

# 5. LANDSCAPE OUTCOMES



Area of bush, predominantly native, in the Warkworth sector

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### DESIGN STATEMENT

The Warkworth sector is located within a rural setting characterised by low rolling hills and expanses of open pasture, punctuated by densely vegetated streams and patches of other existing mature native bush, dotted with farms and rural lifestyle properties. Warkworth has a rich history of native forest logging, established by industrious settlers from Europe in the 1840's. This history remains important to the local story and is evident in the built vernacular of the Warkworth settlement and forms a part of the local community spirit.

Two of the most ecologically significant features of the Project are found in this sector; the right branch of the Mahurangi River and a kauri forest. Both of these features include remnant swathe of native forest including very large kauri trees, some of which are hundreds of years old. A large extent of the planting will link these two features, to create a significant 'stitch' across the motorway to the wider landscape. The Mahurangi River is bridged and all river margins riparian planted. Planting to the north and south of this area will provide a wildlife corridor, and in this area an existing wetland will be rejuvenated and replanted with approximately 2.6ha of native wetland species. This, in conjunction with the wider riparian and terrestrial landscape planting will create habitat, provide natural decomposition, encourage natural pollination and improve water quality. Five stormwater wetlands will treat stormwater runoff from the road.

The motorway ties in with SH1 just north of Warkworth, by way of a roundabout and includes an intersection which will allow for the future construction of the Matakana Link Road and a 3m wide shared path. In this location, significant soft planting, including a large avenue of kōwhai trees (*Sophora microphylla*), will give the roundabout a local gateway status. A separate design feature will also signify the entrance to Warkworth.

Changes to the local road at Woodcocks, Carran and Wyllie Road will maintain connectivity to Warkworth for residents. It is proposed to realign Wyllie Road so that it reconnects to Woodcocks Road, running parallel to and the west of the motorway. This design has minimal impacts to the local road users as well as indirect benefits from the lowering of the alignment, which include a reduction in earthworks and less volume of spoil needing to be disposed of.

Maintaining a sense of openness and a connection across the motorway are key outcomes promoted in this area. Because of the topography, there are a number of places in this sector where the motorway can be viewed from above. The design has sought to screen the road, as practical, through stitching on either side, and minimalist and recessive design of dense planting - particularly on the eastern side. This sector also includes two specific ULDSPs [D38AA(d)] that address the area to the east of the alignment, both north and south of Woodcocks Road.

It is noted that the Warkworth sector also includes a 4km section where the motorway designation adjoins the potential Future Urban zone.



Native forest

### 5.1 NATURAL FEATURES

The Warkworth sector is dominated by agricultural use, interspersed with mature native forest remnants, wetlands, pockets of trees which extend for some distance beside the road and is crossed several times by meandering low-land courses of rivers and streams over floodplains, most notably, the Mahurangi River.

A remnant forest of mature kauri (*agathis australis*), and podocarp trees is located near Perry Road (in the south of the sector), which provides habitat to a variety of native fauna, such as birds, invertebrates, lizards, and bats.

Surrounding the river and Warkworth area are rural pastoral activities on gradual undulating hills, alongside orchards, vineyards, glasshouses, a fish farm, and lifestyle properties (ULDF 5.2)

#### Kauri Forest

The most significant area of existing bush in the Warkworth Sector is the remnant kauri forest located near Perry Road. The viaduct through the kauri forest (Te Arawhiti Pua Ngahere) has been designed to avoid as much impact to this feature as possible. The viaduct has been located to minimise impacts on habitat, the Mahurangi River tributary and minimizes the number of kauri and other large native trees to be removed. In early stages of design, all canopy species were mapped and measured, and then the 'path of least impact' was chosen, where the bridge was located. Of particular note, eight of the largest kauri trees are avoided, all estimated at 350-500 years old.

This area will be landscaped to stitch the kauri bush across the motorway, repair cleared edges, and soften the appearance of the motorway from the Perry Road area [D52]. Kōwhai (*Sophora microphylla*) has been specifically included in the planting mix for this area to fit into the character and context of the Warkworth sector [ULDF 5.2].

#### Mahurangi River

The Warkworth sector drains towards the Mahurangi River, which has two main branches (Right branch and Left branch) and many tributaries. The lower lying land contains bush remnants; most notably the kauri forest on Wyllie Road and the tōtara forest tracing the course of the Mahurangi River (Right Branch).

The focus in these areas is to minimise the clearance of vegetation along Mahurangi River and extend the existing areas of bush in the vicinity of where the motorway crosses it from the vicinity of Perry Road. This involves re-vegetating the hill slope north east of the viaduct and north of the Mahurangi River (as part of replacement planting), in order to stitch the kauri bush across the motorway, and soften the appearance. The land between the motorway and Mahurangi River (Right branch) opposite Wyllie Road, will be rehabilitated, including the extension of existing tōtara bush and the removal of any construction access track. Permanent streams will be replanted to a width of 20m on both banks (total of 40m) [D38AA(d)].

#### Wetland Areas

The sector contains the largest wetland area found throughout the alignment, of which a large area will be restored to its natural state (refer to the eastern side of the motorway at Chainage 47300- 47550). The existing, modified wetland is currently surrounded by agricultural land. The existing wetland portion will be fenced, planted with wetland mitigation plants, such as kahikatea (*Dacrydium dracrydioides*) to attract kererū, kōwhai (*Sophora microphylla*) and harakeke (*Phormium tenax*) to attract tūī and a mixture of grasses to create habitat for heron. This will provide ideal habitat for marsh crakes, fernbirds and other wetland species.

It is the most suitable low lying area to host wetland mitigation planting within the designation, and is provided to offset the loss of wetland elsewhere. The existing area and additional wetland mitigation area will be the largest freshwater wetland along the alignment. The wetland will be "buffered" by terrestrial mitigation planting on the northern and southern edges and linked to other freshwater and terrestrial habitat via riparian plantings along streams.

### 5.2 HUMAN LANDMARKS

#### Warkworth Township and Satellite Areas

Warkworth is a central hub that serves a wider satellite rural community including Tāwharanui, Mahurangi East, Matakana, Goat Island, Leigh and Pakiri. It has a village-like cluster of shops, supermarkets, community facilities and two schools (Warkworth Primary School and Mahurangi College).

The outskirts of Warkworth are a mix of rural production lifestyle properties of varying sizes, valued for their rural settings. The alignment passes to the west of lifestyle properties located at Perry Road, Valarie Close and Viv Davie-Martin Drive. Views from some of these properties will be changed by the new motorway (refer section 5.14).

The motorway will create a new entrance to Warkworth for both northbound and southbound travelers, located on the north-west outskirts of the town.

### 5.3 LOCAL CONNECTIVITY

#### Warkworth Township

The ULDF outcomes include a design feature to mark the gateway to Warkworth. This gateway will be marked with a plant mix specific to the Warkworth area and a specifically commissioned art feature. The roundabout will also be a significant landmark within the gateway.

#### Local Roads

A network of rural roads radiate from the Warkworth township. The alignment of the motorway will change the configuration of Carran Road, Woodcocks Road and Wyllie Road as these are divided by the motorway.

The following changes will be made to existing roads to connect to the motorway;

- The intersection of SH1 and Kaipara Flats Road will be upgraded to accommodate the increase in traffic movements [D70A]
- SH1 will also be widened between the Northern roundabout and Hudson Road to provide two lanes in each direction, plus additional lanes as required for intersection turning movements. This will include a connection to the proposed Matakana Link Road.
- Two signalised road crossings will be installed; one for the proposed Matakana Link Road and the other on SH1 South
- It is proposed that Wyllie Road will be re-aligned to the west of the alignment to reconnect to Woodcocks Road, the small unaffected proposed portion will be turned into a cul-de-sac
- Woodcocks Road will be slightly realigned where it crosses beneath the motorway

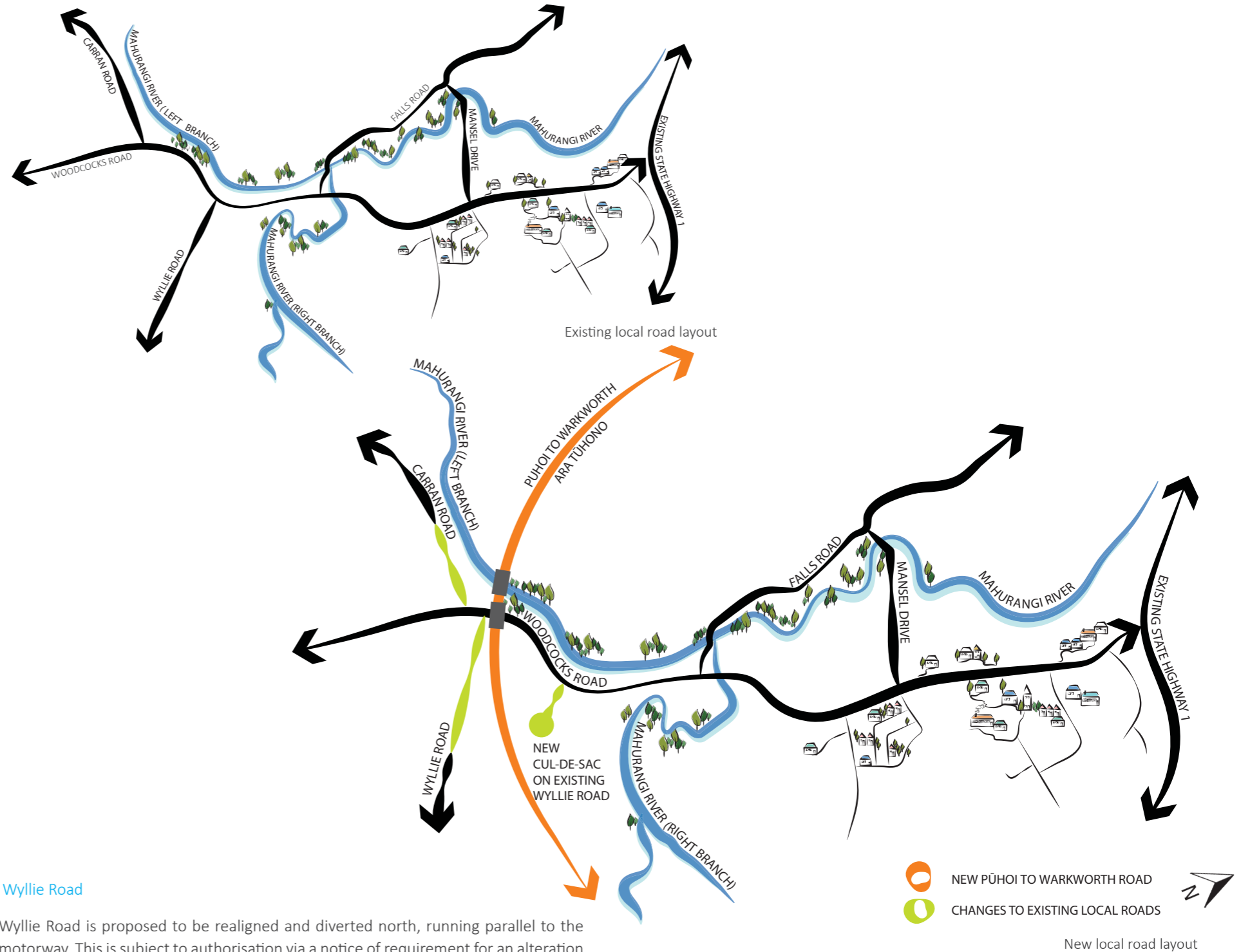
An off-road shared pedestrian and cycle path to the north of the roundabout has been designed with a minimum width of 3m and is generally separated from the carriageway with a grass berm.

The shared path will run alongside the southbound SH1 carriageway, extending from 100m south of Goatley Road, to the proposed Matakana Link Road. Signalised shared path crossings will be provided to cross SH1 and Matakana Link Road. The path will then continue along the northbound SH1 carriageway, connecting to the existing shared path at the Hudson Road signalised intersection

A ramp will be provided for southbound cyclists to join the shared path south of the Goatley Road intersection. Provision for northbound cyclists to leave the shared path and cross SH1 to join the northbound shoulder will occur midway between the northern roundabout and Kaipara Flats Road. The route of the shared path is indicated in the landscape plans in section 7.

NZTA and Auckland Transport are working to improve transport between Warkworth and Matakana with the Matakana Link Road. There will be a connection provided from the motorway to the proposed link road. More information on Matakana Link Road is available from Auckland Transport.

SH1 will be widened between the northern roundabout and Hudson Road to provide two lanes in each direction, plus additional lanes as required for intersection turning movements.



#### Wyllie Road

Wyllie Road is proposed to be realigned and diverted north, running parallel to the motorway. This is subject to authorisation via a notice of requirement for an alteration to designation. The intersection of Wyllie Road will be aligned with Woodcocks Road to the west of the motorway. This means that no bridge is required either with the motorway going over Wyllie Road; or Wyllie Road going over the motorway (as shown in the indicative design).

The realigned Wyllie Road will connect via a new intersection with Woodcocks Road. This has the overall result of a lower alignment in this area. The existing Wyllie Road/ Woodcocks Road intersection to the east of the motorway will be retained, with a portion of Wyllie Road converted into a cul-de-sac to maintain access to houses.

This portion of Wyllie Road will maintain access to properties. The diagram above shows the current, and future alignment of the area's local roads.

## Warkworth Gateway

### Vision

Pukerito has been identified as an appropriate location for a distinctive landmark feature that evokes the Warkworth area. The vision for the gateway is to create both a sense of arrival at Warkworth and to deliver a memorable intervention along the roadway journey that has meaning within this location.

### Context

The contextual and functional considerations of the intersection and roadside environment that have guided the proposed response have included:

- A focus on the Warkworth leg of the intersection as the most appropriate location for an arrival element, with the intersection approaches being space constrained and in a high speed approach environment
- Consideration of the spatial constraints imposed by the close proximity of the ultimate SH1 roadway operational boundaries and the need to locate any non-frangible element a minimum 6m from the edge of the outermost shoulder to address sightlines and clearance requirements
- Recognising the strong influence that the adjacent low lying areas, stream and wetlands have on the character and setting of the intersection

The sector plans in section 7 show a broad area to the east of the alignment that offers the opportunities to realise these contextual considerations.

### Gateway Response

The gateway will be a holistic composition that responds to the scale of the intersection with several layers contributing to the gateway concept. These layers include:

- The landscape response, with tree and under-story planting providing a distinctive backdrop to the gateway experience.
- The landform response, which seeks to present the intersection as a simply arranged, coherent setting for road users and to blend the road verges naturally into the existing topography
- The water management response, which seeks to align wetland and stream restoration to a context driven arrangement that responds closely to the natural history of the location
- An art overlay that provides place specific meaning and interpretation to the gateway experience from the perspective of Ngāti Manuhiri

Specific landscape elements will also be designed at a later stage in response to the art overlay to ensure they are complimentary. This is shown on the sector plans in Section 7.

## Art Brief

The art overlay is being developed in an ongoing process in conjunction with Hōkai Nuku, and in consultation with Auckland Council and Auckland Transport [D36(b)]. A design brief has been developed which will influence and drive the final form of the feature as follows:

- Overall theme – to primarily respond to the identified narratives articulated in the Cultural Footprint Framework with a gateway feature. The feature will draw upon the strong connections of mana whenua to the flow of water from the Puhinui Falls to Te Waihē Awa (Mahurangi River) and to the harbour at Warkworth. Where possible, the gateway will also strengthen the link between the gateway, the township and the wider Warkworth area
- Materiality – the proposed material will demonstrate material durability, is consistent with roadside furniture with a focus on minimising maintenance
- Landscape- planting will accentuate the artwork, while optimizing views of the feature from the motorway



Kōwhai tree in a native forest<sup>1</sup>

## Pukerito

Pukerito will be an important landmark, particularly to the residents of Warkworth and also to travellers heading to and from Matakana, Whangārei and the Far North.

Key features of the roundabout include:

- A multi-lane roundabout with three exit points, those being the north bound exit (onto existing SH1), the east bound exit (heading towards Warkworth), and the south bound exit (entering the new motorway)
- Widening of existing SH1 between the new roundabout and the SH1/Hudson Road intersection to provide two lanes in each direction (plus additional for turning movements)
- A left turn slip lane from the motorway to existing SH1 (northbound)
- A left turn slip lane from the existing SH1 towards Warkworth (eastbound)
- A left turn slip lane from the Warkworth towards the motorway (southbound)
- A shared path

The wetland forest which previously occupied the low-lying ground on the approach to the roundabout from the south will be regenerated. Planting around the Northern roundabout will be bold and will include a selection of indigenous specimens that are locally relevant. This will signal a change in driving conditions to road users while also demarcating the turn off to the Warkworth township.

Gantry signs will direct drivers to choose a motorway lane well in advance of the roundabout. If NZTA decide to toll the road, notice about the Northern Gateway toll route and toll charges will be provided to motorists in advance of entering the Pūhoi to Warkworth motorway. Any driver heading south who does not want to pay the toll, will be able to avoid entering the Pūhoi to Warkworth motorway (an option at the northern roundabout), and travel the existing SH1.

<sup>1</sup>Surrender to the sky your heart of anger, 2016. <sup>2</sup>Russellstreet, 2011



Photo taken facing the Wyllie Road and Woodcocks Road intersection



Northern Gateway Toll Road<sup>1</sup>



Motorway through rural land<sup>1</sup>

## 5.4 LOCAL BRIDGES

### Woodcocks Road Bridge

The Woodcocks Road Bridge carries the motorway alignment over the realigned Woodcocks Road (chainage 49250) at a height of 6m. The bridge maintains the existing local road connections and provides for the future installation of a pedestrian path, however at the time of road opening this will be gravelled, and separated from the road carriageway with w-section barriers. The road below the bridge is at natural grade and given the short width of the bridge (26m), end to end visibility will be provided.

Vehicles and pedestrians travelling under the motorway on Woodcocks Road will see the 'MSE' wing-walls at road level and motorway users will see TL5 concrete barriers as they travel over the bridge. The bridge underside and concrete walls create a clean zone beneath the bridge. Utility services and rainwater pipes will be mostly concealed to provide an attractive long-term appearance. Anti-graffiti paint will be used on accessible areas and safe maintenance inspection will be possible.

The overall project outcomes of an 'uncluttered highway' and a stitched together landscape are considered at this location. Amenity for local residents near the motorway has been provided with the space between Wyllie Road and the motorway to be planted with native species, to address potential impacts from headlight glare. Low-level landscape planting will be installed on each side of the bridge, surrounding the wing-walls, to soften the appearance of the bridge at ground level and further increase the visual amenity of travelling under the bridge. The planting to the north of the crossing will tie into the existing indigenous forest along the Mahurangi River and extend the important ecological corridor, contributing to stitching the landscape across the motorway. The combination of stream side planting, embankment planting and ecological mitigation planting at this location will create a point of interest for local road users. On the south eastern side of the crossing, the design is equally responsive to the landscape character, with shallow grassed batters that blend into the existing pasture. The planting around the road edges is low lying and will provide sight lines from Carran Road and (the proposed realigned) Wyllie Road, overall creating a high amenity for road users [ULDF 5.3]. For further details of the bridge refer to section 4.2 and the plans in section 7.

### Mahurangi River Bridge and Adjacent Culverts

The form of the Mahurangi River Bridge and adjacent culverts has been determined by the physical conditions of the area and complies with the relevant consent conditions. The bridge has a concrete 'super tee' structure which is the same as the other short bridges on the Project. The width of 26m is influenced by the Mahurangi River channel and flood constraints.

Engineered roadside swales are currently located on each side of Woodcocks Road. These are extended north and convey runoff via a landscaped swale to the culvert located at chainage 49100. The swale and culvert enable compliance with flood consent conditions and are designed to accommodate geotechnical constraints in this area.

To create a more naturalised watercourse with increased ecological value, and to provide links across the motorway, planting will occur in appropriate locations in and around the Mahurangi River. Planting mixes will be developed, using species that prefer wet conditions and those which are commonly found in streams, to vegetate areas around the stream diversion, quickly creating habitat for fauna and shade for the stream channel. The riparian margins of the Mahurangi River will be planted on both sides of the bridge with a mitigation planting stream edge mix (MPSE) to further enhance the ecological value of the area. Rip rap rock will be used along the stream margins on each side of the bridge to prevent erosion and damage to the motorway structures. The right stream bank immediately upstream of the bridge will have rip rap rock with native specimen planting to soften the appearance of the rock. For further details of the bridge refer to section 4.2 and the sector plans in section 7.

### Carran Road Access Underpass

The Carran Road Access Underpass will provide access for a farm which is bisected by the new alignment [D80]. This underpass is located at chainage 48650, to the north of Mahurangi River Bridge, and will be a reinforced concrete box underpass. The underpass is 38m long, 5m wide and 4.5m high which is sufficient to accommodate farm vehicles and stock movement to meet condition D80. Motorway users will see wire rope barriers as they travel over Carran Road Access Underpass.

On the north side of the motorway and underpass, one side of the underpass track will be have pasture grass and the other will be planted with plants from the landscape restoration mix. On the south side, pasture grass will merge with the surrounding green grass area.

### Te Arawhiti Pua Ngahere

Te Arawhiti Pua Ngahere is the largest structure in this sector, designed to cross the existing kauri forest and Mahurangi River, and to accommodate native planting mixes to stitch this significant area below the motorway.

For details of this viaduct refer to section 4.2.

## 5.5 STREAMS

The ULDF and Project outcomes for streams include [D36(c)] [ULDF 5.5]:

- Re-vegetating stream margins to enhance habitat and ecological connectivity
- Visually accentuating the streams as landscape features through re-vegetation
- Re-vegetating to soften the appearance of culverts
- Using riparian (relating to banks of rivers and wetlands) and margin species indigenous to the area
- Preferring the use of bridges to culverts, for wildlife connection
- Merging the riparian planting required by specific conditions into the overall landscape concept [D36(c)(iv)]
- Maximising connectivity of streams, wetland, coastal, terrestrial
- Restoring past biodiversity and mahinga kai

The Mahurangi River is an important river system in the locality, and discharges to the Mahurangi Harbour after flowing through Warkworth. Watercourses in the Warkworth sector are all within the Mahurangi River catchment. The route will cross the Mahurangi River and its tributaries several times, with the river branching into 'left' and 'right' branches near the intersection of Falls and Woodcocks Road. The branch which heads west and north from this intersection, is known as the 'left' branch. It meanders towards Woodcocks/Carran/Wyllie intersection, with a tributary system spreading through the valley of the motorway alignment, towards the northern roundabout. The 'right' branch of the Mahurangi River heads up-gradient in a southerly direction from its confluence, meandering parallel to Wyllie Road and to the south of Moir Hill Road.

Both branches in the up-gradient catchment have some reasonable existing riparian shading that extend towards the viaduct. The left branch also has a reasonable riparian shading which extends towards Kaipara Flats Road. The unnamed tributary that the

motorway will cross, mainly comprises of a system of straightened, narrow and soft-bottomed watercourses that have historically been adjusted to increase drainage of the land.

The Mahurangi River and areas within the catchment have examples of both good quality habitat and species diversity, as well as poor and degraded habitat. The high diversity of native fauna recorded within the river system is evidence of healthy streams. The diverse species play key roles within the trophic food-webs of aquatic systems.

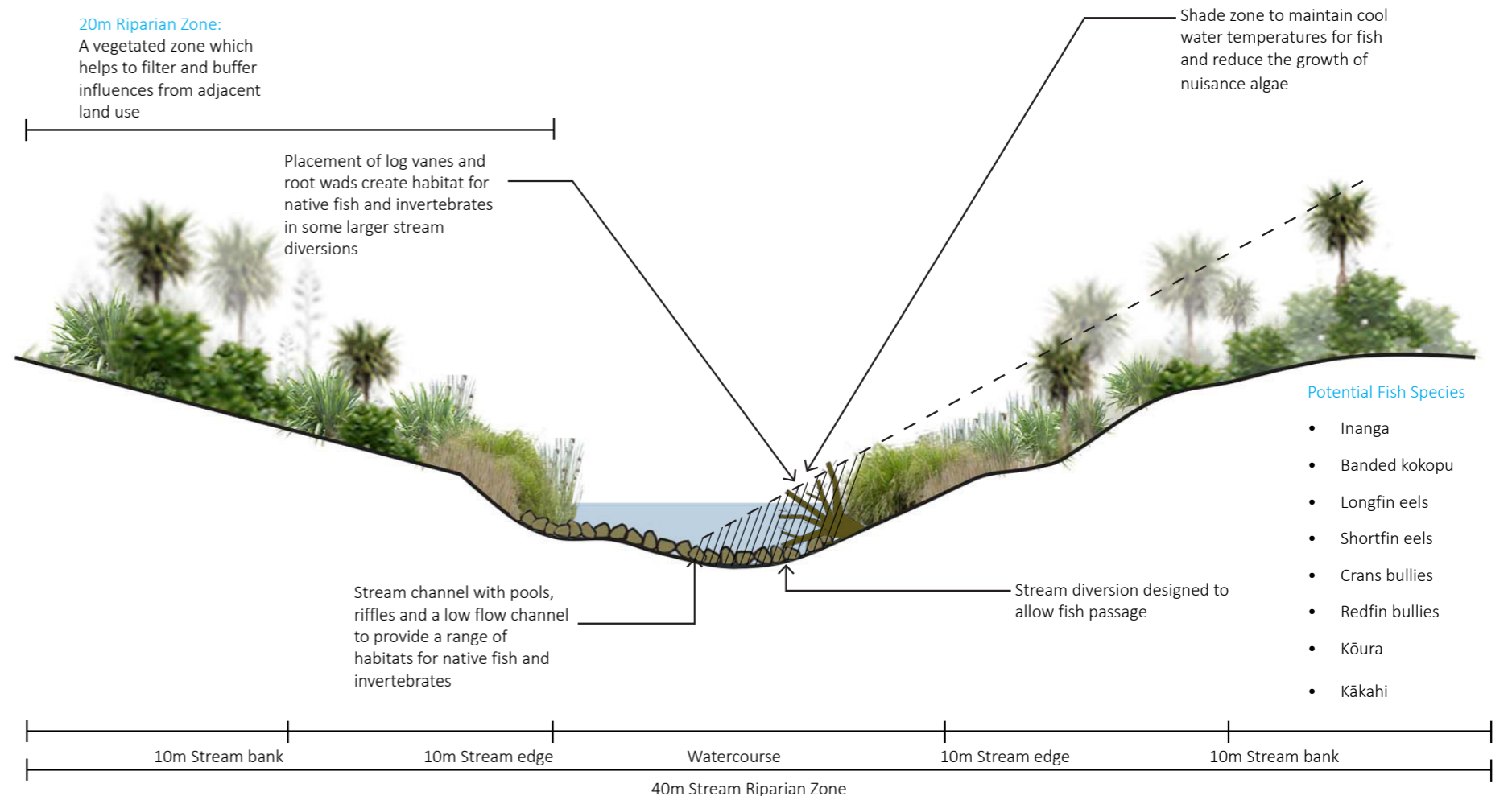
In the right and left branches of the Mahurangi River, longfin eels have been recorded by the Project team, which are declining and classified as nationally 'At Risk'. In addition, the Project team has also recorded native shortfin eels, banded kōkopu, common bullies, kōura and freshwater shrimp along these branches. Other native fish species known to be present in these reaches include inanga, red fin bullies and freshwater mussels.

Many of the freshwater species in the tributaries migrate to sea as a key part of their lifecycle. This biological process is facilitated by the connectivity between the freshwater and marine environment. An existing weir across the Mahurangi River at Warkworth, waterfalls and existing instream barriers inhibits the passage of some fish species further upstream. Where necessary, stream diversions provide low flow channels to allow fish passage when water depth is very low and a pool/riffle sequence (a rocky/shallow area, where the water movement is uneven) to provide resting pools for migrating fish.

The ULDF principles direct the mitigation of stream and culvert enhancements, riparian planting, wetland mitigation and terrestrial planting areas. Ecological and riparian mitigation planting sites located around the watercourses within the Warkworth sector will improve ecological connectivity much like 'stepping stones' will rehabilitate stream margins. The 'stepping stones' reduce the distance between suitable habitat patches, joins smaller habitat patches into larger contiguous habitat patches and improves linkages between streams and maintain stream integrity. Mitigation planting will reflect the current and historic forest and wetland habitats within the Rodney district [ULDF 5.5] and rehabilitate the existing streams and riparian margins.



Kākahi (freshwater mussels) known to be present in the Warkworth sector



Stream Mitigation

## 5.6 CULVERTS

Culverts are the primary method of conveying existing stream and watercourse flows beneath the motorway. A ULDF objective is to minimise culvert lengths and stream encroachments and to maintain stream integrity through culvert design. Culvert length has been minimised by steepening earthworks slopes where practicable and installing wingwalls on each culvert which reduce the need for long tapered earth slopes.

The number of culverts in the Warkworth sector is based on the number of tributaries of the Mahurangi River that travel under the motorway alignment. The stormwater management system for the motorway integrates stormwater conveyance and treatment infrastructure with the surrounding landscape to maintain linkages and connectivity with the natural watercourses and environments either side of the motorway [ULDF 5.6].

In the area next to Te Arawhiti Pua Ngahere, the motorway is bridged to avoid the need to culvert 130m of stream and riparian habitat found in the right branch of the Mahurangi River.

In the area north of the Woodcocks/Carran Road intersection, the motorway is bridged over the left branch of the Mahurangi River to avoid the culverting of the River. During flood events, stormwater flows leave the left branch of the Mahurangi River (approximately 700m upstream of the Mahurangi bridge) and flow overland in a north-easterly direction. To convey these overland flows under the motorway, culverts at chainage 48350 will be installed to maintain the existing flood plain hydraulics and limit flood level changes.

To convey stormwater runoff from the catchment upstream of the Woodcocks/Carran/Wyllie Road intersections and under the motorway a culvert will be installed immediately south of the Mahurangi River Bridge (section 5.4). This location is determined by the requirement to avoid the surrounding highly compressible soils. To convey stormwater to the culvert a landscaped swale will connect from the corner of

Woodcocks Road and Wyllie Road. At the culvert outlet, a similar swale will connect to the existing swale (located to the north-east of the Woodcocks Road Bridge).

Perched (elevated outlets) and steep culverts can inhibit fish movement along waterways. The diversity of freshwater species in the area is very high. Design provisions, such as the installation of spat rope or spoiler baffles, will allow the fish species (banded kōkopu, short-fin eel, long-fin eel, inanga, common bullies, kōura) to move between the downstream and upstream habitats. To lessen adverse effects on stream communities, fish relocations and restoration will be undertaken where the watercourse tributaries are affected by the construction works.

Native riparian margin species and mahinga kai will be restored along the edges of streams by the ecological mitigation stream planting mixes (refer section 8) which merge into the wider landscape restoration planting mixes. Vegetation planted along the stream margins of culverts with flaxes and small shrubs provide shade over the channel, and with larger tree species to provide shade over pools or at bends. This riparian planting helps reduce erosion, accentuate the naturalised appearance and regulate the water temperature for fish health. An increase in habitat quality will be achieved for native freshwater animals [D36(c)][RC58][ULDF 5.6].

Fill batters have been steepened as much as possible at culverts, to minimise culvert length. Where there are no culverts, batters have been flattened as much as possible. The length of culverted stream is offset through the enhancement of other, unaffected areas so that the overall stream ecological values (SEV) remain the same as the unculverted streams.

Culvert appearance has been softened by planting and design. Some embankments adjacent to culverts are hydroseeded, such as at chainage 50300, 51100 and 51600, where this vegetation will match the adjacent landscape. In general, landscaping efforts are being focussed in intentionally selected locations to boost various ecology and amenity outcomes. Robust and resilient inlet and outlet culvert structures dissipate energy and control erosion to reduce bed scour occurrence and stream bank erosion [D36(a)].

## 5.7 WETLANDS

### Stormwater Wetlands

There are five stormwater wetlands in the Warkworth sector which perform an important function of treating stormwater runoff from the road to remove small soil particles, and larger floatable material (e.g. litter) from the water before it returns to the land or streams. The wetlands are located:

- On the corner of existing SH1 and the proposed Matakana Link Road South of the northern roundabout (where the motorway will join existing SH1)
- Immediately south west of the roundabout (approximately chainage 47100)
- North of the Carran Road Access Underpass (approximately chainage 48400)
- South of the Woodcocks/Wyllie/Carran road intersection (approximately chainage 49600)
- On the western side of the Mahurangi River Right Branch (approximately chainage 51100)

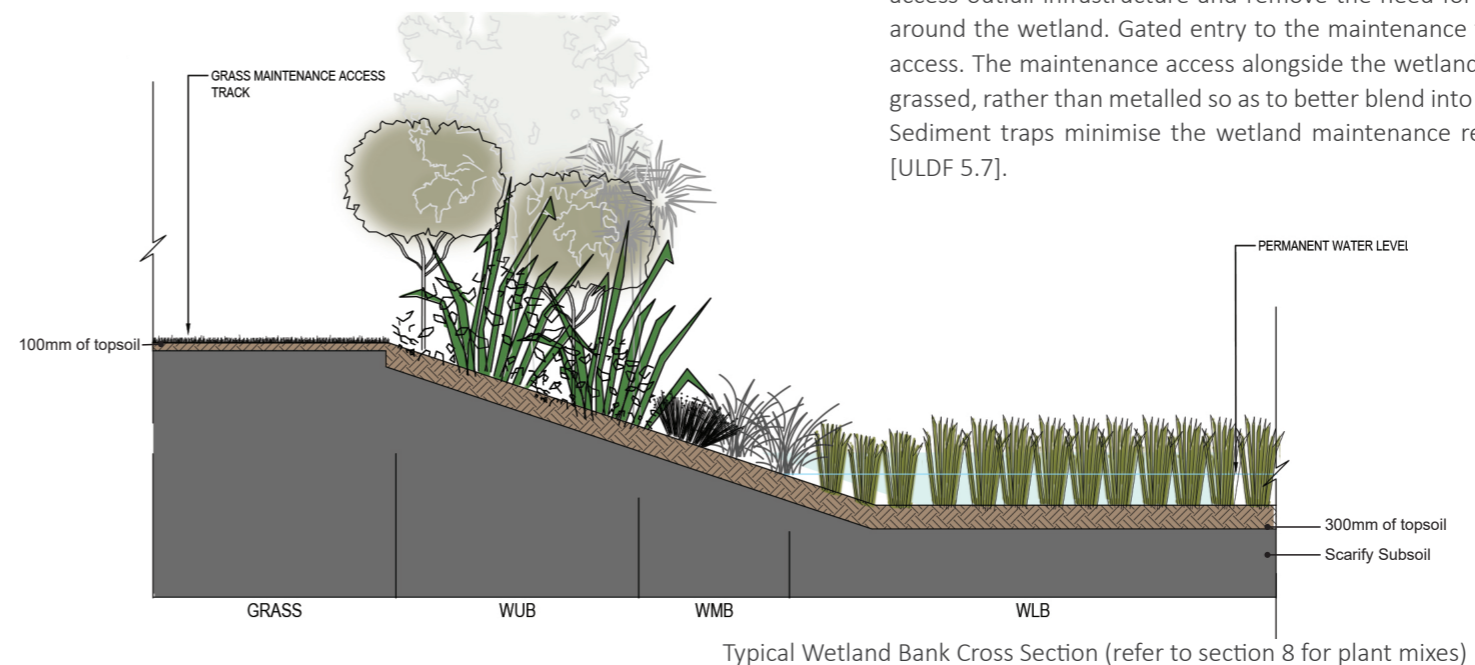
While primarily functional, the wetlands have been landscaped to have a natural appearance, and respond to catchments, geotechnical conditions, existing topography, native vegetation and the proximity to the receiving streams. The outside geometry of each wetland is curved to fit the existing terrain. Planted areas surrounding and in the wetlands include both landscape and ecological mitigation planting will treat water flows off the road surface of the motorway, and provide connections to create a larger habitat and provide food and habitat for native wildlife.

Plant species, which thrive in wet conditions, with different heights and filtering abilities will be planted in the wetlands and will naturalise the appearance of the stormwater wetlands. Species have also been selected that have been used for cultural harvesting. Riparian margin vegetation heights and foliage textures will be varied in each wetland water zone to optimise their natural appearance. The wetland edges will be shallow and vegetated to provide a transition from the wetlands to batter slopes or the maintenance track.

A grassed maintenance track will be provided around one side of each wetland to access outfall infrastructure and remove the need for a wide flat bench all the way around the wetland. Gated entry to the maintenance tracks will deter unauthorised access. The maintenance access alongside the wetland and the laydown area will be grassed, rather than metalled so as to better blend into the surrounding environment. Sediment traps minimise the wetland maintenance requirements [D36(a)] [D36(c)] [ULDF 5.7].



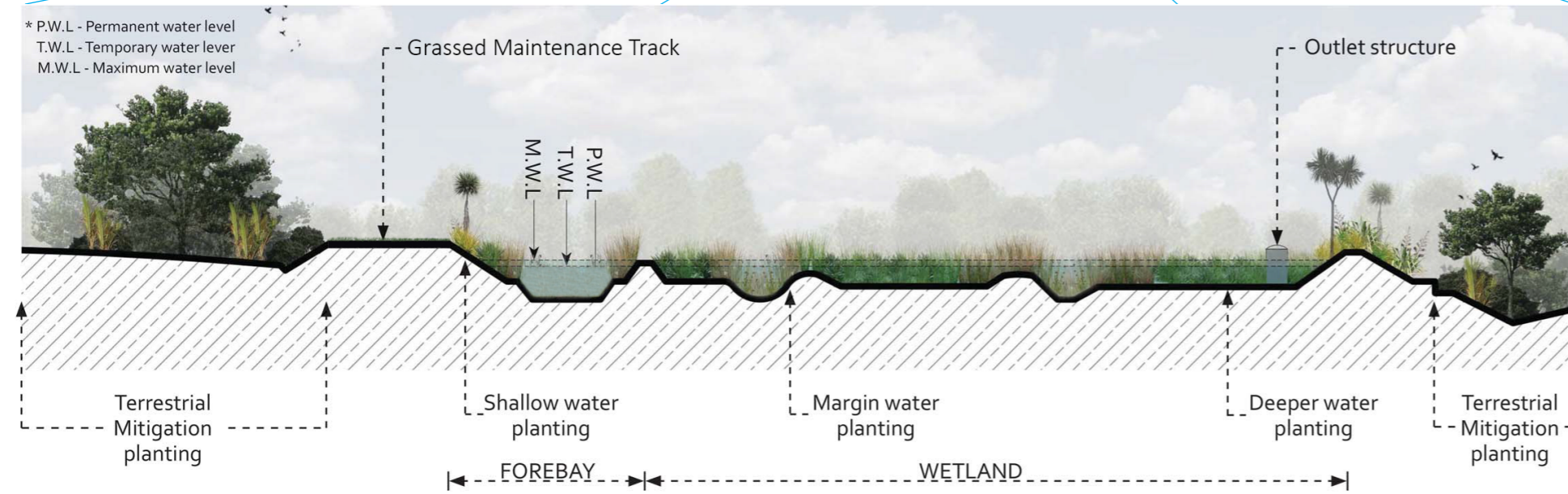
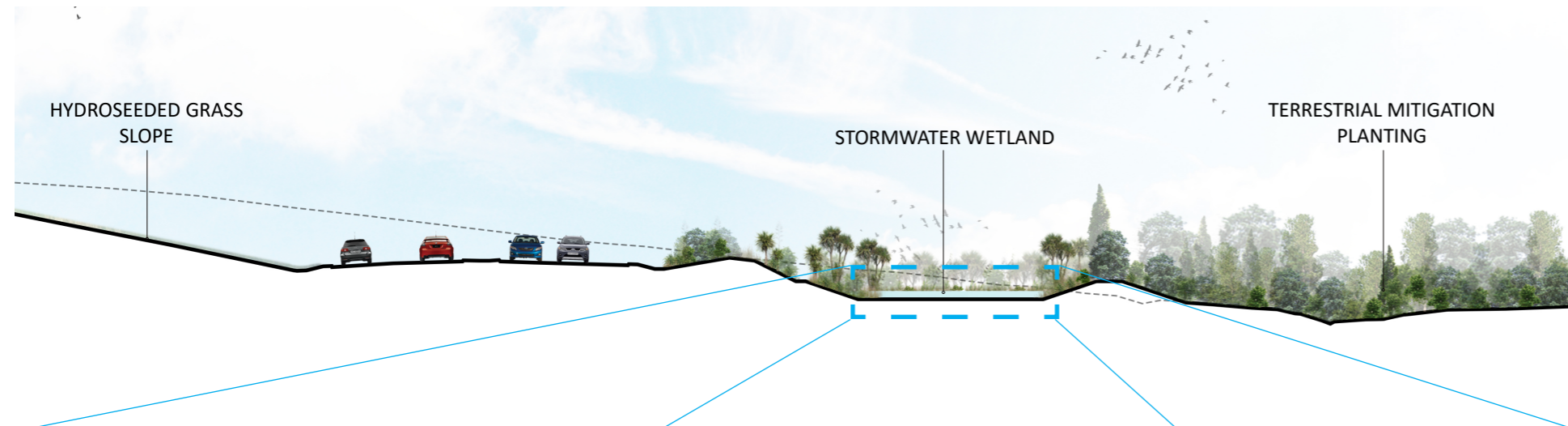
Baffles within a culvert<sup>1</sup>



Typical Wetland Bank Cross Section (refer to section 8 for plant mixes)

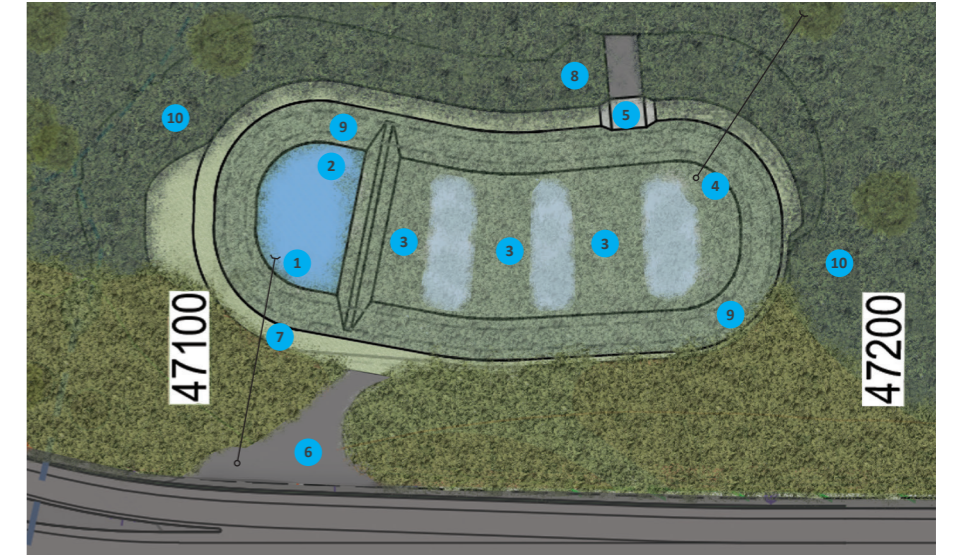
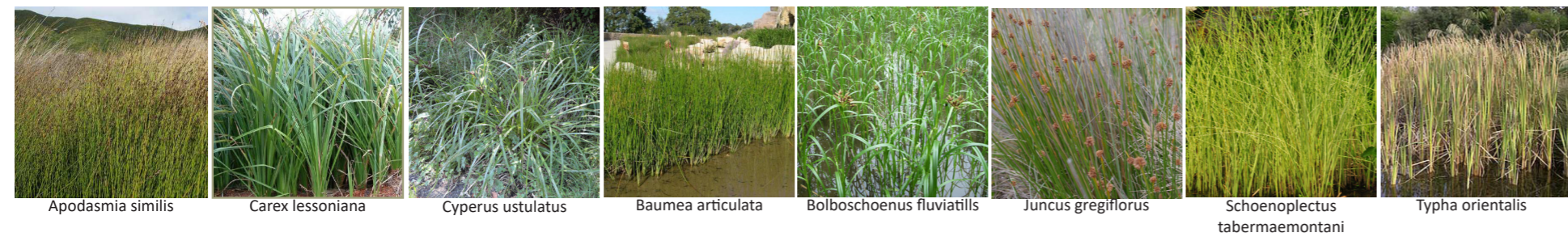
<sup>1</sup>John and Elaine Chesterton, 2007

Cross section of the stormwater wetland located at chainage 47100 to 47200



Diagrammatic wetland section showing integration of landscape treatments

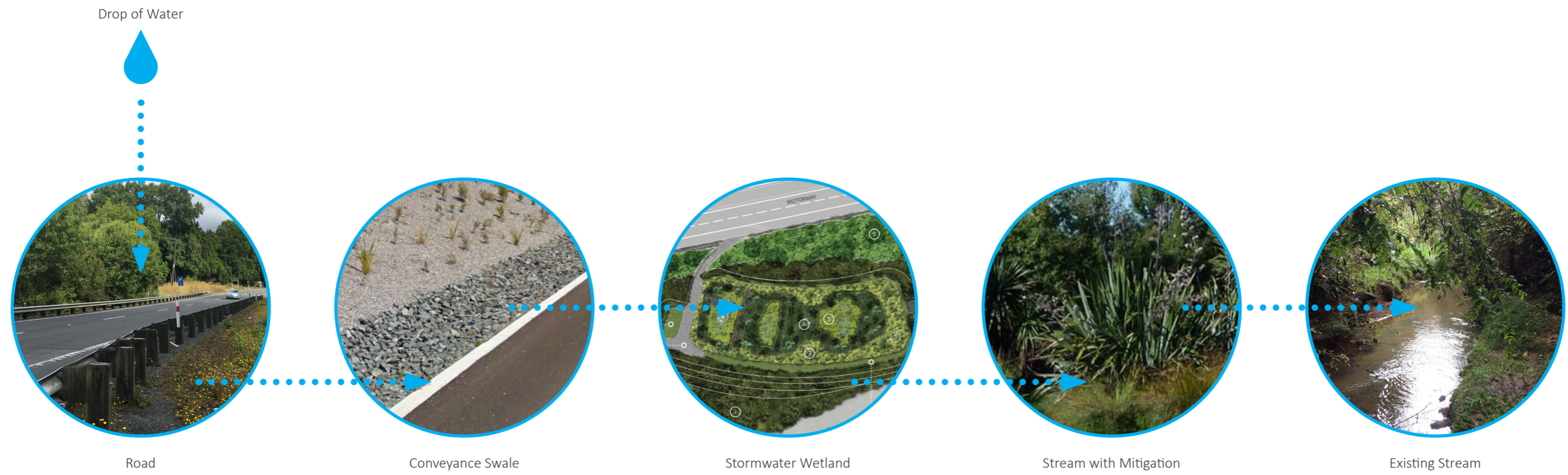
Sample of plants in the wetland planting mixes



Naturalised Wetland (Refer section 7 and 8 for the planting types)

- 1 Inlet**  
Water runoff is received via the inlet pipe. Rock riprap disperses the energy of the water slowing it down as it enters the sedimentation forebay.
- 2 Sedimentation Forebay**  
The forebay is designed to allow the water to slow and the sediment to fall to the bottom.
- 3 Littoral Shelf**  
Wetland plant species are planted on the littoral shelf. The plants take up nutrients in the water as well as trapping sediment.
- 4 Outlet Pipe (Scruffy Dome)**  
After treatment water leaves the wetland via the outlet pipe. A scruffy dome is used to trap debris.
- 5 Emergency Outflow**  
The emergency outflow allows water to exit the wetland after an extreme heavy rain flow.
- 6 Maintenance Access Track**  
This track allows for maintenance vehicles and crews to perform maintenance on the wetland.
- 7 Grass Maintenance Track**  
This track allows for maintenance vehicles and crews to perform maintenance on the wetland.
- 8 Landscape Planting**  
Refer to section 8 for plant species.
- 9 Wetland Bank Planting**  
Plant species that live in swamp like conditions. Refer to section 8 for plant species.
- 10 Terrestrial Mitigation Planting**  
Refer to section 8 for plant species.





Drop of Water



Road

Water falls on the road and flows into a conveyance swale. Contaminants present on the road will be picked up and conveyed by the water.



Conveyance Swale

The conveyance swale on each side of the road is designed to capture and slow the flow of water. Sediment traps are incorporated and designed to collect sediment washed off the rock cuts. The water is diverted to stormwater wetlands.



Stormwater Wetland

Engineered wetlands are shallow vegetated ponds that filter stormwater runoff, slow flows and help control regular flooding downstream. They are formed to look like natural wetlands and provide habitat for wildlife. These wetlands remove sediments, nutrients and contaminants from incoming stormwater before discharging to stormwater systems or waterways.



Stream with Mitigation Planting

The stream mitigation planting is designed to provide; erosion protection, shading of water to provide for fish and invertebrate habitat, fish passage, increased biodiversity and integration with natural waterways/streams and improved landscape amenity. The majority of permanent streams within the designation will receive stream mitigation planting. In many cases, this will uplift and restore the current state of waterways.



Existing Stream

Water is released into the existing streams outside of the designation or without mitigation planting.

### Wetland Enhancement

While not for stormwater treatment purposes, in this sector, low-lying areas that are currently pastoral in land use, that were previously wetland environments will be rejuvenated. The wetland enhancement area will be replanted with approximately 2.6ha of native wetland species, which, over time, will create habitat, provide natural decomposition, encourage natural pollination and improve water quality.

### Stormwater Management

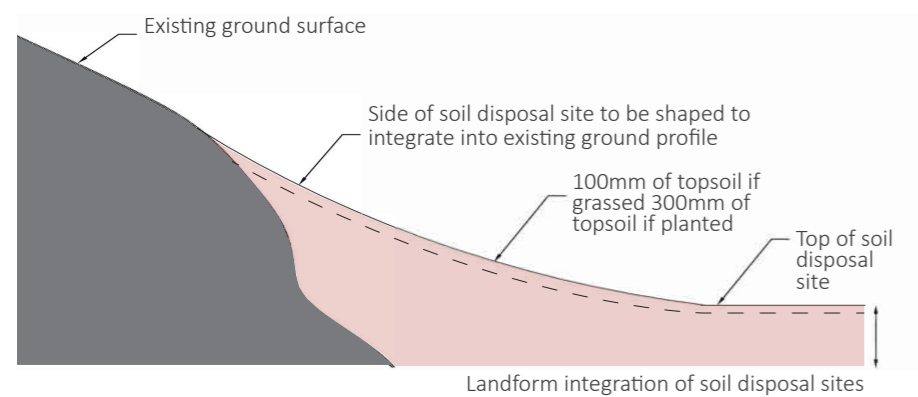
Modifications to landforms will impact on flood prone areas. Existing flood areas have been recorded as a measure to guide the design so that flooding is not exacerbated during and after the construction of the motorway. Post construction, ponding from culverts will be held within existing floodplains [RC67A] [RC68] [RC68A].

### 5.8 SOIL DISPOSAL SITES

The earthworks extents include areas where excess soil or soil unsuitable for engineered fill purposes (e.g. soil that is too wet and can't be dried quickly or efficiently), is deposited and re-contoured [D37].

There are five main soil disposal sites in the Warkworth sector, as identified in the sector plans in section 7. Four of these sites are situated south of Woodcocks Road on either side of Wyllie Road on flat land. The fourth and fifth soil disposal sites are situated in small gullies to the west of the alignment and will also be contoured to fit to the adjacent landform. The final slope gradients will be no steeper than 5H:1V and will be generally compacted to achieve a minimum undrained shear strength of 40kPa.

Soil disposal sites will be hydroseeded to soften the interfaces between these areas and unmodified adjacent areas and to help stabilise the slopes. The disposal sites will be mounded features with feathered edges shaped to merge with the existing adjacent flatter grades in this vicinity, providing a natural appearance. The extent of the soil disposal sites on the sector plans (section 7) show potential maximum volumes. 100mm of topsoil will be provided on all soil disposal sites before hydroseeding for good plant growth. Hydroseeding slopes will enable a return to productive rural land where the gradient allows it. The top 2m of soil will be free of large obstructions (e.g. rocks) and have low compaction to enable landscape plant root penetration [D36(c)] [D37] [ULDF 5.8].



Existing native forest



Existing vegetation alongside farmland

### 5.9 PLANTING

The landscape and ecological mitigation planting will:

- Marry planting with adjacent existing plant communities
- Seek to stitch together existing vegetation patterns on both sides of the motorway with both landscape restoration and ecological mitigation planting
- Seek to bring adjacent land use close to motorway to be part of the road user experience
- Use mix of pioneer species predominant in the area
- Plant to accentuate and appropriately fit existing and resulting topography
- Plant material will be eco-sourced where possible, in accordance with P39 Specification for landscape treatments [D27]
- Configure planting to soften views to the Project from adjacent residential properties
- Reinstate and enhance wildlife corridors
- Repair cleared edges of larger blocks of existing vegetation with dense planting
- Identify vegetation to be retained and protected
- Implement Kauri dieback management protocols [D63-D63D]
- Consider open-ground forestry methodology
- Planting for safe maintenance

Refer to section 8 for the plants to be used in each planting mix [D27] [D36(c)] [D63-D63D] [D76].

### Existing Vegetation

Impact on existing vegetation has been reduced through design and compliance with the designation and resource consent conditions. To mitigate the vegetation losses, proposed plant species have been selected based on an understanding of the existing native plant communities, which is historically dominated by tōtara and kauri forests.

Impacts on existing vegetation and habitat have been reduced, with all vegetation clearance (excluding pasture) conducted outside of bird breeding season [D42D] and bat habitat will be enhanced where practicable [D46]. During construction the remaining forest will be fenced off and weed and pest animal control will be undertaken [D52]. Fencing will be erected to protect all tōtara (*Podocarpus totara*) trees carrying green mistletoe, specifically in the vicinity of land to the west of the intersection of SH1 and Mahurangi East Road [D53(b)]. Areas of native orchids will be identified to avoid any damage or removal during construction [D53(e)].

### Subsoil Drainage

Subsoil drainage will be located under each fill area which will predominantly consist of sand blankets or gully drains at the base of major gullies where significant groundwater flows are expected. Ground improvements for embankments that are constructed over soft, compressible ground, will be built with drainage beneath then pre-loaded and allowed to settle.

Rock will be used to improve drainage in the base of major gullies where ephemeral water channels are expected and groundwater flow is observed beyond the gully drain extents. The final layout of any subsoil drainage will be determined during construction after topsoil removal and gully clean out, based on observed ground, water and access constraints.

## Topsoil

Topsoil will be placed on all soil-cut and fill batter slopes. Topsoil quantities for the Warkworth sector are:

- 300mm topsoil depth for all planting to cut and fill batter slopes, planted soil disposal sites, wetlands, planted swales and stream diversion planting
- 100mm topsoil depth to all hydroseeded grass cut and fill slopes, returned to pasture and on land handed back to adjacent property owners
- No topsoil is proposed for rock cuts
- No topsoil is proposed for mitigation planting (this will go into existing ground)
- Stormwater wetland access ways will have a top soiled and grassed vehicle surface for wetland maintenance clean out [D36(c)]

Other topsoil quantities and planting substrate methodologies may be utilised, as agreed by a landscape architect or designer, in accordance with P39 Specification for landscape treatments [D27].

Scarification will be undertaken to break up cut and fill batter ground surfaces to a depth of 100-200mm. This enables topsoil to key-in to the slope, reducing the risk of topsoil slumping and allow plant root penetration to results in better growth and survival [D36(c)].

## Fencing

Seven wire post and batten fences will be used to provide stock proofing for terrestrial mitigation areas. Fencing that reflects final property boundaries will be confirmed between NZTA and private land owners at a later date. Fencing may be used to demarcate adjacent land uses, such as where adjacent bush areas exist and for maintenance and access requirements. Fencing will also be utilised around bridges and underpasses to reduce fall hazards [ULDF 5.9].

## Wildlife Corridors

Wildlife corridors have been developed and enhanced along the alignment in locations where it has been considered most beneficial by ecologists. In the Warkworth sector, these are provided mostly at Te Arawhiti Pua Ngahere (chainage 52100), on the eastern side of the alignment but also on the western to create links. The mitigation planting and landscape restoration planting connects existing mature and regenerating native forest patches in this area with the new planting to provide native forested habitat and corridors for native wildlife [D36]. Grassed areas generally do not contribute to the enhancement of wildlife corridors. However, in general, the grass treatments have been used in areas that have been determined to have lesser ecological value such as areas where land has been heavily modified, (e.g. for farming). Mitigation planting has been prioritised and allocated to areas that would benefit the most.

All planting in this sector is native and chosen to be suitable to the environment that it will be planted into, to provide the best chance of success. Planting will be undertaken as early as possible, subject to plant and topsoil sourcing in areas which will not be impacted by construction activities. In areas where construction will occur (such as cut and fill areas) planting will occur later, when the risk of plant damage is lower.

## Species Selection

The landscape restoration and ecological mitigation landscape plant species selected mimic the existing plant communities of the Warkworth sector and the Rodney Ecological District. The chosen plants are hardy species known to thrive in the local climate and conditions, which will cope with the range of soils, aspect, elevation and exposure of the areas they will be planted. These will integrate with the existing vegetation to provide a contiguous 'stitch' across the alignment. The planting mixes



Example of landscape planting on earth batters to be similarly used in the Project

are coordinated along the length of the motorway, and tie ecological outcomes to landscape design outcomes [D36(c)] [D37].

The plant mixes specify eco-sourced native species found in the Rodney Ecological District to:

- Integrate the landscape planting with the various types of ecological mitigation planting (terrestrial mitigation large tree species are stipulated in the ecology consent requirements) to enhance the biodiversity and habitat linkages between existing and new vegetation
- Use of native species known to thrive in the various environments of the northern zone including canopy (canopy enrichment) and coloniser (starting crop) species. This is further defined for topography (valley and ridge locations)
- Strengthen the visual landscape patterns of the natural landscape features including existing vegetation and, in particular, following natural vegetation patterns to stitch patterns and habitats across the motorway (such as the remnant stand of kauri forest near Perry Road and the Mahurangi River)
- Form the basis of a plant palette (which is being developed with Hōkai Nuku) to highlight the cultural footprint of local Iwi at certain locations along the route.
- Integrate stormwater treatment wetlands into the wider landscape through the landscaping and mitigation planting around them, as well as connecting them to motorway planting along the route

All plants will be good quality nursery stock. Depending on availability, plants propagated from eco-seed sourced within the Rodney Ecological District will be used. There may be circumstances where volume of plants required or lack of suitable stock may force some material to be sourced from elsewhere. All Wetland species will be eco-sourced as per consent condition D60.

Hardy species known to thrive in the local climate and conditions, which cater for the range of soils, aspect, elevation and exposure within the Project will be selected. Robust plants, consistent with the planting design will endeavour to reflect natural plant distribution. Where there will be no planting, the landscape treatment will be hydro-seeded grass [D36(c)].



Example of a hydroseeded cut slope

## Hydroseeded Grass and Pasture Grass

Hydroseeding is a planting process that uses a mix of grass seed and a growing emulsion sprayed onto a bed of topsoil, from which grass grows. In the northern sector, hydroseeded grass on 100mm of topsoil is proposed for a number of 2H:1V soil cuts and constructed fills which will remain within the project operating boundary. This is also the proposed finish for the four soil disposal sites in this sector for the purpose of visually integrating these into the rural landscape. Designated land not required by the Project, and with slopes less than 3H:1V will be planted with pasture grass and may be 'handed back' to previous land owners subject to property agreements.

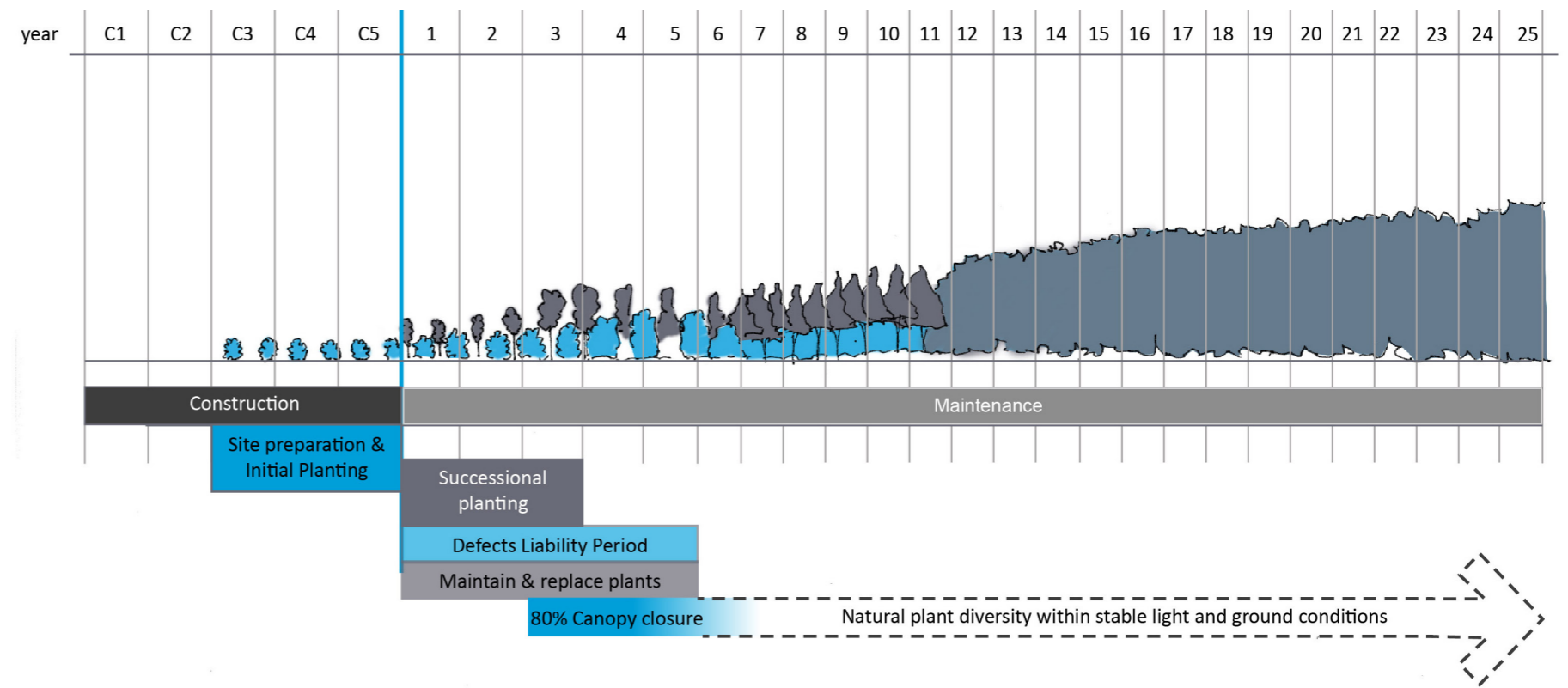
The design approach has been to focus valuable landscape restoration and ecological mitigation planting in locations with high ecological values to provide a more comprehensive landscape stitch using native plant communities in these areas. Landscape stitching between areas of lower ecological value has simpler landscape solutions, such as grass (refer to the stitch diagram in section 3.2). Much of the grass will not be visible to road users as it will be elevated above rock cuts or below the motorway level on fill slopes. This will allow views from the road out to the landscape, which contributes to the road user experience along the alignment.

The ULDF proposes a strategy of leaving large cuts as either bare rock or with ground cover vegetation where such planting is likely to sustainably grow. Hydroseeding is often used to provide vegetation coverage on challenging terrain and soil conditions while also seeking a low maintenance outcome. The maintenance of hydro-seeded grassed areas will include the application of pre-emergent herbicide at the establishment phase to prevent weeds developing from an existing seed source in the soil and spot spraying thereafter, to keep pine seedlings, gorse, pampas and other weed species under control. Use of a pre-emergent herbicide and establishment of thick grass cover will reduce weed competition and ongoing spot spraying maintenance [D36(c)]. Maintenance also includes trimming as required to reduce any potential fire hazard.

## Mulch

Site-won or imported mulch will be clean and free of sawdust, dirt, phytotoxins, pathogens and weed species (including chip from willow, poplar or any other introduced weed species). Mulch will not be used in areas of Mitigation Planting - Wetland, Mitigation Planting-Terrestrial, Mitigation Planting Stream Edge (refer to section 7) or in swales and areas below the stormwater wetland permanent water level. In areas that are steeper than 2:1, mulch is expected to slip down the slope, and biodegradable geotextile fabric will be used instead.

Site Type	Landscape Treatments	Topsoil Depth Required
Soil Disposal Sites	Planted	300mm
	Hydroseeded Grass	100mm
2:1 Cut / Fill Batters	Planted	300mm
	Hydroseeded Grass	100mm
3:1 or shallower Cut / Fill Batters	Grassed with pasture grass seed	100mm
Stormwater Wetlands	Planted	300mm
	Grassed	100mm
Swales & Stream Diversions	Planted	300mm
	Rock Lined	0mm
Rock Cuts	No treatment	0mm
Stream, Wetland & Terrestrial Mitigation	Planted	Planted into existing ground



### Succession Planting Strategy

A two stage planting method has been developed by the NX2 landscape and ecology teams. This enables the integration of the existing plant communities with both the proposed landscape restoration planting and the proposed ecological mitigation planting. It mimics the natural process of plant succession, increasing plant survivability. The two stage method supports whole of life landscape considerations such as the selection of plants, and planting methodologies that allow for effective growth, and plant longevity [D36(c)] [D36A] [D59].

Stage 1 (initial planting)- introduce plants including core pioneer species such as karamu (*Coprosma robusta*), toetoe (*Cortaderia splendens*) and mānuka (*Leptospermum scoparium*) which establish quickly and provide shelter and shade for the Stage 2 planting:

- These robust species from the Rodney ecological district survive well in a range of moisture levels (from streams to exposed ridge areas) and will cope well on cut and fill batters
- Existing vegetation in the surrounding farms, streams and the adjacent road side plantings include a high proportion of mānuka because this species has a proven durability in motorway conditions
- Mānuka (*Leptospermum scoparium*) and toetoe (*Cortaderia splendens*) and to a lesser degree karamu (*Coprosma robusta*), are a colonising species and have a robust nature

Stage 2 (enrichment planting) –introduce no later than 3 years after the initial planting, so it does not ‘out-compete’ Stage 1 planting for light and water:

- These plant species include various large canopy trees that will grow through the Stage 1 planting and support the pioneer species. In the long term, the Stage 2 species will become the dominant feature of the planted areas
- The Stage 2 colonisation and establishment process builds organic matter in the soil to support the growing vegetation
- Stage 2 planting mixes suit the various planting conditions and micro climates that they will be introduced to (for example, tōtara dominant mixes will fill ridge areas and kahikatea will be used in wet areas)

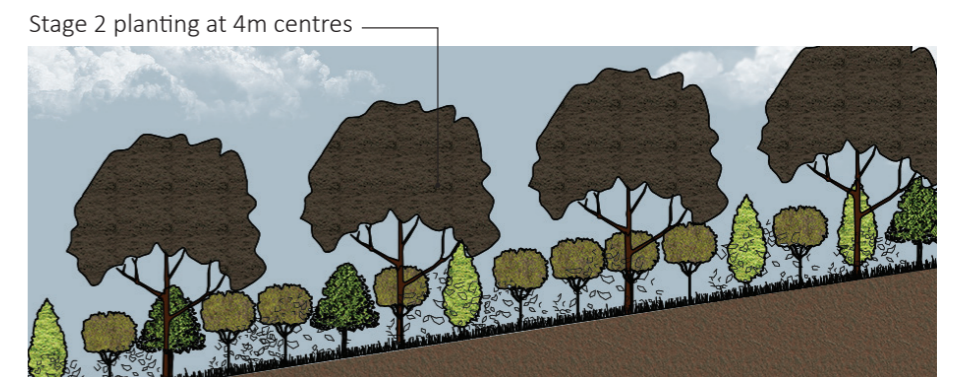
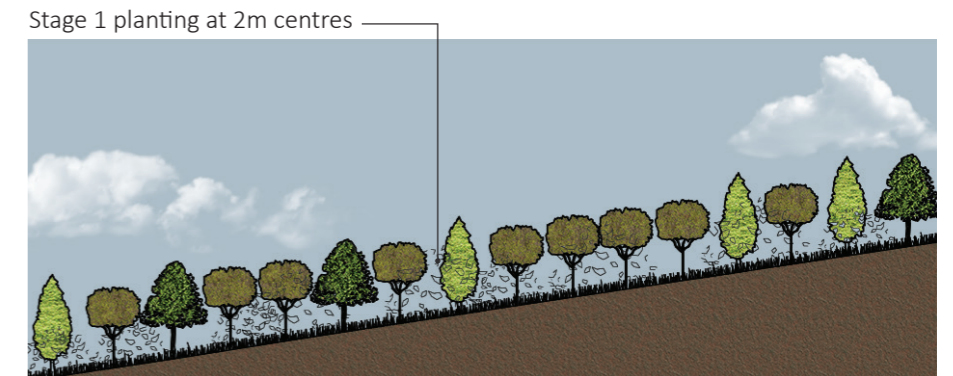
Condition D36A and the ULDF suggests considering open-ground forestry as a methodology for plant sourcing. This has been considered, however it has not been adopted. Nursery stock is considered better for construction coordination with the timing of landscape works, and nursery stock is provided with a guaranteed quality, and can provide the sizes and number required at a time. The open-ground forestry method does not provide certainty of when plants will be available to replant or how fast they will grow, and plants grown in the ground are harder to successfully move due to root sensitivity. Specifically, canopy species do not typically thrive after root disturbances. The open-ground forestry methodology requires large land areas to grow the plants; due to the large volume of plants needed, this would be inefficient.

A Warkworth specific ULDF outcome is to protect and enhance vegetation in the surrounding bush throughout the section. The ULDF suggestions considering the inclusion of clematis and flowering rātā for planting in this sector. Rātā is a flowering tree that typically begins life perched on a host tree, grows roots to the ground and encloses the host tree. Clematis is also a flowering plant and it climbs host trees like a vine before flowering. Consideration has been given to including these plants; because neither of these plants usually grow well when planted, and have a low survival rate, they will not be included in the planted areas. Because both plants occur naturally in the wider Pūhoi to Warkworth area, it is reasonable to anticipate that these will establish naturally in the terrestrial mitigation planting species over time.

### 5.10 ECOLOGICAL MITIGATION PLANTING TYPES

#### Ecological Mitigation Terrestrial Planting Stage 1 (MPT1) and Stage 2 (MPT2)

The terrestrial planting mix has been designed to mitigate the loss of the canopy tree species; pūriri (*Vitex lucens*), taraire (*Beilschmiedia tarairi*), tōtara (*Podocarpus totara*), kahikatea (*Dacrydium dacrioides*), kauri (*Agathis australis*), rimu (*Dacrydium cupressinum*), rewarewa (*knightsia excelsa*) and tānekaha (*Phyllocladus trichomanoides*). This mix matches bush species commonly found in the surrounding area (Rodney Ecological District) and includes under-bridge planting and mitigation planting surrounding the forest remnant. The number, species and separation of plants has been designed to maximise successful plant growth and will stitch the landscape across the motorway [D36(c)][D37][D59].



Stage one and two planting to be planted on the embankments which support the motorway

This planting mix uses the two stage planting method. Hardy, quick establishing natives, including mānuka and kānuka are planted. After three years the quick establishing plants create sheltered growing conditions for the second stage of planting, which contains the more sensitive, larger canopy species [ULDF 5.2, 5.9].



Existing native forest



Tributary of Mahurangi River (M16)



Existing Stream Vegetation

### Ecological Mitigation Stream Edge Planting (MPSE) and Mitigation Stream Planting (MPS)

Ecological stream planting will be undertaken along stream banks and includes plants designed to offset the ecological losses for streams compromised by the Project. Species used in this planting are commonly found in local streams. Condition RC58 sets out the level of improvement required in riparian edges [D36(c)][D37].

### Ecological Wetland Mitigation Planting (WMP)

Each square metre of lost wetland will be replaced with a square metre of new wetland planting. The plants selected thrive in wet-conditions, and include species such as knotted club-rush (*Ficinia nodosa*), ririwaka (*Bolboschoenus fluviatilis*) and mānuka (*Leptospermum scoparium*).

### Swamp Forest Planting Mitigation (WSF)

The swamp forest planting is comprised of 20% low stature wetland planting and 80% swamp plants. This planting will be used in and on the margins of the existing wetland which will be rehabilitated and extended in size. The low stature planting will be used in the wetter areas on site within the wetland boundary. This mix has plant species that thrive in wet environment's and support the ecosystem health of a wetland. The swamp forest mix includes harakeke (*Phormium tenax*) mingimingi (*Coprosma propinqua*), tī kouka (*Cordyline australis*), Nīkau (*Rhopalostylis sapida*), and the low stature wetland mix includes swamp astelia (*Astelia grandis*), pukio (*Carex virgate*) and purei (*Carex secta*).

### Low Stature Wetland Planting (WLS)

The low stature planting (e.g. sedges, rushes and grasses), will be used in the wetter areas of the wetlands to optimise growth and plant survival. This mix includes swamp astelia (*Astelia grandis*), Pukio (*Carex virgate*) and Purei (*Carex secta*).

## 5.11 LANDSCAPE RESTORATION PLANTING TYPES

### Landscape Restoration Planting Stage 1 and Stage 2 (PLR)

Landscape restoration planting will generally occur on construction disturbance areas, 2:1 fill slopes and adjacent to areas of ecological mitigation planting. This is consistent with the ULDF, and helps provide 'a stitched together landscape' – the new vegetation will visually connect to the existing vegetation on either side of the motorway.

### Amenity Road Edge Planting (ARE)

This attractive planting will be installed in front of the 'landscape restoration planting mix' areas and is dominated by low-growing, drought-hardy, exposure-tolerant plant species. Low growing species are chosen to preserve driver sightlines and have few maintenance requirements. These include species such as oioi (*Apodasmia similis*), prostrate taupata (*Coprosma repens* var *prostrata*) and wharariki (*Phormium cookianum*). At the north end of the sector, around the northern roundabout, kōwhai (*Sophora microphylla*) trees will be planted.

### Stormwater Wetland Upper-Bank Planting (WUB), Stormwater Wetland Mid-Bank Planting (WMB) and Stormwater Wetland Lower-bank Planting (WLB)

The stormwater wetland planting is split into three mixes of native plants, according to tolerance of wet conditions:

- Upper-bank planting (WUB) contains riparian zone plant species such as harakeke (*Phormium tenax*), tī koukas (*Cordyline australis*) and mānuka (*Leptospermum scoparium*)
- The Mid-bank planting mix (WMB) contains plants more tolerant of wet conditions with occasional inundation including oioi (*Apodasmia similis*)
- The Lower-bank planting mix (WLB) contains plant species that prefer very wet conditions or permanent inundation such as raupo (*Typha orientalis*) and kuta (*Schoenoplectus tabernaemontani*)

### Amenity Local Road (ALR)

Selected road edges around Woodcocks, Carran and Wyllie Roads, the northern connection and the swales adjacent to Carran and Woodcocks Roads will be planted with this mix. In the expected growing conditions, the species will have a maximum height of 1m, therefore making the plants suitable for maintaining driver sightlines

along local roads. Hardy, native plant species including oioi (*Apodasmia similis*), purei (*Carex secta*) and wharariki (*Phormium cookianum*) will be planted.

### Under Bridge Planting (UBP)

This planting mix will be planted along the stream edges beneath Te Arawhiti Pua Ngahere and irrigated with water captured from the motorway. The mix contains plant species that cope with long periods of, shady conditions. The mix includes Kawakawa (*Macropiper excelsum*), mouku (*Asplenium bulbiferum*), Blechnum fraseri, wharawhara (*Astelia banksia*), turūtu (*Dianella nigra*) and pukupuku (*Doodia australis*).

### Amenity Gateway Planting (AGW)

Amenity Gateway Planting contains a reduced number of plant species that are normally associated with a coastal environment. It contains flowering species such as toetoe and tī koukas (*Cordyline australis*) which visually differentiate the Pūhoi gateway from the rest of the motorway.

### Amenity Riparian Planting (ARP)

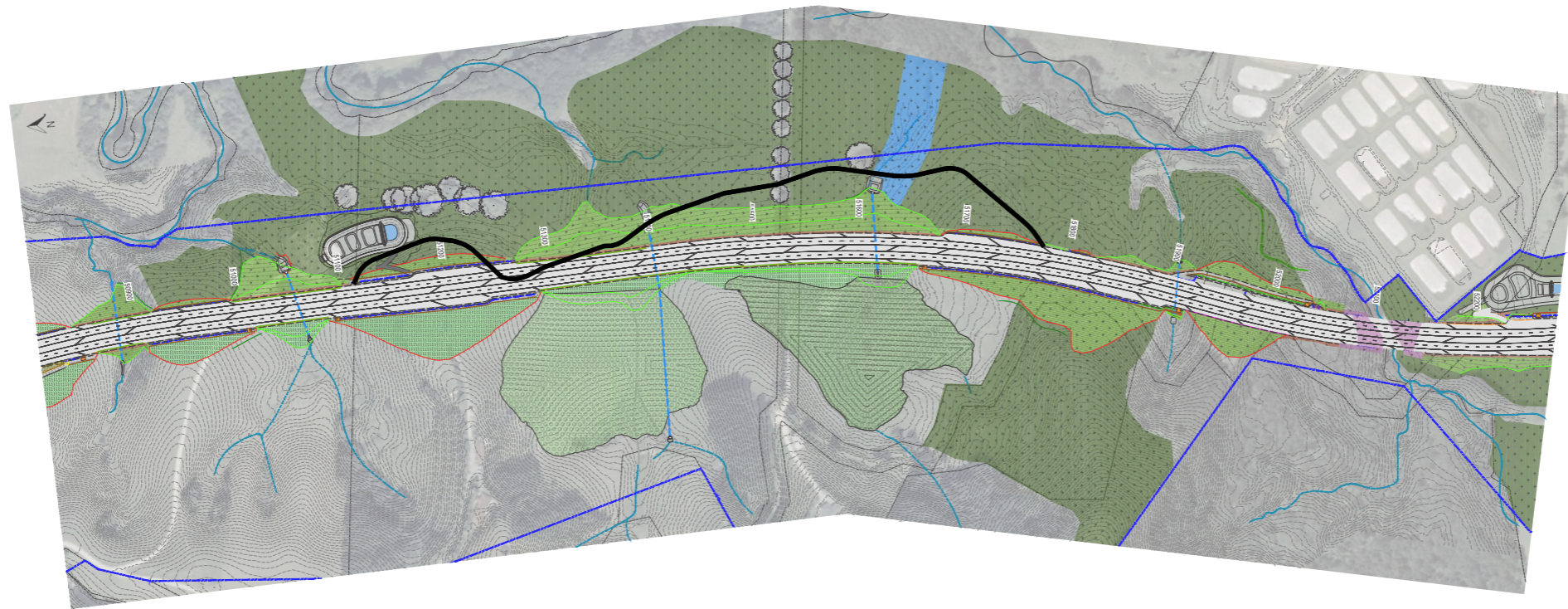
This planting mix will signify and preserve the cultural significance of the streams located at Chainage 59550 and Chainage 63850. It contains plants that are normally associated with a riparian environment but are hardy enough to thrive on engineered fills.

### Amenity Wingwall Planting (AWW)

This planting mix will be planted on top of front of the Woodcocks Road bridge wing walls to soften the appearance of the structure. The species selected have a low and rambling growth habit and are expected to spill over and down the face of the wing walls. The plant species include pohuehue (*Muehlenbeckia complexa*), and Coprosma Poor Knights (*Coprosma repens* var. Poor Knights). These plant species are hardy natives and are commonly used in the road environment because of their tolerance to poor soils, full sun and long periods of dry weather.

### Mahurangi River Diversion Planting (MSD)

This planting mix contains plants that are normally associated with a riparian environment but are hardy enough to thrive in the varied site conditions.



The black line indicates temporary access track required for construction that is to be reinstated in planting as required by condition D38AA(d) and ULDF 6.3

Temporary access track location  
Not to scale

### 5.12 WYLLIE ROAD CONSTRUCTION YARD

The Wyllie Road construction yard is located to the east of Wyllie Road, with a site entrance at 45 Wyllie Road. The construction yard will operate from this area during construction of the motorway.

A specific construction phase ULDSP was not required for this construction yard as it is not within 200m of residential dwellings. However, consideration has been given to screening for noise, dust and visual purposes.

Upon completion of the motorway construction, the construction yard will be removed and rehabilitated to merge with the adjacent land and be consistent with the wider rural outlook of the area. The sector plan (refer section 7) shows the area of the construction yard in its final rehabilitated form [D36(c)] [D38] [D70].

### 5.13 ACCESS TRACK

#### DESIGN STATEMENT

This specific ULDSP is required to address the land situated between the Project and the right branch of the Mahurangi River [D38AA(d)]. This section focuses on the reinstatement of this area, including measures to ensure that the access track becomes inaccessible to motorbikes.

Existing landscape features around the location of the access track include three partially vegetated, intermittent streams dividing the site roughly into thirds. Other features include several large existing native trees, a mature hedgerow to be retained as well as a large area of existing wetland to be retained and enhanced with new wetland mitigation planting.

The motorway severs the two lifestyle properties leaving approximately a quarter of the properties isolated on the eastern side of the motorway. As a result this area of pasture becomes enclosed by the motorway and the right branch of the Mahurangi River, which also removes existing access to the area. This makes the area a logical choice for terrestrial ecological mitigation planting (despite being outside designation). As a result this created the most significant ecological 'stitch' across the motorway, linking the Mahurangi River with the kauri forest and several hectares of proposed terrestrial ecological mitigation planting nearby.

An engineered wetland which will be fully planted and designed to appear as natural as possible is proposed within this area. The main purpose of the wetland is to treat water from the road before entering the Mahurangi River. It also has the added benefit of providing habitat and a food source for indigenous fauna.

Both the ULDF and consent conditions require the rehabilitation of land between the motorway and Mahurangi River (Right Branch) opposite Wyllie Road. This requirement originated in the Board of Inquiry hearing when the construction of the Project included an access track to connect a construction yard (number 11) with a pre-cast concrete manufacturing yard on Wyllie Road. It was to be two lanes, sealed and for the majority of its length, it would have been a sidling cut across foothills devoid of bush. Significant effects on the visual amenity would have been generated from this track in the rural landscape.

The way in which NX2 propose to construct the Project does not require an on-site pre-cast concrete manufacturing yard, nor large construction access tracks, and the effects that the Board were concerned with will not be generated. There are however, access tracks for construction purposes. The figure below demonstrates the major temporary construction track; the construction tracks including surfacing material will be completely removed and rehabilitated when construction is completed. The areas that the Board of Inquiry were concerned with (between the Project, the right branch of the Mahurangi River, Te Arawhiti Pua Ngahere and Wyllie Road) will be planted with two-stage terrestrial mitigation planting (refer section 8 for planting mix details). Aside from being densely planted, the land will be fenced and therefore inaccessible to motor vehicles and motorcycles [ULDF 6.3][D38AA(d)][D59].

5.14 VIV DAVIE-MARTIN DRIVE

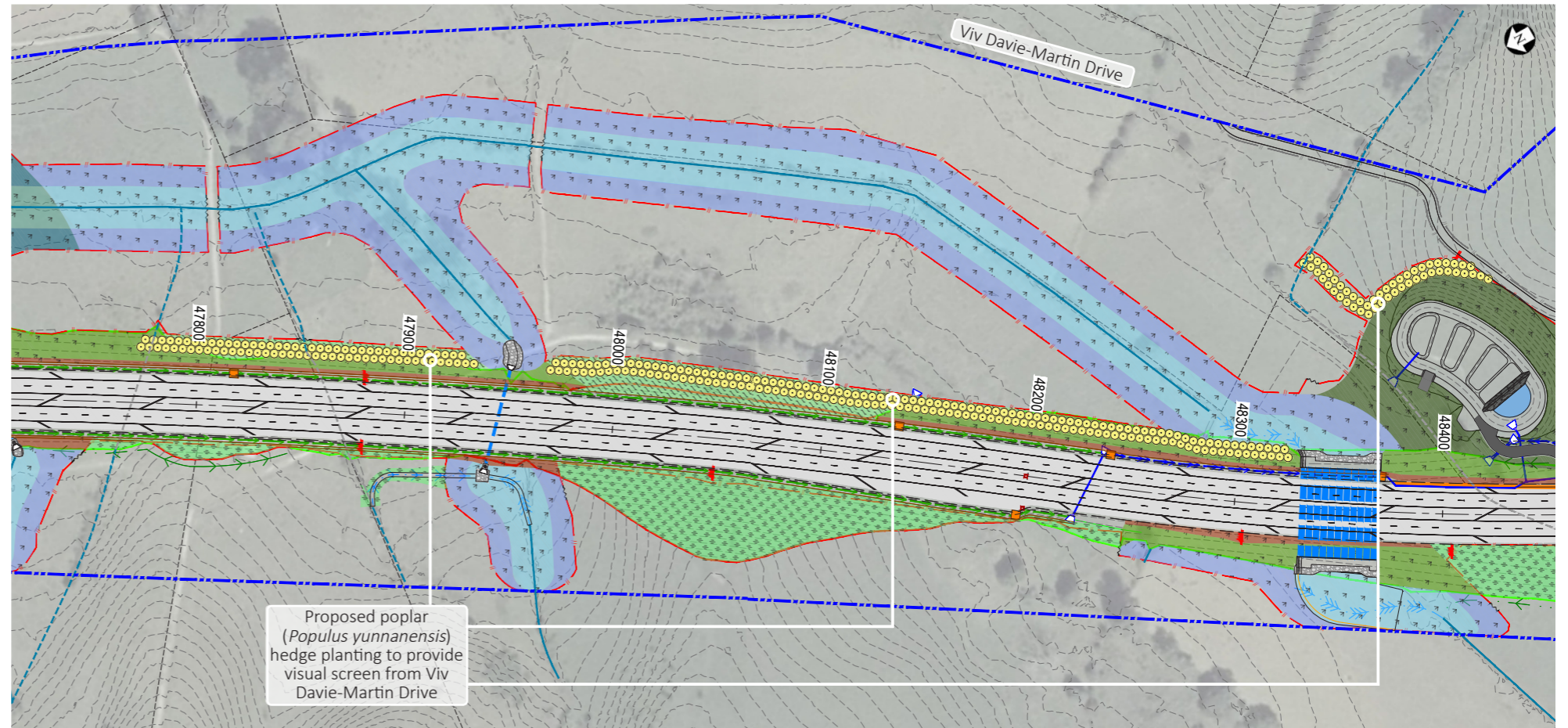
DESIGN STATEMENT

This specific ULDSP is required to address the designation north of Woodcocks Road, with a focus on establishing screening of the motorway [D38AA(b)].

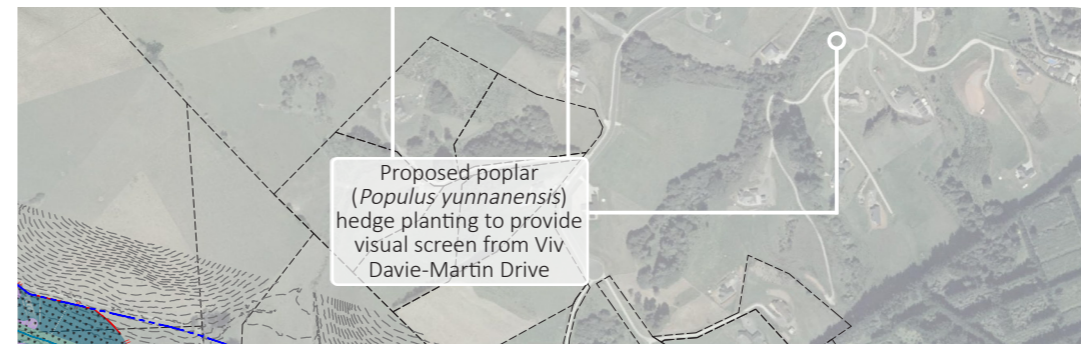
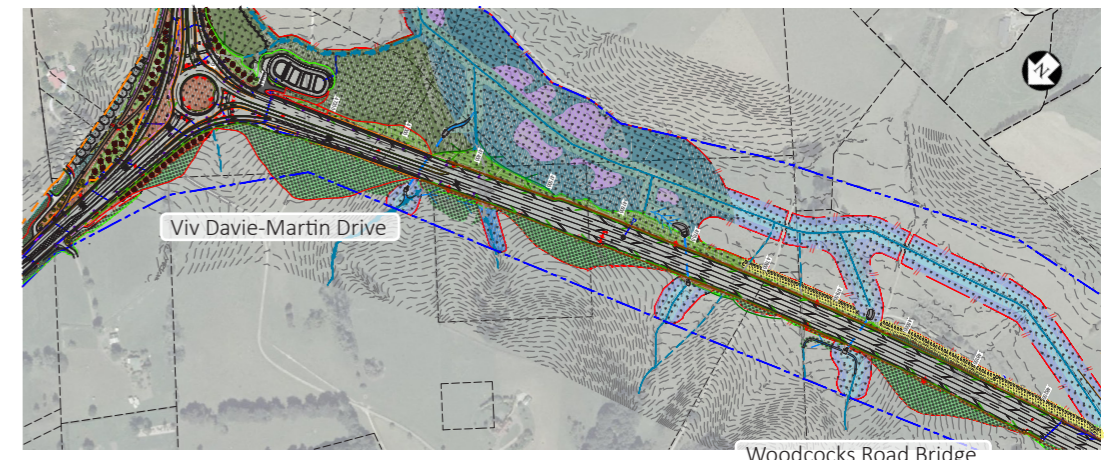
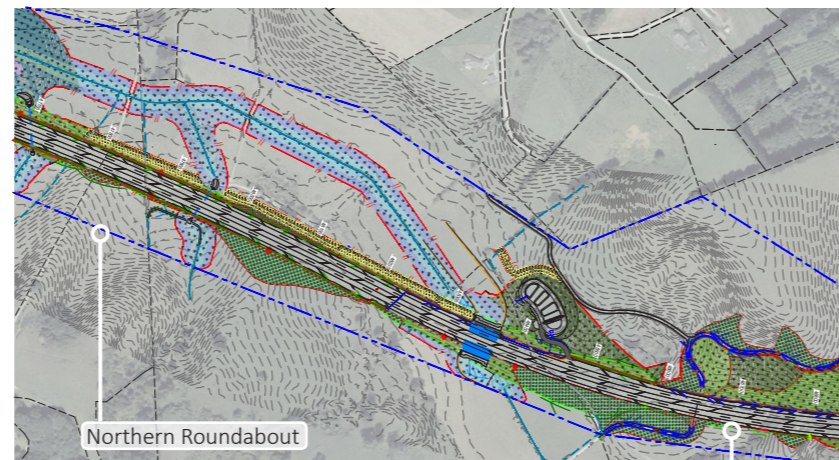
The motorway skirts to the west of Warkworth. The western outskirts include rural and lifestyle properties scattered along the local roads (Wyllie Road, Carran Road, Woodcocks Road, Valerie Close and Viv-Davies Martin Ave). The area from Woodcocks Road to the northern SH1 intersection will be carefully considered in terms of landscaping and visual screening (including extensive riparian planting around the stream), to soften the appearance of the motorway and visually screen it from residents.

A large-lot residential subdivision on Viv Davie-Martin Drive overlooks the motorway and planting will be provided to screen the motorway from residents in Viv Davie-Martin Drive [D38(b)]. To achieve this, the boundary between the motorway and the affected properties will be planted with two rows of approximately 310, tall, fast growing Chinese poplars (*Populus yunnanensis*) which is a robust species commonly used by farmers in the area. Chinese poplars, spaced approximately 4m apart, typically grow to a height of 6-8m after 5-7 years, and a mature height of 25-30m and width of 6m after 15-20 years. The screen planting will be approximately 5m off the edge of the motorway when planting on the two fill embankments and along the top of the cut embankment. A section of the screening will run along the edge of the block of riparian and terrestrial mitigation planting at chainage 48300 to chainage 48400. This will wrap around the mitigation planting to obscure the stormwater culvert headwall structure.

Looking from the properties towards the northern roundabout (from chainage 47800 onwards), a large cut will obscure, but not completely screen the view of the road and the northern roundabout from nearby residents in Viv Davie-Martin Drive. Further softening of this view from Viv-Davie-martin Drive will occur to the south of the affected properties (approximately between chainage 48200 and chainage 48400), where existing tall vegetation will provide some screening to these properties. The poplars planted for screening purposes will compliment other planting in this location, including native planting on the fill batters on the eastern side of the motorway and several hectares of ecological mitigation planting into areas of existing pasture. The wetland swamp forest planting mix will stretch approximately between chainages 47700 and 47200, bearing plants with various growth heights and speeds in order to provide fast establishment with such species as mānuka (*Leptosperum scoparium*) and mingimingi (*Coprosma propinqua*). There is also potential for greater height as the forest matures, with the predominant species being kahikatea (*Dacrycarpus dacrydioides*) which can grow up to 60m. The ecological mitigation planting includes enhancements to a large existing wetland, blocks of terrestrial mitigation and extensive stream enhancement by way of a 40m wide planted stream corridor – all of which contain large native tree species such as tōtara (*Podocarpus totara*) and rewarewa (*Knightea excelsa*), which are anticipated to have a full grown height of around 20m. Planting on rolling land to the north will also screen oblique views of the northern roundabout and the connection to the existing SH1, as will the retention of existing vegetation. The following sections show approximate plant heights after 5-8 years of growth.

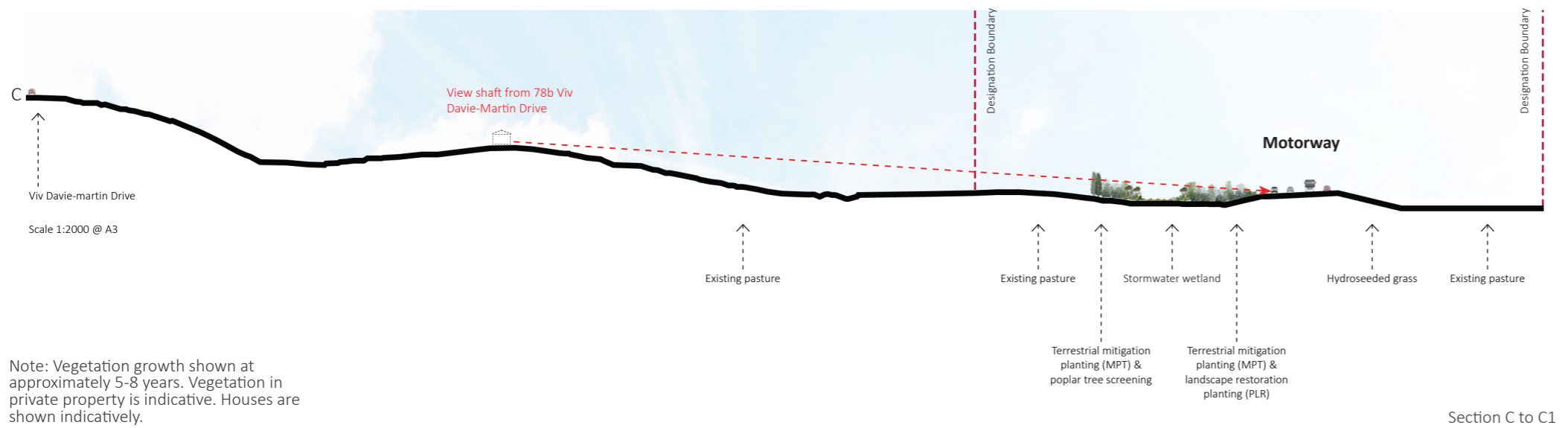
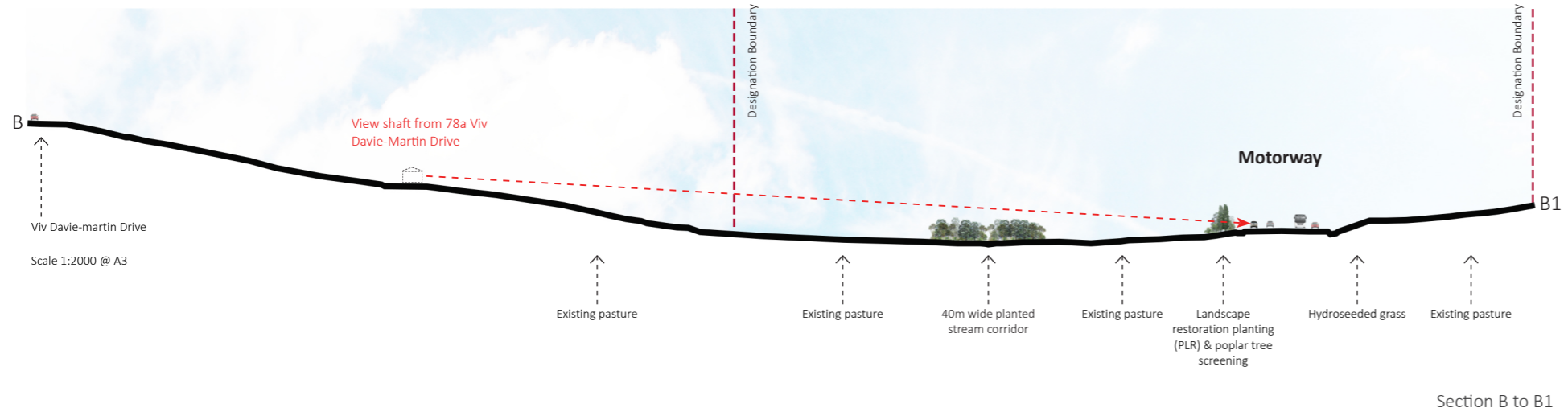
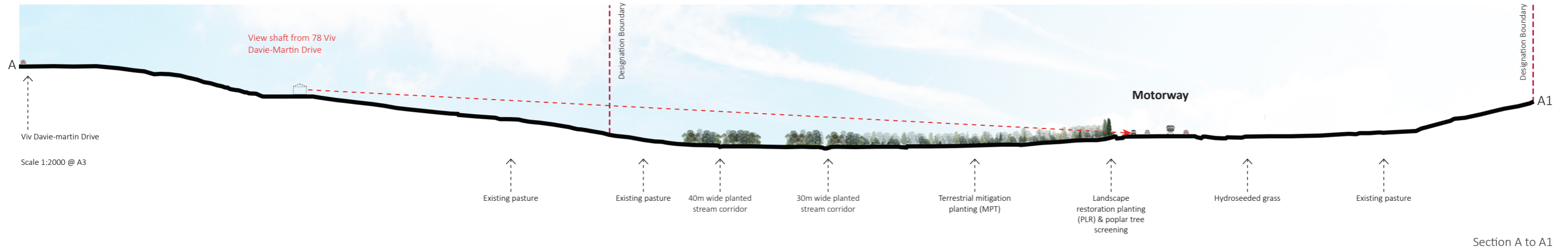


Location of poplars to be planted  
Not to scale

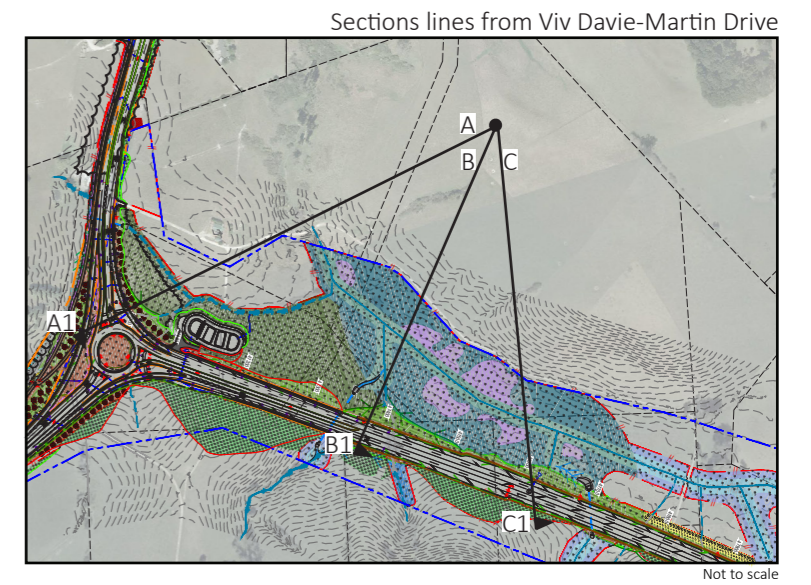


Mahurangi River Bridge

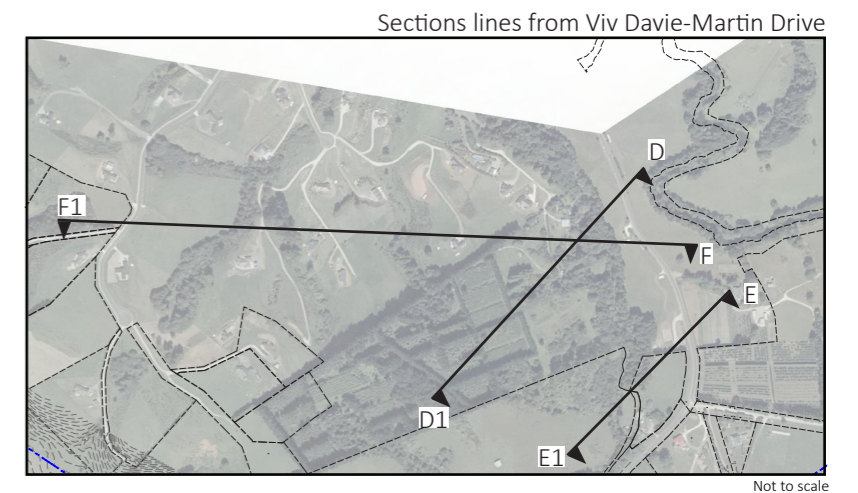
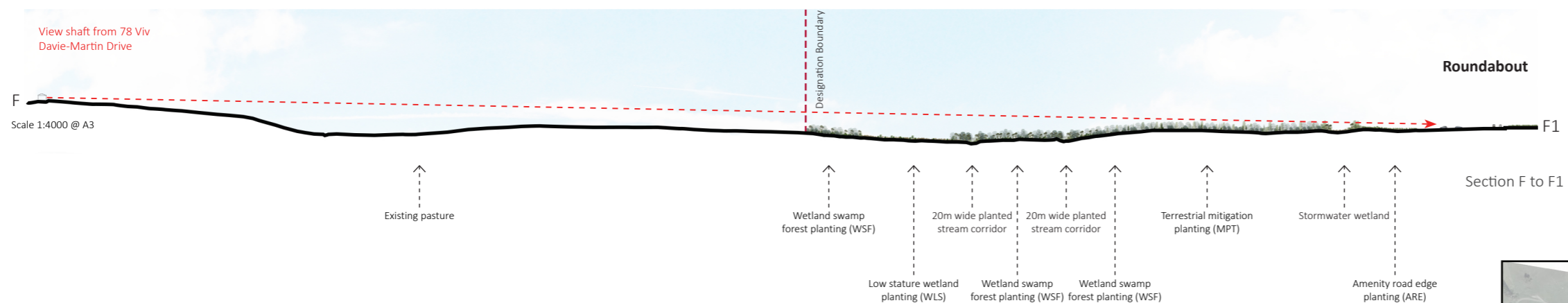
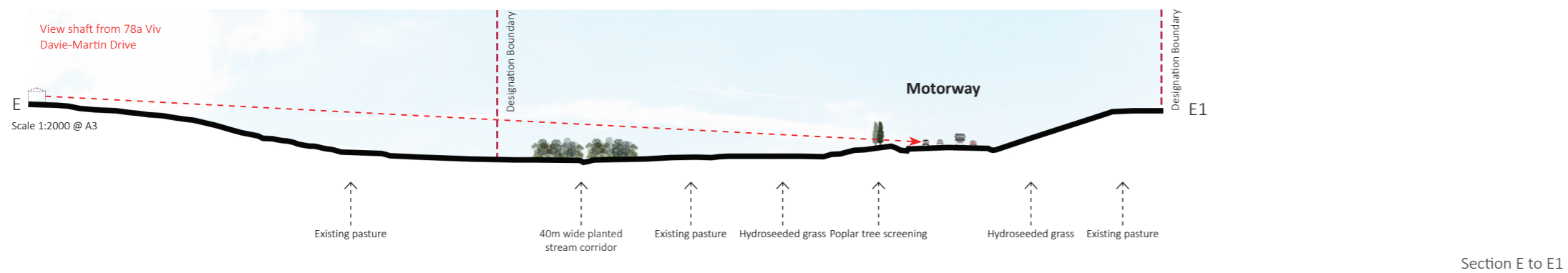
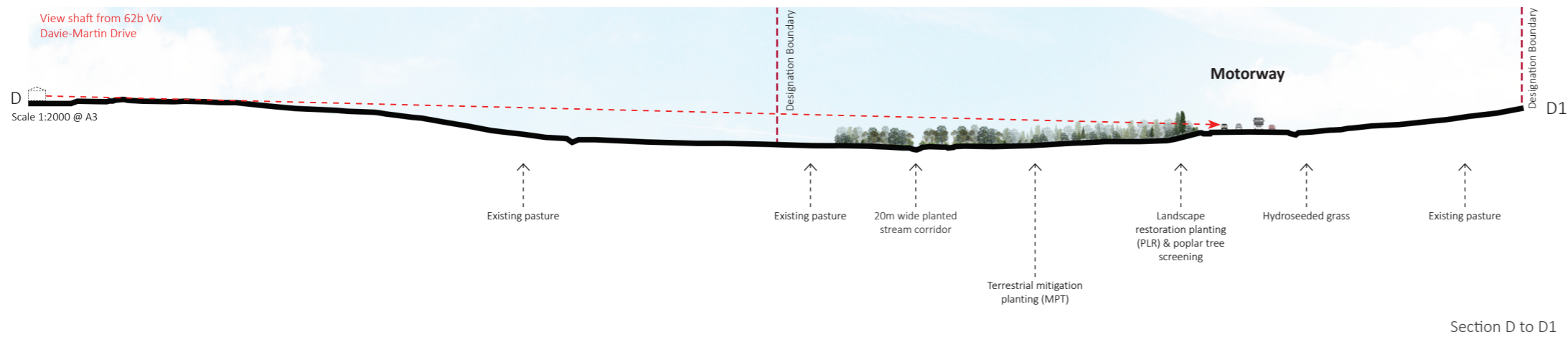
Plan showing wider context of Viv Davie-Martin Drive area  
Not to scale



Note: Vegetation growth shown at approximately 5-8 years. Vegetation in private property is indicative. Houses are shown indicatively.







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