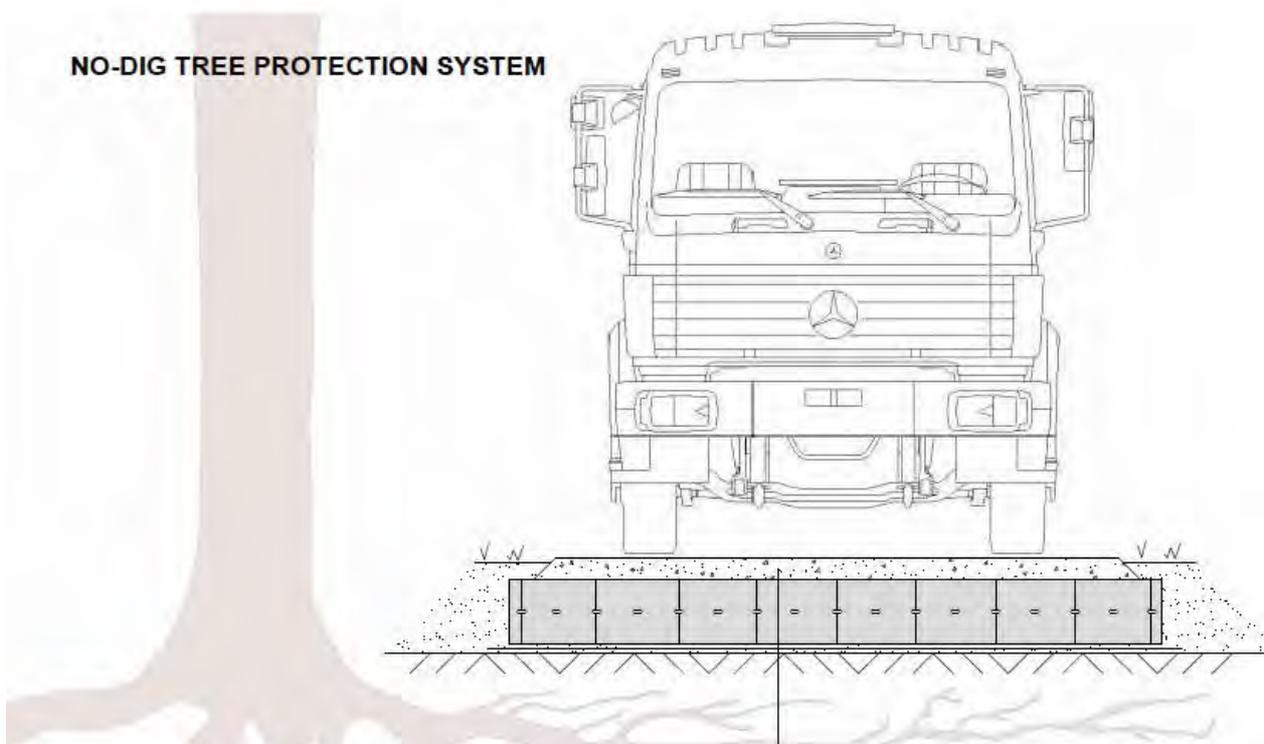
GEOSYSTEMS®, GEOWEB® and ATRA® are registered trademarks of Presto Products Co. This information has been prepared for the benefit of customers interested in the GEOWEB® cellular confinement system. It was reviewed carefully prior to publication. Presto assumes no liability for its accuracy or completeness. Final determination of the suitability of any information or material for the use contemplated, or for its manner of use, is the sole responsibility of the user.

GW/TRP01-A4 JAN 2012
© 2012 Presto GEOSYSTEMS®
AP-6852

Geoweb Weight Distribution Guidance

This document is for reference on generic site conditions of CBR 3% and for guidance only. For tree root protection, site specific solutions are always recommended. For an engineered calculation, relevant to both CBR and soil bulk density, please contact Greenfix who will provide assistance and a full technical recommendation.

Geoweb Depth	Weight	Application
GW20V3 75mm Geoweb	1t Gross Weight	Ideal for pedestrian foot traffic and cycle paths.
GW20V4 100mm Geoweb	6t Gross Weight	For light vehicle traffic applications, such as cars and transit vans.
GW20V6 150mm Geoweb	30t Gross Weight	For increased vehicle weight applications, such as public carparks, refuse collection vehicles and emergency access routes.
GW20V8 200mm Geoweb	60t Gross Weight	For requirement of high level weight distribution, such as H.G.V and construction traffic
GW40V12 300mm Geoweb	-	A control measure to increase ground levels within tree rooting areas, whilst maintaining existing soil bulk densities for tree root health. For information on how Geoweb distributes the weight of its own porous infill, and for site specific recommendations, please contact Greenfix.



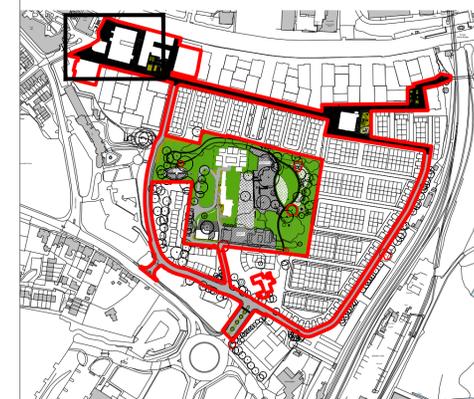
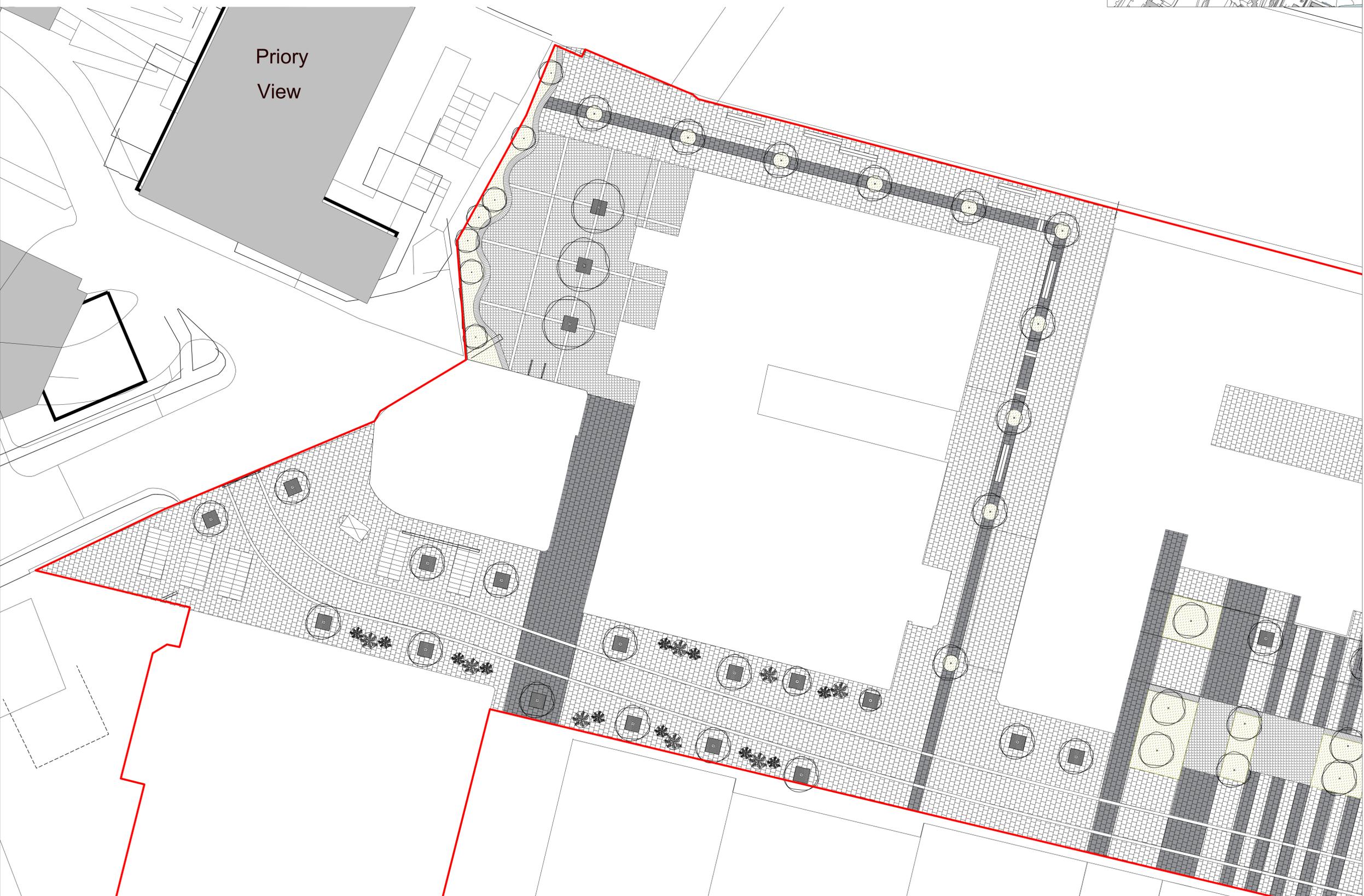


GW30V / G3V3 - 75 mm (3 in) Depth

GEOWEB® SYSTEM PERFORMANCE & MATERIAL SPECIFICATION SUMMARY

	Property	Value				Test Method	
Base Material	Material Composition	Polymer – Polyethylene with density of 0.935 – 0.965 g/cm ³ (58.4 - 60.2 lb/ft ³)				ASTM D 1505	
	Color	Black - from Carbon Black	Tan, Green, Other Colors with no heavy metal content		N/A		
	Stabilizer	Carbon black content 1.5% - 2% by weight	Hindered amine light stabilizer (HALS) 1.0% by weight of carrier		N/A		
	Minimum ESCR	3000 hr				ASTM D 1693	
Strip Properties	Sheet Thickness	1.27 mm -5% +10% (50 mil -5% +10%)				ASTM D 5199	
	Surface Treatment	Performance: The polyethylene strips shall be textured and perforated such that the peak friction angle between the surface of the textured / perforated plastic and a #40 silica sand at 100% relative density shall be no less than 85% of the peak friction angle of the silica sand in isolation when tested by the direct shear method per ASTM D 5321. The quantity of perforations shall remove 13.85% ± 0.5% of the cell wall area.		Material: The polyethylene strips shall be textured with a multitude of rhomboidal (diamond shape) indentations. The rhomboidal indentations shall have a surface density of 22 – 31 per cm ² (140 – 200 per in ²). In addition, the strips shall be perforated with horizontal rows of 10 mm (0.4 in) diameter holes. Perforations within each row shall be 19 mm (0.75 in) on-center. Horizontal rows shall be staggered and separated 12 mm (0.50 in) relative to the hole centers. The edge of strip to the nearest edge of perforation shall be 8 mm (0.3 in) minimum and the centerline of the weld to the nearest edge of perforation shall be 18 mm (0.7 in) minimum. A slot with a dimension of 10 mm x 35 mm (3/8 in x 1 3/8 in) is standard in the center of the non-perforated areas and at the center of each weld.			
Cell & Seam Properties	Cell Details	Depth	Nominal Dimensions ±10%		Density per m² (yd²)	Nominal Area ±1%	Perforations / Cell
			Length	Width			
	GW30V / G3V3	75 mm (3 in)	287 mm (11.3 in)	320 mm (12.6 in)	21.7 (18.2)	460 cm ² (71.3 in ²)	
	Short-term Seam Peel Strength	Cell Depth		Minimum Certified Cell Seam Strength			
	75 mm (3 in)		1060 N (240 lbf)				
Long-term Seam Peel Strength	Long-term seam peel-strength test shall be performed on all resin or pre-manufactured sheet or strips. A 100 mm (4.0 in) wide seam sample shall support a 72.5 kg (160 lb) load for a period of 168 hours (7 days) minimum in a temperature-controlled environment undergoing a temperature change on a 1-hour cycle from ambient room to 54°C (130°F). Ambient room temperature is per ASTM E 41.						
Section Properties	Section Dimension	Section Width		Section Length Range (Cells Long: 18, 21, 25, 29, 34)			
		Variable		Minimum		Maximum	
GW30V / G3V3	2.3 m (7.7 ft) to 2.8 m (9.2 ft)		4.7 m (15.4 ft)		10.7 m (35.1ft)		
Certifications & Warranties	Geoweb® Material	Geoweb® sections are manufactured under a quality management system that is ISO-9001:2000 certified. For additional certification and warranty information, refer to the Presto Geosystems Geoweb® Cellular Confinement System Material Specification .					

APPENDIX E LANDSCAPING PLAN



notes
 1. Read in conjunction with all relevant Architects, Engineers & design team drawings & specifications
 2. Any discrepancies must be drawn to the attention of the lead consultant in writing
 3. All dimensions are in millimeters unless otherwise noted & are subject to checking on site prior to fabrication or ordering of materials
 4. This drawing is the copyright of Bowles & Wyer (and other consultants where referenced)

- key**
- EXISTING TREES TO BE REMOVED
 - EXISTING TREES
 - PROPOSED TREES
 - PROPOSED HEDGING
 - PROPOSED LAWN
 - PROPOSED PLANTING
Proposed shrub planting, 3L, 5L, pots planted to an appropriate density of 50%
Proposed herbaceous planting, 1L, 2L, pots planted to an appropriate density of 50%
 - RAIN GARDEN PLANTING
Proposed herbaceous planting, 1L, 2L, pots planted to an appropriate density of 50%
 - BUFF YORKSTONE PAVING
Size: 900x60x75mm
Finish: Diamond sawn, laid in stretcher bond pattern
 - LARRIBA GRANITE PAVING
Size: 200x100x75mm Salt
Finish: Flown, laid in stretcher bond pattern
Unpolished slip resistance: Class 1, BS EN 1341 / 1342
Flexural Strength: Class 1, BS EN 1341 / 1342
 - LARRIBA GRANITE SETTS by Marshalls (or similar approved)
Granite setts
Size: 900x450mm
Finish: Fine picked 70%, 30% Flamed
 - LARRIBA GRANITE SETTS by Marshalls (or similar approved)
Size: 200x100 setts
Finish: Fine picked 70%, 30% Flamed
 - GALATEA GRANITE KERBS
Size: 150x150x60mm
Finish: Fine picked
 - RECLAIMED GRANITE PAVING by Oxford Stone (or similar approved)
Size: Random (from 50-100mm) x 100mm Granite Setts
Colour: Mixed
 - MODAL CONCRETE BLOCK PAVING by Marshalls (or similar approved)
Size: 300x200mm
Colour: Random mix of light granite, oatmeal granite, silver grey granite.
Pattern: Stretcher bond
 - TUMBLED GRANITE SETS
Size: 100x100mm
Colour: Tumbled
Pattern: Tumbled
 - ASPHALT
Colour: Black
 - COPPICE PRIORS PERMEABLE BLOCK PAVING by Marshalls
Size: 240x160x60mm
Colour: Oak Blend
Pattern: Stretcher bond
 - 1.1M HIGH BRICK AND FLINT WALL
 - 1.2M POST AND RAIL FENCE WITH NATIVE HEDGE
 - DRIPSTER TREE ISLES with Dripster Bench by Streetfit (or similar approved)
Planter finish: Double Layer powder coated RAL 1247
Bench finish: FSC Recycled Hardwood
 - DRIPSTER BENCH with backrest and armrest by Streetfit (or similar approved)
FSC Recycled Hardwood
Size: 1.2m long and 4m long
 - STRIPES PLANTER by Vestro (or similar approved)
Finish: HVI dip galvanised to RAL 1003 yellow
 - BOXLAND BENCH by Ecofit (or similar approved)
Finish: Ecofit Elched White
 - WILLOW DECORATIVE TREE GRILLE by Streetfit (or similar approved)
Finish: Cot'ra
 - WAVY BENCH by Woodscape (or similar approved)
Bespoke size to meet space.
 - PUBLIC ART
 - URBS GLOBE POTS
Size: Glass Globe (D150m, H110m)
Large globe (D152m, H83m)
Finish: Rusty

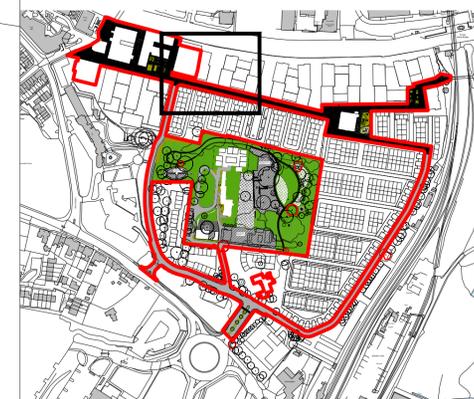
Orig 17.06.22 FL n/a
 rev date by chk notes

BOWLES & WYER
 5 Williams Court, Tunnel Way, Pitstone, Nr. Leighton Buzzard, LU7 9GJ
 Tel: 01296 662439 Fax: 01296 663959 Email: admin@bowleswyer.co.uk

project title
CARROW WORKS, NORWICH
 drawing
DETAILED LANDSCAPE PROPOSALS 1
 job number drawing number
2962 2962-11-02

status
FOR COMMENT





notes
 1. Read in conjunction with all relevant Architects, Engineers & design team drawings & specifications
 2. Any discrepancies must be drawn to the attention of the lead consultant in writing
 3. All dimensions are in millimeters unless otherwise noted & are subject to checking on site prior to fabrication or ordering of materials
 4. This drawing is the copyright of Bowles & Wyer (and other consultants where referenced)

- key**
-  EXISTING TREES TO BE REMOVED
 -  EXISTING TREES
 -  PROPOSED TREES
 -  PROPOSED HEDGING
 -  PROPOSED LAWN
 -  PROPOSED PLANTING
Proposed shrub planting, 30-40 pots planted to an approximate density of 20m²
Proposed herbaceous planting, 10-20 pots planted to an approximate density of 50m²
 -  RAIN GARDEN PLANTING
Proposed herbaceous planting, 10-20 pots planted to an approximate density of 50m²
 -  BUFF YORKSTONE PAVING
Size: 900x600x75mm
Finish: Diamond seen, laid in stretcher bond pattern
 -  BUFF YORKSTONE PAVING
Size: 200x100x75mm Set
Finish: Flown, laid in stretcher bond pattern
Unpolished slip resistance: Class 1, BS EN 1341 / 1342
Tensile Strength: Class 1, BS EN 1341 / 1342
 -  LARRISSA GRANITE SETTS by Marshalls (or similar approved)
Granite side
Size: 600x450mm
Finish: Fine picked 70%, 30% Flamed
 -  LARRISSA GRANITE SETTS by Marshalls (or similar approved)
Size: 300x100 sets
Finish: Fine picked 70%, 30% Flamed
 -  GALATEA GRANITE HERBS
Size: 150x150x60mm
Finish: Fine picked
 -  RECLAIMED GRANITE PAVING by Oxford Stone (or similar approved)
Size: Random from 50-100mm x 100mm Granite Sets
Colour: Mixed
 -  MODAL CONCRETE BLOCK PAVING by Marshalls (or similar approved)
Size: 300x300mm
Colour: Random mix of light granite, oatmeal granite, silver grey granite.
Pattern: Stretcher bond
 -  TUMBLER GRANITE SETS
Size: 150x150mm
Colour: Tumbled
Pattern: Tumbled
 -  ASPHALT
Colour: Black
 -  COPPICE PRORA PERMEABLE BLOCK PAVING by Marshalls
Size: 200x100x60mm
Colour: Oak Blend
Pattern: Stretcher bond
 -  1.8M HIGH BRICK AND FLINT WALL
 -  1.2M POST AND RAIL FENCE WITH NATIVE HEDGE
 -  1.2M BLACK METAL ESTATE RAILING
 -  VROOM CYCLE STANDS by Vestre (or similar approved)
Finish: Powder coated aluminium with anti graffiti coating
 -  KONG SEAT with back and arm rests by Streetle (or similar approved)
FSC Lined Oil proofed No.6: Fine seat with Hot dip galvanised and powder coated steel legs, supports and arm rests. Size: 1.8m x 0.4m
 -  VROOM LITTER BIN by Vestre (or similar approved)
Finish: Hot dip galvanised and powder coated
 -  WILLOW DECORATIVE TREE GRILLE by Streetle (or similar approved)
Finish: Cut-Ten
 -  DRIFTER TREE ISLES with Orfiter Bench by Streetle (or similar approved)
Bench Finish: Double Layer powder coated RAL 1247
Bench Finish: FSC Recycled Hardwood

Orig 17.06.22 FL n/a
 rev date by chk notes

BOWLES & WYER
 5 Williams Court, Tunnel Way, Pitstone, Nr. Leighton Buzzard, LU7 9GJ
 Tel: 01296 662439 Fax: 01296 663959 Email: admin@bowleswyer.co.uk

project title
CARROW WORKS, NORWICH
 drawing
DETAILED LANDSCAPE PROPOSALS 2
 job number drawing number
2962 2962-11-03

status
FOR COMMENT

