Appendix G – Metha Structure Feasibility

Metha Structure Feasibility

The table below highlights the possible construction options for a ramped access from the highway to the railway line adjacent to Metha Bridge. All options have been evaluated using 4 main criteria, environmental impact, cost to construct, time to construct and the overall design life expectancy of the option. The criteria has been scored using the following system:

1 = Un-Favourable 5 = Favourable
Total = Highest is the most favourable solution.
Design Life = 30 years = 1 50 years = 3 100 years = 5

Metha Bridge Ramped Access Feasibility Table						
Option	**Description**	**Environment**	**Cost**	**Time**	**Design Life**	**Total**
1 – Gabion Baskets	Woven stainless steel gabion baskets coated in a PVC protective coating. Gabions filled with granite and stacked above one another. Void between the gabion's to be backfilled with 6N material and well compacted in 300mm layers. 1.8m high handrails to be installed directly on gabions or to either side. Design life is approximately 50 years. There is a low maintenance cost associated with this option.	1	4	5	3	13

2 – Crib Walling	Wooden crib walling stacked on each other at an angle of 1 in 4. Timber to be treated to increase longevity and exposed area to be planted to provide a soft faced finish. Walling to be founded on a concrete pad buried below ground level. Handrails to be installed to the rear of the crib walling units. Design life of the timber is 30 years. Maintenance will be high to prevent degradation of the timber.	2	3	4	1	10
3 – Reinforced Soil	Geotextile wrapped, reinforced soil embankment to be installed at 70 degrees from horizontal. Face of wall to be hydro-seeded or locally planted with wildflower to provide soft facing. Soil will require a starter layer of 6C material or similar for the founding layers before using 7C compacted fill above. Design life is approximately 50 years. Maintenance is low cost for this option.	1	5	3	3	12
4 – Multiple Piles	Mini-piles approximately 250-300mm in diameter, installed along a designated route outside of any root growth. Piles to be either timber or concrete with a reinforced circular hollow section or bars inside. A tie beam is to be installed at the top of the piles and a bridge installed above. The bridge beams are to be designed to bend around the trees acting as a canopy track through the tree tops. The design life for timber piles will be 30 years or with steel and concrete that can be increased to 100 years. The superstructure of the bridge will be costly to maintain as the timber will need to be treated. There is an alternative option to use recycled plastic deck panels for this option to increase design life of the deck. *Design life: 5 = Steel, 1 = Wood	4	2	1	1/5*	12

5 – Single Piles	The superstructure of this option will be the same as option 4. The substructure will be large diameter piles installed at short spacing's. The pile rig will be large so accommodation works will be required for this option which might impact on the amount of vegetation clearance. The piles will need to be reinforced concrete with a tie beam at the top to support the bridge elements. The design life of the substructure is 100 years with a minimal maintenance cost. There is an option to clad the concrete to minimise any potential visual impact.	4	1	1	5	11
6 – Sheet Piles	Sheet piles will be driven into the ground below and will follow a designated route, weaving around the trees. The sheet piles will be tied internally with a series of tie rods and bolted to the face either side. The piles will then be capped with a mass concrete beam and the void between backfilled with 6N fill material. The handrails will be bolted to the top of the capping beams. The footprint of the piles will minimise the tree loss although there will be impact locally at the base of the piles due to the damaging of roots nearby. The piles will need to be marine grade to increase the life span and reduce the maintenance life cycle. The design life of the piles is 100 years. To aid with the visual impact the piles can be clad and the capping beam can be textured to soften its appearance.	3	1	1	5	10

Summary

On reflection of the total scores it can be seen that a gabion basket solution or reinforced earth is the most applicable for this location. However the environmental impact would be large due to the footprint of the construction, resulting in a large loss of trees and removal of tree roots.

Following further investigation there may be justification to increase the cost in this location to reduce the environmental impact and select a piled option. A piling rig would require a track to pile from, therefore it is recommended that the multiple piles option be used as the rig will be smaller and easier to manoeuvre through the trees.