

Appendix A Figures 1 - 64

Assessment of Landscape and Visual Effects  
MacKays to Peka Peka Expressway

Prepared By Boffa Miskell Ltd

AEE Lodgement - 15 March 2012 - rev 1







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## PROPOSED PLANTING MITIGATION



## MASSED PLANTING

Mass planting will primarily include native plant species to provide dense vegetated areas, and may consist of a mixture of species or areas of single species.

Species selection will consider the locality and planting substrate and generally include hardy pioneer species suited to the site. Species may include grasses, ground covers, shrubs and trees.

Indicative species:

Grasses:

- *Festuca novae-zelandiae* (Fescue tussock)
- *Chionochloa flavicans* (Miniature toetoe)
- *Poa cita* (Silver tussock)
- *Chionochloa testacea*
- *Carex inversa* (Knob sedge)

Ground cover:

- *Muehlenbeckia complexa* (Pohuehue)
- *Hebe elliptica*
- *Pimelea prostrata*
- *Dichondra repens*
- *Coprosma cultivars*

Small Trees:

- *Rhopalostylis sapida* (Nikau)
- *Coprosma repens* (Taupata)
- *Macropiper excelsa* (Kawakawa)
- *Myrsine australis* (Mapou)
- *Kunzea ericoides* (Kanuka)
- *Myoporum laetum* (Ngaio)
- *Cordylina australis* (Cabbage tree)

Shrubs

- *Dodonaea viscosa* (Akeake)
- *Coprosma propinqua* (Mingimingi)
- *Coprosma acerosa* (Sand coprosma)
- *Coprosma robusta* (Karamu)
- *Phormium tenax* (New Zealand flax)
- *Griselinia lucida* (Puka)



## MASSED PLANTING WITH TREE ENRICHMENT

Mass planting will primarily include native plant species to provide dense vegetated areas. Enrichment planting of canopy tree species, that require a sheltered environment to establish will enrich the biodiversity of the planting and wider area in the long term. Enrichment planting of canopy species will occur over 2 years following the initial mass planting.

Plant shrubs and small trees at close centres to form a vegetation mass that out competes weeds and other unwanted vegetation for minimal long term maintenance requirements.

Indicative species:

Canopy Trees:

- *Alectryon excelsus* (Titoki)
- *Podocarpus totara* (Totara)
- *Dysoxylum spectabile* (Kohekohe)
- *Prumnopitys taxifolia* (Matai)
- *Knightia excelsa* (Rewarewa)
- *Corynocarpus laevigatus* (Karakara)



## TREES UNDER PLANTED WITH GRASS

Single specimen or groups of tall, exotic and native trees established in lawn or pasture to reflect the open character of the local area- to be used in open rural areas and interchanges.

Tree planting in rural areas will reflect existing patterns, such as shelter belts, wood lots and small groups of trees using species such as poplar, willow, pine, eucalypt. Exotic or native amenity trees will be used in civic areas such as interchanges.

Indicative species:

- *Eucalyptus* spp.
- *Populus* spp.
- *Quercus palustris* (Pin oak)
- *Metrosideros excelsa* (Pōhutukawa)
- *Alnus cordata* (Italian Alder)
- *Myoporum laetum* (Ngaio)
- *Podocarpus totara* (Totara)
- *Metrosideros robusta* (Northern Rata)
- *Knightia excelsa* (Rewarewa)



## RIPARIAN PLANTING

Riparian planting will provide transition to adjoining areas and enhance the ecological values of the stream and its margins, providing shade with overhanging vegetation, and stabilising banks.

Indicative species:

Riparian:

- *Phormium tenax* (New Zealand Flax)
- *Carex secta* (Makuru)
- *Carex lessoniana* (Swamp Sedge)
- *Cordyline australis* (Cabbage Tree)
- *Plagianthus regius* (Ribbonwood)
- *Austroderia fulvida* (Toetoe)
- *Pseudopanax arboreus* (Fivefinger)

## ROAD MEDIAN

Planting at the 6m wide median would consist of hardy indigenous species that will require low level of maintenance once established.

Indicative species:

- *Muehlenbeckia australis* (Pohuehue)
- *Libertia ixioides* (Mikoiko)
- *Libertia peregrinans*
- *Carex spp.*
- *Chionochloa flavicans*
- *Coprosma cultivars*
- *Lomandra spp.*



## SPECIMEN TREES UNDER PLANTED WITH GROUND COVER

Single specimen or groups of tall, exotic and native specimen trees underplanted with massed ground cover species including grasses and low shrubs.

Typically used at interchange or civic areas to provide a low maintenance robust tree structure, shade, screening, and shelter.

Indicative species:

Ground Cover:

- *Muehlenbeckia complexa* (Pohuehue)
- *Corokia cotoneaster* (Korokio)
- *Coprosma spp.*
- *Carex solandri* (New Zealand Bush Sedge)
- *Hebe spp.*

Specimen Trees:

- *Quercus palustris* (Pin Oak)
- *Metrosideros excelsa* (Pōhutukawa)
- *Alnus cordata* (Italian Alder)
- *Liquidambar styraciflua* (Liquidambar)
- *Vitex lucens* (Puriri)
- *Knightia excelsa* (Rewarewa)
- *Alectryon excelsus* (Titoki)

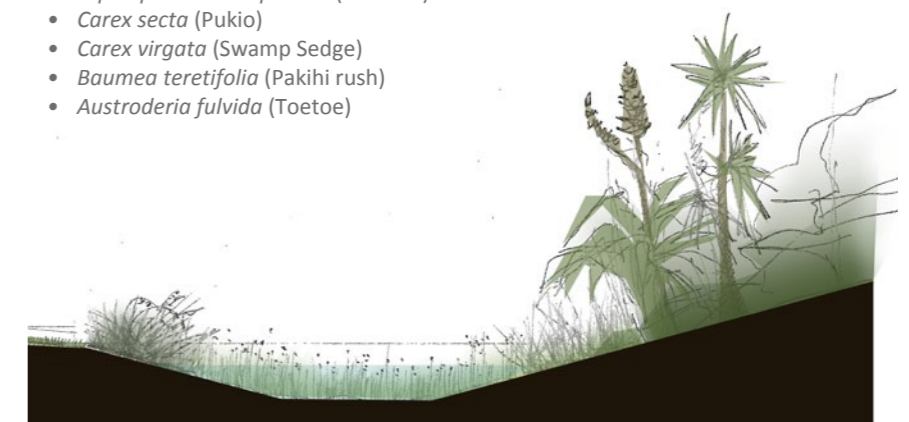


## WETLAND/STORMWATER POND PLANTING

Wetland species consistent with local species including species tolerant of permanent and occasional inundation and drier land on the margins.

Indicative species

- *Phormium tenax* (New Zealand Flax)
- *Leptospermum scoparium* (Manuka)
- *Carex secta* (Pukio)
- *Carex virgata* (Swamp Sedge)
- *Baumea teretifolia* (Pakihi rush)
- *Austroderia fulvida* (Toetoe)



## STORM WATER SWALES

Wetland species consistent with local species including species tolerant of permanent and occasional inundation and drier land on the margins.

Vegetation in swale channel will protect against soil erosion during peak flows.

Indicative species:

Wet swales:

- *Baumea rubiginosa* (Orange nut sedge)
- *Baumea teretifolia* (Pakihi rush)
- *Baumea tenax* (Bumblebee nut sedge)
- *Austroderia fulvida* (Toetoe)
- *Phormium tenax* (New Zealand Flax)
- *Cordyline australis* (Cabbage Tree)
- *Carex virgata* (Swamp Sedge)

Dry swales:

- *Mown grass*

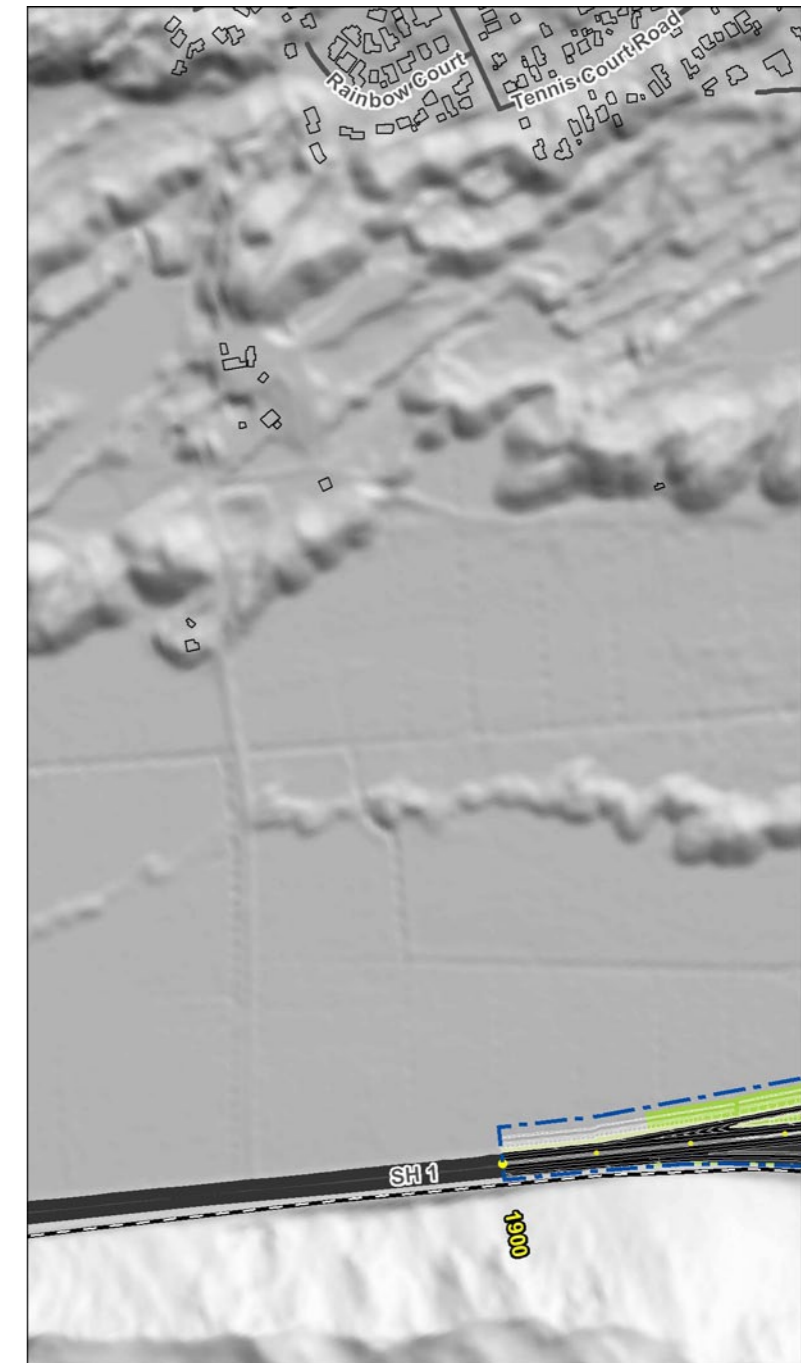
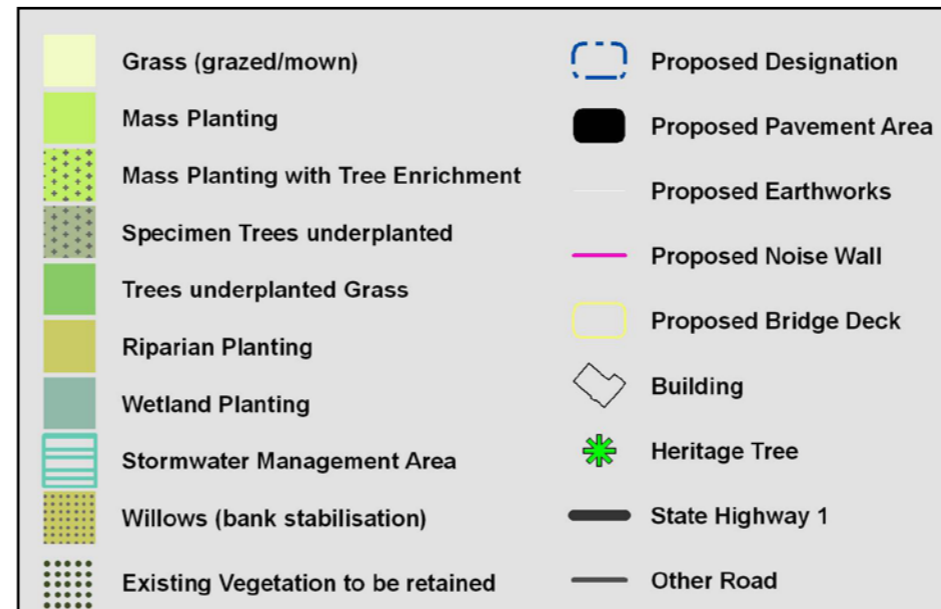
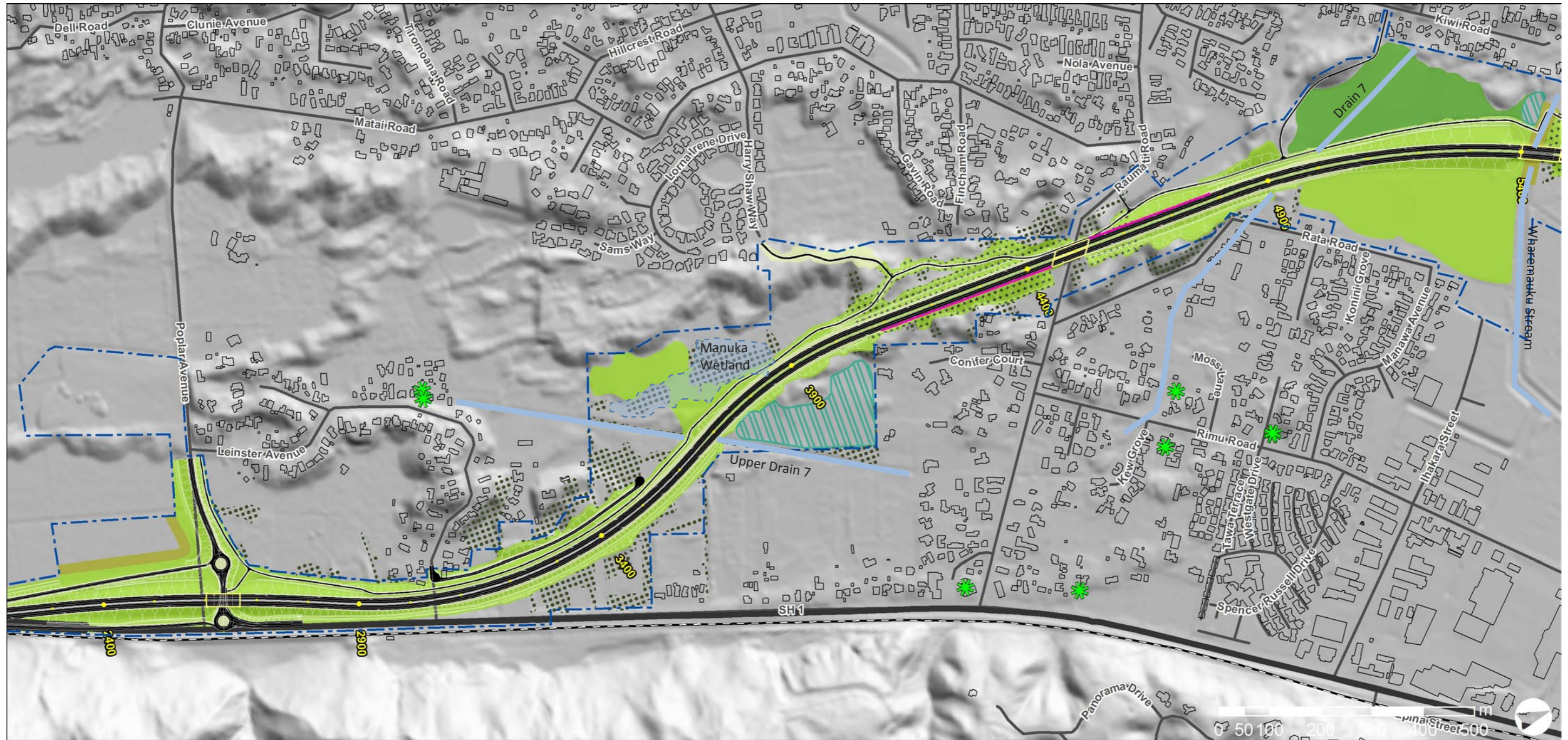


FIGURE 3 SECTOR ONE MITIGATION PLANTING





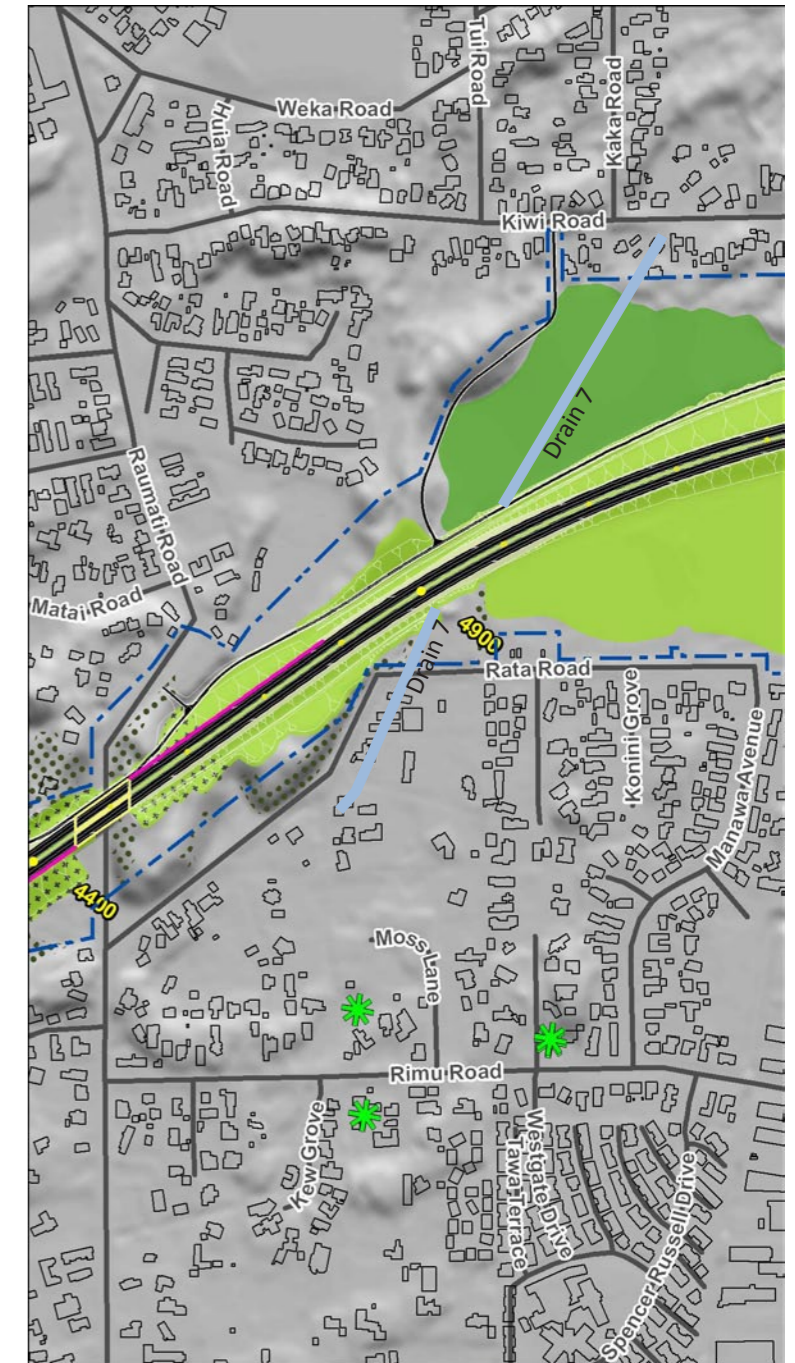
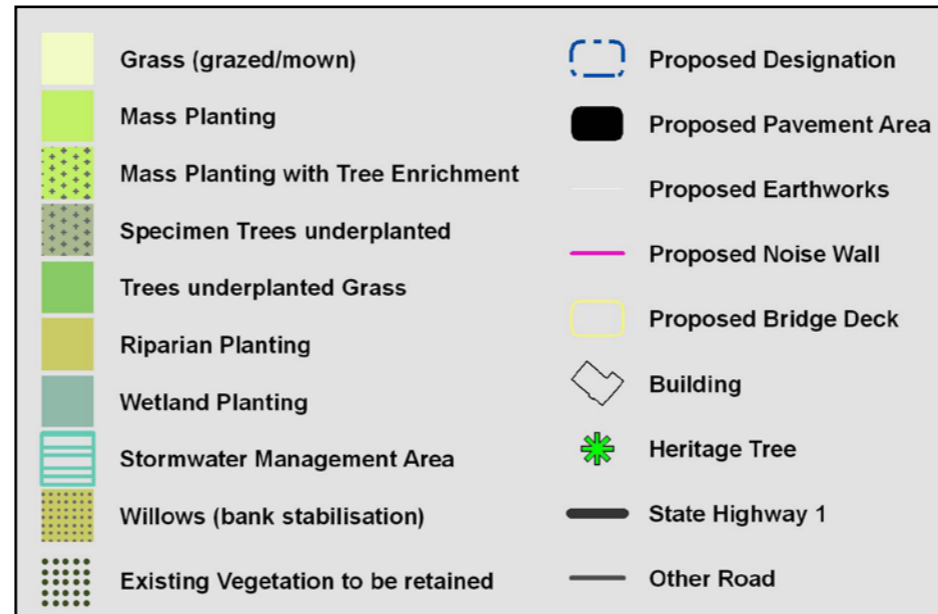
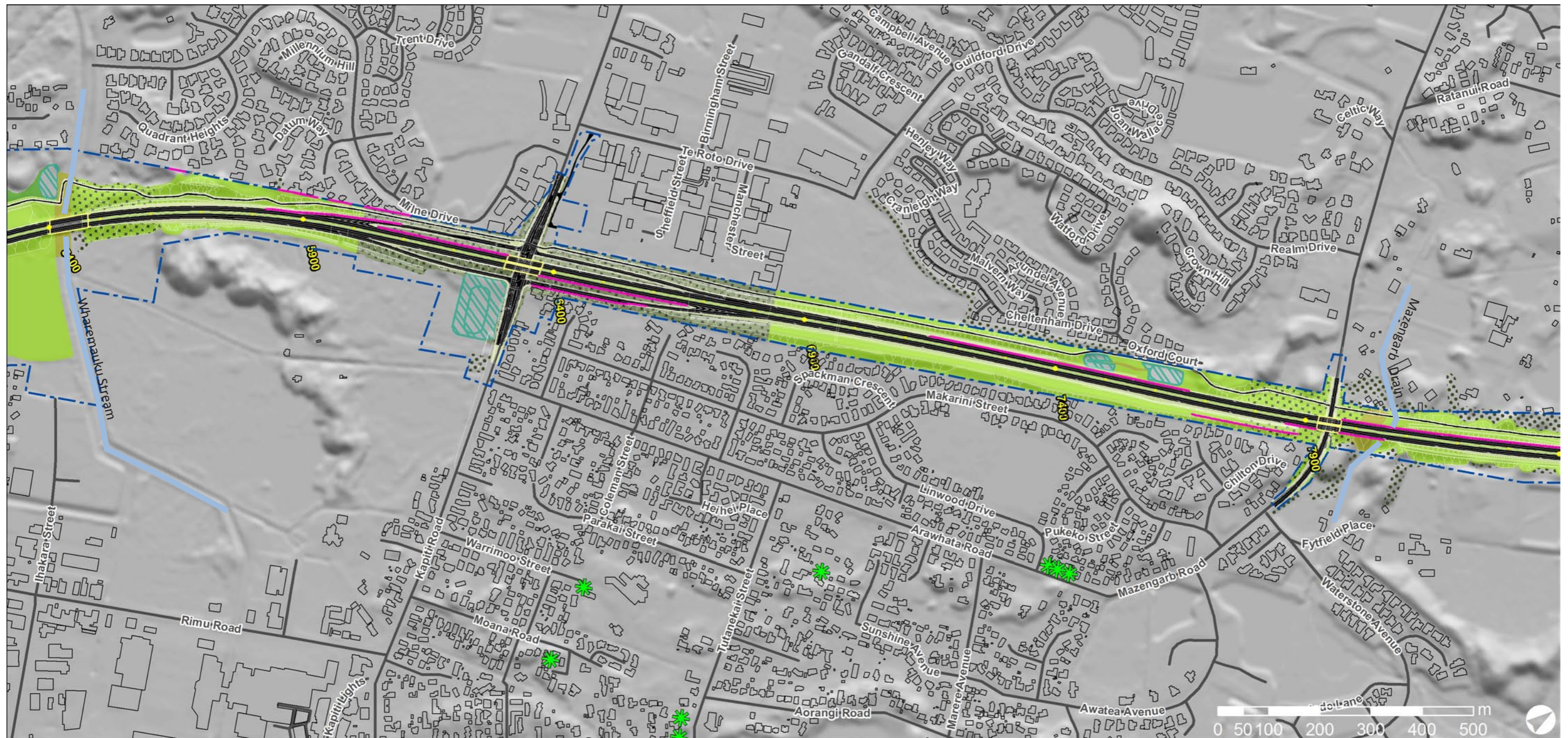


FIGURE 4 SECTOR TWO MITIGATION PLANTING



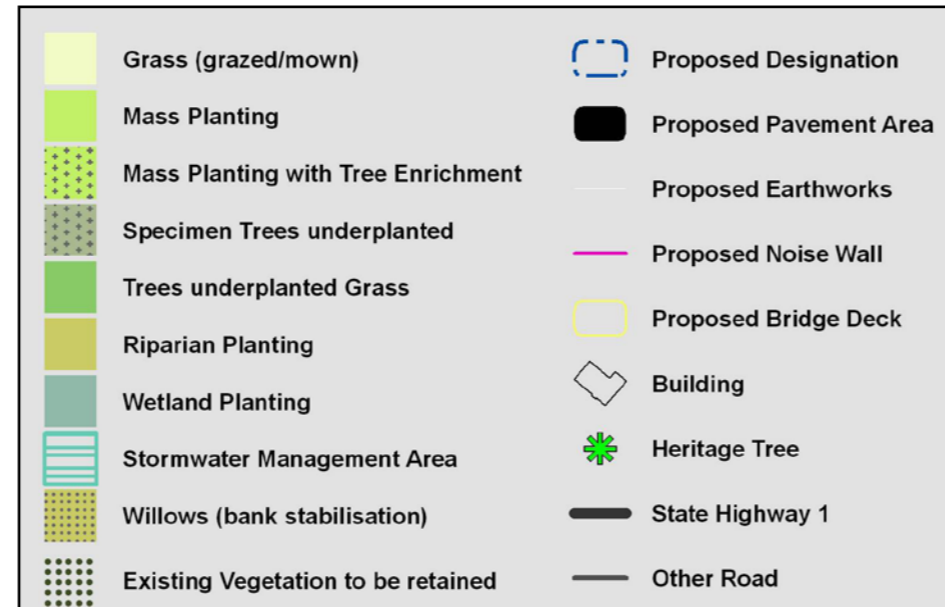
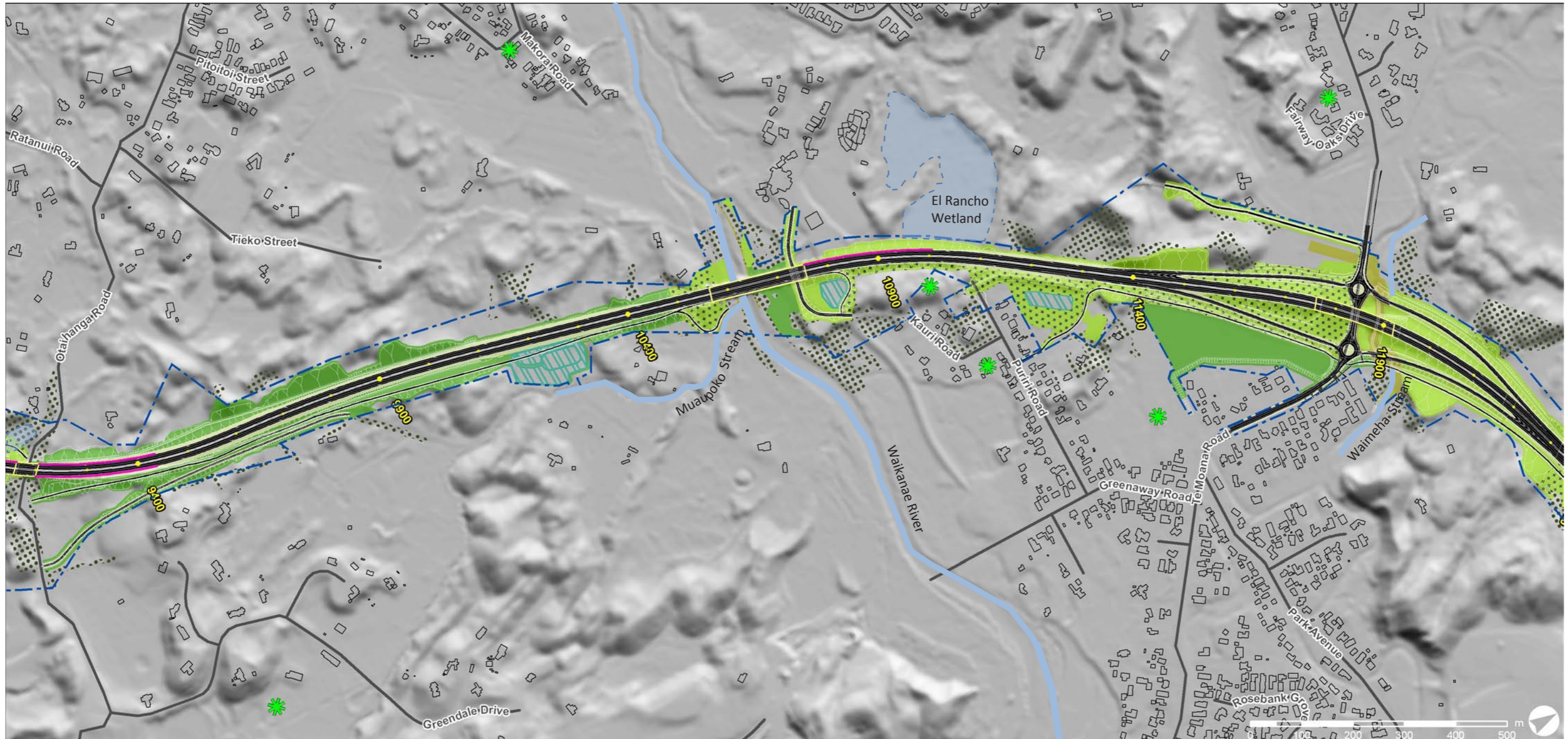


FIGURE 5 SECTOR THREE MITIGATION PLANTING



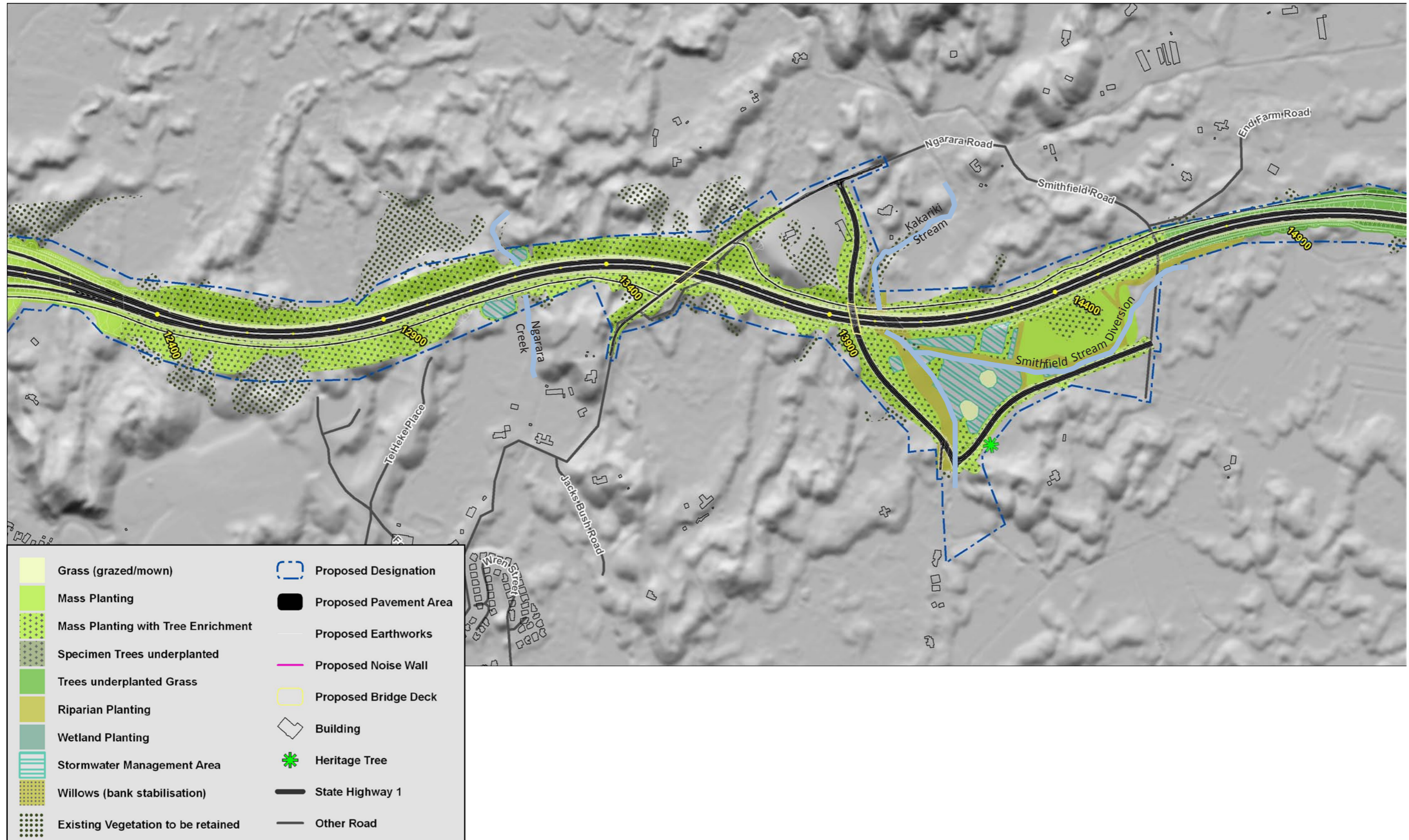
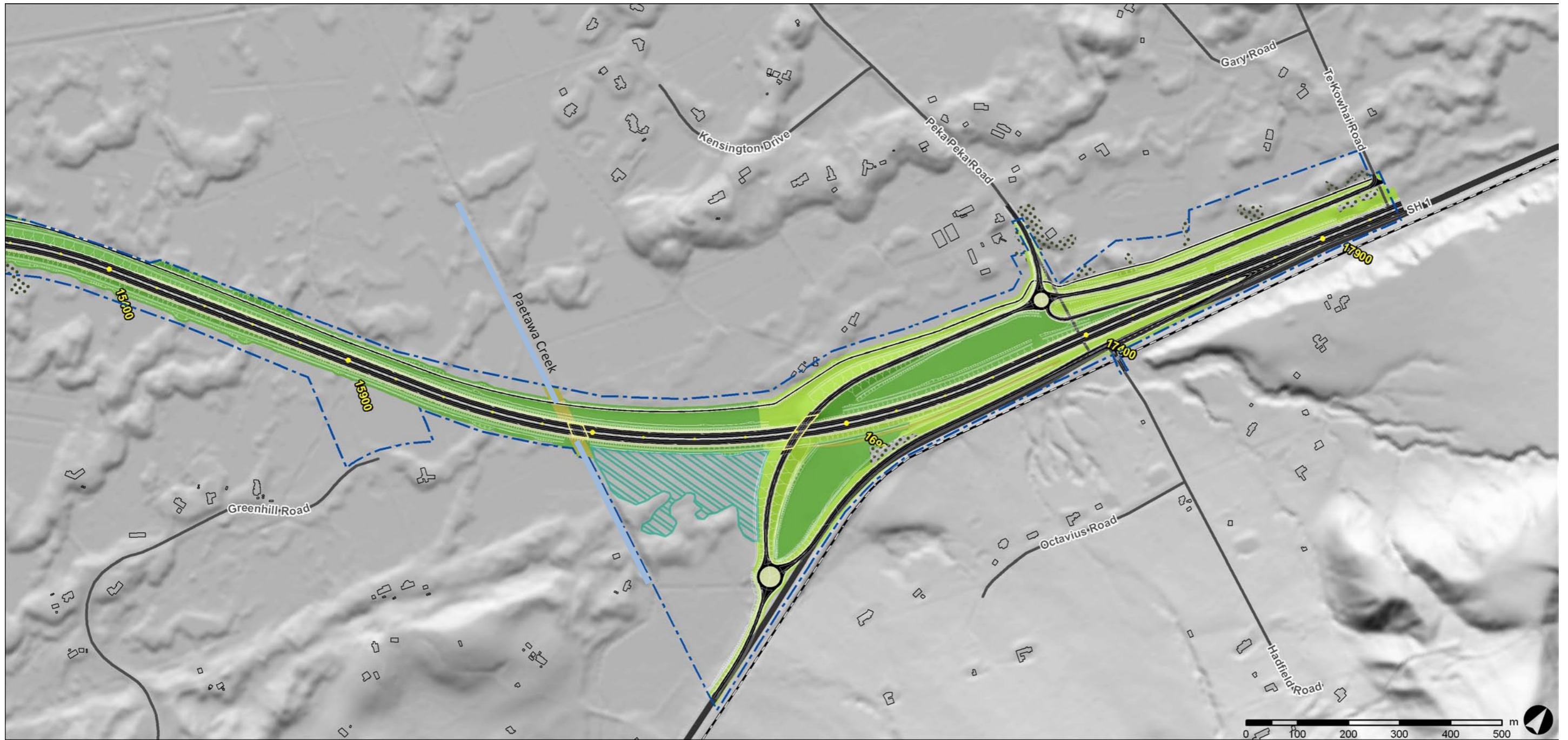


FIGURE 6 SECTOR FOUR MITIGATION PLANTING



## Landscape - Landforms Design

The dunes are the 'signature' landforms encountered along the Expressway corridor. In the first instance the route alignment seeks to avoid significant dunes if possible. However, loss or modification of some dunes will be inevitable in places given the confined corridor available and the scale of the Expressway footprint.

It is noted that some of the dunes that still remain today do so because they are located in the existing road designation and thus have been 'protected' from modification for residential and other development. Notwithstanding this, integrating the Expressway linear form into the dune landforms is a key design objective.

Several streams or parts of streams will be diverted. Regardless of their current state (many are channelized and/or weed infested) they will need to be reconstructed to allow indigenous ecology to re-establish. Other important landforms include the Waikanae River, existing wetlands, and distant views to Kāpiti Island.

### Design Concept

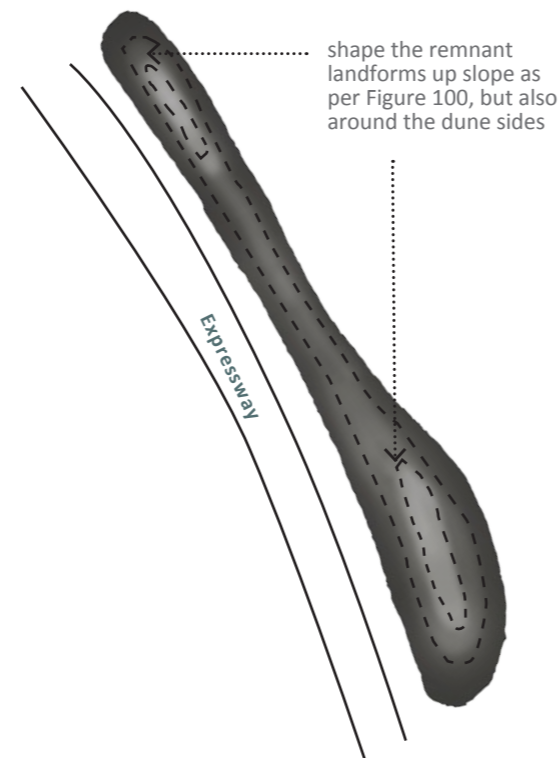
The dune forms and other natural landform features have been avoided as best they can in the alignment of the Expressway. However, the Expressway will create change to landforms and the approach will be to 'naturalise' the changes as far as practicable, to integrate those changes with local topographical patterns.

### Design Principles

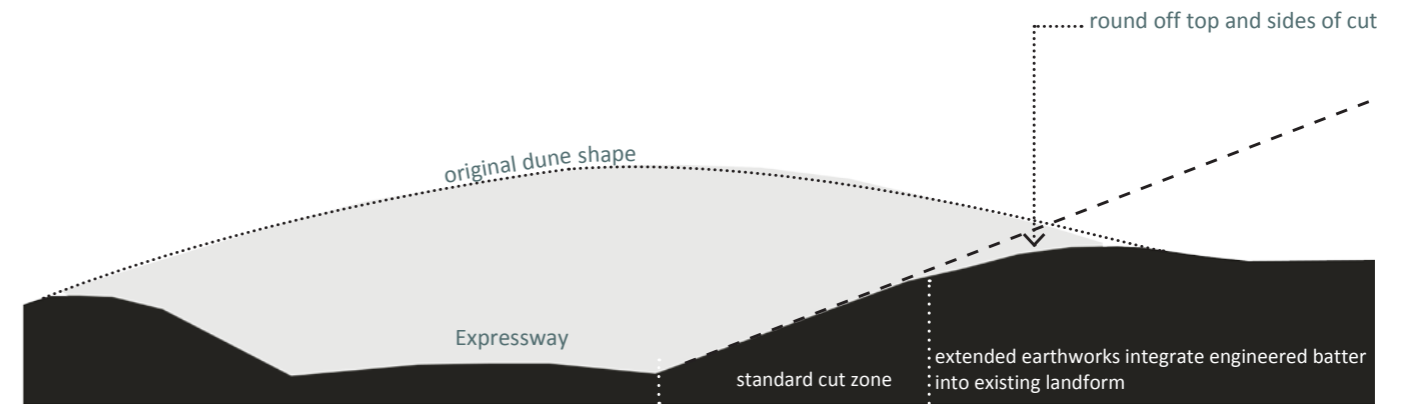
The following principles will apply to the landform design:

1. Avoid modification of dunes, wetlands, and streams by minimising the construction footprint in sensitive areas.
2. Retain or enhance natural landforms wherever possible, including within both permanent and construction operational areas.
3. Design or modify landforms to acknowledge and reflect the local topographical pattern (scale, orientation, profile [refer Figure 99]).
4. Modify the slope or use retaining walls as appropriate to reduce the size of cut faces. A standard 1:3 grade has been proposed in the preliminary design (refer Figure 100).
5. Shape (roll off) the tops of cut/ fill faces so the faces integrate with the existing dune profiles as far as practicable.

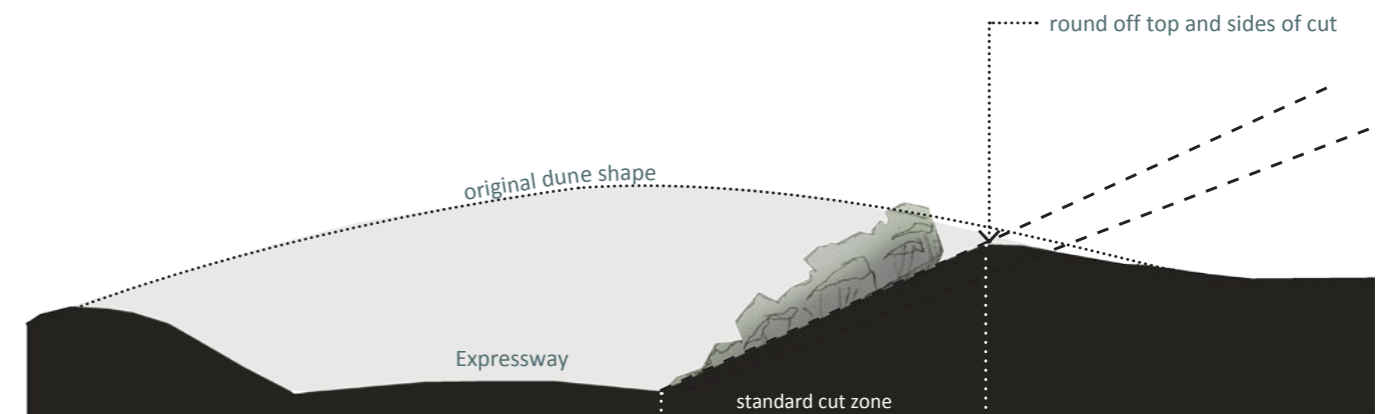
6. Shape visual and noise mitigation bunds to appear as 'naturally' shaped landforms (refer Figure 99), avoiding engineered appearances unless these forms are a component of a designed 'land art' formation.
7. Recognise that the Waikanae River corridor, including, oxbows, river bed and flood plains are a different landform to the dunelands area. The alluvial landform is an important linear feature providing a physical and visual link between the mountains and the coast.
8. Ensure that realigned streams are reinstated and designed to allow re-establishment of natural streams able to support appropriate indigenous ecology.
9. Recognise the views to the Tararua Ranges and Kāpiti Island as prominent and important landforms and features in the design of east/west local road crossings.
10. Recognise that the sand and peat substrates are likely to need conditioning to provide a good growing substrate for plants. Soils substrate trials will be undertaken to assess the needs and methodology to achieve this.



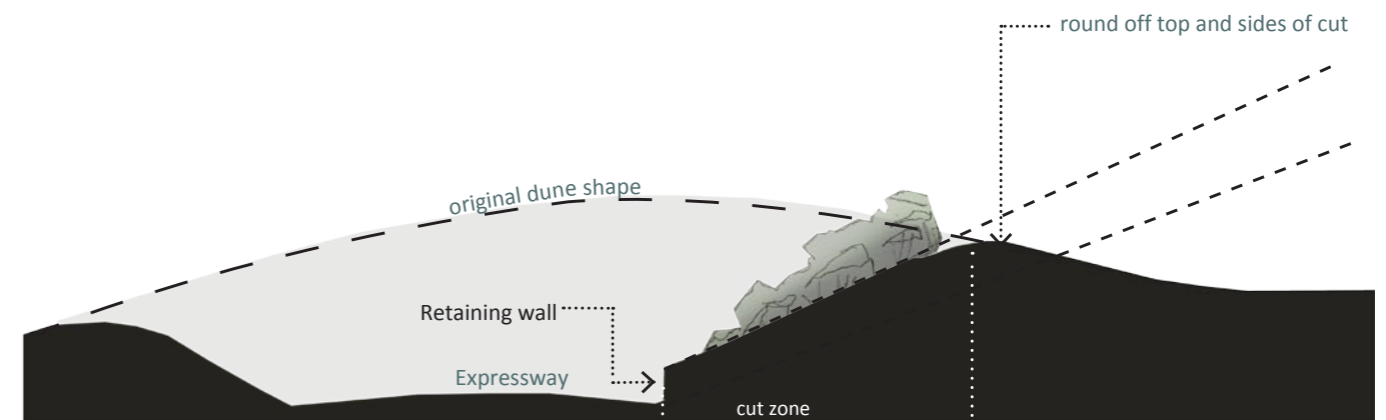
The Expressway is a linear shape. Although the dunes are formed in an approximately linear pattern parallel to the coast they are not even and the Expressway cuts across them in places. In plan the remnant dune forms can be shaped to repeat slopes and shapes. The same approach should be used for bunds.



In open rural areas or where the landform will be seen from beyond Expressway consider extending the earthworks beyond standard cut zone to allow rounded dune forms



In areas to be planted consider a steeper cut as this allows more of the ground to be retained and can limit the need for extended earthworks beyond the engineers construction cut zone



Steepening the sides of the wall with retained toe reduces the size of the cut face and retains more of the dune land form. This same approach can be used where it is desirable to minimise the footprint adjacent to wetlands or other features

Expressway integration into the dune landforms can be improved by managing the cut face slopes and their angle at the slope top to wrap to the natural forms



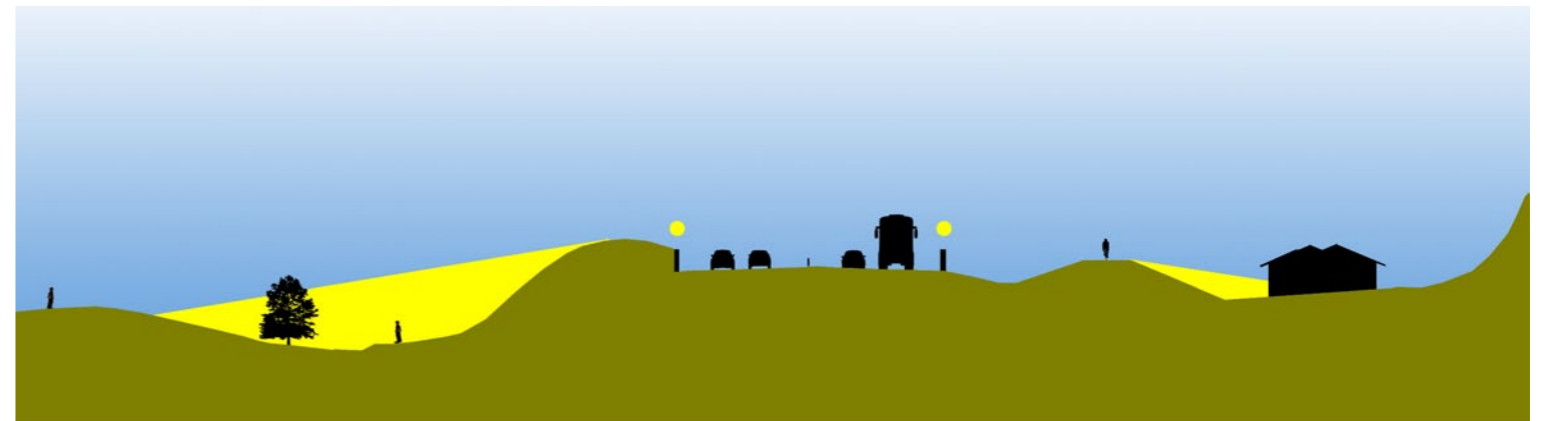
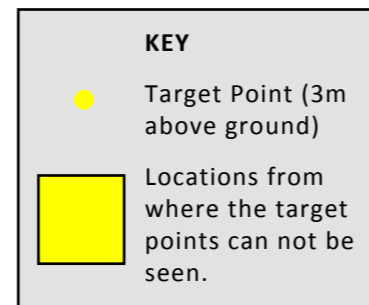
### ZTV Analysis

The theoretical visibility analysis used 'target' points at every 10m along the Expressway, offset 15m each side of the centreline and at a height of 3m above the ground surface over a 3km distance.

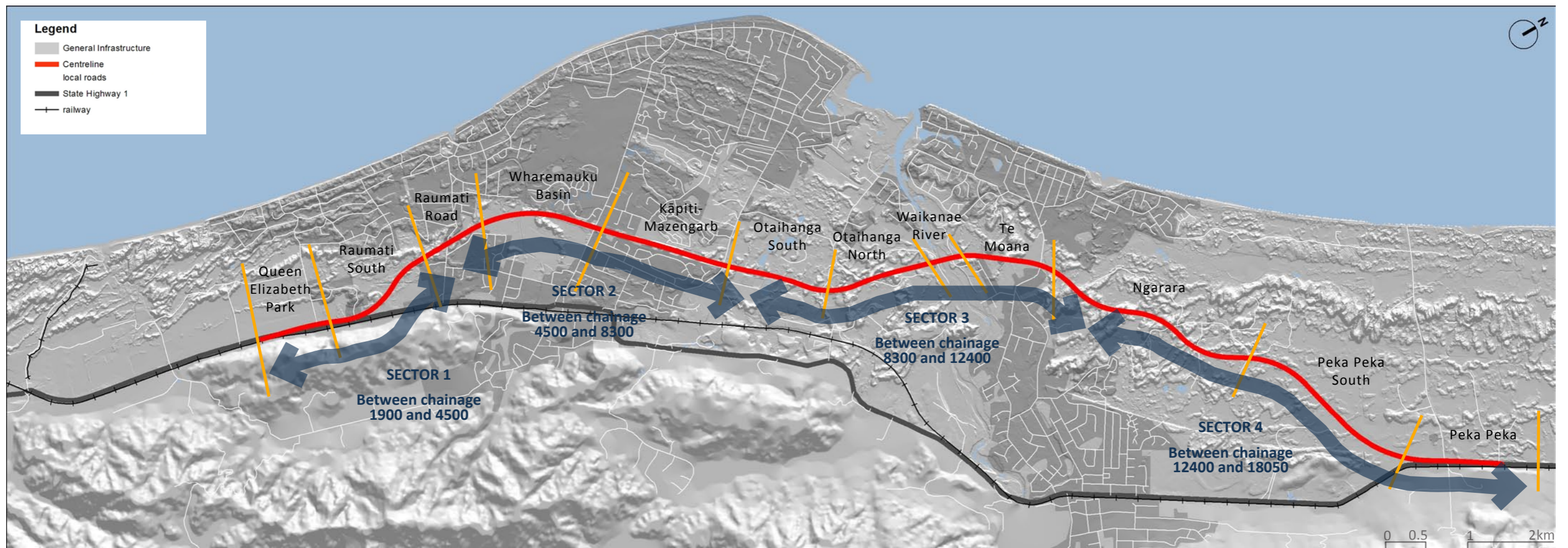
The yellow areas on the map indicates from where the target points can theoretically **not be seen**. It can be thought of as an area in shadow of the line of sight from the target point.

This analysis is based on the LiDAR data for the ground surface only, it does not account for above ground features (vegetation and buildings).

Further detail about the ZTV analysis can be found in the Methodology section of the report.



Twelve landscape character areas as they relate to the four sectors of the project identified for the purpose of the AEE assessment.



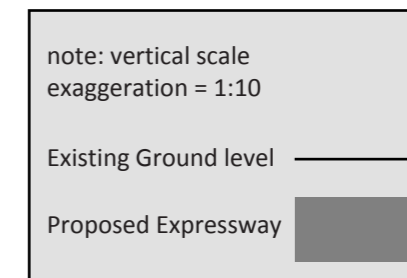
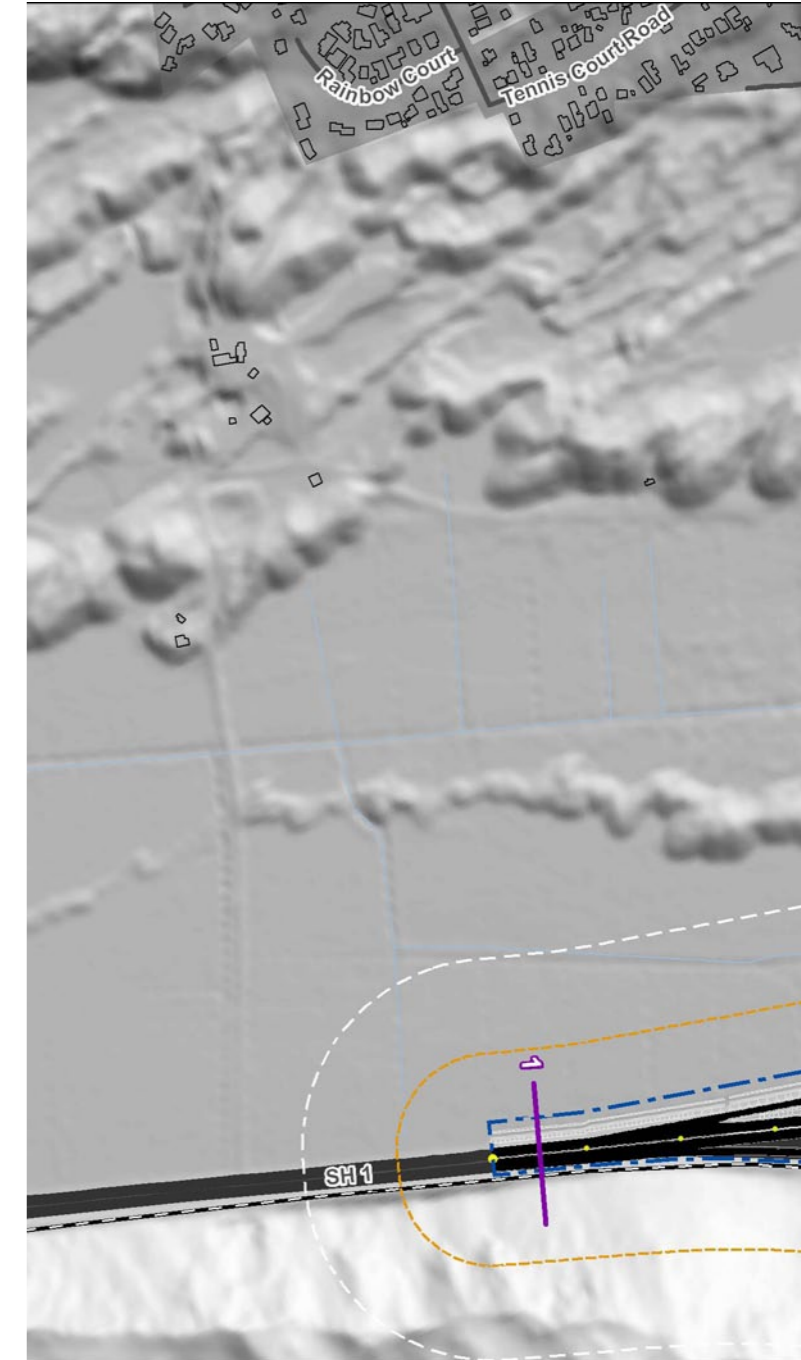
**FIGURE 9 CHARACTER AREA LOCATIONS**

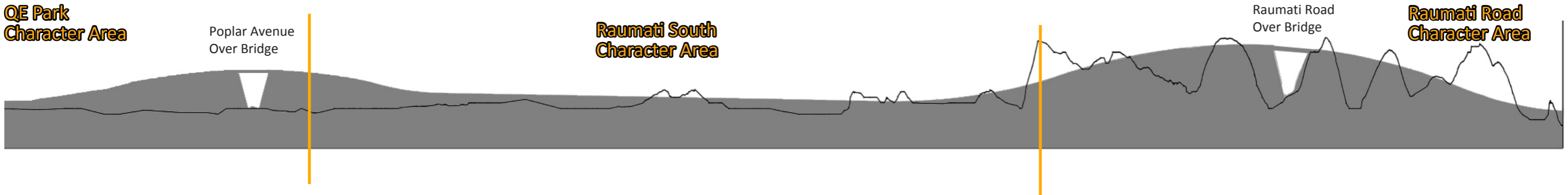
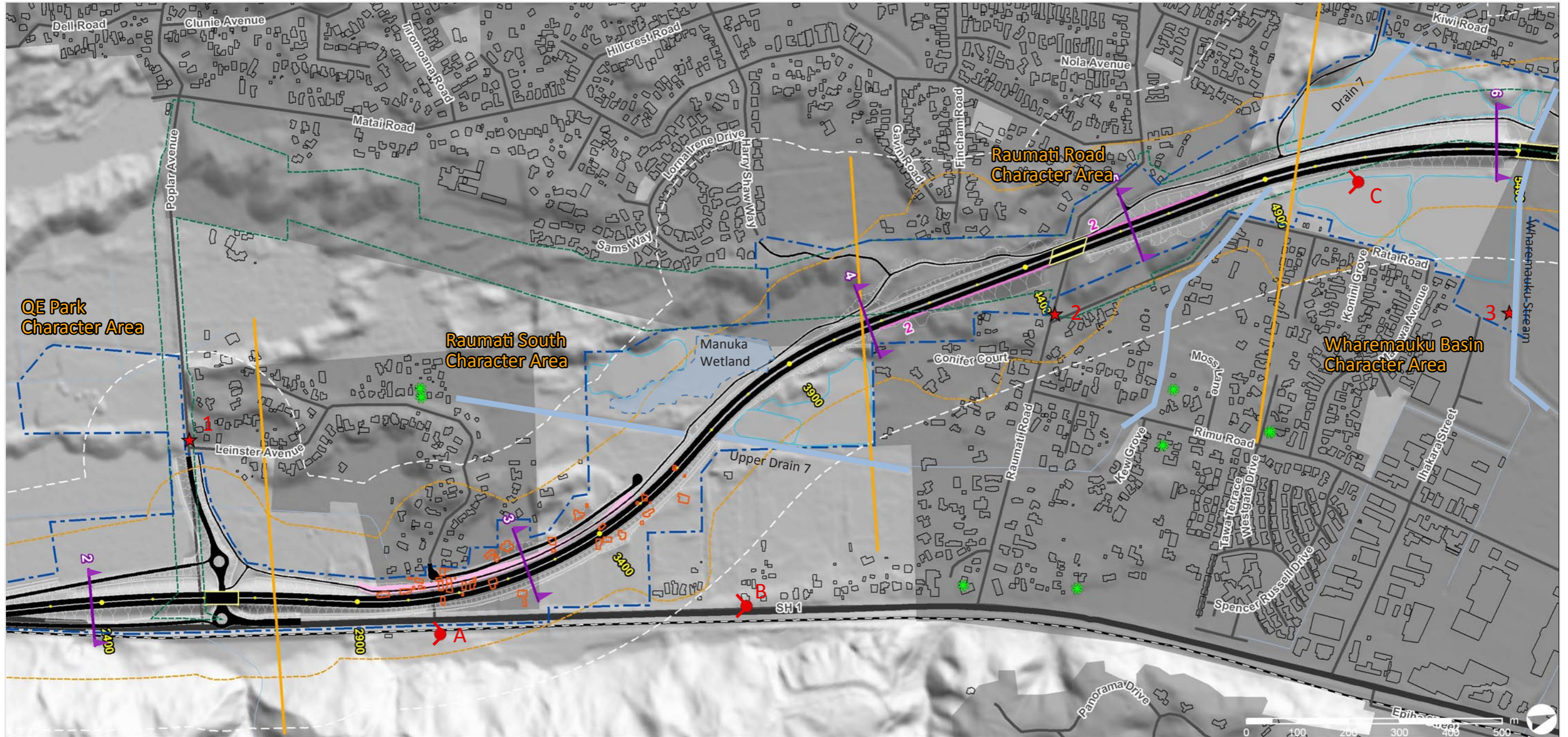
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**LANDSCAPE AND VISUAL ASSESSMENT BY CHARACTER AREA**  
**SECTOR ONE - BETWEEN CHAINAGE 1900 AND 4500**



Cross section 1	Figure 16	Appendix A
Cross section 2	Figure 17	Appendix A
Cross section 3	Figure 18	Appendix A
Cross section 4	Figure 19	Appendix A
Cross section 5	Figure 22	Appendix A
Aerial Oblique A	Figure 12	Appendix A
Aerial Oblique B	Figure 13	Appendix A
Aerial Oblique C	Figure 14	Appendix A
Visual Simulation 1	Figure 1	Appendix B
Visual Simulation 2	Figure 2	Appendix B





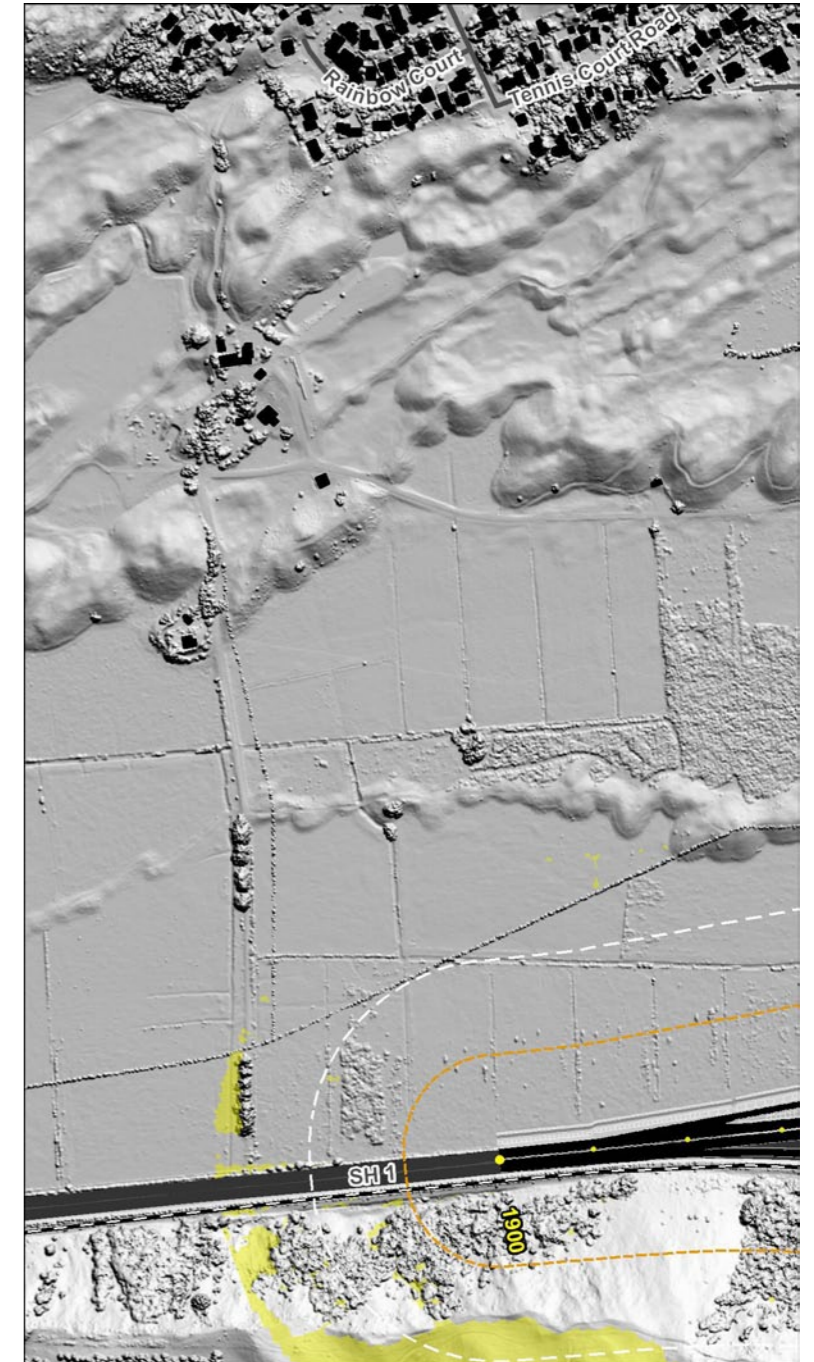
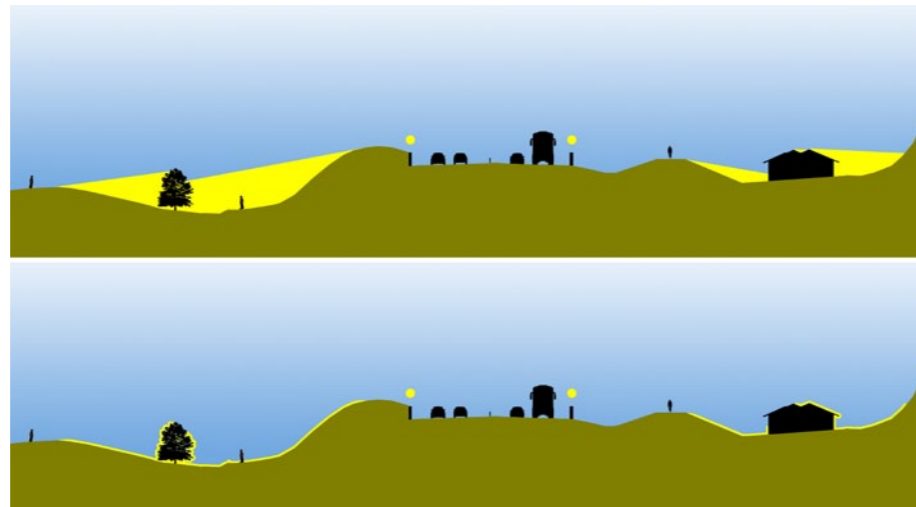
**ZTV Analysis**

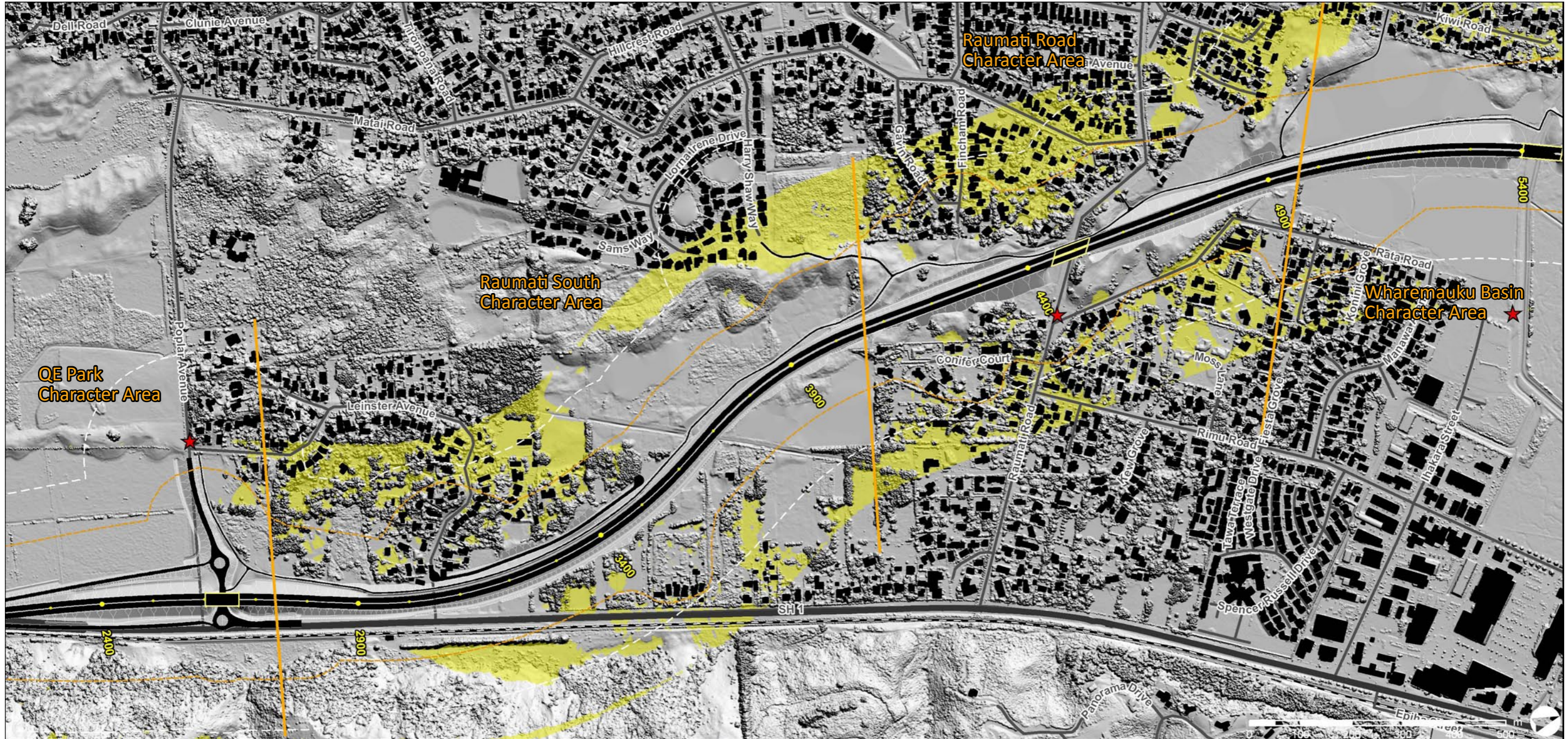
The theoretical visibility analysis used “target” points at every 10m along the Expressway, offset 15m each side of the centre line and at a height of 3m above the ground surface. The yellow areas on the diagrams show locations from where the target points can theoretically **not be seen**. It can be thought of as an area in shadow of the line of sight from the target point.

This analysis is based on the LiDAR data including the land(terrain) and above ground features (vegetation and buildings). Further detail about the ZTV analysis can be found in the Methodology section of the report.

**KEY**

- Target Point (3m above ground)
- Locations from where the target points can not be seen.







**FIGURE 12 AERIAL OBLIQUE A- POPLAR AVENUE INTERCHANGE** AEE Lodgement 15 March 2012 rev 1 - Appendix A MacKays to Peka Peka Expressway- AEE- Landscape and Visual Assessment | page 24







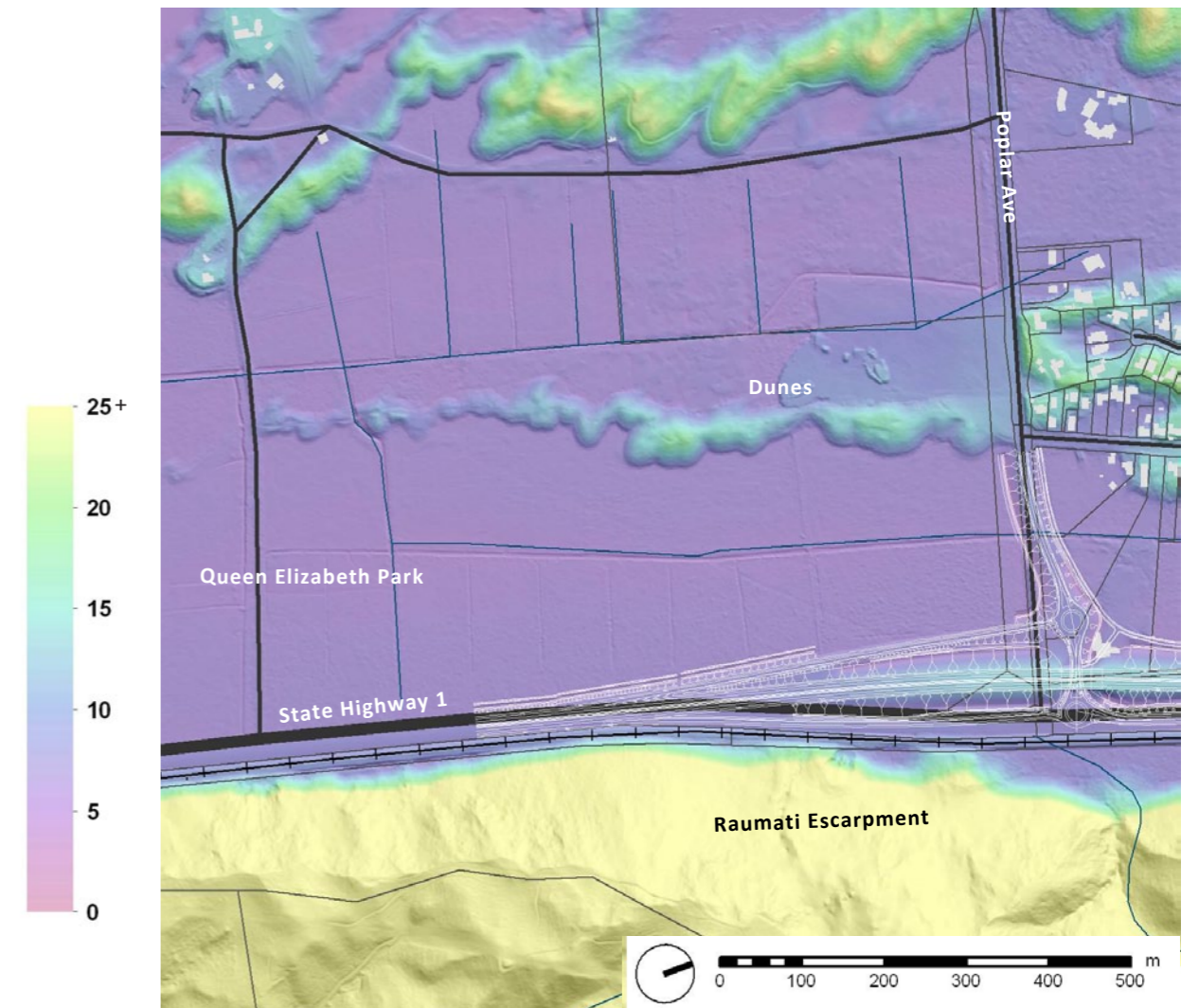
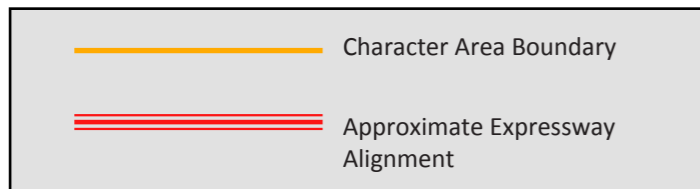
FIGURE 14 AERIAL OBLIQUE C RAUMATI ROAD



View south



View south



QE Park (chainage 1950)

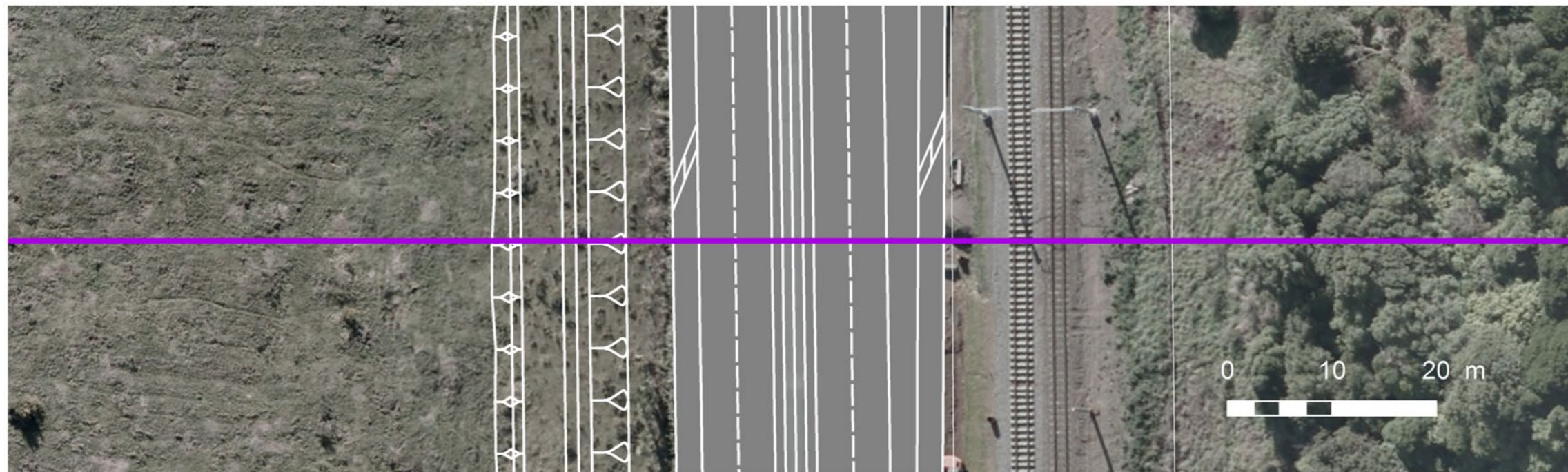
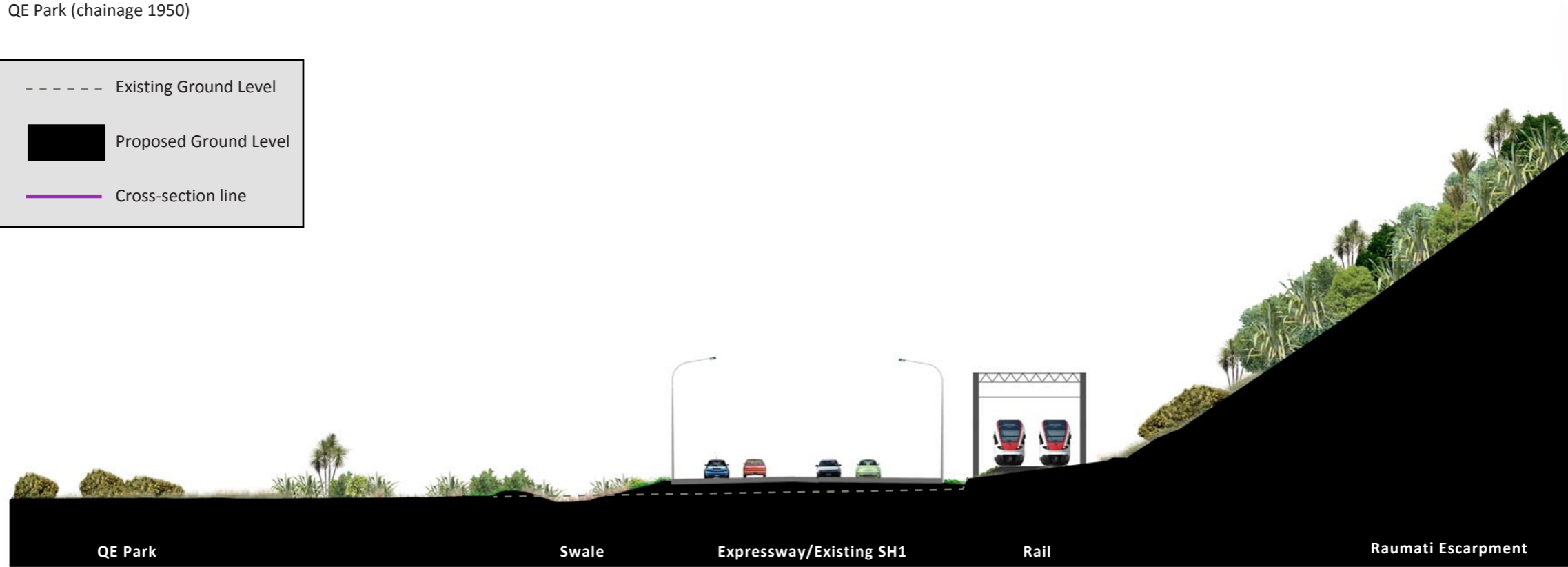
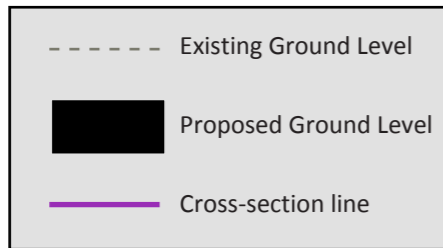
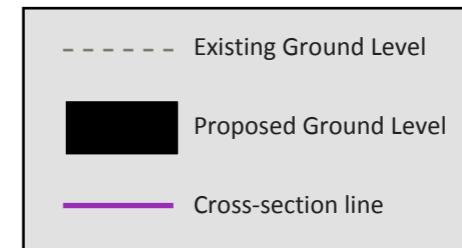


FIGURE 16 CROSS-SECTION 1



Poplar Ave intersection (chainage 2380)

