Vegetation Study

Toowoomba Regional Planning Project

Final Report

Prepared for: Toowoomba Regional Council

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1.0 EXECUTIVE SUMMARY

The Vegetation Study has provided a significant review of the data available to TRC on the extent, composition, condition, management needs and legislative requirements for protection of vegetation and nature in the Toowoomba Region. The project has identified a number of critical issues for consideration in developing the new Toowoomba Regional Planning Scheme and has developed a range of options for TRC to protect and manage vegetation through the Planning Scheme and other Council mechanisms.

Vegetation in the context of this study refers to all native vegetation communities within the TRC region, whether remnant or non-remnant and regardless of whether it is identified on statutory maps developed for the purpose of the *Vegetation Management Act 1999*. Vegetation significance in the TRC region is considered in the context of Regional Ecosystem conservation status, contribution to the conservation of flora and fauna species, contribution to maintenance of ecological processes and potential contribution to ecological resilience to climate change.

The TRC region retains about 25.3% of its original native vegetation (i.e. remnant vegetation), representing some 328,000 hectares of predominantly eucalypt woodland and forest. A further 5% (approximately 64, 000Ha) of the TRC region is covered by non-remnant woody vegetation, although the proportion of this that includes native vegetation (i.e. regrowth and non-mapped remnant vegetation) is unclear from the available data.

Five endangered ecological communities occur in the region, along with 22 endangered, 35 of-concern and 53 not-of-concern Regional Ecosystems. About 38% of the region's remnant vegetation occurs within the protected area estate, although only about 3% is in National Parks or similar dedicated conservation reserves. TRC-controlled lands include some 3,800 hectares of remnant vegetation, providing Council with significant opportunity to contribute to biodiversity conservation in the region.

Six categories of native vegetation were developed for consideration in the new Planning Scheme and as a basis for formulation of other Council policy and procedures. These include:

- Category 1 vegetation — Vegetation with VMA status Endangered or Of Concern and which possesses at least two (2) other conservation attributes with a value rating of High.
- Category 2 vegetation — All other vegetation with VMA status of Endangered or Of Concern.
- Category 3 vegetation — Vegetation with VMA status Not of Concern and which has at least one other conservation attribute.
- Category 4 vegetation — All other remnant vegetation not included in Categories 1-3.
- Category 5 vegetation — Non-remnant native vegetation, including native grasslands, that lies within regional or local biodiversity corridors and/or within 200m of Category 1 or Category 3 vegetation and/or within 50m of Category 2 vegetation.
- Category 6 vegetation — Non-remnant native vegetation other than Category 5 vegetation.

The four remnant vegetation categories are based on Regional Ecosystem status and the cumulative value assigned to a number of other key conservation attributes. Mapping overlays were produced for vegetation categories 1 to 4, but a lack of suitable base data precluded the development of overlays for categories 5 & 6.

The key vegetation issues that need to be considered by TRC, both in the Toowoomba Regional Planning Scheme and in developing other TRC policies and procedures, include:

- Recognition of existing statutory requirements for vegetation management and the need to develop complementary policy, planning codes and management procedures;
- Protection of significant vegetation and habitat areas from development pressures and inappropriate management practices, including those areas that are presently not identified or inadequately defined by existing data sources (i.e. vegetation mapping); and
- The need to address errors in vegetation mapping and to deal with mapping that is currently not available at a scale suitable for local scale planning purposes.

Whilst significant protection is afforded to vegetation and biodiversity by existing Commonwealth and State legislation, TRC would be wise to develop planning codes and other policies and procedures that compliment and enhance the level of protection and maintains critical ecological processes in the region.

Options available to TRC in this regard include:

- The imposition of planning codes that provide greater protection to remnant vegetation, particularly in urban areas;
- Recognition of and codification to protect and manage important wildlife corridors and buffers around significant vegetation/habitat areas; and
- Implementation of projects to improve the quality of vegetation data available to TRC for future planning and expedition of the development approval process.

In order to provide for appropriate management of vegetation in the region, we recommend the following:

1. That TRC adopt the six Vegetation Categories described in Table 2.1;
2. That TRC adopt the preferred planning options for each vegetation category described in Table 4.1;
3. That codes developed for the Planning Scheme have a sound ecological basis in recognition of the vegetation values and options presented in this report;
4. That TRC implement measures to protect and manage significant native vegetation on council-controlled lands for conservation outcomes in accordance with the values and options described in this report;
5. That TRC undertake a vegetation mapping program to obtain more precise data on the location, extent, condition and composition of native vegetation resources in the region; and
6. That codes developed for the Planning Scheme have a sound

2.0 BACKGROUND

2.1 INTRODUCTION

The "Vegetation Study" is an integral part of the Toowoomba Regional Planning Project and has the following key objectives:

- to identify and assess available information to determine future strategic priority policy, planning and management actions for vegetation throughout the Toowoomba Regional Council area; and
- to make recommendations for the management of significant vegetation through the Toowoomba Regional Planning Scheme.

The scope of work for the project is as follows:

- Review relevant existing information [studies, reports and publications] to:
  - fill information gaps identified by Council through its Literature Review;
  - identify issues related to significant vegetation within the Toowoomba Regional Council area.
- Undertake a Gap Analysis of currently protected vegetation (state, commonwealth, local protection) and surveys undertaken on behalf of Council.
- Prepare an Issues Report.
- Undertake additional investigations to address data gaps (after receiving confirmation from Council to proceed).
- Provide information to consultants commissioned to develop land use pattern options.
- Determine assessment criteria for the evaluation of policy / implementation options.
- Prepare an Options Report detailing potential policy / implementation options, including options for the conservation of significant vegetation through the Toowoomba Regional Planning Scheme.
- The Options Report is to be workshopped with Council to identify Council's preferred option.
- Prepare a draft Final Report documenting the study findings.
- Prepare a Final Report following review of the draft.

This document is the "Final Report". It provides a discussion of policy and strategic options for dealing with key vegetation issues in the TRC region, including through the Toowoomba Regional Planning Scheme.

2.2 METHODS

2.2.1 Defining Vegetation Significance

Vegetation significance within the TRC region is defined at a number of scales for a range of statutory and other purposes; and no single data set provides a definitive categorisation of vegetation significance. Determination of vegetation significance for this study, therefore, required an extensive review of mapping data from State and Local government sources, as well as a review of literature, such as regional and local vegetation management and planning studies.

Based on the results of the literature and data review, vegetation significance categories and planning priorities for the TRC region were determined according to the following key criteria:

- Vegetation type – remnant, regrowth, Regional Ecosystem (RE) classification;
- Remnant extent – based on Vegetation Management Act 1999 (VMA) status;
- Endangered Ecological Community (EEC) status as determined under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act);
- Significance as habitat for endangered, vulnerable, rare and other priority species; and
- Contribution to maintaining biodiversity corridors for movement of flora and fauna and maintenance of ecosystem processes and genetic diversity.

2.2.2 Literature and Data Reviewed

Numerous reports, planning documents and mapping data were reviewed for this project. These included statutory mapping, bioregional planning assessments, planning schemes for the pre-amalgamation Shires, biodiversity planning reports for the Condamine Catchment, and detailed vegetation planning studies for the former local government areas of Crows Nest Shire and Toowoomba City.

Given the geographic extent of the TRC region, and considerable variability in mapping scale and "significance" determinants presented in the literature and available map data, it was decided to base our analysis of vegetation significance on the following key statutory and planning tools:

- Regional Ecosystem mapping (RE version 5.0) from the Queensland Herbarium, Department of Environment and Resource Management (DERM)
- Biodiversity Planning Assessments (BPA) for Brigalow Belt (BRB; version 1.3) and South-east Queensland (SEQ; version 3.1) biogeographic regions, produced by DERM
- Endangered Ecological Community "Listing Advice" documents from the Commonwealth Government's Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) web site

Locally derived data and information, such as that contained within the many reviewed reports, was used to contextualise the analyses of these broader-scale data to the TRC region.

A list of data and information sources reviewed for this project appears at Appendix A.

2.2.3 Key Principles

2.2.3.1 Vegetation 'value'

Vegetation 'value' or significance, in this study, is considered in the context of Regional Ecosystem conservation status, contribution to the conservation of flora and fauna species, contribution to maintenance of ecological processes and potential contribution to ecological resilience to climate change. No consideration is given to social or economic values placed on vegetation within the TRC region.

2.2.3.2 Remnant vs. non-remnant vegetation

Vegetation considered for this study includes all native vegetation communities within the TRC region, whether remnant or non-remnant. Remnant vegetation is generally identified as RE in DERM statutory mapping and forms the basis for most 'significant vegetation' in former Council planning schemes. From ecological and conservation perspectives there are considerable areas of other 'non-remnant' vegetation elsewhere in the landscape that contribute to the region's vegetation values. This vegetation includes, but is not limited to: natural regrowth communities; mature remnant vegetation that has not been mapped due to scale-of-mapping issues; and native vegetation planted to achieve environmental outcomes. An example of the latter category is the bushland plantings along Gowrie Creek in Toowoomba City.

2.3 KEY FINDINGS

2.3.1 Summary statistics for vegetation in the TRC region

The TRC region spans two biogeographic regions. The ranges and valleys along the eastern and northern perimeter of the TRC region fall within the South Eastern Queensland bioregion; however, the bulk of the region falls within the Brigalow Belt South bioregion, characterised by alluvial and clay plains interspersed with low basalt and sandstone uplands.

The TRC region retains about 25.3% of its original native vegetation (i.e. remnant vegetation), representing some 328,000 hectares of predominantly eucalypt woodland and forest. A further 5% (approximately 64, 000Ha) of the TRC region is covered by non-remnant woody vegetation, although the proportion of this that includes native vegetation (i.e. regrowth and non-mapped remnant vegetation) is unclear from the available data.

Five endangered ecological communities occur in the region (see Appendix E), along with 22 endangered, 35 of-concern and 53 not-of-concern Regional Ecosystems. About 38% of the region's remnant vegetation occurs within the protected area estate, although only about 3% is in National Parks or similar dedicated conservation reserves. TRC-controlled lands include some 3,800 hectares of remnant vegetation, providing Council with significant opportunity to contribute to biodiversity conservation in the region.

2.3.2 Remnant vegetation and significant habitat areas

The primary source of information on spatial extent, classification and status of vegetation within the region is the Regional Ecosystem (RE) mapping from DERM. Captured at a scale of 1:100,000 this data, and value-added derivatives of it (e.g. Biodiversity Planning Assessments), forms a strong base for the development of regional planning options. The accuracy of data at this scale, however, is less than ideal for developing sound local-scale planning options, particularly in the urban development context, and further work is needed to establish a more reliable foundation for planning within the growing urban footprint areas of the TRC region. Nonetheless, we were able to utilise the RE data and Biodiversity Planning Assessments, tempered with local contextual information and expert opinion, to determine vegetation significance ("conservation attributes") and develop draft mapping layers for application in the other planning studies.

The draft remnant vegetation mapping layers are based on the following conservation attributes:

- Endangered Ecological Communities - listed under the Environment Protection and Biodiversity Conservation Act 1999;
- Regional Ecosystems - according to status assigned under Vegetation Management Act 1999;
- Regional biodiversity corridors - identified in Biodiversity Planning Assessments for Brigalow Belt and South-east Queensland bioregions
- Local biodiversity corridors - identified through a local-scale assessment of potential corridors to link regional corridors and significant habitat areas; and
- Habitat for priority species - identified in Biodiversity Planning Assessments.

These conservation attributes were assigned conservation values (High, Medium, Low), based on the values assigned in the data set/s from which they were derived and enhanced with expert opinion regarding ecological significance in the local context. The four remnant Vegetation Categories (see Table 2.1) for use in the Regional Planning Project were then derived from the cumulative "value" of all conservation attributes.

2.3.3 Non-remnant and regrowth vegetation

Additional draft Vegetation Categories were considered to incorporate 'non-remnant' vegetation, in particular regrowth native vegetation and remnant vegetation not included in the RE mapping (e.g. small areas below the RE mapping scale). The primary data source available for analysis of non-remnant vegetation is the Foliage Projective Cover (FPC) data produced for the State-wide Land-cover and Trees Study (SLATS; DERM 2008).

A GIS mapping layer of non-remnant woody vegetation was derived from the SLATS FPC data using a 25% FPC threshold and masking for mapped RE areas and 'built-up area' boundaries (from 1:250,000 mapping). This non-remnant vegetation layer was then intersected with buffers applied to the remnant vegetation categories to identify non-remnant vegetation with potentially high conservation values (e.g. as buffers to high value remnants or connectivity between significant habitat areas).

At first pass, this exercise showed potential for generating an additional vegetation Category of high value non-remnant vegetation. On closer inspection, however, when this non-remnant layer is viewed over orthophoto imagery (and with the benefit of local knowledge of certain sites) there are significant discrepancies between the derived non-remnant polygons and the position, type and cover of woody vegetation on the ground.

Several iterations of this process were repeated in an attempt to generate a reliable non-remnant woody vegetation mapping layer. Recurring evidence of inaccuracies in the derived polygons, along with disparity potentially due to the age of the aerial photography leads to a singular conclusion: that it is not currently possible to generate a reliable non-remnant vegetation category for planning and management purposes at a suitable scale for the Toowoomba Regional Planning Project.

Although it is not currently possible to produce reliable non-remnant vegetation planning overlays, we have devised two Vegetation Categories (Category 5 and Category 6; Table 2.1) to address potential planning needs. These categories are needed to ensure a more ecologically sound approach to vegetation planning and management in the TRC region. Vegetation that potentially falls within Categories 5 & 6 may be identified in a mapping sense by buffering the Category 1-3 vegetation boundaries (Figure 2.1) to the relevant buffer distance and/or by overlaying the biodiversity corridors (Figure 2.2) on non-remnant vegetation maps or aerial photos.

TABLE 2.1 VEGETATION CATEGORIES FOR PLANNING AND MANAGEMENT WITHIN THE TRC REGION

VEGETATION CATEGORY	CHARACTERISTICS	COMMENTS
1	Vegetation with VMA status Endangered or Of Concern and which possesses at least two (2) other conservation attributes with a value rating of High.	Remnant vegetation mapped as RE (DERM 2008); included in the draft planning overlay.
2	All other vegetation with VMA status of Endangered or Of Concern, including: Endangered or Of Concern vegetation with no other conservation attributes; and Endangered or Of Concern vegetation with one or more other conservation attributes but no more than one attribute with value rating of High.	Remnant vegetation mapped as RE (DERM 2008); included in the draft planning overlay.
3	Vegetation with VMA status Not of Concern and which has at least one other conservation attribute.	Remnant vegetation mapped as RE (DERM 2008); included in the draft planning overlay.
4	All other remnant vegetation not included in Categories 1-3.	Remnant vegetation mapped as RE (DERM 2008); included in the draft planning overlay.
5	Non-remnant native vegetation, including native grasslands, that lies within regional or local biodiversity corridors and/or within 200m of Category 1 or Category 3 vegetation and/or within 50m of Category 2 vegetation.	No mapping layer currently available for this vegetation category.
6	Non-remnant native vegetation other than Category 5 vegetation.	No mapping layer currently available for this vegetation category.

N

YARRAMAN

DALBY

CROWS NEST

OAKEY

CECIL PLAINS

TOOWOOMBA

PITTSWORTH

MILLMERRAN

CLIFTON

WARWICK

INGLEWOOD

Category 1 Vegetation
Category 2 Vegetation
Category 3 Vegetation
Category 4 Vegetation
Toowoomba Regional Council
Towns
Highways

CONICS

Figure 2.1 TRC Vegetation Categories 1-4

Client: Toowoomba Regional Council

Date: 15-10-2009	Compiled by: GF	Project Manager: GF	Reference: PR24083_VEG_Categories

0 12.5 25 50 Kilometres

GDA 94, MGAz56 Scale@A3 1:620,000

Source: Derived from Regional Ecosystem data (2005) provided by and copyright of Queensland Government (Department of Environment and Resource Management.

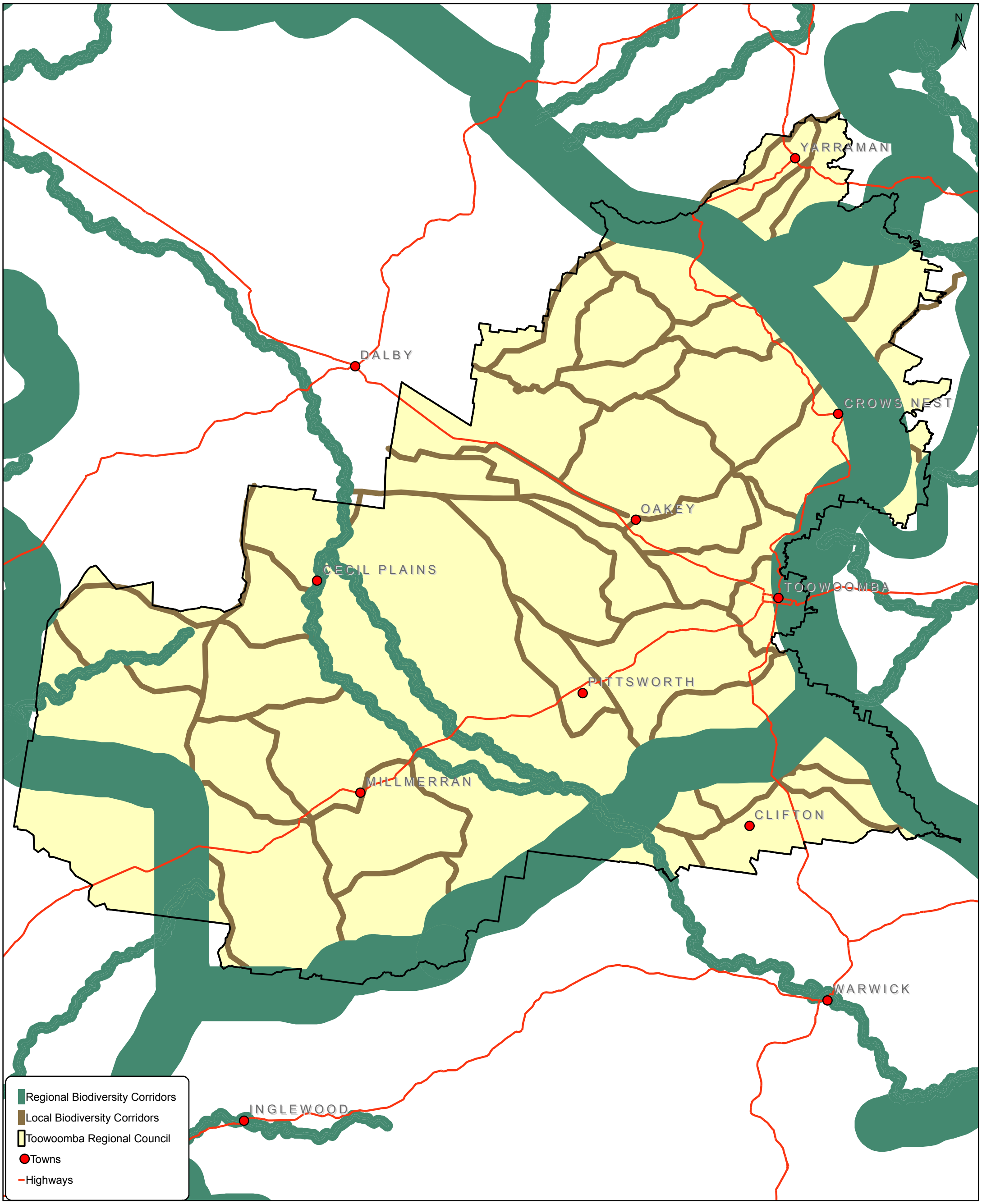

Figure 2.2 TRC Biodiversity Corridors

Client: Toowoomba Regional Council

Date: 15-10-2009	Compiled by: GF	Project Manager: GF	Reference: PR24083_VEG_Corridors

0 12.5 25 50 Kilometres

GDA 94, MGAz56 Scale@A3 1:620,000

Source: Regional Corridors derived from Biodiversity Planning Assessments (Brigalow Belt South Version 1.3 2008; & South-east Queensland Version 3.5 2007) provided by and copyright of Queensland Government (Department of Environment and Resource Management.

3.0 ISSUES

3.1 KEY ISSUES SUMMARY

The key vegetation issues that need to be considered by TRC, both in the Toowoomba Regional Planning Scheme and in developing other TRC policies and procedures, include:

1. Recognition of existing statutory requirements for vegetation management and the need to develop complementary policy, planning codes and management procedures.
2. Protection of significant vegetation and habitat areas from development pressures and inappropriate management practices, including those areas that are presently not identified or inadequately defined by existing data sources (i.e. vegetation mapping).
3. The need to address errors in vegetation mapping and to deal with mapping that is currently not available at a scale suitable for local scale planning purposes.

These issues are treated in more detail below and 4.0 provides a discussion of the Options available to TRC for dealing with the issues.

3.2 STATUTORY REQUIREMENTS

3.2.1 Commonwealth

The primary piece of Australian Government legislation relevant to vegetation management in the Toowoomba Region is the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act). The Act applies to a number of Matters of National Environmental Significance (MNES), including nationally threatened species and ecological communities and migratory species. Under the provisions of the EPBC Act, any action that is taken to develop or otherwise alter the management of the natural landscape must be considered in the context of MNES and the action must not impose a significant impact upon any MNES.

Whilst the onus is on the developer or land manager to consider the EPBC Act and implications for any action they may take, the broader community are afforded significant rights and responsibilities in terms of recognising and referring actions that may be deemed to have potential impacts on MNES. As a representative of the regional community and as the local regulatory authority, TRC would be wise to develop policies and procedures that reduce the likelihood of significant impacts being imposed on MNES within the TRC region.

3.2.2 State

The key pieces of Queensland Government legislation relevant to vegetation management in the TRC region include:

- *Nature Conservation Act 1992* (NCA); and
- *Vegetation Management Act 1999* (VMA).

Other relevant legislation that has a secondary influence on vegetation management in the region (but which is not further discussed in this report) includes: *Forestry Act 1959*; *Land Protection (Pest and Stock Route Management) Act 2002; Environmental Protection Act 1994;* and *Integrated Planning Act 1997.*

The NCA seeks, among other things, to protect and conserve the State's flora and fauna (wildlife) species and their habitats. This is achieved, in part, through the designation of protected areas (e.g. National Parks), scheduling of species' conservation status and regulation of activities that may harm wildlife or wildlife habitats.

The VMA provides for the protection and management of Queensland's native vegetation resources. For the purpose of the VMA, native vegetation is identified as remnant or non-remnant, with remnant vegetation classified into Regional Ecosystems (RE) and assigned a vegetation management status (Endangered, Of Concern or Not of Concern). The Act provides for the protection of remnant vegetation through regulation of clearing and certain other activities that may cause a decline in vegetation management status of the REs. 2.3.1 summarises the extent and status of VMA-protected remnant vegetation in the TRC region.

While the NCA and VMA, along with a range of related sub-ordinate legislation (e.g. various *Regulations*), provide substantial protection for wildlife and vegetation, there are significant opportunities to compliment and enhance that protection at the local scale.

For example, some remnant vegetation is afforded only limited protection by the VMA, particularly in areas zoned for urban development. Some such areas of remnant vegetation have particularly high conservation values within the greater Toowoomba urban footprint and TRC would be wise to recognise those values and provide stronger protection through regulating development within and adjacent to certain remnant vegetation areas.

There are also many 'non-remnant' vegetation areas (i.e. not protected by the VMA) within the region, which are known or likely to provide important ecological functions such as core habitat, connectivity and seasonal food sources for threatened wildlife. These areas should be included in TRC planning considerations through the development of planning codes and council policies that recognise the ecological significance of 'non-remnant' vegetation and provide for maintenance of the ecological functions it provides.

3.3 PROTECTING SIGNIFICANT VEGETATION AND HABITAT AREAS

As discussed in the previous section, significant protection is afforded to vegetation and wildlife through a range of State and Commonwealth legislation. An important issue for TRC as the Regional Planning Project moves forward is determining whether to compliment and enhance this statutory protection and how such enhancements may be achieved.

The key aspects of this issue include:

- The need to provide additional protection for some remnant vegetation areas that are inadequately protected by legislation (e.g. within urban areas);
- The need to recognise and protect unmapped ('non-remnant') native vegetation within regional and local biodiversity corridors;
- the need for retention of vegetated buffers around significant vegetation and habitat areas; and
- the possible need to develop vegetation and habitat offsets to mitigate against loss of vegetation and habitat through development activities.

3.4 DEALING WITH MAPPING ERROR AND PROBLEMS OF SCALE

Vegetation mapping data available for the TRC region is primarily restricted to DERM's RE mapping, which is captured at a scale of 1:100,000. Whilst this data is sufficient for broad-scale (regional) biodiversity conservation planning, it is inadequate for finer scale (local) planning, particularly in an urban development context. Along with (and partly due to) the coarse scale of vegetation mapping, there are concerns over the accuracy of vegetation (RE) classification resulting in reduced ability to reliably identify significant vegetation areas (e.g. EPBC Act endangered ecological communities).

It is possible that these mapping scale and error issues may be dealt with in planning provisions. For example, the new planning scheme could recognise the overlay maps as a "guide only" and include codes that put the onus on developers to provide a reliable assessment of vegetation significance in the development approval process.

Given the extent of development pressure within the greater Toowoomba urban footprint, it is likely that such codification to account for poor data quality would generate significant amounts of work for TRC and developers through the development approval process. It may, therefore, be prudent for Council to undertake further studies to improve the quality of vegetation mapping available for planning purposes.

4.0 OPTIONS

Options to address vegetation issues are presented for TRC consideration in Table 4.1 (planning scheme options) and Table 4.2 (other council mechanisms).

TABLE 4.1 VEGETATION OPTIONS FOR CONSIDERATION IN NEW TRC PLANNING SCHEME

The preferred options in each case are shown on BLUE text

ISSUE	OPTIONS	ADVANTAGES (OF PREFERRED OPTION)	DISADVANTAGES (OF PREFERRED OPTION)	"STREAM1" APPLICATION PRINCIPLES (OF PREFERRED OPTION)
Category 1 vegetation	1. Do not consider 2. Development not preferred within this vegetation. Retain and protect this vegetation. Provide mechanisms to maintain or enhance ecological function and connectivity. 3. Development not preferred within this vegetation or within a 75m buffer from the vegetation boundary. Retain and protect this vegetation. Provide mechanisms to maintain or enhance ecological function and connectivity. 4. Allow development within this vegetation (subject to VMA restrictions) and impose an offset policy to protect and rehabilitate vegetation of same RE and with similar conservation attributes elsewhere in TRC region on an area ratio greater than 1:1. 5. Allow development within this vegetation (subject to VMA restrictions) but implement restrictions on: area that can be cleared; maintenance of connectivity and structural integrity; and buffering between buildings or other uses and vegetation. 6. Combination of 4 and 5. NB. For Options 2-6, statutory mechanism for protection of this category to be achieved through overlay code or other relevant code (e.g. performance solutions to be drafted reflecting the above intent)	- Ensures protection of vegetation assets with high conservation value - Provides a simple buffer application in all cases	- May remove several small areas from development within the existing TSD urban footprint. (Note also that Options 4, 5 and 6 would require complex arrangements to be put in place and would require longer term and more complicated compliance monitoring.)	- Consider all Category 1 vegetation, plus its buffer, as a constraint - Consider options to incorporate significant vegetation as a development feature - Consider options to incorporate significant vegetation in cross-landscape ecological connectivity provisions
Category 2 vegetation	1. Do not consider 2. Development not preferred within this vegetation. Retain and protect this vegetation. Provide mechanisms to maintain or enhance ecological function and connectivity. 3. Development not preferred within this vegetation or within a 50m buffer from the vegetation boundary. Retain and protect this vegetation. Provide mechanisms to maintain or enhance ecological function and connectivity. 4. Allow development within this vegetation (subject to VMA restrictions) but impose an offset policy to protect and rehabilitate vegetation of same RE and with similar conservation attributes elsewhere in TRC region on an area ratio of at least 1:1. 5. Allow development within this vegetation (subject to VMA restrictions) but implement restrictions on: area that can be cleared; maintenance of connectivity and structural integrity; and buffering between buildings or other uses and vegetation. 6. Combination of 4 and 5. NB. For Options 2-6, statutory mechanism for protection of this category to be achieved through overlay code or other relevant code (e.g. performance solutions to be drafted reflecting the above intent)	- Ensures protection of vegetation assets with high conservation value - Provides a simple buffer application in all cases	- May remove small areas from development within the existing TSD urban footprint. (Note also that Options 4, 5 and 6 would require complex arrangements to be put in place and would require longer term and more complicated compliance monitoring.) -	- Consider all Category 1 vegetation, plus its buffer, as a constraint - Consider options to incorporate significant vegetation as a development feature - Consider options to incorporate significant vegetation in cross-landscape ecological connectivity provisions
Category 3 vegetation	1. Do not consider 2. Development not preferred within this vegetation. Retain this vegetation. 3. Development not preferred within this vegetation or within a 50m buffer from the vegetation boundary. Retain this vegetation. 4. Allow development within this vegetation (subject to VMA restrictions) but impose an offset policy to protect and rehabilitate vegetation with same conservation values elsewhere in TRC region. 5. Allow development within this vegetation (subject to VMA restrictions) but	- Ensures protection of vegetation assets with high conservation value - Provides a simple buffer application in all cases	- May remove considerable areas from development within the existing TSD urban footprint, particularly hills and ridges on the perimeter of Toowoomba (e.g. through Hodgsonvale, Westbrook, Torrington, Cotswold and Cranley) and also in the Charlton-Wellcamp area (Note also that Options 4, 5 and 6 would require complex arrangements to be put in place and would require longer	- Consider all Category 1 vegetation, plus its buffer, as a constraint - Consider options to incorporate significant vegetation as a development feature - Consider options to incorporate significant vegetation in cross-landscape ecological connectivity provisions (e.g. corridors incorporating riparian vegetation and significant riverine wetlands)

ISSUE	OPTIONS	ADVANTAGES (OF PREFERRED OPTION)	DISADVANTAGES (OF PREFERRED OPTION)	"STREAM1" APPLICATION PRINCIPLES (OF PREFERRED OPTION)
	implement restrictions on: area that can be cleared; maintenance of connectivity and structural integrity; and buffering between buildings or other uses and vegetation. 6. Combination of 4 and 5. NB. For Options 2-6, statutory mechanism for protection of this category to be achieved through overlay code or other relevant code (e.g. performance solutions to be drafted reflecting the above intent)		term and more complicated compliance monitoring.)	
Category 4 vegetation	1. Do not consider 2. Development not preferred within this vegetation. Retain and this vegetation. 3. Development not preferred within this vegetation or within a 25m buffer from the vegetation boundary. Retain this vegetation. 4. Allow development of this vegetation (subject to VMA restrictions) and consider potential to introduce offset policy to protect other Category 4 vegetation elsewhere in TRC region.	- Ensures protection of vegetation assets with high conservation value - Provides a simple buffer application in all cases	- May remove small areas from development within the existing TSD urban footprint. (Note also that Option 4 may require complex arrangements to be put in place and would require longer term and more complicated compliance monitoring.)	- Consider all Category 1 vegetation, plus its buffer, as a constraint - Consider options to incorporate significant vegetation as a development feature - Consider options to incorporate significant vegetation in cross-landscape ecological connectivity provisions (e.g. corridors incorporating riparian vegetation and significant riverine wetlands)
Category 5 vegetation Non-remnant native vegetation with moderate to high conservation value	1. Do not consider 2. Development not preferred within this vegetation. 3. Control development to ensure non-remnant vegetation is retained to provide: a. Corridors at least 50m wide between significant vegetation areas; and/or b. 'Stepping-stone'[1] patches of at least 2Ha with high core:edge[2] ratio and no more than 200m apart between significant vegetation patches; and/or c. Vegetated buffers between significant vegetation areas and development activity; and/or d. Enlargement of high value remnant vegetation patches (Categories 1-3).	- Provides significant opportunity to improve ecological functioning and longer-term viability of significant vegetation and habitat areas throughout TRC region.	Land-owners may object to further control being placed on vegetation management, especially where property has existing PMAV identifying regrowth as "Category X" vegetation.	- Consider all Category 5 vegetation as a constraint - Consider options to incorporate corridors of Category 5 vegetation as a development feature - Consider options to incorporate significant vegetation in cross-landscape ecological connectivity provisions (e.g. corridors incorporating riparian vegetation and significant riverine wetlands)
Category 6 vegetation All other non-remnant native vegetation	1. Do not consider 2. Development not preferred within this vegetation 3. Control development to ensure non-remnant vegetation is retained to provide: a. corridors at least 50m wide between significant vegetation areas; and/or b. 'stepping-stone' patches of at least 2Ha with high core:edge ratio and no more than 200m apart between significant vegetation patches; and/or c. vegetated buffers between significant vegetation areas and development activity; and/or d. enlargement of high value remnant vegetation patches (Categories 1-3)..	- Provides significant opportunity to improve ecological functioning and longer-term viability of significant vegetation and habitat areas throughout TRC region.	- Need for complex cross-referencing between the TRC Planning Scheme and other planning instruments, guidelines and policies	- Consider options to incorporate corridors of Category 6 vegetation as a development feature - Consider options to incorporate significant vegetation in cross-landscape ecological connectivity provisions (e.g. corridors incorporating riparian vegetation and significant riverine wetlands)
Vegetation mapping error and mapping updates	1. Updates for all mapping overlays and for vegetation category membership must be included at regular intervals through the life of the Planning Scheme or, at least, as a mandatory review element at the end of each statutory planning cycle	- Mapping accuracy guaranteed to be at least equal to best available state-wide mapping	- Nil	
Vegetation mapping scale	1. Updates for all mapping overlays and for vegetation category membership must be included at regular intervals through the life of the Planning Scheme or, at	- Mapping accuracy guaranteed to be at least equal to best available state-wide mapping	- Nil	

[1] Stepping stone patches are an alternative to continuous corridors for providing connectivity for fauna movement through the landscape. Stepping stones reduce the distance that fauna must move through "hostile" habitat in order to find shelter and other resources.

[2] Core:edge ratio is important for optimising the amount of suitable habitat available in a patch of vegetation. The more round the shape, the higher the core:edge ratio; long narrow patches have low core:edge ratio.

ISSUE	OPTIONS	ADVANTAGES (OF PREFERRED OPTION)	DISADVANTAGES (OF PREFERRED OPTION)	"STREAM1" APPLICATION PRINCIPLES (OF PREFERRED OPTION)
	least, as a mandatory review element at the end of each statutory planning cycle			
Unmapped remnant and non-remnant vegetation	1. Do not consider 2. Require pre-development assessment by suitably qualified person to identify ecologically significant vegetation and consider impact mitigation requirements including development exclusion and/or appropriate buffers.	- Ensures that significant but unmapped vegetation assets are not ignored. - Provides the best opportunity for sustainable development at all scales.	- Requires additional pre-development environmental asset identification and impact assessment	

TABLE 4.2 VEGETATION OPTIONS POTENTIALLY AVAILABLE THROUGH NON PLANNING SCHEME MECHANISMS

ISSUE	OPTIONS	ADVANTAGES	DISADVANTAGES
Category 1 vegetation	1. Develop and implement conservation covenanting policy targeted at protection of high-value vegetation assets in private ownership. 2. Implement protection and rehabilitation measures for Category 1 vegetation on Council controlled lands, including the introduction of a buffer zone of at least 75m to minimise development encroachment from neighbouring properties. 3. Develop and implement acquisition policy to procure and protect vegetation assets with high conservation value. 4. Introduce a conservation levy in TRC rates scheme. 5. Survey and map vegetation in the TRC region at a scale more appropriate to local planning.	- Encourage landholders to protect and manage high value vegetation on private lands - Improved protection of high value vegetation on public lands. - Improved financial resources for TRC to support vegetation management initiatives - Provide more reliable data overlays	- Potentially removes some council controlled lands from other uses
Category 2 vegetation	1. Develop and implement conservation covenanting policy targeted at protection of high-value vegetation assets in private ownership. 2. Implement protection and rehabilitation measures for Category 2 vegetation on Council controlled lands, including the introduction of a buffer zone of at least 50m to minimise development encroachment from neighbouring properties. 3. Develop and implement acquisition policy to procure and protect vegetation assets with high conservation value. 4. Introduce a conservation levy in TRC rates scheme. 5. Survey and map vegetation in the TRC region at a scale more appropriate to local planning	- Encourage landholders to protect and manage high value vegetation on private lands - Improved protection of high value vegetation on public lands. - Improved financial resources for TRC to support vegetation management initiatives - Provide more reliable data overlays	- Potentially removes some council controlled lands from other uses
Category 3 vegetation	1. Develop and implement conservation covenanting policy targeted at protection of high-value vegetation assets in private ownership. 2. Implement protection and rehabilitation measures for Category 3 vegetation on Council controlled lands, including the introduction of a buffer zone of at least 50m to minimise development encroachment from neighbouring properties. 3. Develop and implement acquisition policy to procure and protect vegetation assets with high conservation value. 4. Introduce a conservation levy in TRC rates scheme. 5. Survey and map vegetation in the TRC region at a scale more appropriate to local planning	- Encourage landholders to protect and manage high value vegetation on private lands - Improved protection of high value vegetation on public lands. - Improved financial resources for TRC to support vegetation management initiatives - Provide more reliable data overlays	- Potentially removes some council controlled lands from other uses
Category 4 vegetation	1. Implement protection and rehabilitation measures for Category 4 vegetation on Council controlled lands, including the introduction of a buffer zone of at least 25m to minimise development encroachment from neighbouring properties.	- Improved protection of high value vegetation on public lands.	- Potentially removes some council controlled lands from other uses
Category 5 vegetation Non-remnant native vegetation with moderate to high conservation value	1. Develop and implement conservation covenanting policy to encourage protection of high-value non-remnant vegetation in private ownership. May need to be supported by conservation levy. 2. Implement protection and rehabilitation measures for Category 5 vegetation to enhance ecological integrity of remnant vegetation on Council controlled lands.	- Provides opportunity to partner with NRM groups in achieving vegetation targets relating to landscape connectivity and protection of ecological assets	
Category 6 vegetation All other non-remnant native vegetation	1. Implement protection and rehabilitation measures for Category 6 vegetation to enhance ecological integrity of remnant vegetation on Council controlled lands.		-
Vegetation mapping error and mapping updates	1. Survey all TRC vegetation and re-assess 'values' accordingly		- Survey expense
Vegetation mapping scale	1. Survey all TRC vegetation at finer scale and re-assess 'values' accordingly		- Survey expense
Unmapped remnant and non-remnant vegetation	1. Survey TRC area at finer mapping scale. In particular, identify significant small remnants and ecologically significant regrowth areas. 2. Use fine-scale survey data to identify all native vegetation that falls within local and regional biodiversity corridors and then reapply the vegetation categories accordingly to incorporate all vegetation that intersects corridors.	- Provides more accurate and more comprehensive natural resource mapping for future planning and management - Identifies specific vegetation areas that require management to provide significant connections in identified biodiversity corridors.	- Survey expense - Requires TRC mapping updates

5.0 CONCLUSION & RECOMMENDATIONS

With less than 30% remnant native vegetation remaining in the region and continuing development pressures, coming particularly from urban expansion and the coal industry, the TRC faces a significant challenge to find a balance between economic development and the conservation of vegetation, wildlife and ecological processes.

Much of the vegetation in the region is considered to provide critical habitat resources for threatened species as well as important connectivity for the movement of species through the landscape. This habitat connectivity is almost certainly going to play an important role in the ability of flora and fauna species to adapt to climate change.

The region hosts a range of threatened flora and fauna species as well as threatened ecological communities and vegetation types that are protected by Commonwealth and State legislation. TRC has a significant opportunity to support and enhance this legislative protection through the development and implementation of sound vegetation planning and management practices within the TRC region.

In order to provide for appropriate management of vegetation in the region, we recommend the following:

1. That TRC adopt the six Vegetation Categories described in Table 2.1;
2. That TRC adopt the preferred planning options for each vegetation category described in Table 4.1;
3. That codes developed for the Planning Scheme have a sound ecological basis in recognition of the vegetation values and options presented in this report;
4. That TRC implement measures to protect and manage significant native vegetation on council-controlled lands for conservation outcomes in accordance with the values and options described in this report;
5. That TRC undertake a vegetation mapping program to obtain more precise data on the location, extent, condition and composition of native vegetation resources in the region.

APPENDIX A DATA AND INFORMATION SOURCES REVIEWED DUIRNG THE VEGETATION STUDY.

GIS Data

- Planning Scheme overlay mapping, zoning and land use for the eight former shires (Crows Nest, Rosalie, Jondaryan, Pittsworth, Clifton, Cambooya, Millmerran, Toowoomba City)
- Regrowth Moratorium Mapping (DERM, 2009)
- Biodiversity Planning Assessments (BPA) for South East Queensland Bioregion (Version 3.5, 2007) and Brigalow Belt Bioregion (Version 1.3, 2008) (DERM)
- Regional Ecosystems (RE) (Version 5.0) (EPA, 2006)
- EPBC Endangered Ecological Communities (EEC) – potential location/extent derived from RE Version 5.0 and based on EPBC listing advices
- Queensland protected area estate version 2009.1 (DERM, 2009)
- TRC Council Controlled Lands (CCL) derived from DCDB cadastre (DERM & TRC, 2009)
- SLATS - State-wide Land Cover and Trees Study (DERM, 2008)
- Various orthophotos (DERM, 2001-2006)
- Relief (contours) (DERM, unknown date)
- Crows Nest Shire Land Management interactive mapping (CNSC, 2004)

Literature

- Accad, A; Neldner, V.J; Wilson, B. A; and Niehus, R.E. (2008). Remnant Vegetation in Queensland. Analysis of remnant vegetation 1997-1999-2000-2001-2003-2005, including regional ecosystem information. Brisbane: Queensland Herbarium, Environmental Protection Agency.
- Benwell, A. (2005). Toowoomba City Remnant Vegetation Survey. Report to Toowoomba City Council.
- Campbell, K. and Galbraith, R. (2000). Remnant Vegetation Corridor Management Strategy for Crows Nest Shire.
- Crows Nest Shire Council Conservation Agreement Policy (May 2006)
- EPA (2006). Nature Conservation (Koala) Conservation Plan 2006 and Management Program 2006 – 2016 Koala Habitat Area Mapping. Environmental protection Agency, Brisbane.
- Galbraith, R. (undated). Roadside Conservation Assessment Crows Nest Shire. Report to Crows Nest Shire Council.
- Goodland, A. (2000). Grassy Ecosystem Significant Sites of the Darling Downs, Qld. Locations and management recommendations. WWF Queensland.
- Natural Solutions (2007). Bio Regional Corridor Study. Report to Condamine Alliance.
- Natural Solutions (2007). EVR Species Targets for Sustainable Biodiversity in the Condamine Catchment. Report to Condamine Alliance
- Natural Solutions (2008). State of the Condamine Catchment 2004-2008. Report to Condamine Alliance
- Spatial Analysis and Modelling Group (2008). Final Report for sub-project C Remnant Vegetation Condition Assessment. Australian Centre for Sustainable Catchments, University of Southern Queensland. Report to Condamine Alliance.
- Spence, M. and Swarbrick, J. (1995). Inventory of the Remnant Native Vegetation of Toowoomba. Report for Toowoomba City Council.
- TRC (2009). Toowoomba Regional Council Planning Project Literature Review: Interim Report.

APPENDIX B ENDANGERED ECOLOGICAL COMMUNITIES IN THE TRC REGION

EEC NAME	RES WITHIN TRC THAT POTENTIALLY CONTAIN EEC	AREA (HA)OF EEC RES IN TRC REGION	AREA (HA) IN TRC OF EEC RES IN CONSERVATION ESTATE	AREA (HA) OF EEC RES ON TRC CONTROLLED LANDS
Weeping Myall Woodlands	11.3.2	8663	1607	163
White box, Yellow box, Blakely's Red Gum Grassy Woodlands and derived Grasslands (also known as *Box-Gum Grassy Woodlands*)	Primary*: 11.8.2a, 11.8.8, 11.9.9a, 13.11.8 Minor*: 12.8.16, 13.3.4	30106 (Primary) 10883 (Minor) *	824 248	211
Natural Grasslands on basalt and fine-textured alluvial plains of northern NSW and southern Queensland	11.3.21, 11.3.24	2089	0	29
Brigalow (Acacia harpophylla Dominant and Co dominant)	11.4.3, 11.4.10, 11.9.5, 11.9.6, 12.8.23,	4239	1021	8
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	11.8.3	2101	0	71

* The EPBC Act "Listing Advice" for this community refers to the EEC as either a "primary" or "smaller" component of certain REs.

APPENDIX C EXTENT AND STATUS OF REMNANT VEGETATION IN THE TRC REGION.

VEGETATION STATUS	TOTAL EXTENT IN TRC REGION (HA)	NUMBER OF RES	AREA (HA) IN:			
			NATIONAL PARKS	STATE FORESTS	FREEHOLD / LEASEHOLD	OTHER
Endangered	15,186	22	420	3,394	10,090	1,282
Of Concern	40,472	35	1,311	4,890	32,028	2,243
Not of Concern	272,200	53	6,406	106,821	150,364	8,609

APPENDIX D THREATENED SPECIES KNOWN TO OCCUR IN THE TRC REGION

WILDLIFE ONLINE DATA EXTRACT

Date extracted: Tuesday 21 Jul 2009

Description of the CODES

Q - Indicates the Queensland conservation status of each taxon under the Nature Conservation Act 1992. The codes are Presumed Extinct (PE), Endangered (E), Vulnerable (V), Rare (R), Common (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the Environment Protection and Biodiversity Conservation Act 1999. The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

ANIMALS		Q	A
Insects			
Jalmenus eubulus	pale imperial hairstreak	V	
Hypochrysops piceata	bulloak jewel	E	
Acrodipsas illidgei	Illidge's ant-blue	V	
Frogs			
Cyclorana verrucosa	rough collared frog	R	
Litoria brevipalmata	green thighed frog	R	
Adelotus brevis	tusked frog	V	
Reptiles			
Tympanocryptis c.f. tetraporophora	Darling Downs earless dragon	E	E
Hoplocephalus stephensii	Stephens' banded snake	R	
Acanthophis antarcticus	common death adder	R	
Hemiaspis damelii	grey snake	E	
Strophurus taenicauda	golden-tailed gecko	R	
Delma torquata	collared delma	V	V
Paradelma orientalis	brigalow scaly-foot	V	V
Lampropholis colossus		R	
Anomalopus mackayi	long-legged worm-skink	E	V
Birds			
Lophoictinia isura	square-tailed kite	R	
Erythrotriorchis radiatus	red goshawk	E	V
Accipiter novaehollandiae	grey goshawk	R	
Stictonetta naevosa	freckled duck	R	
Calyptorhynchus lathami	glossy black-cockatoo	V	
Lophochroa leadbeateri	Major Mitchell's cockatoo	V	
Calyptorhynchus lathami lathami	glossy black-cockatoo (eastern)	V	
Ephippiorhynchus asiaticus	black-necked stork	R	
Climacteris erythrops	red-browed treecreeper	R	
Geophaps scripta scripta	squatter pigeon (southern subspecies)	V	V
Falco hypoleucos	grey falcon	R	
Melithreptus gularis	black-chinned honeyeater	R	
Grantiella picta	painted honeyeater	R	
Neophema pulchella	turquoise parrot	R	
Psephotus pulcherrimus	paradise parrot	PE	EX
Lathamus discolor	swift parrot	E	E

Cyclopsitta diophthalma coxeni	Coxen's fig-parrot	E	E
Lewinia pectoralis	Lewin's rail	R	
Rostratula australis	Australian painted snipe	V	V
Numenius madagascariensis	eastern curlew	R	
Ninox strenua	powerful owl	V	
Turnix melanogaster	black-breasted button-quail	V	V
Tyto tenebricosa tenebricosa	sooty owl	R	
Mammals			
Dasyurus maculatus maculatus	spotted-tailed quoll (southern subspecies)	V	E
Petrogale penicillata	brush-tailed rock-wallaby	V	V
Onychogalea fraenata	bridled nailtail wallaby	E	E
Pseudomys australis	plains rat	E	V
Notomys mordax	Darling Downs hopping-mouse	PE	EX
Phascolarctos cinereus (SE Queensland bioregion)	koala (southeast Queensland bioregion)	V	
Potorous tridactylus tridactylus	long-nosed potoroo	V	V
Nyctophilus timoriensis	eastern long-eared bat	V	V
Chalinolobus picatus	little pied bat	R	
Chalinolobus dwyeri	large-eared pied bat	R	V
Kerivoula papuensis	golden-tipped bat	R	

PLANTS		**Q**	**A**
Conifers			
Callitris baileyi	Bailey's cypress	R	
Cycads			
Macrozamia machinii		V	V
Monocots			
Cyperus clarus		V	
Diuris parvipetala		R	
Sarcochilus weinthalii	blotched sarcochilus	E	V
Dichanthium setosum		R	V
Dichanthium queenslandicum		V	V
Paspalidium grandispiculatum		V	V
Digitaria porrecta		R	E
Arthraxon hispidus		V	V
Bothriochloa bunyensis	Bunya Mountains bluegrass	V	V
Homopholis belsonii		E	V
Lower Dicots			
Clematis fawcettii		V	V
Higher Dicots			
Parsonsia lenticellata	narrow-leaved parsonsia	R	
Picris evae		V	V
Rhaponticum australe		V	V
Picris conyzoides		R	
Wahlenbergia scopulicola		R	
Zornia pallida		R	
Sophora fraseri	brush sophora	V	V
Indigofera baileyi		R	
Gonocarpus urceolatus		V	

Higher Dicots			
Haloragis exalata subsp. velutina		V	V
Prostanthera sp. (Dunmore D.M.Gordon 8A)		V	V
Acacia brunioides subsp. granitica		R	
Acacia chinchillensis		V	V
Eucalyptus decolor		R	
Leptospermum luehmannii		R	
Kunzea flavescens		R	
Eucalyptus curtisii	Plunkett mallee	R	
Eucalyptus dunnii	Dunn's white gum	R	
Melaleuca formosa		R	
Syzygium hodgkinsoniae	red lilly pilly	V	V
Eucalyptus taurina	Helidon ironbark	V	
Macadamia integrifolia	macadamia nut	V	V
Leionema obtusifolium		V	V
Philotheca sporadica		V	V
Thesium australe	toadflax	V	V
Solanum stenopterum		V	
Solanum papaverifolium		E	

N

YARRAMAN

DALBY

CROWS NEST

OAKEY

CECIL PLAINS

TOOWOOMBA

PITTSWORTH

MILLMERRAN

CLIFTON

WARWICK

INGLEWOOD

Potential EPBC Communities

- Box-Gum Grassy Woodland (Primary)
- Box-Gum Grassy Woodland (Minor)
- Brigalow
- Natural Grassland
- Weeping Myall Woodland
- Semi-evergreen Vine Thicket
- Towns
- Highway
- Major Road
- TRC_Boundary

Appendix E TRC DRAFT Regionally Significant Vegetation: Map 1
Potential locations of Endangered Ecological Communities (EPBC Act)

CONICS

Client: Toowoomba Regional Council

Date: 21-07-2009	Compiled by: GF	Project Manager: GF	Reference: 24083_VEG_TRC_1_EEC

0 12.5 25 50 Kilometers

GDA 94, MGAz56 Scale@A3 1:600,000

Source: Derived from Regional Ecosystem data (2005) provided by and copyright of Queensland Government (Department of Environment and Resource Management.

APPENDIX F LEGISLATION REVIEWED IN RELATION TO THIS STUDY.

Commonwealth of Australia

- Environment Protection and Biodiversity Conservation Act 1999

State of Queensland

- Nature Conservation Act 1992
- Vegetation Management Act 1999
- Forestry Act 1959
- Land Protection (Pest and Stock Route Management) Act 2002
- Environmental Protection Act 1994
- Integrated Planning Act 1997