

Earthworks

Earthworks are a major determinant of the aesthetic quality of the motorway. In this project the topography is varied. The route of the proposed TEL commences at Te Maunga on hummocky foredunes and continues south eastwards on the dunes crossing the toe of a terrace near Mangatawa Lane. It continues south eastwards over alternating lowlands and ridges until Domain Road.

Beyond Domain Road the route turns eastward and progresses over the lowlands until it reaches the foredunes, where it turns south eastwards again and runs along the rear of the foredunes. The route turns southward at the end of the foredunes at Bell road and crosses the Kaituna River and adjacent lowlands, before rising onto the undulating terrain to the north west of Te Tumu Road.

The earthworks involve major cuttings as well as bunds. In general, the earthworks have been designed to integrate with the adjoining existing landforms, taking into account a range of factors including topography, corridor width and engineering requirements. The design minimises large areas of fill and the size of cuttings.

Batter slopes are kept as gentle as possible and in no case exceed a horizontal to vertical ratio of 3:1. These slopes allow all batters to be topsoiled and planted.

Te Maunga to Domain Road

- The 6km length of road from Te Maunga to Domain Road runs along the foothills of the Papamoa Hills to the west and the low lying Papamoa urban area to the east. In two locations the alignment deviates east

of a straight line to pass around a drain at the toe of the Papamoa Hills. There will be interchanges at Te Maunga, Sandhurst Drive, Bruce Road (left in/left out), Kairua Road (Left in/left out) and Domain Road. The road performs a combined role of providing a high standard facility for through traffic as well as an important connection between Papamoa and Tauranga.

- The vertical profile of the new carriageway will approximately match the existing road levels. This means that the level of the western edge of seal for the design and the existing will approximately match. Existing undulations due to historic settlements will be removed.
- The earthworks along this length will generally occur adjacent to and to the north of the existing state highway. It will require filling over peat or sands, with some excavation through fluvial terrace ridges. The works will typically be undertaken parallel to the existing highway; however some works will need to be undertaken along the Mangatawa Drain side. The earthworks will consist of cutting to fill and unsuitable material being removed from the site. Importing of fill material will be required for constructing the embankments.

Domain Road to Kaituna River

- The 16km length of road from Domain Road to Te Tumu Road runs along flat rural plains and through a section of sandhills near Bell Road. To the southern end the road gradually rises to follow the rolling terrain. The horizontal alignment will consist of a series of large radius curves as determined by ground features, environmental factors and the designation boundary.

- The vertical profile along the length will be kept as low as practicable in order to reduce embankment fill quantities and long term settlements. Along the route there are a number of height constraints that need to be accommodated by the vertical design.
- The earthworks along this length will generally be in a "greenfields" situation and will involve crossing two local roads, Parton Road and Bell Road. The length from Domain Road to Parton Road generally consists of peat to a depth in order of 4m at Domain Road reducing around 2m deep at Parton Road. Along this length the earthworks will generally consist of filling above the existing ground in stages over a number of years due to the stability requirements and time for settlement to occur.
- Generally east of Parton Road to the Papamoa East interchange location the earthworks will be undertaken in the sand foredunes. This material will be excavated and used as fill elsewhere along the site.

Kaituna River to SH2/SH33 Intersection (Paengaroa)

The works along this length generally consist of filling for the embankment from the Kaituna River to near Te Tumu Road, then a cut to fill and import fill process from Te Tumu Road to the intersection at SH2/SH33.

Bunds

Details of the design and treatment of embankments include:

- All batters are at a maximum slope of 3:1;
- Batters are rounded at the top and

feathered at the bottom where possible to blend in with the adjoining landform and landscape context;

- The design of bunds provides variability in the cross section to achieve the "natural and organic profile" recommended in the Urban Design Overview;
- The landscape treatment is hydromulch for all batters where native grass and low shrub species are proposed;
- Tree planting on bunds only occurs where there is existing tree canopy at the skyline.

Cuttings

Cuttings are more visible to motorway users than bunds and therefore require careful attention, particularly at their tops where they may be seen against the sky. The cut slopes on the proposed scheme are typically up to 3 metres in height, although occasionally up to 5 metres.

Details of the design and treatment of cutting include:

- Maximum cut slope of 3:1.
- Battered cuttings are rounded to soften the appearance of the earthworks;
- Batter slopes in cuttings are kept as shallow as possible to maximise opportunities for successful planting, thereby reducing visual impacts;
- Where possible batter slopes in cuttings will be vegetated to visually soften them.

Culverts

All culverts will be designed using concrete tinted to a dark grey colour so that they visually blend into adjoining areas and landscape and their visual impact is minimised.

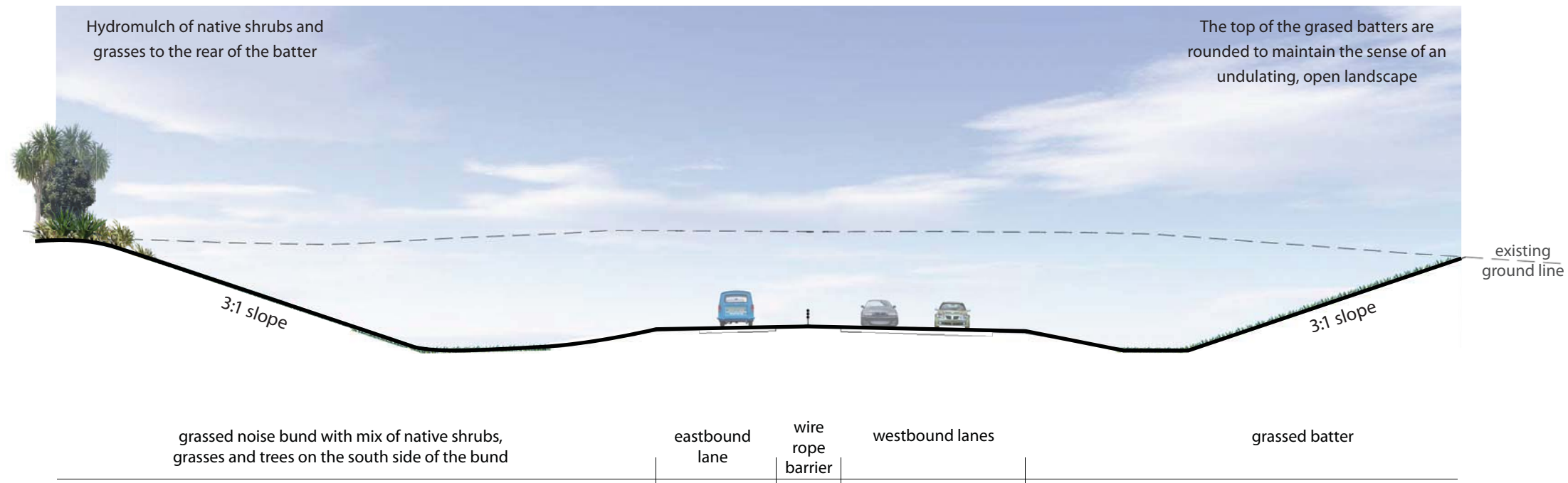
Swale Drainage

The majority of the stormwater management system will use swales, particularly through low lying areas. Swales are planted ditches that can filter contaminants and therefore treat stormwater prior to discharge. In this project they are at relatively flat grades, often less than 1%, to ensure they are easily incorporated into the flat, open landscape character of the area. Swales should not be sprayed.

Shotcrete Minimisation Strategy

During detailed design and construction every effort will be made to achieve stabilisation without the use of shotcrete. If its use cannot be avoided (for example in constructing flood mitigation barriers), the following principles will apply:

- The extent of shotcrete will be minimised;
- The edges of shotcrete will be masked off to avoid overspray;
- Colour and texture of the shotcrete will match the colour and texture of the adjacent rock batter (test panels will be provided);
- Shotcrete will be screened by plantings;
- No shotcrete will be visible around the abutments of bridges
- No shotcrete will be visible from the highway or any public roads.

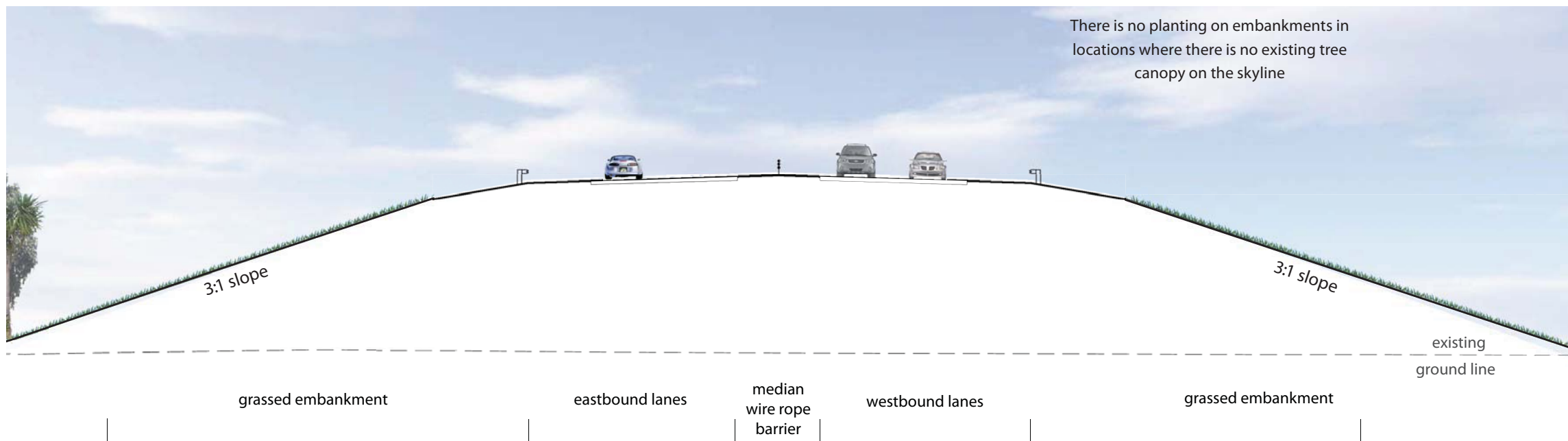


CS3 CROSS-SECTION @CH 16000 (just west of future Papamoa east interchange)



Within the corridor vegetation of cut slopes and embankments is generally restricted to grass, for ease of maintenance as well as to retain the open rural character of the landscape context.

Refer to cross section 4 in Section G: Landscaping for the exception: dense planting of the roadside embankment with native trees, shrubs and grasses to both buffer and visually connect with the remnant bush within the Kaituna Wildlife Management Reserve.



CS6 CROSS-SECTION @ CH 24900 (just west of Paengaroa roundabout)

