MARKET SECTOR:
Environmental

LOCATION:
Keats Way
Rushden
Northamptonshire
NN10 6EE

CONTRACTOR:
South Midlands Homes

CONSULTANTS:
JPP Consulting Civil and Structural Engineers.

MERCHANTS:
JPP Consulting Civil and Structural Engineers.

Case

STUDY

CELLWEB TRP
Keats Way
Tree Root Protection

The

BACKGROUND

Following the recommendations in Arboricultural Practice Note 12 and BS 5837 2005 and 2012, three dimensional cellular confinement systems have been widely used as a no dig solution in the construction of new hard surfaces within root protection areas (RPA's).

The use of an open structured granular infill material offers vertical and lateral water permeation and enables continued gaseous diffusion between the rooting environment and the atmosphere. More often than not, the system is installed on relatively level sites, and there is a perception that the system is unsuitable for anything other than level terrain. In this case study we will look at how Cellweb®TRP has been used to overcome significant changes in levels within the RPA, while maintaining a healthy environment for tree roots.

The area of land to be developed could only be accessed from Keats Way and a new access road would need to be constructed. The only feasible route for the new road would pass through the RPA of a large Beech tree.

Our Client's

REQUIREMENTS

Overcoming significant changes in levels within the Root Protection Area

Geosynthetics Limited were approached by JPP Consulting Civil and Structural Engineers regarding a new residential development on land off Keats Way, Rushden Northamptonshire.

Technical Requirements:

- 2.4m change in levels
- Curve Design
- Vegetated embankment face

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Our Value Engineered

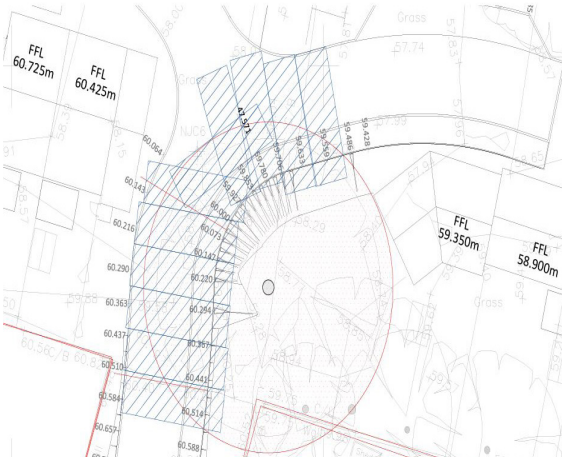
SOLUTION

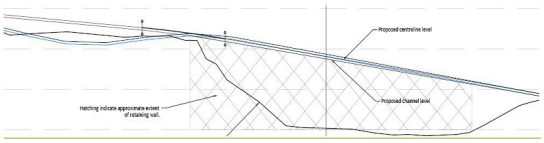
The Beech was considered to be of high amenity value and was to be retained within the new development, which meant that a 'no dig' tree root protection system would need to be used for the construction of the access road.

Figure 1 shows the proposed route of the new access road passing through the RPA of the Beech, as out lined by the red circle. The blue hatched panels across the width of the access road denote panels of Cellweb®TRP. The site posed a second challenge in the form of its terrain. Over the length of the access road there was a fall in levels of 2.4m from the southern end of the road at Keats Way to the Northern end of the road in the new development. Figure 2 below shows a longitudinal section showing how the existing ground level changes along the route of the proposed new access road. The hatched area represents the area where the ground level needed to be built up inside the RPA.

Any increase in levels within the RPA should be carried out and constructed to ensure continued water permeation and gaseous exchange to and from the rooting environment and the atmosphere. If this is not maintained and anaerobic conditions are created, it can result in root death and ultimately bring about the demise of the tree. To overcome this change in levels it required a build-up of 2.4m above the existing ground level at the most southern end of the RPA, reducing to 1.2m above the existing ground at the most northern point.

The Engineering department at Geosynthetics Limited calculated a site specific technical recommendation and proposed the solution that can be seen in figure 3. The solution shows how layers of 200mm depth Cellweb®TRP can be stacked on top of each other to increase levels. The system can then be terraced to create a gradual reduction in levels as the route progresses north towards the new development. This solution was adopted and a full design was carried out by JPP Consulting Civil and Structural Engineers.





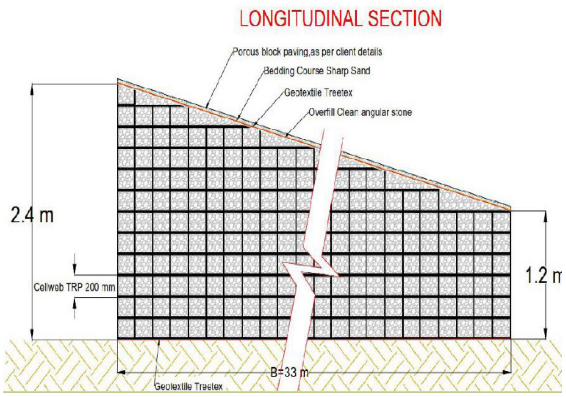


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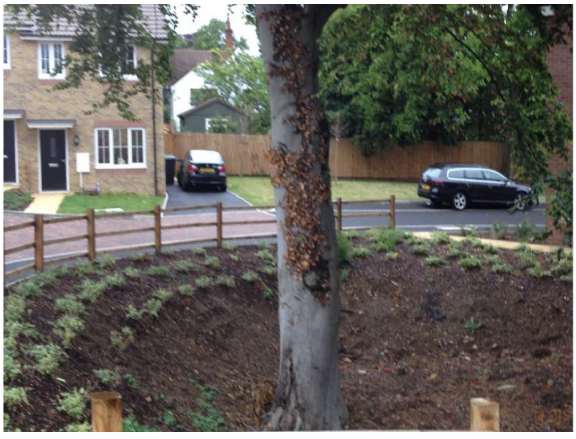
Photo 1, shows the first layer of Cellweb®TRP being installed, with the retained Beech tree on the left. Minimal excavation was carried out on the far southern extremity of the RPA, at the entrance from Keats Way. This was carried out to create a flat surface to which 2.4m of Cellweb®TRP would need to abut. The Cellweb®TRP system is pegged out over the top of one layer of Treetex™ Geotextile. This acts as a separation layer, preventing the infill aggregate from migrating into the subgrade below. This also acts as a pollution control measure in accordance with BS 5837 2012.

Photo 2, shows the progression of the installation and the layering of the Cellweb®TRP. To the right in the photo and next to the tree we can see the beginnings of the formation of a Cellweb®TRP embankment. This batter is designed to have a gradient of one in three and is infilled with the same 4-20mm clean angular stone used to infill the rest of the system. The end cells of each layer of Cellweb®TRP are left empty and are later filled with topsoil and are planted to create a vegetated embankment.

Photos 3 and 4, show the completed access road and development eighteen months later. In photo three it can be seen that the Cellweb®TRP section of the new access road is surfaced using permeable blocks, allowing continued water permeation and gaseous exchange. The remaining road outside of the RPA is constructed using a conventional subbase with an asphalt surface.

In photo four we can see the completed batter which passes around the main stem of the retained Beech, allowing enough space for the future incremental growth of the buttress roots. The end cells of each layer of Cellweb®TRP have been infilled with topsoil and are now planted to create an attractive vegetated bank.



Conclusion

It can be seen from this case study that with thoughtful design Cellweb®TRP can be utilised on far more challenging sites than previously thought.

This is particularly poignant at a time where we see increasing demand for development land, which places ever increasing pressure on our national tree stock. The benefits of trees are becoming increasingly recognised and it is important that we utilise engineered solutions to enable us to retain healthy trees as part of future developments.

The Beech tree in this case study now forms part of an ongoing programme to assess the health and vitality of trees which are subject to the construction of Cellweb®TRP systems.