Appendix 2

Visual Assessment

June 2013

Feedback: Please send your feedback regarding this document to: mr.techdocs@tmr.qld.gov.au

Appendix 2 Amendments – June 2013
Revision Register

Issue / Revision No	Reference Section	Description of Revision	Authorised by	Date
1	-	Initial Release of 2nd Edition of Manual	Steering Committee	Jun 2013

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Visual Assessment

2.1 Introduction

This appendix provides a detailed outline of the visual ecological and cultural heritage analysis process for major projects in new corridors where route options are being explored.

2.2 Step 1 – Visual Analysis

All new transport infrastructure proposals will have some visual effect on the landscape through which it passes. The visual analysis functions to determine the types of visual impacts and level of significance to users. The final outcome of a visual analysis is to minimise these impacts and optimise the visual fit of the corridor into its broad regional context and local landscape setting.

There are five main factors that need to be addressed in the visual analysis. These are:

- existing visual setting and visual landscape character units;
- existing visual catchment and visual sensitivity;
- existing views and visual amenity;
- modifications to the visual character and impacts on the visual landscape; and
- visual experience for all users.

A review of these factors will determine the overall level of visual impact. It will also assist in understanding the nature of the visual interaction of the new transport and road proposal with the existing landscape character. This provides a basis for developing appropriate mitigation measures to decrease the overall level of visual impact.

2.2.1 Stages of the Analysis

Visual analysis should be undertaken by suitably qualified landscape architects experienced in undertaking assessments of this kind. A series of defined tasks should be followed when conducting a visual analysis (Figure APX2-01). These are:

Task A - describe visual setting and identify visual landscape character units (and associated landscape sensitivity);

Task B - identify visual catchment (and associated visual locality), visual sensitivity, view types;

Task C - determine predicted modifications to visual character; and

Task D - assess visual experience for all Users.

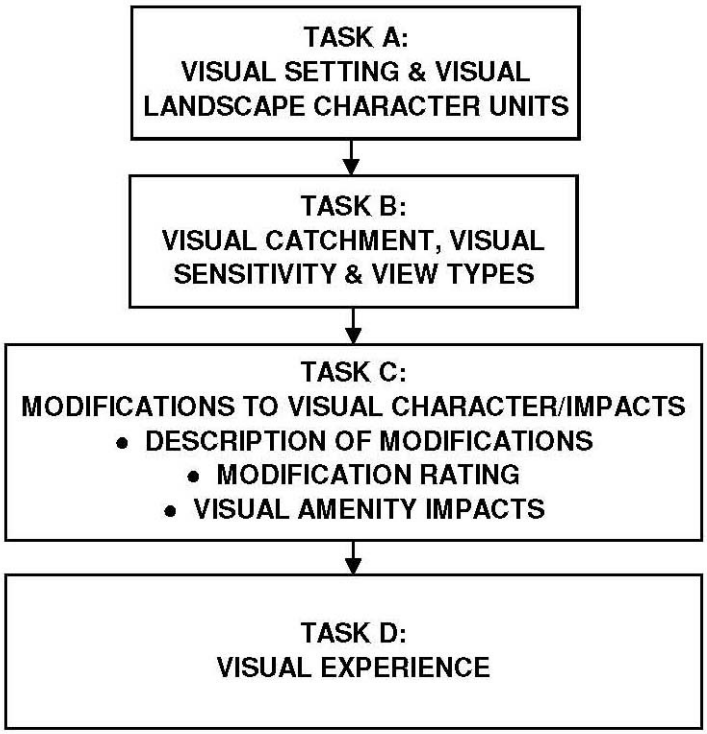

Figure APX2-1: Required tasks when undertaking a visual analysis

2.2.1.1 Task A – Visual Setting and Visual Character Landscape Units

This task requires classifying the overall visual landscape according to a broad setting and character unit.

Visual Setting

Visual settings will have strongly defined visual qualities occurring within broad precincts along the transport and road corridor. A project proposal or site will contain a variety of visual features formed by natural and cultural heritage items which create this visual setting. These features influence how the landscape is viewed and appreciated by users. Examples of these are:

- natural – topography, vegetation and hydrological features; and
- cultural heritage - dominant land use and settlement patterns as well as buildings and infrastructure, such as powerlines.

These features can simply yet effectively be shown on a site plan (Figure APX2-02).

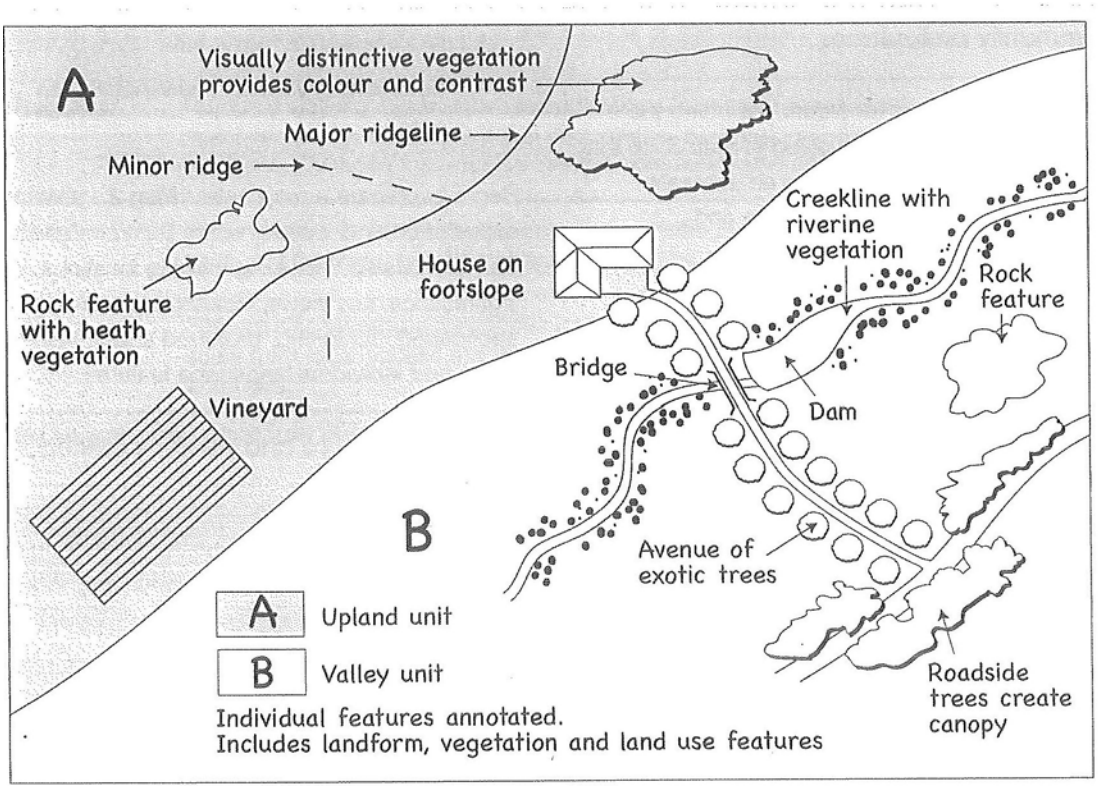

Figure APX2-2: An example plan showing key features of the visual setting

Source: Western Australian Planning Commission, etal, 2007, p27

The site analysis template/ checklist (Appendix 3) is a basis for identifying these elements within the road landscape.

A visual setting should be established at each of the following scales (where applicable relative to the size of a particular project):

- Local (0-1 km);
- Sub-Regional Visual Locality (1-5 km); and
- Regional (>5 km).

This setting is then to be further broken down into character units. A visual setting may comprise one or more visual character units.

Visual Landscape Character Units

The purpose of breaking down the corridor area into character units is to make the visual analysis process more comprehensive and accurate at the project scale. It also ensures that context sensitive designs are delivered during the design stage of projects. Visual character units also help to determine the level of landscape sensitivity within these units.

Visual character units are single identifiable units which can also be referred to as local landscape character zones. These units result from the differing mix of dominant natural and cultural heritage features defined earlier by the broader visual setting.

Local landscape character zones will generally vary along a route, creating a variety of landscapes and experiences. To identify this variety, the corridor study area should be divided into a number of broad homogenous visual landscape character units. These units can generally be identified by being

the most visually dominant within the landscape. The character zones should then accordingly be mapped (Figure APX2-03). It should be noted that visual landscape character units will be more significant and potentially easier to identify on larger sized or more complex projects.

Figure APX2-3: Mapping of visual landscape character units along a corridor

Figure APX2-03 provides an example only of mapping visual landscape character units. Often

transport and road projects; particularly smaller types, will only have one land use within the corridor. Subsequently, other dominant features within the road landscape can be used as a basis for defining these zones. Potential features may include:

- dominant vegetation community/ies;
- significant topography (for example; landform);
- hydrological features;
- urban development types; and
- land use.

Landscape Sensitivity

Landscape sensitivity refers to the landscapes relative sensitivity to change. As an example, a national park will be more sensitive to change than an industrial area. A landscape's uniqueness within the broader landscape, its continuity and ability to change without obvious alteration to character, all determine the level of landscape sensitivity.

The sensitivity of a zone is dependant on the level of:

- uniqueness within the broader landscape;
- continuity of natural and built features and elements that define or exemplify an areas character; and
- ability to accommodate to change without obvious or significant alteration to character or loss of important elements which define that character.

Landscape sensitivity can be analysed in two perspectives; physical and community. The landscape sensitivity from a ***physical*** perspective relates to the landscapes ability to accommodate change, while landscape sensitivity from a ***community*** perspective relates to the extent of the community at large who will perceive changes in the landscape.

The following criteria describe the levels of landscape sensitivity to change from a ***physical*** perspective:

- ***High landscape sensitivity –*** The landscape has a high level of continuity and uniqueness within the broader landscape, and has a low ability to accommodate change without obvious or significant alteration to existing character, or loss/reduction of key elements which define that character (Figure APX2-04);

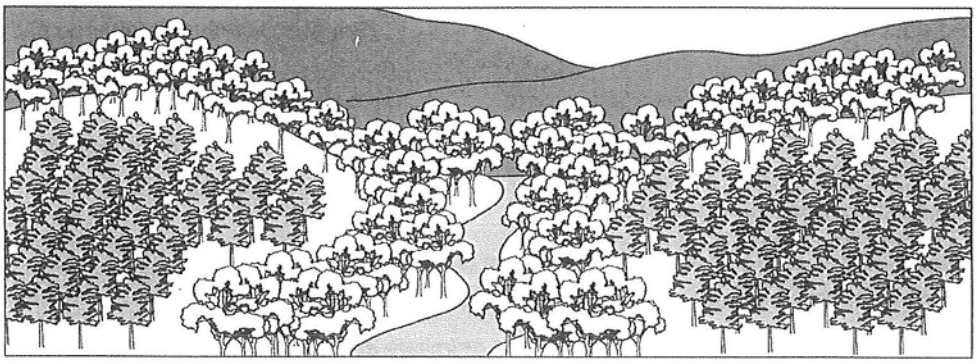

Figure APX2-4: Physical Perspective - This image reflects high landscape sensitivity and a low ability to change, due to the continuity of remnant vegetation and a distinct character defined by creek lines and surrounding topographical features

Source: Western Australian Planning Commission, etal, 2007, p120

- ***Moderate landscape sensitivity -*** The landscape has a moderate level of continuity and uniqueness within the broader landscape, and has the ability to accommodate to change without obvious or significant alteration to existing character, or loss/reduction of key elements which define that character; and
- ***Low landscape sensitivity -*** The landscape has a low level of continuity and uniqueness within the broader landscape, and will accommodate change without obvious or significant alteration to existing character, or loss/reduction of key elements which define that character.

Sensitive landscapes can generally accommodate some level of alteration, although greater emphasis is required in environmental management and formulation of mitigation measures to limit and/or manage the level of alteration.

The following criteria describe the levels of landscape sensitivity to change from a ***community*** perspective:

- ***State level landscape sensitivity -*** the landscape has a high value to the state wide community at large; the proposal has the potential to visibly contrast with the existing landscape character to a degree that would be perceived and experienced by a majority of Queenslanders as a whole;
- ***Regional level landscape sensitivity -*** the landscape has a high value to the community of Brisbane and South East Queensland; the proposal has the potential to visibly contrast with the existing landscape character to a degree that would be perceived and experienced by a majority of South-East Queensland;
- ***Local level landscape sensitivity -*** the landscape is primarily valued by the local community; the proposal has the potential to contrast with the existing landscape character to a degree that would be perceived and experienced by a majority of the local community; and
- ***Less than local level landscape sensitivity -*** the landscape has little value to the local community, and the proposal would have little contrast to the existing landscape character.

Landscapes with high value to the state wide community, and where alteration to that landscape would be perceived by the state wide community can be regarded as having a high level of landscape sensitivity. Landscapes with only local community value and little degree of perceivable alteration can be regarded as having low landscape sensitivity.

2.2.1.2 Task B – Visual Catchment, Visual Sensitivity and View Types

This task requires a more comprehensive analysis of visual aspects within the road landscape from a broader perspective relative to visual catchments. The task then gets more detailed by establishing a level of visual sensitivity within the road landscape.

Determine Visual Catchment

The visual catchment refers to the extent of areas in which a corridor can be viewed from nearby areas or wider surrounding areas by the travelling public. The degree of visual exposure and potential for visibility within the visual catchment extents is influenced primarily by the combination of surrounding landform, built forms and vegetation. The primary visual catchment encompassing all areas from which a new transport and road proposal may be viewed needs to be clearly identified and mapped when undertaking a visual analysis. A potential way of defining and illustrating clearly the visual catchment is to produce a Visual Envelope Map (Figure APX2-05).

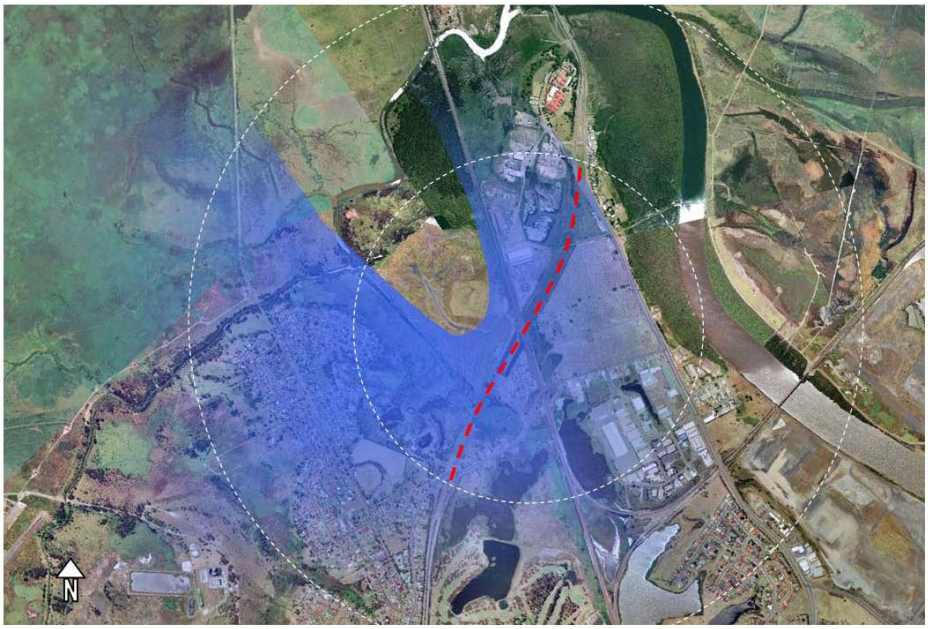

Figure APX2-5: Defining and illustrating the visual catchment

Source: Roads and Traffic Authority of NSW (2009) i), Figure 4-4 'Visual Envelope Map'

Visual Locality

Visual locality prescribes general distance parameters to establish set viewing locations along a proposed corridor alignment. The three general visual locality parameters are:

- Local – the corridor seen from viewing locations less than 1 kilometre away (these locations are often more readily known by the local community).
- Sub-regional visual locality – viewing locations between 1 and 5 kilometres away.
- Regional visual locality – viewing locations further than 5 kilometres away.

In most cases for transport and road corridor projects, the visual catchment is generally limited to the local visual locality only, however, in larger scale projects, it can occur in sub-regional and regional localities.

Determine Visual Sensitivity

Visual Sensitivity refers to the landscapes visual values sensitivity to change. It determines how sensitive the visual character of the landscape setting is to the proposed changes relative to the new transport and road proposal.

The following terms describe the degrees of visual sensitivity possible within state controlled road corridors and transport networks:

- ***High visual sensitivity –*** a highly experienced view to a landscape or feature which is iconic to the state, to a major section of a city/region or a significant view from an area of regional open space (Figure APX2-06);

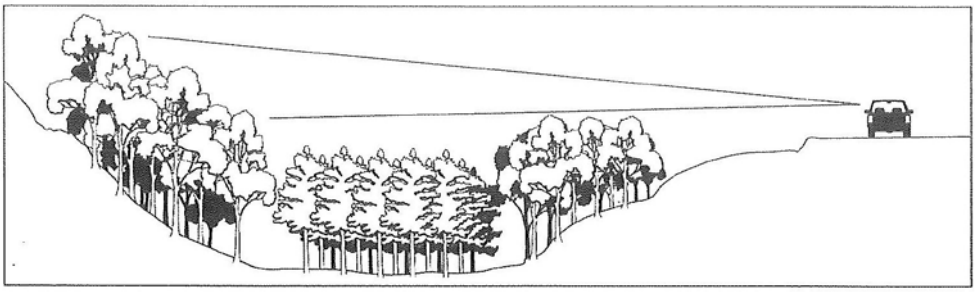

Figure APX2-6: This image reflects high visual sensitivity, due to a significant view to mountainous landscape feature being experienced along a major travel route

Source: Western Australian Planning Commission, etal, 2007, p120

- ***Moderate visual sensitivity -*** high quality views experienced by large numbers of local residents and/or recreational users and/or commuters; and
- ***Low visual sensitivity -*** views where visual amenity's importance is low, (such as views from an industrial area).

Visual sensitivity is also linked to visual quality; that is, the visual condition of the road landscape and how it is perceived, preferred, and valued by the public. Visual sensitivity can be affected by personal viewer perception, particularly within local communities, since individuals will perceive different settings differently.

Because visual sensitivity can be affected by subjectivity, it is difficult to measure quantitatively. However, when assessed in conjunction with visual landscape character units, more quantitative outcomes can be established. The level of visual sensitivity can be estimated by identifying the visual landscape character units and landscape sensitivities mapped as part of Task A. Figure APX2-07 illustrates an example of a Visual Sensitivity Matrix.

TYPICAL VISUAL LANDSCAPE CHARACTER UNIT	VISUAL LOCALITY		
	Local (0-1 km)	Sub-Regional (1-5km)	Regional (>5km)
Urban Residential	H	M	L
Rural Residential	H	H-M	L
Tourist Facility	H	H-M	L
Recreation Facility	H	H-M	L
National Park	H	H	M
Regional Park	H	H-M	L
Local Park	H	M	L
Federal Road (Auslink)	H	L	L
Other State Controlled Roads (OSCR)	M	M	L
Local Roads of Regional Significance (LRRS)	M	M	L
Scenic Roads	H	M	L
Themed Tourist Routes	H	L	L
Commercial Development	H	L	L
Institutional Development	M	L	L
Industrial Area	L	L	L
Rural Area	L	L	L

L = Low Sensitivity
M = Moderate Sensitivity
H = High Sensitivity

Figure APX2-7: Visual sensitivity matrix

Visual sensitivity may also refer to the extent and type of views, frequency and volume of viewers. For example; an industrial area would have lower visual sensitivity than a residential area due to small volumes of viewers.

Highly visually sensitive areas include residential areas, transport systems and main roads with high volumes of viewers, and parklands where visitation is short but a high level of importance is placed on the visual amenity.

Permanent audiences, such as the local community and residents, are likely to have a relatively high sensitivity. This is because they may experience the views on a daily basis and be attached on a personal level (Figure APX2-08). Temporary audiences will have a potentially lower sensitivity since in the viewing areas on a more occasional basis.

Figure APX2-8: Transparent panels on the bridge are used to retain views where high visual sensitivity was an important community issue

Determine View Types

A general assessment of the common view types located throughout the corridor should be undertaken to determine their specific locations and the potential impacts of the road proposals on significant views.

It should be noted that views into existing corridors can be influenced and constrained by a combination of topography, vegetation, existing transport and roadway infrastructure (for example noise barriers) and built forms associated with land use. The combination of these generally limits the extent of visibility of all view types, and restricts expansive and long views of the corridor from areas immediately adjacent.

Types of views apparent within the road landscape can include:

TYPE OF VIEW	DESCRIPTION	ILLUSTRATED EXAMPLE
Vista	*A confined view usually with a terminating point in distance. The terminating point is the main point which viewers focus on and which captures attention.* Vistas are often created by a nodal feature or landmark.	
Viewshed	*Is a contained view (either by land or object) of an area of land, water, or other landscape and or cultural heritage item, visible from a fixed vantage point. Viewsheds are most often areas of particular scenic or historic value that are readily visible from public areas such as from roadways, transport systems or open space. Viewed areas generally have inherent visual or aesthetic qualities as determined by those who view it.*	
Framed	*A view framed by other items within the landscape, either to both sides or to one side; to create visual balance and symmetry.* Framing is often created by vegetation or built structures.	
Sequential	*A series of views experienced while the viewer is in motion that build up and transition progressively over a length of the transport and road corridor.* These views will generally contain: • Visual entry/ exit points; * • Visual transition points; and ** • Visual termination point.	
Panoramic	*A broad view which includes the landscape as a whole viewable area.* Panoramic views are often experienced from existing under and/ or overpassing roads or transport infrastructure within the corridor network.	
Open	*An open view allows viewers to move visual focus from one feature to another; allowing a variety of items to be viewed simultaneously within the road landscape.*	

TYPE OF VIEW	DESCRIPTION	ILLUSTRATED EXAMPLE
Closed	*Closed views limit the amount a viewer can see, prompting viewers to visually focus in on a particular segment within the landscape.*	
** Visual entry/ exit points are places along the transport and road corridor which visually make people aware of approaching, entering or exiting a sequenced area. These points should not be visually abrupt so as to distract drivers or users of transport facilities, but be gradual.*	*** Visual transition points are places along the transport and road corridor where people become aware of moving from one type of landscape to another. Changes in visual character of features located at these points provide visual transition by changing to reflect the character of a landscape setting into which a person is travelling.*	

Table APX2-1: View types

Documenting View Types and Viewpoints

Identifying and mapping the main views experienced by users to and from the corridor alignment is an important part of the visual analysis process.

This identification and mapping of view types provides a basis for determining visual amenity, and recording and categorizing information about the visual qualities of an area. An evaluation of the existing view types provides the baseline conditions against which visual amenity and the effects of modifications to the visual character can be considered.

Viewpoints should be selected from:

- within the visual catchment;
- regular intervals along the corridor;
- within a reasonable distance of the project; and
- other various suitable locality points along the length of the corridor.

A schedule of key viewpoints (based on the view types), should be generated by designers.

2.2.1.3 Task C – Modifications and Impacts to Visual Character

Modification refers to the broader alteration to the visual character within the landscape as a consequence of a new transport and road proposal from a specific viewpoint.

By describing and documenting the previous tasks required of the visual analysis process, potential modifications to the visual character can be identified and rated as to their magnitude. This task is particularly important relative to context sensitive design, as it determines how visually compatible the proposal (according to its magnitude) will be with the surrounding landscape setting.

Description of modifications

In the first instance, predicted modifications to the visual character should be described in broad qualitative terms. Using photographs and computer generated imaging as support is also an effective tool of conveying likely effects on visual quality.

Descriptions and illustrations should focus on the potential:

- changes to existing views at key areas and viewpoints, highlighting the nature and scale of the change;
- overall effects to the landscape settings; and
- degrees of modification to the overall visual character.

The degree of modification to the existing visual character should be defined as:

- **Low**;
- **Moderate**; or
- **High**.

The degree of modification should be made according to the overall extent of contrast created by the new transport and road proposal. General criteria for determining the degree of potential modifications imposed on visual character (Figure APX2-9).

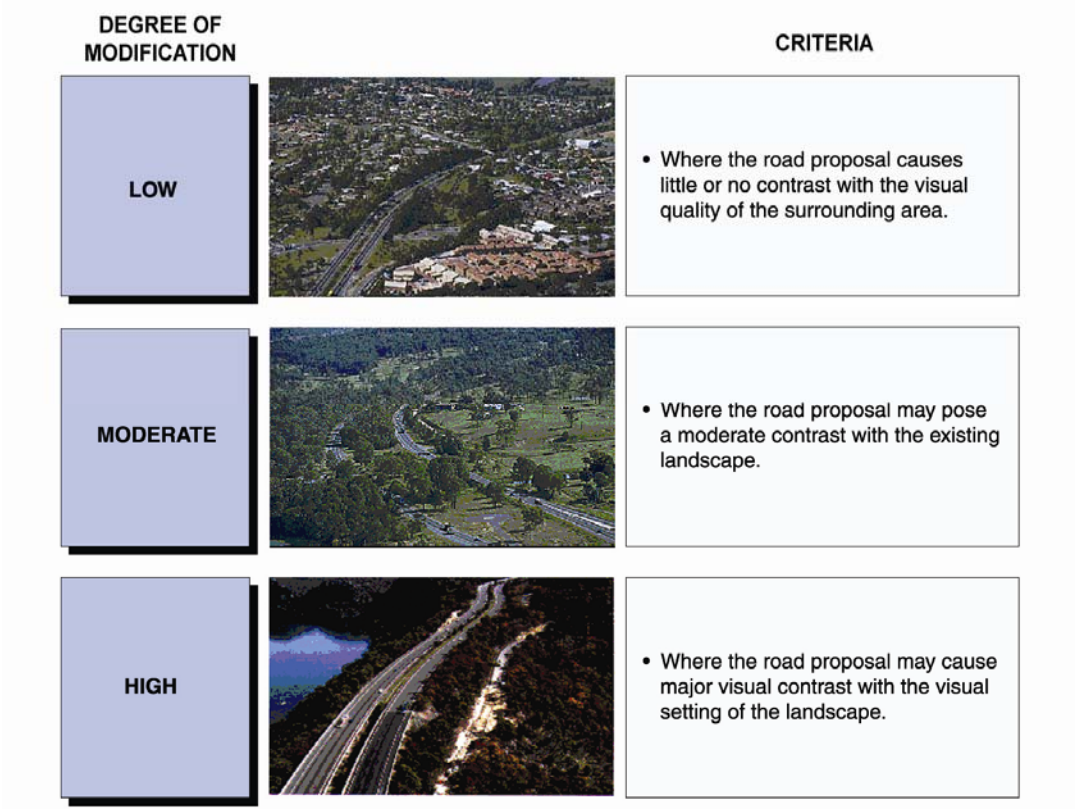

Figure APX4-1: Criteria for assessing degree of modification to visual character

Modification Rating

Assigning a modification rating to the overall visual character of the transport and road proposal is the next stage within this task. Ranking visual sensitivity against the magnitude of the transport and road project provides a clear grading value for the overall changes proposed within the road landscape (Figure APX2-10).

Sensitivity	Magnitude: High	High to Moderate	Moderate	Moderate to Low	Low	Negligible
High	High impact	High impact	Moderate-high	Moderate-high	Moderate	Negligible
High to Moderate	High impact	Moderate-high	Moderate-high	Moderate	Moderate	Negligible
Moderate	Moderate-high	Moderate-high	Moderate	Moderate	Moderate-low	Negligible
Moderate to Low	Moderate-high	Moderate	Moderate	Moderate-low	Moderate-low	Negligible
Low	Moderate	Moderate	Moderate-low	Moderate-low	Low impact	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Figure APX2-9: A matrix for determining the visual character modification rating

Source: Roads and Traffic Authority of NSW (2009) i), Figure 4-6 'Landscape character and visual impact grading matrix'

Note that the magnitude of the project should be determined by the basic project details; such as its location, form and key features. The outcome of the modification rating is the first step towards determining visual impacts.

2.2.1.4 Task D – Visual Experience

The final task of the visual Analysis process involves assessing the likely visual experience for users of a proposal. This is a qualitative exercise and is best undertaken by describing the perceived visual experience of users in terms of:

- predominant landscape character of the corridor, for example; bushland, urban, rural;
- significant view types and viewpoints;
- unique landscape features, for example; mountains (Figure APX2-11), lakes, built structures;

Figure APX2-10: Unique landforms can enhance the visual experience for users

- any major comparisons identified from existing (pre-proposal) to proposed (post-proposal) conditions; and
- identification of preliminary mitigation measures to protect or enhance visual experience (Figure APX2-12).

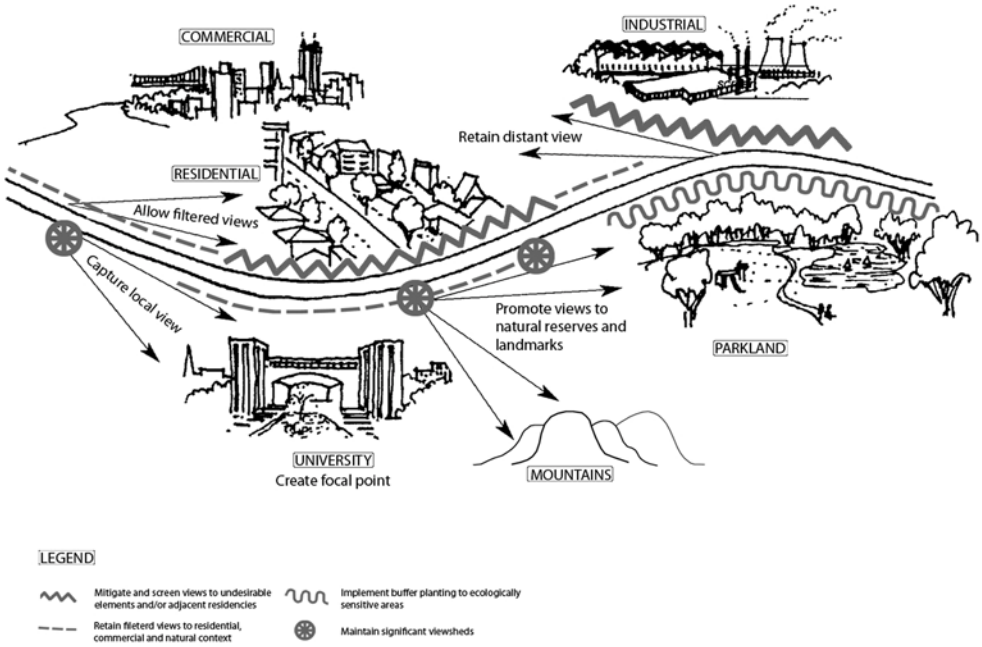

Figure APX2-11: An example preliminary assessment of mitigation measures required to retain or screen different view types

Simple graphic illustrations can be used to depict impacts of the proposal on the visual experience at particular locations, and convey preliminary mitigation requirements. Another useful method for undertaking an assessment of the visual experience is to describe an expected drive through experience for the motorist. This can be effectively captured through a continuous photographic survey of existing views into, from and within the transport and road corridor, and through computer animation of resulting proposed impacts on visual experience (Figure APX2-13).

Vantage Point: WC2

IMAGE VIEW:

INTEGRATED VIEW:

VISUAL PERCEPTION:

VISUAL ASSESSMENT

VANTAGE POINT	VISUAL DISTANCE	VIEW PERIOD	VIEW SENSITIVITY	VIEW IMPACT	MITIGATION
WC2	100 - 200m	Moderate	★★★☆☆	★★☆☆☆	★★★☆☆
Western Freeway heading outbound in a westerly direction with the tunnel portals in view.	Middle-ground focus on the Western freeway with the interface of Portals and signage.	Vehicles in motion, pedestrians, cyclists, heavy regular commuter and transport traffic.	Due to transient views of new western embankment in the middle-ground.	Noticeable deterioration of view due to embankments, transition zone and portals.	Landscape enhancements and stabilisation of western embankment to improve visibility along Western Freeway.

Figure APX2-12: An example photographic depiction of the existing visual experience at a particular vantage point and proposed changes to this experience

Source: Place, etal (2008)

2.3 Step 2 – Ecological Analysis

Ecological values refer to the conservation value of, and relationship between, flora and fauna in an area through which a transport and road corridor passes. The ecological analysis process should be undertaken by suitably qualified environmental specialists experienced in undertaking assessments of this kind, due to the detailed identification and understanding of flora and fauna required. This analysis should be undertaken as part of the overall integrated landscape assessment process, however it may have been completed prior to or during this process, as a separate specialist task. It is critical in either case that the outcomes and reporting of the ecological analysis be incorporated into the integrated landscape assessment process.

Different levels of ecological analysis will also be required according to the scale of the project, and whether a major or minor new transport and road proposal. For example, large projects may require a qualified specialist to undertake assessment at a detailed level. Smaller projects generally require discretion of the designer to determine level of ecological analysis required; for example, small projects may only require simple mapping of existing vegetative communities to determine the significance of species.

Generally, an ecological analysis will require qualified professionals to:

Task A - undertake field assessment, including mapping of species distributions (flora and fauna);

Task B - identify, describe and document ecological values; and

Task C - determine potential new transport infrastructure proposal impacts on ecological values, including flora and fauna habitats.

Task B and ***Task C*** are of importance to the integrated landscape assessment process in order to gain a clear understanding of ecological values and their level of significance. Producing corridor mapping plans through a series of overlaying maps which depict identified ecological values is an effective way of clearly conveying the data. A report should also accompany these maps as supporting documentation of findings.

It is also important to determine predicted impacts of the proposal on these values, as well as to landscape values as a whole. The impact on ecological values can be significant; particularly for large scale projects, and the cumulative effect of all interactions with the local environment should be considered.

Predicted severity of impacts should be clearly ranked as per the ranking system for new transport infrastructure proposal impacts on Visual Values; that is, either:

- **Low;**
- **Medium;** or
- **High.**

Note that the tasks provided above are of a general nature only and different requirements may be suited to the project as determined by a suitably qualified professional experienced in undertaking ecological analyses. For more detailed information on environmental assessment processes, refer to Road Project Environmental Processes Manual.

2.3.1 Existing Urban Forest

Protecting the existing urban forest goes beyond that of protecting individual specimen trees. A much broader perspective should be adopted which assesses the collective value of existing vegetation, to determine its need for retention within the corridor (Figure APX2-14).

Figure APX4-2: The existing urban forest in the background of this transport and road corridor has been protected for its ecological value

Overall aspects which may be assessed are age (and associated ability to regenerate further in future), structure, canopy contribution and amenity value.

More specific aspects of the urban forest to consider during assessment include:

- identifying existing significant species and remnant vegetation of environmental, historical (and/or cultural heritage), horticultural, and aesthetic value;
- providing an assessment of existing vegetation conditions, vegetation retention value (based on useful life expectancy) and risk potential; and
- identifying those species requiring removal: for example dangerous, hazardous, dead, dying or diseased specimens, weed species, poorly performing species and those that are inappropriate for site conditions and subsequent replacement (Figure APX2-15).

Figure APX2-13: The urban forest reinstated within the transport and road corridor

2.3.2 Biodiversity Significance

The Department of Environment and Resource Management (DERM) have developed tools to assess biodiversity values at a landscape scale across Queensland, and determine a level of biodiversity significance (state, regional and local significance and/or other values). These tools are:

- Biodiversity Assessment and Mapping Methodology; and
- Biodiversity Planning Assessments.

A variety of environmental attributes have been assessed and accordingly mapped including plant species, regional ecosystems, bio-condition, fire management constraints, and connectivity throughout the landscape. A final single score of the biodiversity significance of relatively homogeneous road sections is then calculated and displayed on the maps.

DERM's Biodiversity Planning Assessments also identify areas with special biodiversity values. These values are important to include in an ecological analysis, as they often contribute to a unique ecological and often highly bio-diverse environment. An understanding of special biodiversity values also assists in defining special areas within the road landscape to retain and preserve. Areas containing these values can include:

- wildlife refuges (for example, caves, wetlands, gorges, mountain ranges and isolate topographical features);
- those with high species richness (flora and/or fauna);

- those with a high density of hollow-bearing trees (habitat trees for animals); and
- significant breeding or roosting sites populated by many.

Refer to DERM's website (http://www.derm.qld.gov.au) for further information on these Biodiversity Assessment tools.

2.4 Step 3 – Cultural Heritage Analysis

Cultural heritage values refer to the human significance and historical elements of an area through which a new transport and road proposal passes. A detailed process for analysing cultural heritage values is documented within the Department's Cultural Heritage Risk Assessment Form.

It should be recognised that an analysis of cultural heritage is a specialist task that should be undertaken by professionals qualified in anthropology and archaeology. The tasks outlined in this section are intended only to provide simple guidance in ensuring cultural heritage values are integrated into the overall integrated landscape assessment process and is not intended to fulfil the purpose of a stand-alone Cultural Heritage Risk Assessment.

Generally, the main analysis tasks required are:

Task A - research context and development;

Task B - undertake detailed research;

Task C - identify, describe and document cultural heritage values (encompassing aesthetic, historic, scientific and social value); and

Task D - determine potential new transport infrastructure proposal impacts on cultural heritage values.

Task C is of importance to the integrated landscape assessment process in order to gain a clear understanding of the role of cultural heritage values in influencing and shaping the existing landscape setting within the transport and road corridor. Cultural heritage values have a strong relationship with the community since they encompass aesthetic, historic, scientific and social value (Chapter 14). Identifying rare and/or significant cultural heritage areas or features is important for the local community, in order to maintain a sense a place and landscape character (Figure APX2-16).

Figure APX2-14: Historic school in foreground and distant mountain range located adjacent to transport and road corridor combine to form strong cultural heritage value for local communities

Task D is also important to determine predicted impacts of the proposal on cultural heritage values. Recognising these values within the existing corridor early at the assessment and planning stage of a project, is extremely important before any clearing and grubbing occurs. This is vital to protect areas identified as being of cultural heritage significance, as well as retaining their contribution to landscape values as a whole.

The predicted severity of impacts should be clearly ranked as per the ranking system for the proposal impacts on visual values; that is, either:

- **low;**
- **medium;** or
- **high.**

2.5 Step 4 – Combined Analysis of Landscape Context and Landscape Values

The purpose of undertaking a combined analysis is to synthesise the visual, ecological and heritage analyses. This should be a simple process of drawing together data collected and summarising key outcomes. The combined analysis should also establish clear links between landscape context and values, and how they contribute to the landscape character of the area as a whole.

The format of this combined analysis should take the form of a short summary text component within the Integrated Landscape Assessment Report or Opinion. It should clearly provide key conclusions of the analyses as a whole. Illustrated graphics may also be useful to depict key findings. A table listing the overall findings of landscape context, visual, ecological and cultural heritage values is an effective way of capturing links, similarities or conflicts between the data. Developing a priority matrix system may also help to identify one or all of the landscape values which will have the most influence within the transport and road corridor, or be most affected by the proposal. A matrix also assists in establishing priority areas requiring greater or more detailed mitigation strategies.

2.5.1 Impacts on Landscape Values

A preliminary assessment of potential impacts of a proposal on existing landscape values is important during the planning stage and prior to commencing the actual design process. This initial assessment assists with scoping for future design stages as well as devising a strategy for the project. The level of detail associated with this preliminary assessment will be determined by the scale and significance of the project.

Note that impacts need to be described qualitatively in the first instance for inclusion in an integrated landscape assessment opinion or report clearly summarising:

- visual impacts;
- ecological impacts; and
- cultural heritage impacts.

Specific impacts according to these landscape values should then be clearly set out in a comprehensive schedule or table, providing:

- a short description of potential impacts;
- extent of impacts;
- duration of impacts; and
- severity and impacts.

Suitable photographs should also be included in the table to justify all impacts and conclusions on their predicted severity. This table then serves as an overall summary of all potential impacts of the proposal and their interactions with the landscape.

APX2-Table 2 provides an example table useful in describing all impacts relative to the landscape values of visual, ecological and cultural heritage.

EXISTING LANDSCAPE VALUES (and example potential impacts)	DESCRIPTION OF POTENTIAL IMPACTS	EXTENT OF IMPACTS (for example; Chainage References)	DURATION OF IMPACTS				SEVERITY OF IMPACTS			ILLUSTRATION OF IMPACTS (for example; photographs)
			Permanent		Temporary					
			Short Term	Long Term	Short Term	Long Term	Low	Medium	High	
VISUAL VALUES ▪ Changes to the Visual Character ▪ Effects on Visual Amenity ▪ Altered Outlook for Road Users ▪ Built versus Natural Impacts										
ECOLOGICAL VALUES ▪ Loss of existing Flora ▪ Loss of existing Urban Forest ▪ Loss of and Modification to Fauna Habitat ▪ Specific Habitat Loss										
CULTURAL HERITAGE VALUES ▪ Modification of Settings of Cultural Significance ▪ Loss of and Modification to Cultural Heritage Items										

Figure APX2-15: An example table of potential impacts of new transport infrastructure proposal on landscape values as a whole

Where a specific impact is noted as particularly critical and ranked with a high severity rating, a more detailed impact analysis should be undertaken relative to the specific issue. An example where this may be warranted is in the case of a proposal having a highly severe impact on pedestrian and cyclist connectivity within the immediate local community, as well as to surrounding areas (Figure APX2-17).

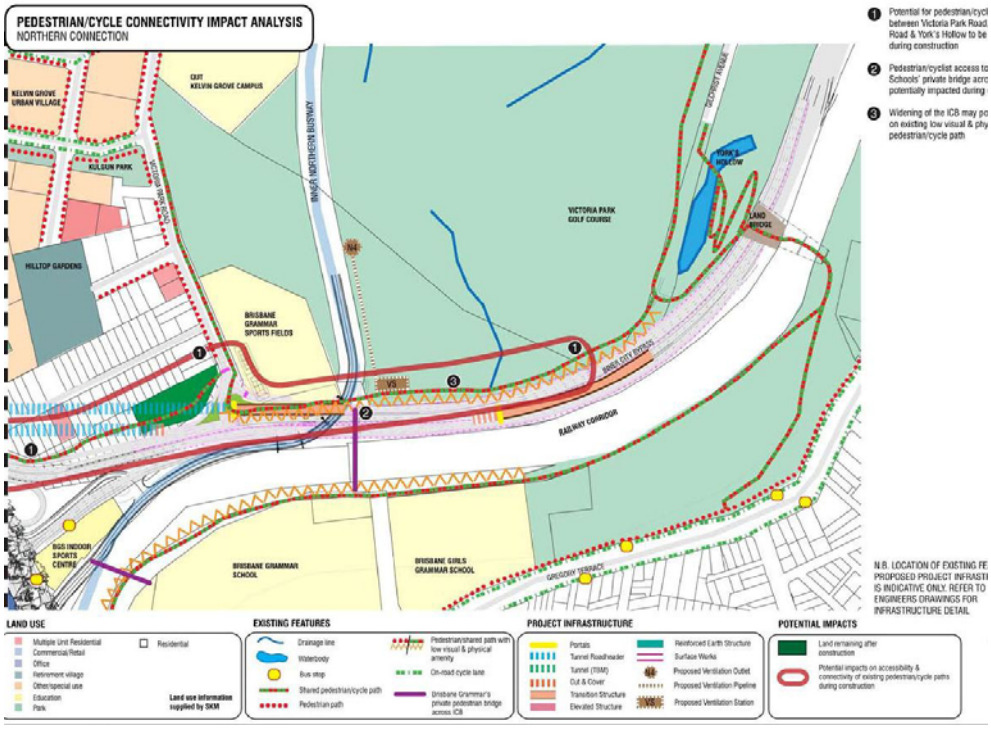

Figure APX2-16: An example pedestrian and cyclist connectivity impact analysis

Source: Place, etal (2008)

It should be noted that a balance between the impacts of visual, ecological and cultural heritage should be sought by designers. Figure APX2-18 shows an example where the impacts of a new road proposal have been appropriately balanced.

Figure APX2-17: Balancing impacts of the road proposal on landscape values through reduced clearing, visual expression of geology and character maintained

The reasons for the differences between rankings should be made clear in the final *Integrated Landscape Assessment Report or Opinion*. Although most impacts will be described qualitatively, where possible, quantitative effects (for example; number of houses with view of road, area of vegetation to be removed and so on) should also be documented.

2.5.2 Mitigation Measures

Nearing the completion of the integrated landscape assessment process, mitigation measures require development to minimise and remediate the potential identified impacts of the proposal. These preliminary measures aim to resolve possible conflicts and mitigate possible effects on landscape values and the character of an area.

It should be noted that mitigation measures are not only designed to avoid, reduce or eliminate adverse or negative effects. They can also be used to enhance or generate positive effects within the road landscape. This task is critical in managing the visual qualities of the corridor and enabling aesthetic outcomes to be achieved. It also assists in guiding the ongoing future design process.

Broad mitigation measures may include:

- best practice, fit for purpose siting and context sensitive design;
- protection and maintenance; and
- restoration and or enhancement.

2.5.2.1 Best Practice, Fit for Purpose Siting and Context Sensitive Design

Complement the existing landscape character. Emphasise tourist routes and high sensitivity areas by being visually expressive of significant surrounding features. Reflect distinctive topography, forms, shapes and patterns of the landscape setting, as well as individual vegetation communities, different stands and unique species (Figure APX2-19).

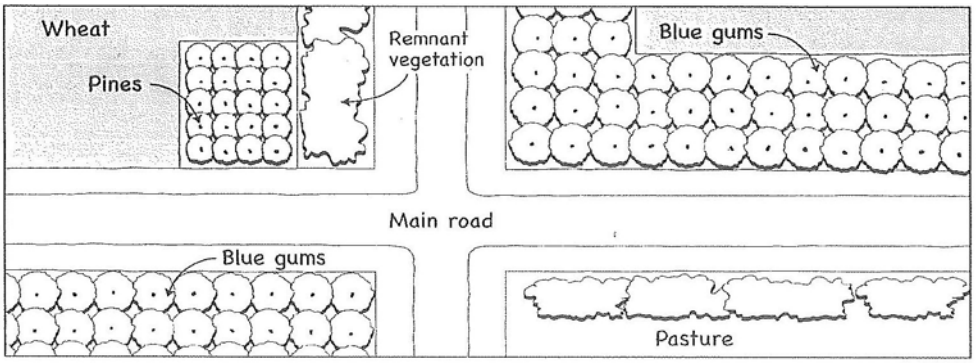

Figure APX2-18: A broad mitigation measure to ensure context sensitive design is implementing vegetation species which complement those in the surrounding landscape

Source: Western Australian Planning Commission, etal, 2007, p120

Capitalise on opportunities to sensitively locate and site design components to reduce visual impacts. Locate landscape works strategically to screen or soften line of sight to undesirable features or activities from a sensitive or significant viewpoint.

2.5.2.2 Protection and Maintenance

Retain existing significant vegetation and wildlife corridors. Minimise the width of clearing of significant vegetation communities with ecological values, particularly through areas with canopy trees. Enhance existing wildlife corridors through the addition of tall native tree species.

Preserve significant views and visual amenity. Emphasise rather than diminish the value of distant and close views, ensuring that built structures do not dominate, distract or diminish the ability to appreciate a view corridor. Where appropriate mitigate, remediate and screen undesirable views. Reduce impact from within the corridor out to adjoining areas, as well as from views into the corridor from adjacent

viewers.

2.5.2.3 Restoration and / or Enhancement

Protect and create habitat opportunities. Reinstate cleared areas through selection and planting of wildlife attracting species. Enhance vegetation in waterway areas.

Offset impacts of the proposal by *ensuring* treatments to built structures are designed with appropriate form, materials and detailing (including colour, patterns and textured finishes). Provide consistent, where suitable, within view corridors by integrating design components which are visually appropriate to the local character and setting.

Figure APX2-20 provides a guide to some of the commonly identified mitigation measures required within transport infrastructure corridor projects, and their relationship to the identified impacts.

IMPACTS ON LANDSCAPE VALUES	FACTOR	POSSIBLE MITIGATION MEASURES
VISUAL EFFECTS	Changes to the Visual Character	▪ Minimise width of existing vegetation clearances ▪ Undertake native planting to reflect local character & blend into existing environment ▪ Design batters & embankments with suitable slope grades and/or benching to facilitate planting
	Effects on Visual Amenity	▪ Screen transport & road networks from viewers with planting and/or structures (if required) ▪ Undertake planting outside of transport & road corridor with agreement from landowners ▪ Ensure consistency in design treatments & plant species selection
	Altered Outlook for Road Users	▪ Screen unsightly views with vegetation and/or structures (where possible) ▪ Feature & accentuate attractive views ▪ Provide filtered views outwards to scenic areas
	Built versus Natural Impacts	▪ Minimise 'bulky'/ 'constructed' appearance of overpass structures within natural environment (where possible) ▪ Ensure contextually appropriate urban design treatments to built structures ▪ Integrate 'hard' structures with planting (where space permits)
ECOLOGICAL EFFECTS	Loss of existing Flora	▪ Minimise loss through transport & road design and/or re-alignment ▪ Replace lost flora with similar vegetation types & provide more flora species in new works than those removed (if possible) ▪ Prepare vegetation management plans & ongoing maintenance/ monitoring plans
	Loss of existing Urban Forest	▪ Protect existing urban forest & reinstate new similar plantings ▪ Establish roadside regeneration areas (where feasible) ▪ Minimise disturbance to wetland plant communities & other specialised habitat areas
	Loss of and Modification to Fauna Habitat	▪ Minimise loss through transport & road design and/or re-alignment ▪ Provide fauna crossings (including signs) & culverts ▪ Integrate landscape treatments with fauna movement devices
	Specific Habitat Loss	▪ Provide newly created habitats; for example, detention basins ▪ Integrate habitat trees; for example, koala feeding trees ▪ Prepare ongoing maintenance & monitoring plans
CULTURAL HERITAGE EFFECTS	Modification of Settings of Cultural Significance	▪ Re-align transport & road corridor location (where possible) ▪ Undertake detailed cultural heritage assessment (engage specialist where required) ▪ Ensure landscape design compliments local setting & provide suitable interpretative signage
	Loss of and Modification to Cultural Heritage Items	▪ Recording, preservation and/or relocation of cultural heritage item (engage specialist where required) ▪ Enhancement of retained cultural heritage item with suitable landscape treatment ▪ Provide appropriate interpretative facilities for users/ visitors

Figure APX2-19: Schedule of typical mitigation measures

Mitigation measures should be developed specific to the identified impact they need to mitigate, and relative to the project site and proposal details. These measures serve as a basis for future design stages. Mitigation measures should be prepared in written form as well as graphically depicted through plans, cross sections and illustrations, in order to provide a clear direction for future implementation. They may also require input, consultation and development from other specialist areas and disciplines; such as transport and road planners and designers.

2.6 Step 5 – Integrated Landscape Assessment Strategy

Following the prediction of potential impacts of the proposal, together with an identification of the appropriate mitigation measures to address these, the final step of the assessment process involves the formulation of a landscape integration strategy. The intention of a landscape integration strategy is to provide a proactive statement on how a proposal may best be integrated with its landscape setting. This strategy should generally include the following levels:

- establishing an overall vision;
- developing project specific strategies; and
- master planning.

This strategy should also be integrated into the project's Environmental Management Plan and include recommendations for further action during the design process; particularly at the stages of design, construction, and maintenance.

2.6.1 Overall Vision

The overall vision for the Integrated Landscape Assessment Strategy is a simple statement which captures the intended manner in which the proposal will be both integrated within its landscape setting and proposed treatments. A vision statement might aspire to one or several of the following:

- ***Gateway*** – An arrival point via a roadway or transport system into a specific locality or region (Figure APX2-21);
- ***Parkway*** – A continuous roadway or transport corridor with consistent character and treatments;
- ***Scenic Route*** – A roadway or transport system with scenic outlook to natural, cultural or scenic features;
- ***Environmental Corridor (or Greenway)*** – A corridor linking areas of wildlife habitat or providing selected natural features in an urban setting;
- ***Avenue (or boulevard)*** – A formal roadway or transport corridor with consistent and regular features; and
- ***Feature*** – A distinctive roadway element contrasting with and highlighting adjoining features (Figure APX2-22).

Figure APX2-20: An example of a feature vision implemented through the urban design treatment to the retaining walls of this underpass structure within a new transport and road proposal

2.6.2 Developing Project Specific Strategies

Project specific strategies are developed based on the impacts identified in the combined analysis and the identified mitigation strategies to address these. The strategies are used to guide the development of design outcomes in the Landscape Master Plan and for further action during the design, construction, and maintenance stages.

2.6.3 Master Planning

Landscape Master Plans represent the broadest level of landscape and urban design planning for projects. They provide a coordinated design approach to all components of the road landscape.

Public amenity improvement opportunities should be written in the form of specific recommendations, to provide a clear conclusion to the integrated landscape strategy. Supporting illustrative maps and plans should also be included to clearly capture identified opportunities.