



07 Landscape implementation strategy

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7 Landscape implementation strategy

7.1 Road corridor

Median and verge treatments

The landscape design of the median is responsive to the context and seeks to provide separation between the carriageways. No tree planting is within the typical median cross section due to their standardised widths and the inability to achieve clear zone requirements. All medians maintain a grassland treatment to address clear zones, sightlines and maintainability of the median. Grass mix is to comprise a mix of readily available and robust native grass species.



Figure 196: Median on Pacific Highway

7.2 Revegetation

7.2.1 Existing vegetation and landscape design

Proposed landscape design

With respect to the bioregion's ecological communities, habitats, existing vegetation and flora and fauna, the landscaping strategies below are put forward to minimise the impact of the Project on the environment.

The landscape design will provide a strong emphasis on creating a well-vegetated corridor with distinctive intersections, and interchanges. Where planting is used the mix must contain tube stock for indigenous ground cover, shrub and tree species and larger stock for feature trees.

The underlying landscape strategy is to capture the three distinct character zones along the alignment:

- Character Zone 1 - The Boambee Basin
- Character Zone 2 - The Coffs Harbour Basin
- Character Zone 3 - The Korora Basin / resort precinct.

In addressing these environmental contexts there are two other significant environmental considerations which inform the revegetation strategy.

- Management of former Banana Plantations

Banana Plantation Management is required to address potential risk of Panama Disease. Areas of banana plantation which are cut by the works and will not be retained are to be cleared of banana plants and revegetated with the natural community.

Banana trees stripped as part of the clearing operations cannot be reused as mulch within the Project and are to be disposed of in accordance with management plans.

- Koala Corridors

A number of koala movement corridors have been identified, and as required, are to be revegetated utilising koala feed trees planted at a density which is both conducive to the development of the forest canopy but also the safe movement of koala populations free from the highway corridor.

Revegetation strategy

The revegetation strategy provides:

- An attractive approach and departure from developed areas
- A planting and seeding palette based on key local vegetation patterns to ensure the visual and ecological integrity of the journey. It reinforces enclosure when passing through forest and woodland areas, provide long distance views for road users when they are available, and retains existing district views for residents
- Screening to minimise the visibility of the Project from townships, farms and residential estates
- A varied sequence of views along the journey to reduce the linear effect of the highway, providing visual interest and enjoyment and reducing the potential from driver fatigue
- Tree plantings, of locally significant or characteristic trees, and hedge planting to emphasise junctions to local towns, or to provide character along the route

- Mitigation measures to address the visual impact of fauna fencing and overhead power lines where they occur
- Revegetation to cuttings and embankments to maintain the character of undulating green hills against the horizon line
- Predominantly native grasses within median although a range of frangible low shrubs, grasses, or ground covers in medians may be used where screening is required and width is sufficient to enable establishment
- Non-frangible planted and seeded areas conforming to clear zone requirements and roadside furniture requirements
- Safe sight distances and signage which is not obscured by planting and revegetation areas
- Setbacks for structures, roadside furniture and pathways enable clear access for maintenance and visual inspections when the landscape matures
- Where vegetation has been cleared from within the project boundary as part of construction, revegetation treatments will incorporate naturally occurring Plant Community Types
- Retention of existing vegetation (including root and above ground plant mass) is maximised
- In areas where the possibility of weed invasion is high, revegetation of disturbed areas includes planting, seeding, and the establishment of a clean weed free layer of topsoil as the foundation for revegetation work. Weed free topsoil or other growing medium is used in all landscape works
- Design communities refer to a standardised community simplified for constructability and availability reasons and are an abstraction of the natural community.

Local access roads

Where local access roads are located within close proximity to the upgrade, two approaches have been adopted:

- Screen planting and seeding on batters is provided
- In more urbanised areas the adoption of formal street trees within a grassed verge is to be used.

Creek crossings and riparian zones

- Where bridges and road structures cross creeks and interrupt riparian zones, revegetation strategies will endeavour to reconnect the riparian patterns. Indigenous species are utilised to revegetate the affected areas and reconnect local habitat. The potential to use site salvaged material and translocated material is being reviewed to enhance the connectivity and improve biodiversity and sediment control outcomes
- Reconnecting the creek line communities running through Coffs Harbour to the escarpment vegetation to form a green web across the road corridor is a key approach adopted within the works boundary. This facilitates the connection from the mountain to the sea and enhancing water quality and biodiversity outcomes
- A key example of such a strategy is the response to the Grandpa Scrub at Mackays Road Rainforest in which the core remnant is retained and additional planting of Lowland Rainforest is reinstated to its margin to minimise edge effects and enhance overall connections
- Topsoil or other growing medium used in landscape work must be free of weeds as defined in specification R178 or other unintended or undesirable species
- Maximise riparian vegetation under creek crossings to encourage fauna connectivity along creek lines.



Figure 197: Eastlink, Mitcham to Frankston Freeway, VIC



Figure 198: Eastlink, Mitcham to Frankston Freeway, VIC

7.2.2 Vegetation communities

The key vegetation communities along the road corridor have been identified in the Coffs Harbour Bypass Environmental Impact Statement. The vegetation in the road corridor itself is largely disturbed lands because of historical agricultural practices. Natural vegetation communities are responsive to the topography, soils and water influences in the landscape. In order to address the slightly varying structure of the vegetation communities along the alignment a simplified response is developed based on the dominant structural forms. As part of the analysis and design process four dominant natural communities are identified. These are:

- The Rainforest – dominates the foot slopes of the transition
- Forested Wetland – occurs on the floodplain where drainage is impeded or in association with creeklines
- Dry Sclerophyll Forest – Located on dry raised grounds and sandy soils, and
- Wet Sclerophyll – located at the interface between lowland rainforests

A fifth community is an open grassland community, which will comprise a robust mix of native and readily available non-invasive grasses common within the corridor.

Median treatments are responsive to the adjoining vegetation defined by a margin of grassland a minimum 2 metres wide. They consist typically of a shrub treatment related to the adjoining vegetation which will be established to reinforce the sense of enclosure and to help in the control of headlight glare. In more open zones the grassland community will be continued to provide a connection with the broader landscape.

Interchange landscape design is responsive to the cultural setting of these environments and introduces a level of structure to the landscape. A dominant species is selected which relates to this setting.

As part of the reuse strategy for the site material from the tunnelling process is to be used for the construction of fill embankments, particularly in Zone 2. This fill will form the subgrade of the proposed embankment and so it will be important to gain an understanding of its qualities in order to ensure that it supports vegetation growth and is not hostile. This will be treated with the appropriate ameliorants and topsoiled as per other fill slopes in preparation for revegetation.

7.2.3 Impacted landscape

As identified in Chapter 3 - Part 3.2 of the Biodiversity Assessment prepared by Biosis, the list below identifies the dominant vegetation communities that intersect the highway upgrade alignment.

These communities include:

- Freshwater Wetlands: PCT 780 Coastal Floodplain
- Swamp Sclerophyll Forest: PCT 1064 Paperbark Swamp Forest
- Lowland Rainforest: PCT 1302 White Booyong Fig and PCTv 670 Black Booyong – Rosewood.

7.2.4 Landscape and visual screening

A number of key areas of visual screening are identified as part of the environmental assessment process. The focus of visual screening identified is associated with views of local residents and those using local roads and is recommended in order to minimise the degree of visual change.

As part of this process the strategies below are adopted:

- Minimise loss of existing trees
- Planting and seeding of local native trees to blend with the existing landscape and screen views
- Planting and seeding of dense low grasses, ground covers on fill batters within agricultural landscapes
- Reinstate agricultural land where possible

In addition to these requirements planting and seeding will be of:

- Small to moderate height shrubs to screen local roads from the alignment and minimise risk of headlight glare issues
- Small to moderate height shrubs within the median to reduce the visual scale of the alignment to road users and to mitigate headlight glare.



Figure 199: Batter Stabilisation

7.2.5 Aboriginal cultural heritage

The traditional owners of the Coffs Harbour region are the Gumbaynggirr people. Their connection to the landscape span vast distances from the rivers, coast and mountains. Many of the sites relate to Aboriginal heritage and occur within the more forested sites. The landscape interpretation of these sites has been incorporated as part of the broader narrative. A range of species have been identified which have been integrated into the overall design as a key element or just as part of the revegetation process with the relevant communities.

Creeklines in particular have been identified as a place of importance for interpretation. Species proposed include:

- *Rubus parvifolius* (Native Raspberry)
- *Ficus coronata* (Sandpaper Fig)

7.2.6 Disturbed landscape

The alignment of the corridor goes through a variety of modified and disturbed landscapes. In all instances these disturbed landscapes are combination of urban development and productive landscapes which include, pasture lands, crop lands and industrial lands. The alignment of the corridor to some degree has kept to these areas where possible to minimise its impact on the natural systems and to provide a separation from the township itself. Banana plantations are the dominant of these modified communities and are managed vegetated landscapes, for the purpose of this section they are excluded from the discussion, as they are perceived as part of the everyday landscape of the region.

For the purposes of this section disturbed land is interpreted as the urban development and industrial sites which have impacted both landform and vegetation cover and resulted in a landscape which is considered to be degraded in visual and physical form.

The alignment passes through pastoral lands along the alignment. The purpose of this revegetation is to both rehabilitate and stabilise the damaged areas within the corridor enabling the reinforcement of the closed dry forest character on the higher grounds and swamp forest in the lower region of this portion of the alignment, as well as providing improved fauna connectivity.

7.3 Batter stabilisation

Vegetation is used to stabilise the disturbed soil profile of the corridor after completion of engineering work. Stabilisation encompasses both a combination of seeding and planting works. Seeding is discussed below.

Seeding of the corridor using a mix comprising groundcovers, shrubs and canopy using a hydromulch treatment forms the key revegetative response.

The management of canopy trees on the batter slopes is discussed below:

- Tree seeding has been incorporated on upper or lower batters where free of constraints to provide greater diversity and density of canopy to enhance revegetation outcomes
- Seeding is proposed to comprise a combination of hydromulch and hand seeding so that seed which cant be placed by hydromulch can be incorporated into the overall mix. Such seed includes those associated with fleshy fruit. The fruit can be collected and then hand distributed enabling the establishment of greater diversity of tree and palm species

- All plants species with the exception of interchanges are selected from plants known to grow naturally within the project area, a full list is appended. Plant selection of these species has sought to use those species due to the suitability to the climatic and site conditions but also their contribution to biodiversity.

Non-vegetative treatments are used on slopes which exceed 2:1 such strategies include:

- Retention of the cut face where rock is competent and does not need support or stabilisation treatments the natural face is retained.

Where this is not possible alternate strategies are adopted. One such strategy is the use of shotcrete:

- Shotcrete entails the use of geofabric and drainage layer capped with sprayed concrete layer to provide stable long term protection to the face. Shotcrete is used either as the primary slope protection or as part of a broader stabilisation regime including rock bolting etc. In such instances the use of shotcrete is required to both protect and provide stable base.



Figure 200: Revegetation

7.4 Seed application and establishment

Seeding mixes are consistent with TfNSW's landscape design guidelines for the region and consist of a cover crop – short lived non-native pasture grasses to provide quick establishment and minimise erosion, and a native seed mix, comprised of a mix of native grasses, shrubs and potentially trees.

Details of the seeding and planting mix are established as part of the landscape design. A number of different mixes are to be used to reflect the various vegetation communities along the route. These mixes are to be based around the core mix parameters defined above. Due to the Wet Sclerophyll and rainforest nature of a number of the ecological communities the seeding of species will be limited by the seed type and forms. These communities are generally climax communities and so will need time to develop and to achieve appropriate species diversity.

Where seeding is to be used the following techniques have been adopted:

- Hydromulching – Hydraulic application of mulch matrix, sprayed onto the soil as a slurry which sets to form a layer of protection from erosion incorporating seed and soil ameliorants
- Compost blanket – High quality compost incorporating organic tackifiers, biological stimulants, wetting agents, soil ameliorants and seed mix applied pneumatically to slopes may be used on steeper cuttings
- Bonded fibre matrix – a high weight hydraulic application of seed and mulch matrix used for vegetated drains.

7.4.1 Seed collection

Seed collection is to be undertaken in line with TfNSW's project specific specification R178.

7.5 Ecological establishment and monitoring

In order to ensure complete coverage of the corridor is achieved in a timely and effective manner and provides ongoing protection and biodiversity benefits, it is important to have a focused maintenance program.

To ensure this a Landscape Management Plan (LMP) has been prepared. This document details the landscape maintenance actions for the upgrade and covers the first 12 months from Final Certificate.

Key elements covered in this plan include:

- Review of clearances to fencing, in particular fauna fencing to ensure this is not breached in any way
- Landscape management including appropriate establishment procedures, fertiliser, pest and disease management. Performance of the landscape establishment is determined by the TfNSW Modified Landscape Functional Analysis (LFA) Rapid Assessment Technique which is undertaken on a quarterly basis.

7.5.1 Weed control

Weed control adopts a systematic approach in order to reduce potential weed impacts in the future. Key to this is ensuring weed control is:

- An integral part of the build process, with weed assessment and management actions undertaken before site clearance during construction in line with the Weed Management Plan (WMP) which is part of the Construction Environmental Management Plan (CEMP)
- Carried out by the contractor in all areas of the corridor including revegetated and planted areas for a period of 12 months beyond Practical Completion of the work
- The adoption of a strategy which addresses structural weed issues as a focus as opposed to general weed issues. Critical to this process is the acceptance of revegetation as a gradual process which has numerous interactions which influence the landscape response in varying ways. Weed strategies will need to evolve to the various issues that arise from season to season and year to year as the landscape develops.

7.5.2 Clearance to fencing

A variety of fence types have been installed along the corridor, including fauna fencing, stock fencing and pedestrian fencing.

Maintenance of offset for fauna fencing is important to ensure offsets and integrity is maintained to ensure they are not breached in any way. Breaching of fauna fencing may occur when seeded material establishes next to fence lines providing the opportunity for fauna to cross the fence. It may also be facilitated by falling trees or limbs, establishment of taller vegetation and or twinning climbers growing on fence, providing the opportunity for fauna to scramble over the fence structure. The ongoing maintenance based on fauna types being managed will be critical for the long term success of the fencing.

7.5.3 Establishment of seeded landscapes

The establishment of seeded landscapes may take some years to establish but that monitoring and appropriate action will be taken to ensure that the desired species mix is established or that soils with seed bank reliance are responding as envisaged. Responses will be gauged against locally successful installations and corrective actions determined to encourage and ensure response achieves the planned intent.

7.5.4 Supplementary watering and mulching

The LMP for the project will require that revegetated areas are watered and maintained until plants have become established. If extended periods without rain are experienced during the establishment period then watering will be required to supplement natural rainfall.

7.5.5 Fertiliser

Fertilising post landscape installation may be required where specific nutrient deficiencies are identified. The need for additional fertiliser is minimised by the use of slow release fertiliser. Fertiliser may be required to address specific soil and vegetation responses. This may include nitrogen drawn down as a result of mulch in soil media. These issues are addressed as part of the soil amelioration process defined as a result of site soil testing in both the design and construction phases.

7.5.6 Pruning and thinning

Pruning and thinning is likely to form a minor component of maintenance. Pruning may be required to ensure retention of sightlines where seeded shrubs have grown obscuring signage or views around bends or to maintain clearances to fauna fencing.

7.5.7 Pests and diseases

Generally pest and disease management is not viable for large areas. Landscape establishment will rely on developing an environmental balance through the establishment of improved habitat conditions. If an outbreak is identified which will impact on the establishment of landscape outcomes an appropriate action plan will be determined.

7.5.8 Plant replacements

As part of the monitoring requirements, diseased or dying plants are to be replaced to ensure 90 percent of planting has established after 12 months.

7.6 Landscape treatments

Landscape treatments include a combination of seeding and planting. Planting is undertaken in a number of differing ways, as garden beds to address a specific need or as broad scale planting to establish canopy and maintain diversity which cannot be achieved by seeding such as in fauna passage or creekline areas. Species selection is reflective of the Plant Community types (PCT) encountered within the corridor and adopts an indigenous and endemic plant palette. The key communities include the following:

- PCT 692 Blackbutt - Tallowwood moist ferny open forest of the coastal ranges of the NSW North Coast Bioregion
- PCT 695 Blackbutt – Turpentine – Tallowwood shrubby open forest of the coastal foothills of the central NSW North Coast Bioregion.
- PCT 747 Brush Box - Tallowwood - Sydney Blue Gum Tall moist forest of the ranges of the central NSW North Coast Bioregion
- PCT 1064 Paperbark swamp forest of the coastal lowlands of the NSW North Coast Bioregion and Sydney Basin
- PCT 1244 Sydney Blue Gum open forest on coastal foothills and escarpment of the North Coast.

Several isolated pockets associated with creeklines and other vegetation remnants include:

- PCT 1262 Tallowwood – Small fruited Grey Gum dry grassy open forest of the foothills of the NSW North Coast
- PCT 1285 Turpentine moist open forest of the coastal hills and ranges of the NSW North Coast Bioregion
- PCT White Booyong – Fig Subtropical rainforest of the NSW North Coast Bioregion.

7.6.1 Seeding Treatments

The seed mix must include indigenous non-invasive shrub and grass mix sown at a minimum rate of 8 kg/Ha and cover crop seed mix comprising non-invasive exotic grasses at 20kg/ha.

7.6.2 Garden Bed Treatments

At key locations including noise walls, headlight screens, interchanges and where residential properties abut garden bed plantings for screening would be adopted.

7.6.3 Tree planting

Planting of trees is included to augment species within the seed mix, address clear zone requirements, and provide species which are otherwise unable to be established by seeding. Broad scale planting will occur outside of clear zones of both the road alignment, relevant service corridors and furniture that restricts opportunities; and where rock profile is restricting.

Planting is over the top of the seeded area and is provided to ensure the long-term development of a canopy layer and diversity of community.

7.7 Topsoil management

7.7.1 Topsoil management

The Coffs Harbour Bypass project traverses a number of different landscape situations that include forested areas, cleared land and floodplains that are extensively used for banana plantation and open grassland agricultural lands. Consequently, the topsoils within these landscape situations vary significantly in terms of their physical and chemical composition as well as the species of seed they contain. Topsoil is a highly valuable resource that requires management by careful planning, implementation and monitoring to ensure the best use is made of it. Good topsoil management results in cost effective landscape outcomes that require minimal ongoing maintenance.

7.7.2 Topsoil treatments

The treatment of topsoil is defined as part of the Soil and Revegetation Management Plan (SRMP) for the Project. In developing this plan the undertaking of a soil pedology study is to occur. This identifies the different soil units and tests a number of samples of the soil within this zone. Samples will be tested of the A and B Horizons in order to determine the soil qualities and the requirements for amelioration in order to supported the relevant vegetation communities proposed as part of the SRMP.

7.7.3 Mulches

Vegetation material generated by clearing operations, outside of banana plantations is to be used as mulch in the landscape works, subject to availability and Panama Disease constraints.

Wood chip mulch is to be used as a surface cover on planted areas to suppress weeds and retain soil moisture. Composted mulch may to be incorporated in topsoil spread on cut and fill slopes to improve the resistance to surface erosion and assist revegetation.

7.8 Drainage and water quality

Drainage work can potentially have a significant influence on the character and appearance of the road corridor and its landscape treatments, as well as influence the movement and usage by fauna – both aquatic and terrestrial. Care has been taken to ensure the drainage design has been considered and integrated with both the formation and structures associated with the road. As part of the drainage response the use of concrete lined drainage channels and rock mattresses has been minimised in favour of vegetated drains or rock armoured channels. The alignment of channels will be informal and not rigid, responding to the topography and interfacing with the road formation.

7.8.1 Vegetated swales and channels

The design has maximised the use of vegetated channels, helping to clean the water but also integrate the drainage with its landscape context. The vegetated nature of these drains ensures velocities are reduced and the potential for sediment to be removed from the water column is maximised.

7.8.2 Concrete lined channels and gutters

Concrete lined channels are to be used where other drainage forms are unsuitable due to:

- Steepness of slope
- Velocity and concentration of flows.

Landscape will be used to help reduce the visual prominence of drains where possible by providing screening or visual foil to the drain.

7.8.3 Basins

Basins form a significant component of the water treatment chain as part of the construction and operational phase of the Project.

The final form of a basin has the potential to impact visually the character of the alignment as a result of its context and grading and the degree to which it can be integrated. Basin forms will be refined to respond to their context and visual exposure adopting forms that readily respond to the landscape of the alignment itself. Consideration of other visual integration issues including the need for fencing and shaping of landform associated with basins are to be incorporated.

7.8.4 Culverts

Fauna connectivity culverts are designed to allow for the passage of fauna under and across the highway.

With fauna culverts the primary design input has been the location and the size of the culvert depending on the type of fauna. Siting reflects key movement corridors and connections to other appropriate environments to minimise fragmentation caused by the highway alignment. Culverts have been sited as part of the development of management plans for all fauna. Fauna furniture is incorporated in associated with fauna culverts and some drainage culverts which form combined fauna and drainage culverts.

Flood relief and drainage culverts convey floodwaters and surface flows under the highway. Floodwater and drainage culverts have been sited reflecting present surface flows and the need to maintain and, or augment these flow paths in response to flood modelling to alleviate adverse impacts.

7.8.5 Creek Realignment

The realignment of a number of creeks requires an approach which maintains the creek character while providing a channel alignment compatible with the alignment constraints in both the short to long term.

A combination of rock armouring and vegetated treatments is used so the overall feel of the creekline remains a vegetated creek corridor. This will ensure visual continuity, the maintenance of the creekline as a wildlife corridor, and stability of the channel in relation to bridge or culvert structures.

Creeklines are to be revegetated with riparian vegetation indigenous to the corridor. Species selection reflects the ephemeral or permanent nature of the creekline. The potential translocate material from the existing creeklines into the new channels will be reviewed and where possible adopted as a means of maintaining genetic composition of creeklines and the rapid reestablishment of the vegetation community.

7.9 Fauna crossings

7.9.1 Fauna connectivity

Fauna connectivity is an important part of the mitigation strategy for the corridor. The project has the potential to isolate native fauna on both a local and regional population level. To inform the design development of the project, key movement corridors have been identified and specific measures for each section of the alignment identified. Upgrading the Pacific Highway Design Guidelines (2015) sets out the requirements for revegetation for fauna connectivity. This includes:

- Revegetation near fauna connectivity structures
- Vegetation planted or seeded within an approach to a fauna crossing is provided in such a way as to:
 - Be complete as soon as practicable after clearing of existing vegetation, and within three months of completion of construction of the fauna crossing
 - The density of vegetation planting or seeding will match the surrounding natural habitat.
 - Not obstruct access to the underpass or bridge
 - Be indigenous species and representative of the surrounding natural habitat
 - Be designed to attract native fauna species to the structure, except where fauna exclusion fences are not present
 - Not obstruct the views through, or disguise, the entrance to the underpass or bridge.

7.9.2 Revegetation near fauna and frog fencing

Native tree and shrub seeding and planting stock must not be used within three metres of fauna fences or one metre of frog fences during the revegetation process. The growth of vines and heavy vegetation and grass growth in and next to fauna fences must be reduced.

7.9.3 Koala specific revegetation

The design of fauna underpasses and fencing for koalas is a critical aspect of the mitigation measures adopted. Several long-term studies undertaken by TfNSW to track koalas pre, during, and post major work to investigate effectiveness of various underpasses, overpasses and exclusion fencing has been incorporated within the proposed strategies for this Pacific Highway Upgrade.

A key aspect of the mitigation strategy is provision of additional koala habitat adjoining the corridor as part of a strategy to enhance connectivity as stipulated in the MCoA.

Within the project boundary the revegetation work will include primary and secondary koala food trees in areas that will not cause a road safety traffic hazard and will encourage the use of fauna underpasses. If planting occurs within fauna fencing species selection will avoid those attractive to koalas.

7.9.4 Frog management

The Giant Barred Frog habitat has been identified within the Pine Brush Creek precinct and north of the Luke Bowen footbridge. Management of its environment and the frog itself is addressed as part of the Project Frog Management Plan. As part of this plan the use of Frog Fencing to limit access to the alignment is required. The landscape response adopted utilises the relevant vegetation communities related to the site's natural characteristics. As part of this there is a requirement to maintain minimal vegetation cover within 1 metre of the fauna fence in order to discourage movement adjacent or over fencing. To achieve this the grassland mix is adopted adjoining fences.

7.9.5 Fish passage

Fish passages are required to any Class 3 or above waterway within this portion. This has been considered within the corridor but with particular focus on provisions at Pine Brush Creek. The allowance for fish passage is incorporated in the design of the drainage culverts and is in line with *Why do fish need to cross the road – Fish Passage Requirements for waterway crossings*, Department of Primary Industries, 2003 Policy and Habitat Guidelines for Fish Habitat, Department of Primary Industries, 2013.

7.9.6 Fauna crossing structures

Fauna structures have been standardised across the Project in order to provide efficiencies in the provision and delivery of these structures. A number of bridges as well as culverts with fauna furniture beneath, are provided along the alignment. In addition the provision of glider poles are provided addressing the variety of fauna present within the habitats along the corridor.

The landscape design has been developed with the help of ecologists and is composed of plant species which encourages the movement of fauna through these elements by the utilisation of plants attractive to the relevant fauna species, but which do not obstruct or disguise the entrance.



Figure 201: Koala fauna fencing



Figure 202: Fauna crossing

08 Materials and finishes

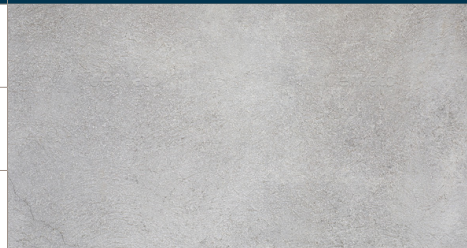







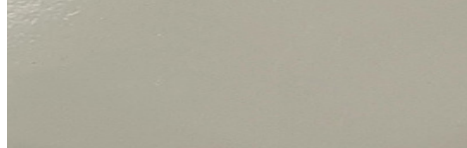


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8 Materials and finishes

The materials concept features a consistent and robust palette of complementary materials. Their application is based on functionality, durability and the visual prominence of elements within the urban context.

Table 7: Materials and finishes

ELEMENT	MATERIAL	COLOUR / FINISHES	DESCRIPTION	IMAGE	
Bridges	Piers / headstocks	Concrete	Natural concrete / Class 2	AS 3610	
	Girders	Concrete	Natural concrete / Class 2	AS 3610	
	Parapets + skirtings	Concrete	Natural concrete / Class 2	AS 3610	
Pedestrian bridge	Truss	Steel	Dulux Top Coat: FX39/001 Skyfall	RMS B220, metallic finish with a shimmer effect	
	Balustrade	316 Marine grade stainless steel	No. 4 – brushed finish		
	Tensile screen	316 grade stainless steel	Stainless steel		
	Piers / headstock	Concrete			
Safety screen	Safety screen	Hot-dipped galvanised (HDG)	Galvanised steel	Structure: HDG structural steel T-post Infill: 358 weldmesh panel	
Headlight screen	Standard screen	Structure: HDG Screen: Acrylic	Plexiglas: Earth brown / opaque	Structure: HDG structural steel T-post Screen: Plexiglas Acrylic Multiple colours - base colour: earthy tone and accent colours to reflect cultural themes	
Noise walls	Standard noise walls	CFC with EPS core	Painted cementitious skin	R271, paint specification Multiple colours - base colour: earthy tone and accent colours to reflect cultural themes	
	On bridge noise walls	Structure: HDG Screen: Transparent acrylic	Plexiglas: Smokey brown / tinted transparent	Structure: HDG structural steel T-post Infill: Plexiglas Acrylic	

Note:
Colours nominated are indicative and are to be replaced with an approved equivalent if unavailable.

ELEMENT	MATERIAL	COLOUR / FINISHES	DESCRIPTION	IMAGE	
Retaining walls	L-shape wall	Concrete	CCS 3% oxide Smoky Blue / Class 2	Recessive appearance with architectural grooves	
	Soldier pile wall	Concrete / shotcrete	CCS 3% oxide Smoky Blue / Wood float	Recessive appearance with architectural grooves	
	Soil nail wall	Shotcrete	CCS 3% oxide Smoky Blue/ Wood float	Recessive appearance with architectural grooves	
	RSW	Precast Concrete	Natural concrete / Class 2	3.0m x 1.5m panels	
Tunnel portals	Portal collar	Concrete	Natural concrete / Class 2	AS 3610	
	Portal facade	Architectural shotcrete	Natural rock appearance	Colour to match or complement the surrounding rock cut face	
	Shotcrete back drop	Architectural shotcrete	CCS Smoky Blue 3% oxide	Gun finish	
Tunnel Facilities	External wall cladding	Aluminium panel	Mondoclاد Copper Penny Monument / propriety PVDF coated	Accent colour to define entry / habitable areas or on shorter facades	
	External wall	Concrete	Natural concrete / Class 2	AS 3610	
	External louvre	Extruded aluminium	Dulux Duratec: Monument Satin / powdercoat Dulux Duratec: Signal Grey Matte / powdercoat	Base colour provided along the long facades and visually bulky elements	
	Roof	Colorbond steel trapezoidal profile	Colorbond: Surfmist		
	Deluge tanks	Colorbond steel	Colorbond: Monument Satin		
MOMF	External wall cladding	Aluminium panel	Mondoclاد Copper Penny Monument / Proprietary PVDF coated Interpon D2525-EZYHD2-Australian Ash (HD388)	Accent colour to define entry / habitable areas or on shorter facades	
	External wall	Concrete	Natural concrete / Class 2	AS 3610	
	Insulated wall panel	Colorbond steel	Colorbond: Shale Grey		
	External louvre	Extruded aluminium	Dulux Duratec: Monument Satin / Powdercoat Dulux Duratec: Signal Grey Matte / Powdercoat	Base colour - recessive appearance	
	Roof	Colorbond steel trapezoidal profile	Colorbond: Monument		
	Deluge tanks	Colorbond steel	Colorbond: Monument Satin		

Note:
Colours nominated are indicative and are to be replaced with an approved equivalent if unavailable.

09 Conclusion



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9 Conclusion

The design presented in this document demonstrates that a unified, integrated and an inspired urban design has been developed. It also demonstrates that a co-design process has been adopted. A balanced urban design and engineering outcome with the local Gumbaynggirr community is achieved for the Project through the collaboration and integration with a multidisciplinary FGJV team which included contractors, engineers, architects, urban and landscape designers, and Aboriginal cultural narrative, art and design consultants.

The integration of opportunities for art and the development the Aboriginal narrative speaks of setting up the framework to celebrate and provide Connection to Country for the Project, which will be further developed.

Additional Koala feed tree planting has been incorporated, which will enhance biodiversity. Cost effective solutions to reduce impacts to the mountains have been incorporated particularly in the tunnel portals design. The interchange have been designed to consider their surrounding context of being close to residential properties.

The design integrates the roadway into the natural environment, whilst reinforcing the Mountains to the Sea concept reflecting the unique setting of the bypass and creating opportunities to capture the essence of Coffs Harbour and provide community benefits.



Figure 203: Korora Hill Interchange - aerial view

