Tweed Shire Rural Land Strategy

Resource Inventory and Land Capability Assessment

TWEED SHIRE COUNCIL | DECEMBER 2013
Authors
Mike Ruzzene [Planner, Urban Economist] Urban Enterprise
Darrel Brewin [Agriculture and Environment Consultant] EnPlan Partners
Alan Thatcher [Planner, Natural Resource Management] EnPlan Partners
Graeme A David [Planning and Environment Consultant] EnPlan Partners
Shashi Karunanethy [Economist] Urban Enterprise
Jojo Chen [Planner, GIS officer] Urban Enterprise

Document Information
Filename Tweed Shire Rural Land Use Strategy Resource Inventory and Land Capability Assessment 20131112 FINAL.docx
Last Saved 20 December 2013 10:53 AM
Last Printed 20 December 2013 11:21 AM
File Size 7,832 kb

Disclaimer
Neither Urban Enterprise Pty. Ltd. nor any member or employee of Urban Enterprise Pty. Ltd. takes responsibility in any way whatsoever to any person or organisation (other than that for which this report has been prepared) in respect of the information set out in this report, including any errors or omissions therein. In the course of our preparation of this report, projections have been prepared on the basis of assumptions and methodology which have been described in the report. It is possible that some of the assumptions underlying the projections may change. Nevertheless, the professional judgement of the members and employees of Urban Enterprise Pty. Ltd. have been applied in making these assumptions, such that they constitute an understandable basis for estimates and projections. Beyond this, to the extent that the assumptions do not materialise, the estimates and projections of achievable results may vary.

The above disclaimer also applies to EnPlan Australia Pty Ltd.
CONTENTS

EXECUTIVE SUMMARY 6
BACKGROUND 6
RURAL PROFILE 6
RURAL LAND USE AND CAPABILITY ASSESSMENT 7

1. INTRODUCTION 9
1.1. PROJECT BACKGROUND 9
1.2. DEFINITION AND PRINCIPLES OF SUSTAINABILITY 9
1.3. PROJECT SCOPE 10
1.4. APPROACH TO RESOURCE INVENTORY AND LAND CAPABILITY ASSESSMENT 10
1.5. ABOUT RURAL TWEED SHIRE 10
1.6. AUSTRALIA BUREAU OF STATISTICS (ABS) DATA 11

PART A: TWEED SHIRE RURAL PROFILE 12
2. REGIONAL ECONOMIC AND DEMOGRAPHIC CONTEXT 13
2.1. INTRODUCTION 13
2.2. SUMMARY OF REGIONAL ECONOMIC AND DEMOGRAPHIC CONTEXT 13
2.3. ECONOMIC AND DEMOGRAPHIC PROFILE 14

3. TWEED SHIRE RURAL: DEMOGRAPHIC AND EMPLOYMENT PROFILE 17
3.1. INTRODUCTION 17
3.2. POPULATION 17
3.3. INCOME AND EMPLOYMENT 21

4. AGRICULTURAL INDUSTRY PROFILE 25
4.1. INTRODUCTION 25
4.2. REGIONAL TRENDS IN AGRICULTURE 25
4.3. AGRICULTURAL INDUSTRY TRENDS IN TWEED SHIRE 26
4.4. LOCAL CONTEXT 27
4.5. AGRICULTURAL VALUE ADDING AND PROCESSING 29

5. RURAL SETTLEMENT PROFILE 30
5.1. INTRODUCTION 30
5.2. SUMMARY OF RURAL SETTLEMENT PROFILE IN TWEED SHIRE 30
5.3. SUPPLY AND DISTRIBUTION OF RURAL SETTLEMENT AND HOUSING 30
5.4. DEMAND FOR RURAL PROPERTY 34
5.5. DWELLINGS GROWTH 34
5.6. NEW RESIDENTS AND INTERNAL MIGRATION 34
5.7. RURAL AND REGIONAL LAND VALUE TRENDS 37

6. TOURISM PROFILE 45
6.1. INTRODUCTION 45
6.2. SUMMARY OF TOURISM PROFILE 45
6.3. GOLD COAST AND NORTHERN RIVERS REGIONAL CONTEXT 45
6.4. LOCAL CONTEXT 48

PART B: RURAL LAND USE AND CAPABILITY ASSESSMENT 53
7. PRINCIPAL RURAL LAND USES 54
7.1. AREA OF LAND USES IN TWEED RIVER BASIN 54
7.2. PRIMARY INDUSTRY 54
7.3. RURAL INDUSTRIES (INCLUDING VALUE ADDING ENTERPRISES) AND EXTRACTIVE INDUSTRY 56
7.4. BUILT DEVELOPMENT IN RURAL SETTINGS 57
7.5. RURAL RESIDENTIAL OPPORTUNITIES AND VILLAGE EXPANSION 57

8. NATURAL RESOURCES PROFILE 61
8.1. INTRODUCTION 61
8.2. GEOLOGY 61
8.3. MAJOR LANDFORMS 63
8.4. SOIL LANDSCAPES 65
8.5. USE OF SOIL LANDSCAPES IN EVALUATING THE LAND 65
8.6. EXPANATION OF METHODOLOGY 66
8.7. LAND DEGRADATION HAZARDS 75
8.8. NATIVE VEGETATION MANAGEMENT 75
8.9. WEED CONTROL AND MANAGEMENT 76
8.10. FLOODING AND FLOODPLAIN MANAGEMENT 76
8.11. CLIMATE AND CLIMATE CHANGE IMPACTS 81
8.12. DRAINAGE AND WATER USE 84
8.13. KEY WATER MANAGEMENT ISSUES 84
8.14. WATER SHARING PLANS 87
8.15. GEOLOGICAL HAZARD (MASS MOVEMENT) 89
8.16. BIODIVERSITY AND NATURAL LANDSCAPE 89

9. LAND CAPABILITY 94
9.1. DEFINING LAND CAPABILITY 94
9.2. LAND CAPABILITY FOR DWELLING DEVELOPMENT ON RURAL LAND 95
9.3. LAND CAPABILITY FOR AGRICULTURE 105
9.4. PRINCIPLES FOR CONSIDERING AGRICULTURE IN RURAL LAND USE PLANNING 109
9.5. AGRICULTURAL LAND OF STATE AND REGIONAL SIGNIFICANCE 109

PART C: LAND USE PLANNING AND DEVELOPMENT CONTROL PLANNING 111
10. ROLES OF COMMONWEALTH, STATE AND LOCAL GOVERNMENT IN LAND AND ENVIRONMENTAL PLANNING 112
10.1. INTRODUCTION 112
10.2. COMMONWEALTH LEGISLATION 112
10.3. STATE LEGISLATION 112
10.4. NSW STATE ENVIRONMENTAL PLANNING POLICIES (SEPPS) 113
10.5. LOCAL ENVIRONMENT PLANS 118
10.6. STRATEGIC RURAL LAND USE PLANS 118

11. TWEED LEP 119
11.2. SECTION 149 PLANNING CERTIFICATES 129

12. TWEED DEVELOPMENT CONTROL PLAN 2008 131
12.1. A1. RESIDENTIAL AND TOURIST DEVELOPMENT CODE 131
12.2. A3 DEVELOPMENT OF FLOOD LIABLE LAND 132
12.3. A5 TWEED SUBDIVISION MANUAL 134
12.4. OTHER DEVELOPMENT CONTROL CONSIDERATIONS 135

13. REGIONAL PLANS AND STRATEGIES 137
13.1. FAR NORTH COAST REGIONAL STRATEGY 137
13.2. NORTHERN RIVERS CATCHMENT ACTION PLAN (CAP2) 137

14. LAND USE CONFLICT 141
14.1. ‘RIGHT TO FARM’ 143
14.2. ‘DUTY OF CARE’ AND ASSOCIATED CONCEPTS’ 143

PART D: REFERENCES 145
APPENDICES 150
APPENDIX A NEW SOUTH WALES AND NORTHERN RIVERS REGION – BROADER REGIONAL AGRICULTURAL TRENDS 151
APPENDIX B CHANGE IN VALUE BY AGRICULTURAL PRODUCT, NORTHERN RIVERS REGION, TWEED SHIRE AND GOLD COAST – 2005-06 TO 2011-11 153
APPENDIX C CRITERIA FOR ECOLOGICAL MAPPING 154

FIGURES
FIGURE 1 URBAN-RURAL AREAS OF TWEED SHIRE 10
FIGURE 2 GREATER REGIONAL AREAS 13
FIGURE 3 POPULATION GROWTH – URBAN/RURAL TWEED SHIRE, 2001 – 2011 17
FIGURE 4 AGE PROFILE RURAL – URBAN/RURAL TWEED SHIRE, 2011 17
FIGURE 5 RANKING OF RELATIVE SOCIO-ECONOMIC ADVANTAGE – 2011 20
FIGURE 6 INDUSTRY SPECIALISATION CURVE – RURAL NSW AND RURAL TWEED SHIRE RESIDENTS, 2011 21

TWEED SHIRE RURAL LAND STRATEGY
RESOURCES INVENTORY AND LAND CAPABILITY ASSESSMENT
TWEED SHIRE COUNCIL
DECEMBER 2013
TABLE 37 DESCRIPTION OF SOIL LANDSCAPES IN TWEED SHIRE 67
TABLE 38 CONSTRAINTS FOR TREATED WASTE DISPOSAL RELEVANT TO RESIDENTIAL DEVELOPMENT ON RURAL LAND 98
TABLE 39 SITE ASSESSMENT RATING FOR ON-SITE SYSTEMS 99
TABLE 40 RECOMMENDED BUFFER DISTANCES FOR ON-SITE SYSTEMS 100
TABLE 41 LAND EXCLUSIONS UNDER THE GENERAL EXEMPT DEVELOPMENT AND RURAL HOUSING CODES 104
TABLE 42 LAND CAPABILITY CLASSIFICATIONS FOR REGULAR CULTIVATION 106
TABLE 43 LAND CAPABILITY CLASSIFICATIONS FOR GRAZING 106
TABLE 44 NSW STATE PLANNING PRINCIPLES FOR RURAL PLANNING AND FOR RURAL SUBDIVISION 116
TABLE 45 CURRENT LAND USE ZONES (AT OCTOBER 2013) MOST APPLICABLE TO RURAL AREAS OF TWEED SHIRE 123
TABLE 46 SUBDIVISION CONTROL OVER RURAL LANDS IN TWEED SHIRE 127
TABLE 47 OBJECTIVES OF LAND USE ZONES COMMON OR POTENTIALLY APPLICABLE IN THE RURAL TWEED AS PROPOSED IN DRAFT TWEED LEP 2012 128
TABLE 48 LEP 2000 AND DRAFT LEP 2012 CATEGORIES FOR PROVISIONS TO PROTECT AGAINST HAZARDS 129
TABLE 49 FLOODING PLANNING PROVISIONS FOR RURAL LAND USE ZONES 134
TABLE 50 ASSESSMENT OF THE POTENTIAL INFLUENCE OF DRIVERS OF CHANGE ON NORTHERN SOCIO-ECOLOGICAL LANDSCAPE 138
TABLE 51 COMMON CONFLICT ISSUES IN RURAL LAND 141
TABLE 52 LAND USE OF RURAL LAND, 2010-11 151
TABLE 53 GROSS VALUE OF AGRICULTURAL ACTIVITY, 2010-11 151
TABLE 54 TOP TEN AGRICULTURE PRODUCTS BY GROSS VALUE OF PRODUCTION, 2010-11 152
Despite its transition towards service sectors, Tweed Shire remains a significant agricultural producer, particularly in horticultural and sugarcane industries. Furthermore, the rural features of the Shire are found to have additional economic values beyond its agricultural output; the landscape continues to be a key drawcard for new lifestyle residents and visitors through its mountainous backdrop, pastoral-coastal setting, conserved forested parks and “village” characteristics of its rural hamlets. These features are anticipated to face increasing pressure from urbanisation of Tweed Heads and Tweed Coast, rising land prices and increased migration from South East Queensland.

AGRICULTURAL CONTEXT

Tweed Shire's agricultural industries have seen a volatile decade, experiencing extreme weather conditions (cyclone, flooding and frosts) and fluctuating commodity prices. In spite of natural conditions, Tweed Shire's agricultural value grew by a modest 3% to $57.3 million, between 2005/06 and 2010/11.

Agricultural industry growth has been attributed to gains in the sugarcane industry, vegetable horticulture industry; and cattle and calves (slaughtered meat) production. However, industry growth was dampened by decline in the Nurseries, Cut Flowers and Cultivated Turf; and Banana industry, which saw a -8% decline in horticultural product value over the period.

The changes in agricultural production reflect regional trends in the Northern Rivers with the region experiencing significant decline in horticultural production value, attributed to the aforementioned weather conditions and root/fungal diseases leading to crop destruction.

Nevertheless, the Northern Rivers Region and Tweed Shire continue to remain as a state-level significant agricultural producer, particularly in vegetable, banana and sugarcane industries. Given this prominence, the region has facilitated opportunities for value-added agricultural activities, including the local establishments of Condon Sugar Mill, Murwillumbah livestock saleyard and a number of vegetable and fruit wholesalers.

Towards the future, competition for land from amenity purchases and residential development may continue to limit opportunities for expansion in the agricultural industry. Given Tweed Shire’s proximity to Brisbane and Gold Coast cities, farmers may be increasingly outpriced from migrating metropolitan residents with non-farming backgrounds, seeking hobby farms, rural residential properties and holiday home properties.

The challenge for Tweed Shire’s agricultural areas is how to grow and maintain agricultural productivity on land owned by rural property owners who purchased property for its amenity attributes.

PROPERTY SETTLEMENT IN RURAL AREAS

Tweed Shire and the Northern Rivers Region are heavily influenced by South East Queensland residential market, one of Australia’s fastest growing metropolitan regions.

Tweed Shire’s proximity to Gold Coast City in particular has positively supported employment opportunities for Tweed Shire residents. Furthermore, improved transport linkages and, sea and tree-change migration has increased demand for housing in Tweed Shire.1

Affordable housing and its accessibility has also placed greater demand for housing from migrating interstate working migrants, fuelling residential developments in Tweed Heads and along the coast, as seen in Casuarina, Kingscliff, Cabarita and Pottsville. Overall, Tweed Shire is expected to provide the majority of future dwelling and residential growth in the Northern Rivers region. Research anticipates the continued need to provide a range of housing types, to cater for the ageing population and younger migrating families.

Within rural areas, the majority of internal migration movements were found to concentrate in Murwillumbah, West Murwillumbah, Uki, Bilambil and Terranora; this has been reflected in the growth of property values, particularly along the ‘rural coastal’ and peri-urban areas. These trends are anticipated to place increased financial incentives for residential development along environmental protected zone coastal areas and nearby productive agricultural land in Tweed Shire.2

Research indicates that the majority of future dwelling growth will be concentrated within the Tweed Heads urban area, nearby Cobaki growth area and Tweed Coast. Within the rural Tweed Shire, Murwillumbah, Bray Park and areas close to the coast (e.g. Kielvale, Kings Forest, Chinderah, Burringbar, Mooball and Cudgera Creek) will absorb the majority of regional dwelling growth.3 Forecasted residential growth identifies that Cobaki Lakes, Kings Forest and Kielvale are anticipated to be classified as

1 Mapping the Northern Rivers Housing Market to 2036 (Dr Tony Gilmour, Northern Rivers Housing Forum 2011).
2 Overview of Economic Implications of South East Queensland on the Northern Rivers Region (SGS Economics and Planning, 2005).
3 Far North Coast Residential Submarket Analysis (Macroplan, 2008)
villages by 2031, while Tanglewood and Kunghur will be upgraded to a Small Village status.  

TOURISM IN TWEED SHIRE

Tweed Shire strongly linked to the key tourism economy of the Gold Coast Region. In 2011, the Gold Coast Region alone attracted 11.3 million visitors. In the same year, Tweed Shire attracted 1,477,000 visitors, comprising of 1,081,000 visitors to Coastal/Urban region and 396,000 visitors to Rural Region.

Development and marketing of rural tourism product, has supported increased visitation over the past decade, through absorption of existing coastal visitor markets in Gold Coast City and Tweed Coast. Tourism in rural Tweed Shire features its network of villages and riverside hamlets, providing a quiet rural and natural alternative to the coastal destinations of Gold Coast City; the setting compliments the agricultural heritage of the region, supporting a number of attractive farmers markets and local producers.

Rural Tweed Shire also hosts a number of nature-based activities within its World Heritage rainforests and mountain ranges, including the Wollumbin/Mt Warning Caldera, which was nominated on a list of 8 iconic sites across Australia. The National Park offers camping, cabins and hiking/bushwalking trails for nature-based visitors to Tweed Shire’s rural hinterland.

Over the past 10 years, the Coastal/Urban areas have experienced marginal levels of growth in visitation, in line with trends seen in the Gold Coast Region. In contrast, rural Tweed Shire has seen an average 8.1% annual growth in visitation over the same period, contributing the majority of visitor growth to the Shire. Tourism Research Australia (TRA) data indicates that a major source of rural visitation growth include visitors from regional Queensland (including Gold Coast City residents) and tourists of younger age brackets (both singles and couples).

RURAL LAND USE AND CAPABILITY ASSESSMENT

RURAL LAND USE

The current Tweed LEP provides strong emphasis on the economic and social importance of rural lifestyle living within and to the Shire. Rural lifestyle living land is land used and developed for dwellings that are not primarily associated with agriculture. While agriculture may occur, it will be ancillary to the use for a dwelling and the amenity of a rural setting. Because its function is primarily lifestyle, it can typically also generate expectations for Council services that may normally be provided in urban sectors. Rural lifestyle living can include dwellings on existing single lots, or on subdivided lots, or on clustered low-density lifestyle developments. Rural lifestyle living is widespread in the shire and can have environmental, social and economic consequences.

AGRICULTURE

The Tweed Shire Community Strategic Plan 2011-2021 identifies a need to foster a viable farming community and improve the environmental capacity of Tweed farmland. However, a range of social, economic and environmental pressures - including an ageing farming population, market factors, changing land uses, and increasing variability of environmental factors - are all impacting on the viability of Agricultural production in Tweed Shire is conducted predominantly on small farms.

These farmers are finding it increasingly difficult to generate adequate incomes, invest in new equipment and practices and compete with larger businesses operating in other regions. Some small producers opt for roadside stalls and farmers markets to sell all or part of their produce.

AGRIBUSINESS

Major agribusiness in Tweed Shire includes the sugar mill at Condong, Tropical Fruit World and Murwillumbah cattle yards (recently closed). A number of businesses operating in Tweed Shire provide agricultural merchandising, agricultural financing and rural real estate.

EXTRACTION INDUSTRIES

A number of quarries are widely distributed within Tweed Shire and provide stone for road making and construction purposes. The zoning of resource areas has been analysed and no changes that might prohibit or restrict mining or quarrying have been identified.

RURAL LIFESTYLE LIVING

Rural lifestyle living is widespread in the shire and can have environmental, social and economic consequences.

NATURAL RESOURCES PROFILE

The natural resource profile of the shire is diverse. It consists of a wide range of geological and soil landform types. The shire contains exceptional biodiversity and other natural environmental assets (including landscape and scenic appeal) across public and private land. Linear reserves along streams and road reserves also contain strong biodiversity values both in their biodiversity content and in their functions as biodiversity corridors.

Acid sulfate soils, flooding, soil erosion and mass movement present land degradation hazards to agricultural land, streams, coastal areas and the built environment.

CLIMATE CHANGE

Knowledge of climate change and its impacts continue to evolve. Climate change researches used to inform this document are identified in the Appendices.

Climate change is expected to impact the shire mainly through reduced winter rainfall and decreased in soil moisture in winter and spring. Sea levels will rise, changing flood patterns and affecting the coast. Minimum temperatures across all seasons are projected to be warmer, with winter maximum temperatures rising more than summer maximum temperatures.

LAND CAPABILITY

Land capability is the inherent physical capacity of land to safely and effectively sustain uses without resultant degradation of land or water resources. The land capability assessment examines the inherent capability of the land to support agriculture and rural living through identifying the bio-physical characteristics of the land and its constraints. Soil Landscapes (Morand, 1996) are defined that identify and describe areas of land that are uniform with respect to the characteristics that affect land use and capability.

Land capability maps were derived which show limitations for agricultural uses (grazing and cultivation) and rural lifestyle living (septic absorption and building foundations) by using Morand’s land capability descriptions, which he derived by comparing the Soil Landscape descriptions with the actual land characteristics required to sustainably support the nominated land uses.

Knowledge of the relative capability of the land for agricultural uses provides additional information for strategic planning for the use and protection of land. It also identifies land that is more marginal for particular
agricultural uses, and land that has too many limitations to be capable of sustainably supporting agricultural uses.

For rural lifestyle living, the long-term effectiveness of a land use may be threatened by factors such as failure of building foundations, mass movement including collapse of cutting batters, flooding, poor performance of sewerage treatment systems, and restricted plant growth.

Land capability assessment for rural lifestyle living provides information on the land uses most physically suited to an area, the potential hazards and limitations associated with specific uses and the inputs and management requirements associated with specific land uses.
1. Introduction

1.1. Project Background

The Tweed Rural Land Strategy is about land use planning and its role in responding to and supporting future directions for a range of functions and values for rural land including farming, protection of the environment, tourism, rural industries, extractive industries, forestry, recreation and rural housing.

This project addresses the Tweed Shire Council’s requirement for a rural land strategy that has been well documented over the preceding decade and highlighted by the development of a ‘Rural Land Use Study’ prepared by the then Tweed Economic Development Corporation in 2002. This study recommended an urgent need for local, state and federal government action and intervention to address small lot sizes and lack of economies of scale which was impacting on agricultural viability and sustainability and the pressure for subdivision and urban encroachment on land zoned rural in Tweed Shire.

The Project’s stated overarching aims are:

- **Snapshot**: understand the extent, diversity and nature of rural land resources and enterprises which rely upon them, how they relate to each other, and the extent of their contribution to the Tweed Shire economy;
- **Change**: understand the nature of change affecting rural and agricultural land use, why and how farming practices have change and the projections based on maintaining a ‘do nothing’ scenario compared with likely outcomes from adoption of outcomes derived in this Strategy;
- **Issues**: define and evaluate key issues affecting viability of rural enterprises and opportunities for sustainable rural enterprises;
- **Future Character**: define the future character (landuse types, extent and location) of rural lands in the Tweed;
- **Policy**: provide a clear and workable policy framework for management and development of a sustainable and viable future for rural lands in Tweed Shire;
- **Strategies**: provide workable strategies for implementation of the policy directions generated by the Strategy; and
- **Other**: identify additional studies and investigations required to support directions of this Strategy.

The Strategy does not aim to:

- Diminish the right to farm;
- Alienate or fragment agricultural land; or
- Increase the demand for provision of social and urban infrastructure that is self-sustaining.

1.2. Definition and Principles of Sustainability

Various definitions of ‘sustainability’ have minor variation. The following definition drawn from the NSW Protection of the Environment Administration Act 1991 contains the key elements of the definitions:

(Sustainability is) a ‘framework for balancing the environmental, social, economic values and assets to meet current needs, without compromising the ability for future generations to meet their needs’.

There are also a range of principles and objectives which can be applied to understanding and achieving sustainability. The following list of principles and objectives is relevant to the land use planning at the local government level across Australia.

<table>
<thead>
<tr>
<th>Sustainability Element</th>
<th>Principle</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic</td>
<td>Sustainable economic development</td>
<td>To enhance individual and community well-being and welfare through economic development that safeguards the welfare of future generations, through effective and efficient resource use and service provision.</td>
</tr>
<tr>
<td></td>
<td>Sustainable growth</td>
<td>To develop a strong, growing and diversified economy that also enhances capacity for environmental protection.</td>
</tr>
<tr>
<td>Social</td>
<td>Intergenerational equity</td>
<td>To provide for equity within and between generations by ensuring that current policy and actions account for the current needs while not affect adversely affecting the ability of future generations to access resources and services.</td>
</tr>
<tr>
<td></td>
<td>Community engagement</td>
<td>To include broad community involvement in decisions and actions on issues that affect them.</td>
</tr>
<tr>
<td>Environmental</td>
<td>Ecological integrity</td>
<td>To protect biological diversity and maintain essential ecological processes and life-support systems.</td>
</tr>
<tr>
<td></td>
<td>Precautionary principle</td>
<td>To ensure that where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.</td>
</tr>
<tr>
<td></td>
<td>Global impacts</td>
<td>To recognise and consider the ‘global’ dimension of the environmental impacts of actions and policies by reducing dependency on non renewable resources, and increasing renewables, particularly in the area of energy and greenhouse gas emission.</td>
</tr>
<tr>
<td></td>
<td>Environmental responsibility</td>
<td>To maintain and enhance international competitiveness in an environmentally sound manner by avoiding, minimising and mitigating environmental impacts of actions while maximizing efficient use of resources, minimising wastes and preventing pollution.</td>
</tr>
<tr>
<td>Governance</td>
<td>Systems thinking</td>
<td>To integrate decision making processes across long-term and short-term economic, environmental, social and equity considerations.</td>
</tr>
</tbody>
</table>

Source: Developed by EnPlan from analysis of a range of organisational and broader expressions of sustainability.  

\[5\] In part derived from the NSW Protection of the Environment Administration Act 1991
1.3. PROJECT SCOPE
The Rural Land Strategy has four stages:

- Stage 1 - Resource Inventory and Land Capability Assessment.
- Stage 2 - Issues Analysis.
- Stage 3 - Land Suitability and Options Paper.
- Stage 4 - Strategy Development & Implementation.

EnPlan and Urban Enterprise are engaged by Tweed Shire for Stages 1 and 2.

1.3.1. STAGE 1 - RESOURCE INVENTORY AND LAND CAPABILITY ASSESSMENT
The deliverables for Stage 1 are:

- Detailed inventory of all known information, (spatial and textual) on the natural resource attributes of Tweed Shire;
- Inventory and analysis of the rural land and property transaction data;
- Demographic profile and analysis of population trends;
- Land capability assessment;
- Recommendations for enhancing future assessment of land capability and other unidentified outcomes.

1.3.2. STAGE 2 - ISSUES ANALYSIS
The deliverables for Stage 2 are as follows:

- Background and Issues Paper and consultation strategies that address:
  - A contextual overview of the current agricultural and rural economy of Tweed Shire, and by comparison to its Region and NSW;
  - Identification and analysis of the key issues affecting sustainable rural lands sector, a constraints and opportunities, cause and effect analysis;
  - A comprehensive understanding of the implications of policies and strategies affecting the spatial distribution and types of rural land uses;
  - An understanding of the causes and effect of changing rural demography on rural land use ownership and agricultural enterprises;
- An understanding of the socio-economic drivers of change and the implications for the future of rural lands and the resilience of rural communities to adapt to these changes;
- An understanding of the extent and interaction of the environmental factors in the development of a sustainable agricultural enterprise.
- Clear definition of the strategic and critical linkages, value-chains and relationships between rural land use enterprises and associated sectors and identification of opportunities to strengthen such associations; and
- Access to infrastructure and land with excessive servicing costs encompassing, roads, potable water supply, waste water treatment, electricity, telecommunications, and waste disposal.

- Consultation strategies
- Summary report detailing the investigations, strategies and findings, including providing an analysis of feedback received.
- Formation of either a Steering Committee or Reference Panel.

1.4. APPROACH TO RESOURCE INVENTORY AND LAND CAPABILITY ASSESSMENT
This report has been developed from:

- Review and interpretation of much documented information on the physical, social and environmental attributes of the Shire, that has been both provided to and researched by the Project Team.
- Statistical information from the Australian Bureau of Statistics (ABS).

The project team has consolidated the above information into the content of this document. The project has not been based on original research, and all main information sources as are referenced in the document. Where similar information has been provided in different forms (such as descriptions of the land and its attributes) professional judgement has been required in its consolidation into the form presented in this document.

1.5. ABOUT RURAL TWEED SHIRE
Tweed Shire is located on the far north coast of New South Wales (NSW), adjoining the border of Queensland and Gold Coast City. The Shire is located 860km north of Sydney, 100 km south of Brisbane and 26 km south of Gold Coast City centre.

The Shire's rural areas are endowed with a sub-tropical climate, surrounded by nationally significant rainforests and dormant volcanic calderas. Rural Tweed Shire has a predominantly rural and pastoral outlook, with mainly grazing pastureland, broadacre sugarcane cropping and scattered horticultural (banana) establishments throughout the area.

The geography of rural Tweed Shire has been selected based on the urban-rural boundaries provided by the 2001, 2006 and 2011 ABS Urban Centre boundaries. The following figure depicts the defined urban and rural areas of Tweed Shire.

**FIGURE 1 URBAN–RURAL AREAS OF TWEED SHIRE**
1.6. AUSTRALIA BUREAU OF STATISTICS (ABS) DATA

The population profile has been prepared using ABS 2011, 2006 and 2001 Population Census data and ABS 2010/11 and ABS 2005/06 Agricultural Census Data.

1.6.1. ABOUT THE POPULATION CENSUS

TYPES OF CENSUS DATA

Three types of census data are included in the assessment, Usual Place of Residence and Place of Enumeration.

- **Place of Usual Place of Residence.** Usual Place of Residence refers to where the person usually lives, which may or may not be where they are on census night. This is used to analyse the resident population of Tweed Shire.

- **Place of Enumeration.** Place of Enumeration data refers to where the person is on census night, rather than their usual place of residence. The Place of Enumeration data provides information related to dwellings, including size, type and internet provision.

- **Place of Work.** Place of Work data provides information on where people work. The address of each employed person’s main place of work, in the week prior to Census Night, is used for employment data.

1.6.2. ABOUT THE AGRICULTURAL CENSUS

The ABS agricultural census provides benchmark information on the agricultural sector for small geographic areas. The census is run every 5 years, with the Agricultural and Resource Management Survey (ARMS) and the Agricultural Survey (AS). The 2005/06 and 2010/11 Census provides estimates for a range of agricultural commodity items including land use, industry structure, broadacre crops, horticultural production and livestock.
This section provides an overview of the trends in industry, population and settlement in the rural areas of Tweed Shire.
2. Regional Economic and Demographic Context

2.1. Introduction
The following section provides an economic and demographic context of the profile of the greater surrounding region and key influencing drivers of the market and economy of Tweed Shire.

Definition of Regional Areas of Influence
Tweed Shire, located adjoining and south of the Queensland border, is positioned within the major tourism, agriculture and urban-growth areas of New South Wales and Queensland.

The growth areas are defined as the Greater Regional Areas, and profile of these areas provide context and insight into regional trends influencing Tweed Shire. The Greater Regional Areas of influence includes:

- Gold Coast Region (QLD) including Gold Coast City and Scenic Rim Rural Shire growth areas.
- Northern Rivers Region (NSW) including the municipalities of Tweed, Kyogle, Byron, Lismore, Ballina, Richmond Valley and Clarence Valley.

These are depicted in Figure 2.

Changes in Political Boundaries
The identified regional areas have undergone a number of municipal boundary changes in the past decade; in particular, a number of geographical areas have been ceded to municipalities outside the defined region, including Logan City (Queensland), and Coffs Harbour and Bellingen (New South Wales).

As a result, a trend analysis may not accurately yield comparable data sets across the 2011, 2006 and 2001 Census data. Where necessary, Urban Enterprise has included these three additional municipalities (Logan City, Coffs Harbour and Bellingen) in the analysis to align geographical boundaries, providing compatible trend analysis.

2.2. Summary of Regional Economic and Demographic Context
The following is a summary of the economic context of key trends and influencing regions of Tweed Shire:

- Tweed Shire is located on the far north coast of New South Wales (NSW), adjoining the border of Queensland and Gold Coast City. Due to its strategic location, the Tweed Shire economy is strongly linked within the greater context of the NSW Northern Rivers Region and South East Queensland’s twin cities, Gold Coast City and Brisbane City.

- Over the past 10 years, Tweed Shire and the Northern Rivers region as a whole have seen residential and dwelling growth, above Regional New South Wales trends. The growth trends have been strongly influenced by nearby Brisbane and Gold Coast City’s expanding urban areas.

- Its strategic location and increasing accessibility (from the upgrading of the Pacific Highway) has supported migration of Queensland’s worker-residents, encouraging inter-state employment opportunities for Tweed Shire residents, as well as migrating residents seeking affordable housing.

- The migration trend has significantly impacted the economic profile of Northern Rivers Region. Over the past decade, the region has seen a notable shift from timber and agricultural economic activities, to servicing tourists and migrating life-stylers, retirees and sea-changers. These growth sectors include accommodation, health care and social services, retail and construction.

- Tweed Shire’s strategic location provides accessibility to export markets through the Brisbane Port and Gold Coast (Coolangatta) airport; the region has opportunities to leverage off growth in South East Asia, East Asia and other developing regions, particular through tourism and Australian-grown agricultural industries.

- Despite its transition towards service sectors, Tweed Shire remains a significant agricultural producer, particularly in the horticultural and sugarcane industries. Furthermore, the rural features are found to have additional economic values beyond its agricultural output; the landscape continues to be a key drawcard

for new lifestyle residents and visitors through its mountainous backdrop, pastoral-coastal setting, conserved forested regions and “village” features. These rural features will face increasing pressure from urbanisation, rising land prices and increased congestion in South East Queensland.

2.3. ECONOMIC AND DEMOGRAPHIC PROFILE

2.3.1. POPULATION GROWTH

In 2011, the Gold Coast Region and Northern Rivers Region had a combined population of 1.17 million residents, with the majority of population in Queensland. The combined regional areas have seen an increase in 196,075 residents over the past decade, representing an annual population growth rate of 2.4%.

TABLE 2 GREATER REGIONAL POPULATION GROWTH, 2001–2011

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Rivers</td>
<td>320,767</td>
<td>332,383</td>
<td>345,697</td>
<td>24,310</td>
<td>0.8%</td>
</tr>
<tr>
<td>Gold Coast Region</td>
<td>651,003</td>
<td>716,626</td>
<td>822,143</td>
<td>172,517</td>
<td>2.4%</td>
</tr>
<tr>
<td>Total Greater</td>
<td>971,770</td>
<td>1,049,009</td>
<td>1,167,845</td>
<td>196,875</td>
<td>1.9%</td>
</tr>
<tr>
<td>Regional Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSW Balance</td>
<td>2,363,153</td>
<td>2,419,813</td>
<td>2,512,949</td>
<td>149,136</td>
<td>0.6%</td>
</tr>
<tr>
<td>Brisbane City</td>
<td>873,780</td>
<td>956,129</td>
<td>1,041,839</td>
<td>86,659</td>
<td>1.8%</td>
</tr>
</tbody>
</table>


Tweed Shire is the fastest growing local government area in the Northern Rivers Region, with an average population growth rate of 1.4% p.a., greater than other municipalities in the Northern Rivers Region. A large proportion of population growth was sourced from new residents from Gold Coast City and Brisbane. Population growth is also occurring in Richmond Valley and Clarence Valley, primarily in the Coffs Harbour regional centre.

2.3.2. DWELLING GROWTH

In 2011, the Gold Coast Region and Northern Rivers Region recorded 497,010 in combined residential dwellings. The region has seen an increase in 88,013 dwellings over the past decade or 2.0% per annum.

Dwelling growth is concentrated within the Gold Coast Region which contributed more than 77% of the total regional growth. Growth has been driven by the expanding urban areas of Gold Coast City and Logan City.

The Northern Rivers region saw an increase in 7,110 dwellings over the past decade, led by growth in Tweed Shire and the Coffs Harbour area. In particular, dwelling growth in these two regions was greater than the residential growth over the same period; the data suggests that retirees and holiday homes owners may have contributed to the significant dwelling increases in these growth nodes, as well as growth in single person and adult couple households.

TABLE 3 POPULATION GROWTH OF NORTHERN RIVERS REGION MUNICIPALITIES, 2001–2011

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tweed</td>
<td>73,821</td>
<td>79,321</td>
<td>85,105</td>
<td>11,284</td>
<td>1.4%</td>
</tr>
<tr>
<td>Kyogle</td>
<td>9,159</td>
<td>9,256</td>
<td>9,228</td>
<td>77</td>
<td>0.1%</td>
</tr>
<tr>
<td>Byron</td>
<td>28,916</td>
<td>28,766</td>
<td>29,209</td>
<td>443</td>
<td>0.1%</td>
</tr>
<tr>
<td>Lismore</td>
<td>41,572</td>
<td>42,210</td>
<td>42,766</td>
<td>556</td>
<td>0.3%</td>
</tr>
<tr>
<td>Batina</td>
<td>37,017</td>
<td>38,461</td>
<td>39,274</td>
<td>810</td>
<td>0.6%</td>
</tr>
<tr>
<td>Richmond Valley, Clarence Valley and Coffs Harbour</td>
<td>130,282</td>
<td>134,369</td>
<td>140,115</td>
<td>9,833</td>
<td>0.7%</td>
</tr>
</tbody>
</table>

Source: ABS 2001, 2006 and 2011 Census data. Municipalities have been combined due to political boundary changes.

TABLE 4 GREATER REGIONAL DWELLING GROWTH, 2001–2011

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Rivers</td>
<td>140,149</td>
<td>149,498</td>
<td>159,938</td>
<td>19,439</td>
<td>1.3%</td>
</tr>
<tr>
<td>Gold Coast Region</td>
<td>268,848</td>
<td>310,535</td>
<td>337,072</td>
<td>26,537</td>
<td>2.3%</td>
</tr>
<tr>
<td>Total Greater Regional Area</td>
<td>408,997</td>
<td>460,033</td>
<td>497,010</td>
<td>36,973</td>
<td>2.0%</td>
</tr>
<tr>
<td>NSW Balance</td>
<td>1,024,849</td>
<td>1,085,044</td>
<td>1,144,196</td>
<td>119,347</td>
<td>1.1%</td>
</tr>
<tr>
<td>Brisbane City</td>
<td>364,587</td>
<td>400,198</td>
<td>426,827</td>
<td>66,630</td>
<td>2.1%</td>
</tr>
</tbody>
</table>


TABLE 5 DWELLING GROWTH OF NORTHERN RIVERS REGIONS, 2001–2011

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tweed</td>
<td>32,974</td>
<td>36,598</td>
<td>40,084</td>
<td>3,486</td>
<td>2.0%</td>
</tr>
<tr>
<td>Kyogle</td>
<td>4,106</td>
<td>4,177</td>
<td>4,397</td>
<td>220</td>
<td>0.7%</td>
</tr>
<tr>
<td>Byron</td>
<td>13,095</td>
<td>13,564</td>
<td>14,455</td>
<td>890</td>
<td>1.0%</td>
</tr>
<tr>
<td>Lismore</td>
<td>3,107</td>
<td>3,177</td>
<td>3,397</td>
<td>220</td>
<td>0.7%</td>
</tr>
<tr>
<td>Batina</td>
<td>17,406</td>
<td>18,151</td>
<td>18,954</td>
<td>803</td>
<td>0.8%</td>
</tr>
<tr>
<td>Richmond Valley, Clarence Valley and Coffs Harbour*</td>
<td>56,820</td>
<td>60,383</td>
<td>64,511</td>
<td>4,128</td>
<td>1.3%</td>
</tr>
</tbody>
</table>

Source: ABS 2001, 2006 and 2011 Census data. Municipalities have been combined due to political boundary changes.
2.3.3. INDUSTRY OF EMPLOYMENT

The following section provides a summary of key employing industries in the Gold Coast Region and Northern Rivers Region.

PRIMARY INDUSTRIES

Agriculture, Forestry and Fishing represents 5% of employment in the Northern Rivers Region. This is in line with the employment profile in Regional NSW, where primary industries (in particular the Agricultural sector) represent a small proportion of total employment.

SECONDARY INDUSTRIES

The data shows that secondary industries (Construction and Manufacturing) are major contributors of employment to the Gold Coast Region, reflecting the urbanisation trends of the region.

The high proportion of Construction workers in Northern Rivers Region (9% of total employment) and Regional NSW (8%) also indicates that overall employment is significantly supported by investment in commercial and residential infrastructure.

TERTIARY INDUSTRIES

Tertiary Industries represents the largest employing industries in the Gold Coast Region, Northern Rivers Region and Regional NSW.

Health Care and Social Assistance, Education and Training, and Retail Trade represent the largest employing industries in Gold Coast Region and Northern River Region, contributing over a third of employment in the regions.

In comparison to Regional NSW, the Northern Rivers Region is found to be a significant service industry employer, particularly Health Care and Social Assistance (15% of population) and Retail Trade (13%). The data indicates that within Regional NSW, the Northern Rivers Region is a prominent residential hub, supporting employment in these key service industries.

Accommodation and Food Services represent 8-9% of employment in Gold Coast Region and Northern Rivers region. Combined with the high proportion of Retail Trade employment, the data suggests that the regions are also prominent tourist destinations.

### TABLE 6 INDUSTRY OF EMPLOYMENT BY BROAD SECTORS, 2011

<table>
<thead>
<tr>
<th>Industry of Employment - 2011</th>
<th>Tweed Shire</th>
<th>Gold Coast Region</th>
<th>Northern Rivers Region</th>
<th>NSW Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons Employed</td>
<td>%</td>
<td>Persons Employed</td>
<td>%</td>
<td>Persons Employed</td>
</tr>
<tr>
<td>Primary Industries</td>
<td>1,045</td>
<td>3%</td>
<td>5,180</td>
<td>2%</td>
</tr>
<tr>
<td>Secondary Industries</td>
<td>8,970</td>
<td>25%</td>
<td>116,603</td>
<td>31%</td>
</tr>
<tr>
<td>Tertiary Industries</td>
<td>22,753</td>
<td>70%</td>
<td>242,399</td>
<td>65%</td>
</tr>
<tr>
<td>Support Services</td>
<td>10,566</td>
<td>32%</td>
<td>106,567</td>
<td>29%</td>
</tr>
<tr>
<td>Health and Education</td>
<td>7,481</td>
<td>23%</td>
<td>65,858</td>
<td>18%</td>
</tr>
<tr>
<td>Other Services</td>
<td>2,638</td>
<td>8%</td>
<td>37,583</td>
<td>10%</td>
</tr>
<tr>
<td>Advanced Services</td>
<td>2,098</td>
<td>6%</td>
<td>30,951</td>
<td>8%</td>
</tr>
</tbody>
</table>

Source: ABS 2011 Census data. Place of Usual Residence. Data includes Logan (C) and Coffs Harbour.

### TABLE 7 INDUSTRY OF EMPLOYMENT BY ANZSIC06 INDUSTRY CATEGORIES, 2011

<table>
<thead>
<tr>
<th>Industry of Employment - 2011</th>
<th>Tweed Shire</th>
<th>Gold Coast Region</th>
<th>Northern Rivers Region</th>
<th>NSW Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons Employed</td>
<td>%</td>
<td>Persons Employed</td>
<td>%</td>
<td>Persons Employed</td>
</tr>
<tr>
<td>Agriculture, forestry and fishing</td>
<td>837</td>
<td>3%</td>
<td>3,103</td>
<td>1%</td>
</tr>
<tr>
<td>Mining</td>
<td>208</td>
<td>1%</td>
<td>2,717</td>
<td>1%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1,880</td>
<td>6%</td>
<td>36,247</td>
<td>10%</td>
</tr>
<tr>
<td>Electricity, gas, water and waste services</td>
<td>324</td>
<td>1%</td>
<td>3,296</td>
<td>1%</td>
</tr>
<tr>
<td>Construction</td>
<td>3,689</td>
<td>11%</td>
<td>42,144</td>
<td>11%</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>891</td>
<td>3%</td>
<td>16,054</td>
<td>4%</td>
</tr>
<tr>
<td>Retail trade</td>
<td>4,183</td>
<td>13%</td>
<td>44,774</td>
<td>12%</td>
</tr>
<tr>
<td>Accommodation and food services</td>
<td>3,410</td>
<td>10%</td>
<td>30,000</td>
<td>8%</td>
</tr>
<tr>
<td>Transport, postal and warehousing</td>
<td>1,286</td>
<td>4%</td>
<td>18,862</td>
<td>5%</td>
</tr>
<tr>
<td>Information media and telecommunications</td>
<td>315</td>
<td>1%</td>
<td>5,406</td>
<td>1%</td>
</tr>
<tr>
<td>Financial and insurance services</td>
<td>608</td>
<td>2%</td>
<td>9,790</td>
<td>3%</td>
</tr>
<tr>
<td>Rental, hiring and real estate services</td>
<td>648</td>
<td>2%</td>
<td>8,484</td>
<td>2%</td>
</tr>
<tr>
<td>Professional, scientific and technical services</td>
<td>1,490</td>
<td>5%</td>
<td>21,161</td>
<td>6%</td>
</tr>
<tr>
<td>Administrative and support services</td>
<td>1,167</td>
<td>4%</td>
<td>14,031</td>
<td>4%</td>
</tr>
<tr>
<td>Public administration and safety</td>
<td>1,806</td>
<td>6%</td>
<td>17,762</td>
<td>5%</td>
</tr>
<tr>
<td>Education and training</td>
<td>2,611</td>
<td>8%</td>
<td>26,007</td>
<td>7%</td>
</tr>
<tr>
<td>Health care and social assistance</td>
<td>4,840</td>
<td>15%</td>
<td>40,891</td>
<td>11%</td>
</tr>
<tr>
<td>Arts and recreation services</td>
<td>517</td>
<td>2%</td>
<td>8,498</td>
<td>2%</td>
</tr>
<tr>
<td>Other services</td>
<td>1,158</td>
<td>4%</td>
<td>15,605</td>
<td>4%</td>
</tr>
<tr>
<td>Inadequately described/Not stated</td>
<td>796</td>
<td>3%</td>
<td>10,296</td>
<td>3%</td>
</tr>
<tr>
<td>Total</td>
<td>32,664</td>
<td>100%</td>
<td>375,118</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: ABS 2011 Census data. Place of Usual Residence. Data includes Logan (C) and Coffs Harbour.
The Gold Coast Region and Northern Rivers Region also saw employment growth in the Education and Training and Professional Services sectors. The data reflects the regional economy transitions towards a service or Tertiary Industry-based employment. However, growth in the Tertiary Industries has been dampened by declines in the Rental, Hiring and Real Estate Services sector. The industry saw negative growth in all regions, particularly in the Northern Rivers Region which saw a loss 152 workers over the 5 year period. The data indicates that the local real estate market has been acutely affected by the national downturn in the property sector.

### TABLE 8 CHANGE IN INDUSTRY OF EMPLOYMENT BY BROAD SECTORS, 2006–2011

<table>
<thead>
<tr>
<th>Change In Industry Employment</th>
<th>Tweed Shire</th>
<th>Gold Coast Region</th>
<th>Northern Rivers Region</th>
<th>NSW Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Persons Employed</td>
<td>%</td>
<td>Persons Employed</td>
<td>%</td>
</tr>
<tr>
<td>PRIMARY INDUSTRIES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture, Forestry and Fishing</td>
<td>1,435</td>
<td>6%</td>
<td>610</td>
<td>-2%</td>
</tr>
<tr>
<td>Secondary Industries</td>
<td>280</td>
<td>1%</td>
<td>486</td>
<td>0%</td>
</tr>
<tr>
<td>Tertiary Industries</td>
<td>3,098</td>
<td>3%</td>
<td>5,290</td>
<td>1%</td>
</tr>
<tr>
<td>Support Services</td>
<td>975</td>
<td>2%</td>
<td>967</td>
<td>0%</td>
</tr>
<tr>
<td>Health and Education</td>
<td>1,745</td>
<td>5%</td>
<td>4,124</td>
<td>3%</td>
</tr>
<tr>
<td>Other Services</td>
<td>-3</td>
<td>0%</td>
<td>-254</td>
<td>0%</td>
</tr>
<tr>
<td>Advanced Services</td>
<td>381</td>
<td>4%</td>
<td>453</td>
<td>1%</td>
</tr>
</tbody>
</table>

### TABLE 9 CHANGE IN INDUSTRY OF EMPLOYMENT BY ANZSIC06 INDUSTRY CATEGORIES, 2006–2011

<table>
<thead>
<tr>
<th>Change In Industry Employment</th>
<th>Tweed Shire</th>
<th>Gold Coast Region</th>
<th>Northern Rivers Region</th>
<th>NSW Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodation and Food Services</td>
<td>2,903</td>
<td>2%</td>
<td>714</td>
<td>1%</td>
</tr>
<tr>
<td>Administrative and Support Services</td>
<td>2,513</td>
<td>4%</td>
<td>4,699</td>
<td>3%</td>
</tr>
<tr>
<td>Agriculture, Forestry and Fishing</td>
<td>-105</td>
<td>-1%</td>
<td>-1,011</td>
<td>-3%</td>
</tr>
<tr>
<td>Arts and Recreation Services</td>
<td>1,139</td>
<td>3%</td>
<td>111</td>
<td>1%</td>
</tr>
<tr>
<td>Construction</td>
<td>3,122</td>
<td>2%</td>
<td>869</td>
<td>1%</td>
</tr>
<tr>
<td>Education and Training</td>
<td>5,312</td>
<td>5%</td>
<td>999</td>
<td>2%</td>
</tr>
<tr>
<td>Electricity, Gas, Water and Waste Services</td>
<td>1,151</td>
<td>9%</td>
<td>234</td>
<td>4%</td>
</tr>
<tr>
<td>Financial and Insurance Services</td>
<td>581</td>
<td>1%</td>
<td>-147</td>
<td>-1%</td>
</tr>
<tr>
<td>Health Care and Social Assistance</td>
<td>11,181</td>
<td>7%</td>
<td>3,125</td>
<td>4%</td>
</tr>
<tr>
<td>Information Media and Telecommunications</td>
<td>-282</td>
<td>-3%</td>
<td>-1,447</td>
<td>-3%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>-124</td>
<td>-1%</td>
<td>-548</td>
<td>-1%</td>
</tr>
<tr>
<td>Mining</td>
<td>1,540</td>
<td>18%</td>
<td>362</td>
<td>9%</td>
</tr>
<tr>
<td>Other Services</td>
<td>2,095</td>
<td>3%</td>
<td>69</td>
<td>0%</td>
</tr>
<tr>
<td>Professional, Scientific and Technical Services</td>
<td>5,004</td>
<td>6%</td>
<td>600</td>
<td>2%</td>
</tr>
<tr>
<td>Public Administration and Safety</td>
<td>3,517</td>
<td>5%</td>
<td>538</td>
<td>1%</td>
</tr>
<tr>
<td>Retail, Hiring and Real Estate Services</td>
<td>-387</td>
<td>-1%</td>
<td>-152</td>
<td>-1%</td>
</tr>
<tr>
<td>Transport, Postal and Warehousing</td>
<td>1,501</td>
<td>1%</td>
<td>-967</td>
<td>-1%</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>3,098</td>
<td>4%</td>
<td>152</td>
<td>1%</td>
</tr>
<tr>
<td>Inadequately described/Not Stated</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>43,123</td>
<td>2%</td>
<td>4,987</td>
<td>1%</td>
</tr>
</tbody>
</table>

Source: ABS 2011 Census data. Place of Usual Residence. Data includes Logan (C) and Coffs Harbour.
3. Tweed Shire Rural: Demographic and Employment Profile

3.1. Introduction
The following section provides background to the demographic and economic profile of Rural Tweed Shire.

3.2. Population
3.2.1. Residential Population
Figure 3 outlines the residential population in historical population for Tweed Shire (2006 to 2011) and forecast population for the Shire (2016 to 2031).

Urban Tweed Shire population grew from 61,207 residents in 2001 to 71,761 residents in 2011, at 1.6%. The data suggests that Shire is heavily influence by the urbanising areas of Gold Coast City, which grew by 2.4% annually over the same period.

The data shows that the Rural Tweed Shire has experienced a population growth from 12,614 persons in 2001 to 13,344 residents in 2011, at 0.6% p.a. In comparison, the Northern Rivers Region and Regional NSW grew by 0.8% and 0.6% over the same period, indicating that rural Tweed Shire has seen moderate population growth trends, in line with Regional NSW.

The rural population is forecast to reach 19,533 residents by 2031, achieving 1.9% annual growth over the time period. The Urban population is forecasted to reach 104,386 residents by 2031, achieving similar growth trends of 1.9% annual growth.

3.2.2. Age Profile and Trends
The data shows that population in both urban and rural areas are concentrated towards the 25-54 age groups. However, the rural population is found to have a larger proportion of younger age groups compared to urban areas. 5-14 and 15-24 age groups comprise 26% of the total rural population, while these same age groups represent 24% in urban areas.

In contrast, the urban areas are found to have a larger proportion of older age groups. The population aged 55 and over comprises of 38% of the population in urban areas; in rural areas, the same age group represents 30% of the population.

Source: ABS 2001, 2006 and 2011 Census. Profile & Forecast population growth rates have been applied to the 2011 Census Data.

3.2.3. HOUSEHOLD COMPOSITION

Table 11 depicts the household composition for rural and urban Tweed Shire in 2001 and 2011.

The ABS data shows that family households are predominant in both rural and urban Tweed Shire. Over the past decade, the urban areas saw greater growth in family households (1.7% p.a.), while the rural areas only saw marginal growth over the same time period (0.1%).

Within rural Tweed Shire, population growth was concentrated to lone person household (1.5% p.a.) and group household (3.2% p.a.). The urban areas also recorded strong growth trends in lone person households (at 2.2% annually) and group households (3.5%).

3.2.4. FAMILY COMPOSITION

Table 12 depicts the family composition for rural and urban Tweed Shire, in 2001 and 2011.

The data shows that between 2001 and 2011, the numbers of ‘Couple families with children’ have declined by -0.6% in rural Tweed Shire. In contrast the rural areas have seen significant growth in ‘Couple families without children’ (2.3% growth p.a.). Combined the ageing trend, the data suggests that Rural Tweed Shire is increasingly becoming a destination for retiring couples.

Couple families without children represent the largest group in Urban Tweed Shire with 9,099 persons in 2011. However, the data shows that the greatest level of growth was seen within family groups with children, including ‘Couple families with children’ (2% annually) and ‘One parent families’ (2.4%). The data suggests that growth in Urban Areas is led by younger families.

3.2.5. EDUCATIONAL ATTAINMENT

ABS Census data shows that the urban and rural residential population are increasingly attaining tertiary-level qualifications. In particular, postgraduate degree holders more than doubled in rural Tweed Shire between 2001 and 2011; in urban Tweed Shire, this segment triple over the same period.

Certificate Level and Bachelor Degree holders continue to compose the largest proportion of education-attainment in both rural and urban Tweed Shire. Both qualification levels saw substantial growth in the past decade.

The data may be reflective of an inward migration of service-sector based workers, who are residing in Rural Tweed Shire, while maintaining employment in urban areas (e.g. Tweed Heads, Gold Coast City).
3.2.6. SOCIAL WELL-BEING

REGIONAL SOCIAL WELL-BEING

Social well-being represents a fundamental need that contributes to the quality of life of Tweed Shire residents. A number of factors contribute to levels of social well-being including (but not limited to) economic self-sufficiency, health and happy relationship.

The ABS Socio-Economic Indexes for Areas (SEIFA) represents a quantitative measure for quality of life and social well-being that ranks areas in Australia according to relative socio-economic advantage and disadvantage. Scores for all areas are standardised to a distribution where the average SEIFA index equals 1000. A lower score indicates that an area is relatively disadvantaged compared to an area with a higher score, and vice versa.

Table 14 depicts the SEIFA index for Rural and Urban Tweed Shire, and major municipalities in the Northern Rivers Region. By comparison to other municipalities in the Northern Rivers Region, Tweed Shire has a similar level of socio-economic advantage/disadvantage to Lismore Shire, while it is slightly lower than Byron Shire and Ballina Shire.

Nevertheless, The SEIFA data estimates that rural Tweed Shire has one of the highest levels of social well-being in the region with an average SEIFA index score of 980; this is comparatively higher to the urban areas of Tweed Shire, which held a SEIFA index of 949. The SEIFA index indicates that in general, the rural areas are found to be of higher levels of socio-economic indicators than the urban areas.

TWEED SHIRE SOCIAL WELL-BEING

Figure 5 depicts the ranking of relative states of social well being within Tweed Shire, compared to the average regional SEIFA score for New South Wales. The ranking is distributed on a scale of 1-10, where 10 represents the most advantage areas, relative to the NSW average; conversely, 1 represents the least advantage areas, relative to the NSW average.

The data shows that overall areas of the lowest level of socio-economic advantage are concentrated within Tweed Heads and Murwillumbah urban centres, and the western portions of rural Tweed Shire. Dislocation from urban centres and social infrastructure may be contributing to low levels of SEIFA scores in the western parts of rural Tweed Shire. This is further elaborated in Section 5.6.

Conversely, areas of the highest level of socio-economic advantage are located in the rural outskirts of Tweed Heads, along the Tweed River valleys and the coast in Cudgen, Casuarina and Hastings Point.

### TABLE 14 NORTHERN RIVERS REGION LGA – INDEX OF RELATIVE SOCIO–ECONOMIC ADVANTAGE AND DISADVANTAGE

<table>
<thead>
<tr>
<th>LGA</th>
<th>Index of Relative Socio–Economic Advantage and Disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Tweed Shire</td>
<td>980</td>
</tr>
<tr>
<td>Ballina (A)</td>
<td>980</td>
</tr>
<tr>
<td>Byron (A)</td>
<td>979</td>
</tr>
<tr>
<td>Tweed (A)</td>
<td>949</td>
</tr>
<tr>
<td>Lismore (C)</td>
<td>946</td>
</tr>
<tr>
<td>Urban Tweed Shire</td>
<td>943</td>
</tr>
<tr>
<td>Richmond Valley (A)</td>
<td>907</td>
</tr>
<tr>
<td>Kyogle (A)</td>
<td>902</td>
</tr>
<tr>
<td>Richmond Valley (A)</td>
<td>888</td>
</tr>
</tbody>
</table>

Source: ABS 2011 Census.
FIGURE 5 RANKING OF RELATIVE SOCIO-ECONOMIC ADVANTAGE – 2011

Source: Map compiled by Urban Enterprise 2013 using data from SEIFA Ranking against NSW ABS 2011. Data is unavailable for certain small areas.
3.3. INCOME AND EMPLOYMENT

The following section provides an overview of industry employment profile. Information has been sourced to the ABS Census 2011 Place of Usual Residence data. It is important to note that the following information is an employment profile of rural and urban Tweed Shire residents.

RESIDENTIAL EMPLOYMENT PROFILE

Table 15 depicts the employment of Tweed Shire residents by industry category in 2011. The data shows that, Health Care and Social Assistance, Retail Trade and Construction form the largest employing industries for both rural and urban residents of Tweed Shire.

The data shows in 2011, rural Tweed Shire included 5,708 employed residents. This represents 17% of the 32,664 working residents in the whole Shire. The remaining 83% or 26,956 workers resided in the Shire’s urban areas.

The rural areas are found to have a higher proportion of residents employed in Agriculture (9% of total rural employment), Education and Training (8%), Professional, Scientific and Technical Services (5%). The data shows that despite the rural outlook, these areas of Tweed Shire maintain a significant diversity of workers, particularly in secondary and service industries.

The data shows that urban areas have a higher proportion of residents employed in Accommodation and Food Services (11%), Retail Trade (13%) and Health Care and Social Assistance (15%). The data reflects the greater concentration of businesses servicing the residential and tourist nodes along the coastal-urban areas of Tweed Shire.

<table>
<thead>
<tr>
<th>2006 ABS Industry Categories</th>
<th>Rural</th>
<th>%</th>
<th>Urban</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodation and food services</td>
<td>388</td>
<td>7%</td>
<td>3,024</td>
<td>11%</td>
</tr>
<tr>
<td>Administrative and support services</td>
<td>172</td>
<td>3%</td>
<td>995</td>
<td>4%</td>
</tr>
<tr>
<td>Agriculture, forestry and fishing</td>
<td>523</td>
<td>9%</td>
<td>311</td>
<td>1%</td>
</tr>
<tr>
<td>Arts and recreation services</td>
<td>111</td>
<td>2%</td>
<td>406</td>
<td>2%</td>
</tr>
<tr>
<td>Construction</td>
<td>640</td>
<td>11%</td>
<td>3,048</td>
<td>11%</td>
</tr>
<tr>
<td>Education and training</td>
<td>480</td>
<td>8%</td>
<td>2,129</td>
<td>8%</td>
</tr>
<tr>
<td>Electricity, gas, water and waste services</td>
<td>51</td>
<td>1%</td>
<td>275</td>
<td>1%</td>
</tr>
<tr>
<td>Financial and insurance services</td>
<td>70</td>
<td>1%</td>
<td>540</td>
<td>2%</td>
</tr>
<tr>
<td>Health care and social assistance</td>
<td>792</td>
<td>14%</td>
<td>4,047</td>
<td>15%</td>
</tr>
<tr>
<td>Inadequately described/Not stated</td>
<td>157</td>
<td>3%</td>
<td>638</td>
<td>2%</td>
</tr>
<tr>
<td>Information media and telecommunications</td>
<td>49</td>
<td>1%</td>
<td>265</td>
<td>1%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>344</td>
<td>6%</td>
<td>1,537</td>
<td>6%</td>
</tr>
<tr>
<td>Mining</td>
<td>27</td>
<td>0%</td>
<td>182</td>
<td>1%</td>
</tr>
<tr>
<td>Other services</td>
<td>212</td>
<td>4%</td>
<td>945</td>
<td>4%</td>
</tr>
<tr>
<td>Professional, scientific and technical services</td>
<td>278</td>
<td>5%</td>
<td>1,212</td>
<td>4%</td>
</tr>
<tr>
<td>Public administration and safety</td>
<td>324</td>
<td>6%</td>
<td>1,484</td>
<td>6%</td>
</tr>
<tr>
<td>Rental, hiring and real estate services</td>
<td>89</td>
<td>2%</td>
<td>561</td>
<td>2%</td>
</tr>
<tr>
<td>Retail trade</td>
<td>597</td>
<td>10%</td>
<td>3,586</td>
<td>13%</td>
</tr>
<tr>
<td>Transport, postal and warehousing</td>
<td>242</td>
<td>4%</td>
<td>1,044</td>
<td>4%</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>162</td>
<td>3%</td>
<td>726</td>
<td>3%</td>
</tr>
<tr>
<td>Total</td>
<td>5,708</td>
<td>100%</td>
<td>26,956</td>
<td>100%</td>
</tr>
</tbody>
</table>


INDUSTRY SPECIALISATION

Figure 6 show the proportion of employment by industry sector, for rural Tweed Shire and rural NSW residents.

In 2011, 21% of employment of rural NSW residents was supported by primary industries (mainly agriculture). In comparison, rural Tweed Shire supported 10% of employment in the same sector. Despite its rural outlook, rural Tweed Shire is found to be less dependent on the primary industry sector (particularly agriculture) compared to rural NSW.

The data indicates that employment of rural Tweed Shire residents is highly specialised in tertiary industries compared to rural NSW, particularly Health and Education sector and Support services.

The data reflects the strategic location of rural Tweed Shire; the data suggests that close proximity to major metropolitan areas and urban centres in supporting service sector employment for rural Tweed Shire residents. The data indicates that despite its rural setting, employment in rural Tweed Shire is highly linked to urban centre nodes and services industries.

FIGURE 6 INDUSTRY SPECIALISATION CURVE – RURAL NSW AND RURAL TWEED SHIRE RESIDENTS, 2011

RURAL RESIDENTIAL EMPLOYMENT GROWTH

Table 16 depicts the change in employment of rural Tweed Shire residents in 2001, 2006 and 2011. The data shows between 2001 and 2011, rural Tweed Shire saw a net increase of 870 employed residents or 2% annual growth.

A major driver of employment growth includes the services industries (Administrative and Support Services, Professional, Scientific and Technical Services and Other Services) which grew by 535 new workers, or 18% growth p.a. Over the same period, Rural Tweed saw significant residential employment growth in the Construction (258 new workers), Health Care and Social Assistance (242) and Education and Training sector (122).

The data shows that despite its rural setting, the region has attracted residents working in the service sector industries; growth in residents working in the construction industry also reflects property development surge within Gold Coast City (including Tweed Heads).

Rural Tweed Shire also saw significant loss of residents employed in the Agriculture, Forestry and Fishing (-254 workers), Rental, Hiring and Real Estate Services (-287) and Retail Trade (-86). These trends are reflective of broader national/regional declines in these industries, and local weather conditions, including recent floods and frost (as informed by information provided by Condong Sugar Mill).

### TABLE 16 INDUSTRY BY DIVISION, RURAL TWEED SHIRE RESIDENTS, 2001-2011

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>4838</td>
<td>5326</td>
<td>5708</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture, Forestry and Fishing</td>
<td>777</td>
<td>591</td>
<td>523</td>
<td>Agriculture, Forestry and Fishing</td>
<td>-254</td>
<td>-4%</td>
</tr>
<tr>
<td>Construction</td>
<td>382</td>
<td>602</td>
<td>640</td>
<td>Construction</td>
<td>258</td>
<td>5%</td>
</tr>
<tr>
<td>Cultural and Recreational Services</td>
<td>124</td>
<td>111</td>
<td>111</td>
<td>Arts and Recreation Services</td>
<td>-13</td>
<td>-1%</td>
</tr>
<tr>
<td>Education</td>
<td>358</td>
<td>426</td>
<td>480</td>
<td>Education and Training</td>
<td>122</td>
<td>3%</td>
</tr>
<tr>
<td>Finance and Insurance</td>
<td>45</td>
<td>78</td>
<td>70</td>
<td>Financial and Insurance Services</td>
<td>25</td>
<td>5%</td>
</tr>
<tr>
<td>Health and Community Services</td>
<td>550</td>
<td>635</td>
<td>792</td>
<td>Health Care and Social Assistance</td>
<td>242</td>
<td>4%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>367</td>
<td>340</td>
<td>344</td>
<td>Manufacturing</td>
<td>-23</td>
<td>-1%</td>
</tr>
<tr>
<td>Personal and Other Services</td>
<td>127</td>
<td>107</td>
<td>172</td>
<td>Administrative and Support Services</td>
<td>535</td>
<td>18%</td>
</tr>
<tr>
<td>Property and Business Services</td>
<td>376</td>
<td>104</td>
<td>89</td>
<td>Rental, Hiring and Real Estate Services</td>
<td>-287</td>
<td>-13%</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>683</td>
<td>611</td>
<td>597</td>
<td>Retail Trade</td>
<td>-86</td>
<td>-1%</td>
</tr>
<tr>
<td>Transport and Storage</td>
<td>182</td>
<td>233</td>
<td>242</td>
<td>Transport, Postal and Warehousing</td>
<td>60</td>
<td>3%</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>172</td>
<td>170</td>
<td>162</td>
<td>Wholesale Trade</td>
<td>-10</td>
<td>-1%</td>
</tr>
<tr>
<td>Electricity, Gas and Water Supply</td>
<td>27</td>
<td>26</td>
<td>51</td>
<td>Electricity, Gas, Water and Waste Services</td>
<td>24</td>
<td>7%</td>
</tr>
<tr>
<td>Communication Services</td>
<td>30</td>
<td>61</td>
<td>49</td>
<td>Information Media and Telecommunications</td>
<td>19</td>
<td>5%</td>
</tr>
<tr>
<td>Mining</td>
<td>3</td>
<td>23</td>
<td>27</td>
<td>Mining</td>
<td>24</td>
<td>25%</td>
</tr>
<tr>
<td>Not stated</td>
<td>152</td>
<td>166</td>
<td>157</td>
<td>Inadequately described/Not stated</td>
<td>5</td>
<td>0%</td>
</tr>
<tr>
<td>Government Administration and Defence</td>
<td>216</td>
<td>288</td>
<td>324</td>
<td>Public Administration and Safety</td>
<td>108</td>
<td>4%</td>
</tr>
</tbody>
</table>

PLACE OF WORK

Table 17 and Table 18 depict the place of work of rural Tweed Shire residents. The data shows that while 66% of rural residents work within the Shire, 34% of rural residents work outside Tweed Shire.

In particular, 17% work in other areas of New South Wales and 13% work in Queensland. ABS Place of Work by Local Government Area (LGA) indicates that rural Tweed Shire is highly linked to Gold Coast City, which supports 10% of the employment of rural residents.

TABLE 17 PLACE OF WORK BY STATE – RURAL TWEED SHIRE RESIDENT WORKERS, 2011

<table>
<thead>
<tr>
<th>Local Government Area</th>
<th>Number of Workers</th>
<th>% of total Rural resident-workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tweed (A)</td>
<td>3,764</td>
<td>66%</td>
</tr>
<tr>
<td>NSW (excluding Tweed Shire)</td>
<td>942</td>
<td>17%</td>
</tr>
<tr>
<td>Queensland</td>
<td>770</td>
<td>13%</td>
</tr>
<tr>
<td>Other areas unclassified</td>
<td>232</td>
<td>4%</td>
</tr>
<tr>
<td>Total Rural Residential Workers</td>
<td>5,708</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: ABS 2011 Census.

TABLE 18 TOP TEN PLACE OF WORK BY LGA – RURAL TWEED SHIRE RESIDENT WORKERS, 2011

<table>
<thead>
<tr>
<th>Local Government Area</th>
<th>Number of Workers</th>
<th>% of total Rural resident-workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tweed (A)</td>
<td>3,764</td>
<td>66%</td>
</tr>
<tr>
<td>Gold Coast (C)</td>
<td>580</td>
<td>10%</td>
</tr>
<tr>
<td>Byron (A)</td>
<td>147</td>
<td>3%</td>
</tr>
<tr>
<td>Brisbane (C)</td>
<td>97</td>
<td>2%</td>
</tr>
<tr>
<td>Lismore (C)</td>
<td>40</td>
<td>1%</td>
</tr>
<tr>
<td>Ballina (A)</td>
<td>23</td>
<td>0%</td>
</tr>
<tr>
<td>Logan (C)</td>
<td>14</td>
<td>0%</td>
</tr>
<tr>
<td>Scenic Rim (R)</td>
<td>9</td>
<td>0%</td>
</tr>
<tr>
<td>Sydney (C)</td>
<td>9</td>
<td>0%</td>
</tr>
<tr>
<td>Kyogle (A)</td>
<td>8</td>
<td>0%</td>
</tr>
</tbody>
</table>

Source: ABS 2011 Census. Data excludes unclassified areas including Place of Work State/Territory/Capital City undefined and Place of Work with No Fixed Address.

OCCUPATION

Figure 7 depicts the proportion of working residents by occupation type for rural and urban Tweed Shire, and rural New South Wales.

The data shows that Professional workers comprise of 18% of rural Tweed Shire working residents, significantly higher than both Urban Tweed Shire (16%) and Rural NSW (15%). The data indicates that skilled, white collar occupations represent the largest employer for rural Tweed Shire residents.

Furthermore, compared to rural NSW, rural Tweed Shire has a higher proportion of Technicians and Trade Workers.

In contrast, Managers comprise of only 17% of rural Tweed Shire’s workforce, significantly lower compared to Rural NSW (25%). In the context of New South Wales, Managers generally comprise of agricultural farmland managers. The data reflects the lower level of agricultural activity in rural Tweed Shire, compared to rural NSW.

Furthermore, rural Tweed Shire has a significantly lower level of Community and Personal Workers, and Sales Workers compared to Urban Tweed Shire. The data reflects of the concentration of activity and health hubs within the urban areas of Tweed Shire.

Figure 7 OCCUPATION TYPE - URBAN/RURAL TWEED SHIRE AND RURAL NSW, 2011
HOUSEHOLD INCOME

In 2011, rural areas of Tweed Shire supported a weekly median household income of $998, greater than the urban areas of Tweed Shire ($816) and Regional NSW ($961).

**TABLE 19 WEEKLY MEDIAN HOUSEHOLD INCOME – URBAN/RURAL TWEED SHIRE, 2006 – 2011**

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural – Tweed Shire</td>
<td>$998.44</td>
</tr>
<tr>
<td>Urban – Tweed Shire</td>
<td>$816.47</td>
</tr>
<tr>
<td>Tweed Shire</td>
<td>$845.00</td>
</tr>
<tr>
<td>Regional NSW</td>
<td>$961.00</td>
</tr>
</tbody>
</table>


UNEMPLOYMENT

The rural Tweed Shire unemployment rate declined from 6.5% in December 2011 quarter to 6% in September 2012 quarter. Unemployment in NSW, Rural and Urban Tweed Shire saw recent increases from September 2012 onwards, in line with national trends of increased participation rates.

Between 2011 and 2012, the rural Tweed Shire has maintained an average unemployment of 6.3%, higher than that of Regional NSW (5.4%) and Urban Tweed Shire (5.5%). This is aligned with national unemployment trends seen in rural Australia.

**TABLE 20 UNEMPLOYMENT RATE – URBAN/RURAL TWEED SHIRE, 2012 QUARTERS**

Source: DEEWR, Small Area Labour Markets, June Qtr, 2012. Rural Tweed is assumed to consists of Tweed (A) Pt SLA and Urban Tweed is assumed to consist of Tweed (A) Tweed Coast and Tweed Heads SLA.
4. AGRICULTURAL INDUSTRY PROFILE

4.1. INTRODUCTION
This section provides an assessment of agriculture and forestry land use in Tweed Shire and surrounding regions of Gold Coast Region and Northern Rivers, in terms of land dedicated to agriculture production and downstream processing of agricultural and forestry product.

Data has been predominantly sourced from the Australian Bureau of Statistics (ABS) Agricultural Census.

4.2. REGIONAL TRENDS IN AGRICULTURE
The following trends have been considered for the agricultural industry in the Northern Rivers Region and New South Wales. These have been identified through a review of relevant literature, policy and ABS Agricultural Census data.

CONTRIBUTION TO THE NEW SOUTH WALES ECONOMY
Over the past decade, the contribution of agriculture industry has fallen as a share of New South Wales economy. This has been attributed to growths in competing service industries as a share of the economy, and extreme weather conditions (flood and drought) that have affected declines in agricultural output.⁴

The agricultural industry remains as a substantial contributor of export revenue for New South Wales, accounting for 8.2% of NSW exports worldwide. Towards the future, economic growth and a burgeoning middle class in Asia is expected to support an increase in export potential, through increasing demand for quality Australian-grown agricultural produce.⁷

CHANGES TO GOVERNMENT ASSISTANCE
The Productivity Commission report Trade and Assistance Review 2011-12 identifies that the value of government assistance to the agricultural industry, represents approximately 3% of the total Australian agricultural industry value in 2011.

The report highlights that over the past decade, the rate of government assistance to the industry has seen gradual declines. This has been attributed to industry tariff deregulations; reduction in budgetary expenditures and drought relief programs; and the cessation of funding assistance through industry structural programs (e.g. the Dairy Structural Adjustment Program which ceased in April 2008).

Towards the future, the agricultural industry will continue to receive government support, primarily through research grants and major infrastructure funding programs, including the Caring for Our Country Commonwealth program. In particular, the Commonwealth government has renewed commitment to the Program and is set to provide over $2.2 billion in additional funding from 2013/14 to 2017/18.

DECLINE IN DAIRY INDUSTRY
Industry price deregulation in the early 2000s exposed the local milk industry to increased competition, contributing to decreases in farm gate milk prices. Over the past decade, the policy shock has accelerated declines in New South Wales milk production, as farms attempted to achieve efficiency through increase in size, economies of scale and reduced production. Dairy production in the industry was further impacted by recent weather extremes (drought and floods), limited irrigation water supplies (reducing pasture production) and the recent supermarket milk price wars.⁵

OPPORTUNITIES IN SUGARCANE INDUSTRY
The New South Wales and Queensland sugarcane industries have experienced a volatile decade, with extreme weather conditions (cyclone, flooding and frosts) and fluctuating commodity prices. As the industry is highly export oriented, sugarcane growers are anticipated to face declining prices, due to increased competition in the global market.

Nevertheless, increasing demand for alternative fuel is expected to support new opportunities for long-term industry growth. In light of rising oil prices and climate change policy, new ethanol production methods may provide opportunities for value growth in the sugarcane industry.

HORTICULTURAL INDUSTRIES IN NORTHERN RIVERS
The Northern Rivers region remains as a state-significant horticultural producer. The region’s water resources, subtropical climate and fertile soil continues to support a diversity of crops, particularly its regional strengths in nursery production, macadamias, bananas and various other fruit and vegetables. However, traditional plantings of banana and avocados have seen production declines in the Northern Rivers region. This has been attributed to steep competition from cheaper varieties grown elsewhere in Australia and local spread of horticultural crop diseases.

INCREASING FARM SIZE AND COMPETITION FROM AMENITY USES
Overall, increases in productivity of agricultural land has led to declines in the price of farm produce (or terms of trade) over the last ten years; as such, farmers seeking to maintain a consistent level of real income must increase the size of farms and production.

The consolidation of farmed land (particularly broad acre cropping) has ultimately led to larger farm sizes and fewer establishments within regional New South Wales. However, growth through consolidation is limited within Tweed Shire and Gold Coast Region, as farmers face limited supply of adequately sized lots and stiff competition from amenity purchasers.

The rapid improvements in transportation and the increasing urbanisation trend in Brisbane and Gold Coast cities have led to an increase demand and competition for rural land for amenity purposes. This trend is particularly acute in the Northern Rivers Region and Gold Coast Region’s rural hinterland. Amenity purchases include land for hobby farms, rural residential properties, weekenders and bush retreats.

CHANGES TO AGRICULTURAL METHODS AND STRATEGIES
Despite the competition from amenity purchases, farm businesses are able to expand production, albeit with limitations. Farmers have undertaken expansion either through purchasing the high priced land and diversifying income streams (e.g. tourism products and mixed agricultural uses) or

⁴ The NSW economy in 2020: A Foresighting study (Access Economics, 2010)
⁵ An overview of food and fibre industries for Boonah and Beaudesert Shires (March 2007).
⁶ An overview of food and fibre industries for Boonah and Beaudesert Shires (March 2007).
⁷ IBISWorld Industry Report: Dairy Cattle Farming in Australia (March 2013).
retaining existing land and intensifying production methods (e.g. hydroponics, improve grazing management, irrigation development).

IMPACT OF CLIMATE CHANGE

Climate change forecasts indicate that extreme weather events will increase in frequency over the forthcoming years. Coastal areas and low-level plains of the Northern Rivers Region are anticipated to face severe risks of increased floods and cyclones. Historically, the weather conditions have been detrimental to local broadacre industries, as witnessed in the recent 2010/11 flood and consequent sugar cane crop damages.

Furthermore, research indicates that the Northern Rivers region is likely to experience warmer and drier weather conditions on average, with increased risks of prolonged heat waves. Irrigated agricultural industries (dairy, horticulture and emerging tea and coffee sectors) are likely to be affected by reductions in water availability.

4.3. AGRICULTURAL INDUSTRY TRENDS IN TWEED SHIRE

The following trends have been considered for the agricultural industry in Tweed Shire. These have been identified through a review of relevant literature, policy and ABS Agricultural Census data.

CONTRIBUTION TO THE NEW SOUTH WALES ECONOMY

Tweed Shire is recognised as a state-level significant agricultural producer; the Shire contributes approximately 30% of State product value of sugarcane and banana, and 10% of the State’s tropical orchard fruit value. The land use and landscape of the region continue to maintain a predominantly agricultural outlook, with the majority of land uses in grazing activities for meat and dairy cattle.

REGIONAL AND LOCALISED GOVERNMENT SUPPORT

The local agricultural industry continues to receive regional governmental support through various governmental agencies, including the NSW Department of Primary Industries (district office based in Murwillumbah), the Northern Rivers Catchment Management Authority (NRCMA) and RDA Northern Rivers.

Local industry support has been limited to efforts in improving intra-industry linkages and partnership opportunities (through business networking, events and organisational development), and the promotion and marketing of locally produced products. In particular, local development efforts have supported the delivery of the following key programs:

- The Northern Rivers Food program, an umbrella for marketing, promoting and development of food businesses in the Northern Rivers region;
- The Northern Rivers Food Links program, a source identification project which aims to increase the number of retailers who stock local food produce.

TRENDS IN LOCAL LIVESTOCK AND DAIRY INDUSTRY

Local dairy producers in Tweed Shire have faced stagnant income levels over the past decade. Between 2005/06 and 2010/11, the value of whole milk produced in Tweed Shire remained constant at $3.6 million. Over the same period, value of cattle and calves slaughtered grew by $3.3 million, to a total product value of $9.9 million in 2010/11.

At present, the cattle and calves meat sector represents the second highest valued agricultural product in Tweed Shire, after sugarcane. The data suggests that, in the face of stagnant price trends, a large proportion of dairy cattle producers have transitioned towards meat cattle production. Given the regional prominence of the Northern Co-operative Meat Company, the increase is anticipated to support additional agricultural value-adding activities in regional processing hubs outside Tweed Shire (including Casino).

Dairy producers facing stagnant or decreasing income levels are also seeking opportunities through agricultural value-adding activities. In particular, a small level of dairy producers are ‘moving up the supply chain’ through expansion in retail (farm gate sales), agri-tourism, on-site processing and packaging of new produce (e.g. cheese, premium unhomogenized milk), direct delivery to local consumers and farmers markets.

TRENDS IN LOCAL SUGARCANE INDUSTRY

Tweed Shire’s sugarcane producers have been significantly affected by adverse weather conditions (cyclone, flooding and frosts) and fluctuating commodity prices. The agricultural value of sugar cane produced in Tweed Shire grew marginally by 4%, between 2005/06 and 2010/11, to $16.8 million. Despite these trends, sugar cane continues to represent the highest valued agricultural produce in Tweed Shire.

Towards the future, sugarcane values are expected to remain stagnant, as the industry is anticipated to meet declining world prices from increased global competition. In the face of these trends, local sugar manufacturers will continue to cut costs and seek value adding opportunities, particularly through investment in renewable energy from sugar cane waste products. These activities have already been undertaken in Tweed Shire, where local manufacturers have diversified operations into electricity generation activities.

TRENDS IN LOCAL HORTICULTURAL INDUSTRIES

Tweed Shire is recognised as a key horticultural producer in vegetable, nursery flowers and turfs, and fruits. Altogether, the horticultural industry supports 46%, or $26.6 million, of total agricultural product value in Tweed Shire.

The Shire continues to rely on the concentrated and fertile agricultural areas of the Cudgen-Duranbah plateau, to support the significant production of vegetables (valued at $7.2 million in 2011) and nursery, flowers and turfs (valued $8.1 million). Furthermore, the climate and landscape as a whole, has positioned the Shire as a state-level significant producer of bananas. Bananas represented the third highest value agricultural product in Tweed Shire ($8.5 million in 2011) after sugarcane and slaughtered cattle and calves.

The value of local banana production has been significantly affected by the outbreak of the Panama Disease over the past decade. The disease has led to declines in the production of high valued Lady Finger bananas, as producers have increasingly shift to lower valued Cavendish varieties. This has exposed the local Tweed Shire banana industry to direct competition from major Cavendish producers in North Queensland, The Northern Territory and Western Australia. Despite these setbacks, the banana industry remains as a state-level significant agricultural product, supporting 33% of New South Wales’s banana produce in 2011.

LAND USE TRENDS AND IMPACT OF AMENITY PURCHASERS

Competition for land from amenity purchases has impacted on the value of rural land, in many cases outpricing bids from farmers who seek to expand...
and retain consistent levels of income. As such, farmers are facing increasing competition from new residents with non-farming backgrounds. This is particularly acute within peri-urban areas of Tweed Heads, including Cudgen, Duranbah and Kings Forest.

The increasing demand for land for amenity purposes is also supporting incentives to agricultural land owners to exit the industry, through subdivision and sale of land. This will continue to negatively impact the incentives for continued agricultural production in Tweed Shire. ABS data substantiates these findings, depicting declines in agricultural land uses across all agricultural product types in Tweed Shire.

ABS Agricultural Census data shows that land use changes have aligned with trends seen in the Gold Coast region, where agricultural land use has declined, impacted by stagnant producer prices and increasing competition with urban growth areas.

### 4.4. LOCAL CONTEXT

The following section provides a local context to agricultural land uses and trends in Tweed Shire.

#### 4.4.1. AGRICULTURAL LAND USE IN TWEED SHIRE

Table 21 indicates that 79% of rural land in Tweed Shire is apportioned for agricultural uses. This is significantly lower compared to the Northern Rivers Region (90%) and Gold Coast Region (83%); the data suggests that this is attributed to the high proportion of non-agricultural uses (national parks, conservation areas) compared to Northern Rivers region.

Tweed Shire has a greater prominence of cropping industries compared to the remaining areas of Northern Rivers region; over 21% of rural land is apportioned for cropping (broadacre sugarcane and horticulture) compared to Northern Rivers Region (9%). Conversely, Tweed Shire has a lower proportion of land used for grazing (57% of rural land) compared to Northern Rivers Region (78%).

### 4.4.2. AGRICULTURAL VALUE BY SECTOR

Table 22 shows that the horticulture industry is prominent in Tweed Shire, supporting $26.6 million in agricultural value or 46% to the industry as a whole. Horticulture is also found to be prominent in Gold Coast Region, supporting $30.7 million in agricultural value or 60% of the industry’s output.

Broadacre cropping (mainly sugarcane) supports $17.1 million or 30% of Tweed Shire’s total agricultural value; this is significantly higher than Gold Coast Region and Northern Rivers Region, where broadacre activity represents 19% and 14% of agricultural output, respectively.

In contrast, livestock activity is under-represented in Tweed Shire (24% of industry) compared to Northern Rivers Region as a whole (47%).

### 4.4.3. AGRICULTURAL VALUE BY PRODUCT

Table 23 depicts the top ten agricultural products by industry value for Tweed Shire.

The data shows that almost a third of Tweed Shire is supported by the sugarcane industry ($16.8 million in value). This is followed by Cattle and Calves ($9.9 million) and Plantation fruits ($8.5 million), which mainly consist of bananas. In comparison to the Gold Coast Region, Nurseries, Cut Flowers and Cultivated Turf, Vegetable and Milk production are significantly underrepresented in Tweed Shire.

The data also shows that Tweed Shire’s agricultural products are notably varied compared to its regional counterparts. In particular, the Northern Rivers region is found to be a significant producer of Nuts, Berry Fruit, Poultry and Whole Milk producer.

The Gold Coast Region is found to be a significant horticulture-based economy, with Nurseries, Cut Flowers and Cultivated Turf and Vegetables are its primary produce. The region shares similar attributes with Tweed Shire, with Sugarcane and Cattle and Calves meat produce.

### TABLE 21 RURAL LAND USE – TWEED SHIRE AND GOLD COAST REGION, 2011

<table>
<thead>
<tr>
<th></th>
<th>Tweed Shire (ha)</th>
<th>%</th>
<th>Gold Coast Region (ha)</th>
<th>%</th>
<th>Northern Rivers Region (ha)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land use crop</td>
<td>10,055</td>
<td>21</td>
<td>5,680</td>
<td>20</td>
<td>84,584</td>
<td>9</td>
</tr>
<tr>
<td>Grazing land</td>
<td>26,729</td>
<td>57</td>
<td>17,620</td>
<td>62</td>
<td>735,349</td>
<td>78</td>
</tr>
<tr>
<td>Land under commercial forestry plantations</td>
<td>356</td>
<td>1%</td>
<td>110</td>
<td>0%</td>
<td>20,543</td>
<td>2%</td>
</tr>
<tr>
<td>Total Agricultural Uses</td>
<td>16</td>
<td>0%</td>
<td>83</td>
<td>0%</td>
<td>1,686</td>
<td>0%</td>
</tr>
<tr>
<td>Total Agricultural Uses</td>
<td>37,156</td>
<td>79%</td>
<td>23,493</td>
<td>83%</td>
<td>842,562</td>
<td>90%</td>
</tr>
<tr>
<td>Total Non-agricultural Uses</td>
<td>5,425</td>
<td>12%</td>
<td>3,345</td>
<td>12%</td>
<td>70,752</td>
<td>8%</td>
</tr>
<tr>
<td>Total Land Use Area</td>
<td>47,018</td>
<td>100%</td>
<td>26,215</td>
<td>100%</td>
<td>941,298</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: ABS 2010-11 Agricultural Census.

### TABLE 22 AGRICULTURAL CATEGORY VALUE – TWEED SHIRE AND GOLD COAST REGION, 2011

<table>
<thead>
<tr>
<th>Agricultural Activity</th>
<th>Tweed Shire ($ mil.)</th>
<th>%</th>
<th>Gold Coast Region ($ mil.)</th>
<th>%</th>
<th>Northern Rivers Region ($ mil.)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livestock</td>
<td>$13.6</td>
<td>24%</td>
<td>$10.3</td>
<td>20%</td>
<td>$267.7</td>
<td>47%</td>
</tr>
<tr>
<td>Horticure</td>
<td>$26.5</td>
<td>46%</td>
<td>$30.7</td>
<td>60%</td>
<td>$220.0</td>
<td>39%</td>
</tr>
<tr>
<td>Broadacre</td>
<td>$17.1</td>
<td>30%</td>
<td>$9.9</td>
<td>19%</td>
<td>$76.5</td>
<td>14%</td>
</tr>
<tr>
<td>Agricultural - Total Gross Value</td>
<td>$57.3</td>
<td>100%</td>
<td>$50.9</td>
<td>100%</td>
<td>$564.2</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: ABS 2010-11 Agricultural Census.

### TABLE 23 TOP TEN AGRICULTURAL PRODUCTS BY INDUSTRY VALUE – TWEED SHIRE, 2011

<table>
<thead>
<tr>
<th></th>
<th>Tweed Shire Value ($ mil.)</th>
<th>%</th>
<th>Gold Coast Region Value ($ mil.)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Sugarcane - Broadacre</td>
<td>$16.8</td>
<td>29%</td>
<td>$57.3</td>
<td>100%</td>
</tr>
<tr>
<td>2 Cattle and Calves (Slaughtered)</td>
<td>$9.9</td>
<td>17%</td>
<td>$48.5</td>
<td>100%</td>
</tr>
<tr>
<td>3 Plantation fruits - Horticulture</td>
<td>$8.5</td>
<td>15%</td>
<td>$10.3</td>
<td>100%</td>
</tr>
<tr>
<td>4 Nurseries, Cut Flowers and Cultivated Turf - Horticulture</td>
<td>$8.1</td>
<td>14%</td>
<td>$1.8</td>
<td>100%</td>
</tr>
<tr>
<td>5 Vegetables (Seed and Human Consumption) - Horticulture</td>
<td>$7.2</td>
<td>13%</td>
<td>$4.8</td>
<td>100%</td>
</tr>
<tr>
<td>6 Whole milk</td>
<td>$3.4</td>
<td>6%</td>
<td>$1.8</td>
<td>100%</td>
</tr>
<tr>
<td>7 Tropical orchard fruit - Horticulture</td>
<td>$2.6</td>
<td>5%</td>
<td>$0.7</td>
<td>100%</td>
</tr>
<tr>
<td>8 Olives - Broadacre</td>
<td>$0.2</td>
<td>0%</td>
<td>$0.4</td>
<td>100%</td>
</tr>
<tr>
<td>9 Nuts - Horticulture</td>
<td>$0.2</td>
<td>0%</td>
<td>$0.3</td>
<td>100%</td>
</tr>
<tr>
<td>10 Pigs (Slaughtered)</td>
<td>$0.2</td>
<td>0%</td>
<td>$0.1</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: ABS 2010-11 Agricultural Census.
4.4.4. TRENDS IN PRODUCTION VALUE

Figure 8 depicts the change in agricultural production value between 2005/06 and 2010/11 for Tweed Shire and Gold Coast Region. Tweed Shire’s agricultural value grew by 3% to $57.3 million, between 2005/06 and 2010/11.

The data shows that Tweed Shire saw marginal increases in livestock and broadacre production value over the last 5 years; growth has been attributed to modest gains in the sugarcane industry and cattle and calves (slaughtered meat) production. In contrast, Tweed Shire’s horticulture industry saw an -8% change in production value over the same period, attributed to significant declines in the Nurseries, Cut Flows and Cultivated Turf industry and Plantation Fruit (Banana) industry.

In comparison to Tweed Shire, the Gold Coast Region saw a significant decline in the livestock sector; this has been attributed to changes in its key agricultural activities including cattle and calves (slaughtered), poultry and milk production.

4.4.5. TRENDS IN AGRICULTURAL LAND USE

Figure 9 depicts the change in agricultural land use (by hectare) between 2005/06 and 2010/11 for Tweed Shire and Gold Coast Region. The data shows that Tweed Shire experienced a decline in agricultural land uses across all industry sectors.

In particular, the Horticulture industry saw a 34% decline from 1,896 hectares of production in 2005/06 to 1,254 hectares in 2010/11. The decline was concentrated within land used for vegetables and plantation fruits (bananas). Production value data saw a relatively lower decline of 8% over the same period; this suggests that although land use has decrease, producers are increasing the intensity of production over existing land uses.

The second largest decline was seen in the broadacre industry (mainly sugarcane), which saw land uses fall by 13% between 2005/06 and 2010/11; this is followed by grazing land uses which fell by 3% over the same period. Decline is attributed to stagnant producer prices, which have led to industry exits in the dairy milk and sugarcane industry.

Similar land use trends were seen in Gold Coast Region; in particular, grazing land uses declined by 39% over the 5 year period, corresponding with severe falls in production value. This was followed by horticulture and broadacre, which saw a 30% and 20% decline respectively over the same period. The trend suggests that the local agricultural industry has been significantly affected by expanding growth areas of Gold Coast.
4.5. AGRICULTURAL VALUE ADDING AND PROCESSING

4.5.1. PROCESSING FACILITIES IN TWEED SHIRE
Tweed Shire is home to a number of major value adding establishments including the Condong Sugar Mill, Murwillumbah livestock saleyard and a number of vegetable and fruit wholesalers. In particular, the Condong Sugar Mill (operated by NSW Sugar Milling Co-operative) has diversified into electricity generation, fuelled by sugar cane waste materials; the operations are part of a co-generation project with Delta Electricity to diversify into renewable energy opportunities.

The Shire also supports a number of small scale and boutique operators, leveraging off the niche retail products and tourism markets. These include:

- Coffee roasters and tea packaging;
- Bush foods and rainforests products;
- Small scale fruit processors; and
- Farmers markets and farm gate tourism products.

Table 24 depicts the agricultural and value-added agricultural industry employment by the Shire in 2011. The data shows that Tweed Shire supported 444 workers in the value added agricultural sector.

The Shire is strategically positioned to absorb relocating businesses seeking affordable and accessible industrial land for operations.

4.5.2. PROCESSING FACILITIES IN COMPETING REGIONAL AREAS OF NORTHERN RIVERS REGION
The data suggests that the key value adding centres are located outside Tweed Shire, in the Richmond Valley and Byron Shire, and Gold Coast Region. This includes the following:

- Meat processing industries, including Norco Cooperative Meat Company cattle abattoirs and beef and pork processing centres in Casino (Richmond Valley) and Booyong (Byron Shire). The industry supported over 656 employed workers in both Shires in 2011;
- Wood-related manufacturing in Clarence Valley (including log sawmilling, veneer and plywood manufacturing) which supported 432 employed workers in the Shire, in 2011.
- Regional poultry product operators in Byron, including Sunnybrand processing plant, which supported 170 employed workers in the Shire in 2011;
- Major sugar mills operations located at Harwood and Broadwater, which supported 226 jobs in Clarence Valley and Richmond Valley in 2011;
- Dairy manufacturing industries including the Norco Cooperative headquarters and regional milk processing centres in Lismore. The industry supported 184 jobs in Lismore in 2011;
- Coffee/tea plantations and processing centres in Lismore and Byron.
- Macadamia processing centres in Lismore.

There is opportunity to grow the food processing sector in Tweed Shire, building on its proximity to Brisbane’s Port and the Gold Coast Airport as well as the excellent highway transport routes. As Gold Coast continues on its urbanisation trend, Tweed Shire is strategically positioned to absorb relocating businesses seeking affordable and accessible industrial land for operations.

TABLE 24 VALUE ADDED AGRICULTURAL EMPLOYMENT

<table>
<thead>
<tr>
<th>Regions and municipalities</th>
<th>Agriculture, Forestry and Fishing Sector</th>
<th>Value Added Agricultural Sector</th>
<th>Ratio of Value Added Agricultural Employment to Primary Agricultural Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richmond Valley (A)</td>
<td>495</td>
<td>983</td>
<td>1.99</td>
</tr>
<tr>
<td>Byron (A)</td>
<td>411</td>
<td>441</td>
<td>1.07</td>
</tr>
<tr>
<td>Clarence Valley (A)</td>
<td>865</td>
<td>812</td>
<td>0.94</td>
</tr>
<tr>
<td>Lismore (C)</td>
<td>823</td>
<td>570</td>
<td>0.69</td>
</tr>
<tr>
<td>Tweed (A)</td>
<td>698</td>
<td>444</td>
<td>0.64</td>
</tr>
<tr>
<td>Ballina (A)</td>
<td>698</td>
<td>271</td>
<td>0.39</td>
</tr>
<tr>
<td>Kyogle (A)</td>
<td>534</td>
<td>147</td>
<td>0.28</td>
</tr>
<tr>
<td>Northern Rivers Region</td>
<td>4524</td>
<td>3668</td>
<td>0.81</td>
</tr>
<tr>
<td>Gold Coast Region</td>
<td>2012</td>
<td>4148</td>
<td>2.06</td>
</tr>
</tbody>
</table>

Source: 2011 Census ABS Place of Work data.
5. Rural Settlement Profile

5.1. Introduction
The following section provides a review of rural residential property development and residential settlement patterns within Tweed Shire. The assessment includes a review of broader regional and municipal property and settlement trends, property values, rural amenity and markets in Tweed Shire. Demographic data has been sourced to ABS 2001, 2006 and 2011 Census; land value data has been sourced to Tweed Shire Council.

5.2. Summary of Rural Settlement Profile in Tweed Shire

- ABS Census data shows that the Rural Tweed Shire has experienced a population growth from 12,614 persons in 2001 to 13,344 residents in 2011, at 0.6% p.a. In comparison, the Northern Rivers Region and Regional NSW grew by 0.8% and 0.6% over the same period, indicating that rural Tweed Shire has seen moderate population growth trends, in line with Regional NSW.

- Rural Tweed Shire comprised of 5,669 dwellings in 2011. Rural dwelling growth saw an increase of 1.1% annually from 5,102 in 2001. This is in line with Regional NSW and Northern Rivers region trends which saw 1.1% and 1.3% annual growth over the same period.

- Profile lid population forecast data indicates that Tweed Shire’s rural population is projected to reach 19,533 residents by 2031, achieving 1.9% annual growth over the time period. Research indicates that the majority of new dwellings are expected to be concentrated in Tweed Heads, peri-urban areas (including Cobaki and Tweed Coast). Within the regional areas, Murwillumbah and Bray Park and rural areas close to the coast (e.g. Chinderah, Kielvale, Kings Forest) will absorb the majority of regional dwelling growth.

- As a result of forecasted population growth, Cobaki Lakes and Kings Forest is anticipated to be classified as villages by 2031, while Tanglewood and Kunghur will be upgraded to a small village status.

- Tweed Shire’s residential property market is highly linked to the South East Queensland economy. Given its strategic location, the Shire has supported accessibility to employment in Gold Coast and Brisbane, for its local residents. The accessibility and affordability of land in Tweed Shire has also supported the migration of interstate residents, particularly to high valued coastal and peri-urban areas. The data suggests that Tweed Shire has attracted working commuters to Queensland, and sea-change and tree-change dwellers seeking rural-coastal lifestyle opportunities.

- Property value data shows that, on average, the value of rural residential land in Tweed Shire is lower compared to neighbouring coastal regions of Byron Bay and Ballina. Conversely, the data shows that the median value of Tweed Shire rural land is higher compared to neighbouring inland regions of Lismore, Scenic Rim and Logan (Queensland). The property value data suggests that proximity to the coast is a key driver for rural residential demand and value within Northern Rivers Region and Tweed Shire.

- The land value data suggests that changes in the price of rural living residential land may be influencing the value of farmland, above its productive values. The data shows that areas of Duranbah, Cudgen and Eviron are experiencing high rural land values, comparable to the peri-urban areas of Tweed Heads. The financial incentives to convert these agricultural allotments to residential uses may have supported the increases in values.

5.3. Supply and Distribution of Rural Settlement and Housing

5.3.1. Dwelling Type

Figure 10 depicts the proportion of dwellings by dwelling structure in rural and urban Tweed Shire and rural New South Wales.

The data shows lower levels of housing diversity in Rural Tweed Shire, compared to Urban Tweed Shire. In 2011, ‘separate houses’ formed 57% of urban dwellings, compared to 93% in rural areas. Furthermore, only 3% of rural dwelling formed ‘semi-detached’ and ‘flat, unit or apartment’ dwellings, compared to 39% in urban areas.

However, in comparison to rural New South Wales, rural Tweed Shire is found to have a marginally higher level of housing diversity. In particular, ‘semi-detached dwellings’ forms 3% of rural dwelling in Tweed Shire, compared to 1% in rural New South Wales.

5.3.2. Location of Settlement

Figure 11 shows the location of zoned land to accommodate rural settlement including rural residential nodes and villages.

The majority of rural residential zoned land is located in the hinterland areas just inland of the coast and further south west along the Valley of the Tweed River.

There is only a limited supply of zoned rural residential land in the western extremity of the Shire.

In contrast, Figure 12 shows the distribution of allotments by parcel size throughout Tweed Shire. This map highlights that there is significant fragmentation of lots throughout Tweed Shire outside of land zoned for rural residential purposes.

5.3.3. Lot Size

Figure 12 shows the distribution of allotments by parcel size throughout Tweed Shire. This map highlights that there is significant...
fragmentation of lots throughout Tweed Shire outside of land zoned for rural residential purposes.

A breakdown of lot size distribution is shown in Table 25. It shows that 64% of lots are smaller than 1,000sqm and are mainly located within urban and residential centres, and built up coastal areas.

Within rural areas, lot sizes under 5ha are predominately located near townships, along rivers and major highways, and valleys. Large lots over 40ha make up over 63% of the land area in the Shire and are distributed between townships in areas with high gradients which are less appropriate for development and to the west of the Shire.

The lot distribution map shows a high level of fragmentation in areas which may have been suitable for more intensive farming at some time such as along the river corridors.

Whilst the western part of the Shire is predominantly large lots there remain significant tracts of hobby farm size allotments throughout the entire Shire which may conflict with more commercially intensive farming uses.

<table>
<thead>
<tr>
<th>Lot Size</th>
<th>Total Area (ha)</th>
<th>% of Total Area</th>
<th>No. Lots</th>
<th>% of Total Lots</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1000sqm</td>
<td>1,414</td>
<td>1%</td>
<td>21,430</td>
<td>64%</td>
</tr>
<tr>
<td>1,000-4,000sqm</td>
<td>747</td>
<td>1%</td>
<td>4,405</td>
<td>13%</td>
</tr>
<tr>
<td>4,000sqm - 9ha</td>
<td>1,018</td>
<td>1%</td>
<td>1,706</td>
<td>5%</td>
</tr>
<tr>
<td>1 - 9ha</td>
<td>6,919</td>
<td>6%</td>
<td>2,776</td>
<td>8%</td>
</tr>
<tr>
<td>5 - 10ha</td>
<td>5,018</td>
<td>4%</td>
<td>729</td>
<td>2%</td>
</tr>
<tr>
<td>10 - 50ha</td>
<td>10,346</td>
<td>8%</td>
<td>715</td>
<td>2%</td>
</tr>
<tr>
<td>20 - 40ha</td>
<td>19,906</td>
<td>16%</td>
<td>690</td>
<td>2%</td>
</tr>
<tr>
<td>40 - 100ha</td>
<td>45,123</td>
<td>36%</td>
<td>782</td>
<td>2%</td>
</tr>
<tr>
<td>&gt; 100ha</td>
<td>45,123</td>
<td>36%</td>
<td>782</td>
<td>2%</td>
</tr>
<tr>
<td>Total</td>
<td>124,158</td>
<td>33,462</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FIGURE 11  TWEED SHIRE RURAL SETTLEMENT – LEP LAND ZONES

Source: Tweed Shire Council, 2013. Map prepared by Urban Enterprise
FIGURE 12 LOT SIZES AND DISTRIBUTION OF PROPERTY IN TWEED SHIRE

Source: Tweed Shire LEP.
5.4. DEMAND FOR RURAL PROPERTY

Demand for rural property can be defined by the following indicators:

- Dwelling growth, measured by building approvals and Census Data;
- New residents and internal migration, measured movement of new residents into Tweed Shire; and
- Rural and regional land value trends.

These indicators are presented below.

5.5. DWELLINGS GROWTH

Table 26 outlines the number of dwellings in 2001, 2006 and 2011 for Tweed Shire.

Urban Tweed Shire comprised of 34,415 dwellings in 2011. The region saw an increase of 2.1% dwelling growth over the past decade, from 27,872 dwellings in 2001. The data reflects the influence of Gold Coast City, which saw a 2.3% annual growth in dwellings over the same period.

Rural Tweed Shire comprised of 5,669 dwellings in 2011, an increase of 1.1% annually from 5,102 in 2001. This is in line with Regional NSW and Northern Rivers region trends which saw 1.1% and 1.3% annual growth over the same period.

| TABLE 26 DWELLING GROWTH – URBAN/RURAL TWEED SHIRE, 2011 |
|------------------|------------------|------------------|
| Rural Dwellings  | 5,102           | 5,125           | 5,669           | 1.1%          |
| Urban Dwellings  | 27,872          | 31,473          | 34,415          | 2.1%          |
| Tweed Shire      | 32,974          | 36,598          | 40,084          | 2.0%          |
| Northern Rivers Region | 140,149 | 149,498       | 159,938         | 1.3%          |
| Regional NSW     | 1,024,849       | 1,085,044       | 1,144,196       | 1.1%          |


5.5.1. RURAL BUILDING APPROVALS

Table 27 depicts the rural residential building approval trends by localities in Tweed Shire.

The data shows that over the past decade, building activity is concentrated in Burringbar (25 building approvals), followed by Uki/Smiths Creek (23 building approvals) and Keilvale (12).

The data also shows that the number of rural residential building approvals have declined over the past ten years. This is attributed to the softening in the property market and the 2008 Global Financial Crisis. Building activity has seen a resurgence from 2009-10 onwards, with the majority of building approvals concentrated in Keilvale and Uki/Smiths Creek.

It is important to note that the data provided excludes rural residential approvals data.

| TABLE 27 RURAL RESIDENTIAL BUILDING APPROVAL TRENDS BY LOCALITY |
|------------------|------------------|------------------|------------------|------------------|
|                  |                  |                  |                  |                  |                  |       |
| Tanglewood       | 1                 | 1                 | 1                 | 1                 | 1                 | 5     |
| Nundah           | 7                 | 6                 | 2                 | 2                 | 0                 | 17    |
| Keilvale         | 1                 | 1                 | 1                 | 1                 | 1                 | 6     |
| Burringbar       | 7                 | 4                 | 4                 | 4                 | 4                 | 21    |
| Durrindoo        | 9                 | 9                 | 9                 | 9                 | 9                 | 36    |
| Uki/Smiths Creek | 5                 | 5                 | 5                 | 5                 | 5                 | 20    |
| Tyalgum Creek    | 2                 | 2                 | 2                 | 2                 | 2                 | 10    |
| Kunghur          | 0                 | 0                 | 0                 | 0                 | 0                 | 0     |
| Total LGA        | 51                | 7                 | 1                 | 8                 | 20                | 87    |

Source: Far North Coast Housing and Land Monitor 2011.

5.6. NEW RESIDENTS AND INTERNAL MIGRATION

Internal migration data represents the relocation of residents from one defined area to another, within Australia. Table 28 depicts the movement of residents into and out of Tweed Shire, between 2006 and 2012.

Data indicates that between 2011 and 2006 Census, the largest proportion of new residents originated from other areas of New South Wales (with a net migration of 2,750 new residents), followed by Queensland (621 new residents) and Victoria (151 new residents).

| TABLE 28 NET MIGRATION – TWEED SHIRE, 2006–2011 |
|------------------|------------------|------------------|------------------|------------------|
|                  | Outward Migration | Inward Migration | Net Migration    |
|                  |                  |                  |                  |                  |
| NSW - Other      | 3,237            | 5,987            | 2,750            |
| Victoria         | 734              | 885              | 151              |
| Queensland       | 6,349            | 6,970            | 621              |
| South Australia  | 164              | 193              | 29               |
| Western Australia| 306              | 299              | -7               |
| Tasmania         | 171              | 165              | -6               |
| Northern Territory| 148             | 146              | -2               |
| Australian Capital Territory | 106 | 163 | 57 |
| Other Territories| 0              | 0                | 0                |
| Total            | 11,215           | 14,808           | 3,593            |


Table 29 shows that between 2006 and 2011 Census, a large proportion of new Tweed Shire residents originated from Gold Coast City (318 new residents), followed by Brisbane (215). The data suggests that rural Tweed Shire is increasingly viewed as a residential destination for Queensland urban dwellers, seeking lifestyle changes. The data also indicates that new residents will be increasingly sourced from Queensland metropolitan areas, particularly Gold Coast City and Brisbane City, which supported the highest number of new residents over the two census periods.
The ABS data suggests that the impact of new residents to Tweed Shire will continue to be limited by the outward migration of Tweed Shire residents to Queensland and other areas of New South Wales. Nevertheless, a distinction between outward and inward migration will be critical for understanding the concentration of areas of new residents and the impact on demand for new developments.

Figure 13 (on the following page) depicts the proportion of new residents in 2011 by SA1 ABS boundaries within Tweed Shire. The figure shows the majority of new residents are relocating to new and high valued residential developments along the coastal areas of Cudgen, Casuarina, Pottsville and Hastings Point. The data suggests that demand from new residents is supporting new residential developments along the coastal regions. The data also shows a moderate concentration of new residents, within the peri-urban areas of Tweed Heads.

Within rural areas, moderate concentrations of new residents are found in Uki, surrounding rural areas of Murwillumbah and Nunderi, and the foothills of the Limpinwood Nature Reserve (to the north west). The data suggests there is moderate level of demand for rural residential housing, from new residents in Tweed Shire.
FIGURE 13 PROPORTION OF NEW RESIDENTS TO TOTAL RESIDENTIAL POPULATION BY SA1 ABS GEOGRAPHY – TWEED SHIRE, 2011

Source: ABS 2011 Census, Place of Usual Residence 5 Years ago data.
5.7. RURAL AND REGIONAL LAND VALUE TRENDS

The following section provides a profile of rural land value trends in Tweed Shire and Regional NSW. The data relates to values of unimproved land.

5.7.1. RURAL URBAN CENTRES AND VILLAGES – RESIDENTIAL PROPERTY TRENDS

REGIONAL NEW SOUTH WALES AND TWEED SHIRE TRENDS

Figure 14 shows that, over the past 15 years, residential land in Tweed Shire’s rural localities and urban centres experienced an annual growth rate of 10.3%; median land value for Village zoned land in Tweed Shire reached $161,000 in 2012. Murwillumbah, Tweed Shire’s major rural centre, saw an annual growth rate of 7.6% annual growth, achieving a median land value of $164,000 in 2012.

The property value data indicates that growth in rural Tweed Shire’s urban centre and localities have generally converged with regional NSW trends, to a median land value of $162,425. The data also shows that in the recent years, the village residential market has seen a decline in property values from 2009 onwards, in line with the Global Financial Crisis and subsequent softening of the Australian property market. Tweed Shire alone suffered a -6.4% decline in value between 2009 and 2012. In spite of this, historical growth rates have shown that Tweed Shire has seen significant increases in property values over the past 15 years.

FIGURE 14 MEDIAN RESIDENTIAL LAND VALUES – COASTAL URBAN CENTRES AND LOCALITIES, 1996 TO 2012

Table 30 shows that between 2003 and 2013, all of Tweed Shire’s major localities had significant growth in land value in line with regional trends. The largest growth levels were seen in Tyalgum, which grew by 10.1% annually over the period; this is followed by Burringbar (10% annual growth), Uki (9.5%) and Chillingham (9.4%).

The data also shows that the highest valued Village zone land were found in Terranora, with a median value of $246,000. This is followed by Kielvale ($190,000) and Tumbulgum ($170,000).

TABLE 30 VILLAGE ZONE – MEDIAN LAND VALUE TREND BY LOCALITY, 1993 TO 2012

<table>
<thead>
<tr>
<th>Locality</th>
<th>1996</th>
<th>2003</th>
<th>2012</th>
<th>Annual Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terranora</td>
<td>$75,000</td>
<td>$108,000</td>
<td>$246,000</td>
<td>6.5%</td>
</tr>
<tr>
<td>Kielvale</td>
<td>$42,000</td>
<td>$80,900</td>
<td>$190,000</td>
<td>8.3%</td>
</tr>
<tr>
<td>Tumbulgum</td>
<td>$31,900</td>
<td>$67,700</td>
<td>$170,000</td>
<td>9.2%</td>
</tr>
<tr>
<td>Uki</td>
<td>$28,600</td>
<td>$45,900</td>
<td>$160,000</td>
<td>9.5%</td>
</tr>
<tr>
<td>Bilambil*</td>
<td>$48,800</td>
<td>$65,900</td>
<td>$153,500</td>
<td>7.4%</td>
</tr>
<tr>
<td>Stokers Siding</td>
<td>$28,500</td>
<td>$61,550</td>
<td>$148,000</td>
<td>9.1%</td>
</tr>
<tr>
<td>Burringbar</td>
<td>$23,000</td>
<td>$42,600</td>
<td>$141,000</td>
<td>10.0%</td>
</tr>
<tr>
<td>Tyalgum</td>
<td>$22,500</td>
<td>$27,900</td>
<td>$139,000</td>
<td>10.1%</td>
</tr>
<tr>
<td>Chillingham</td>
<td>$23,000</td>
<td>$26,800</td>
<td>$127,500</td>
<td>9.4%</td>
</tr>
</tbody>
</table>

Source: Tweed Shire Council, 2012; 1993 Median Property Value was unavailable for Bilambil; the data utilizes the median property value of 1996.
5.7.2. RURAL RESIDENTIAL PROPERTY TRENDS

REGIONAL NEW SOUTH WALES AND TWEED SHIRE TRENDS

Over the past 15 years, rural residential property values in Tweed Shire experienced considerable growth with an average annual growth of 8.1%; median land value for Rural Living zoned land in Tweed Shire reached $277,000 in 2012. Growth rates in Tweed Shire were found to be aligned to regional NSW trends (8% p.a.), to a median land value of $302,378.

The data also shows that in the recent years, the rural residential market has seen decline in property values from 2009 onwards, in line with the Global Financial Crisis and subsequent softening of the Australian property market. Figure 15 shows that between 2009 and 2012, rural residential property markets fell across Rural NSW all municipalities in the Northern Rivers and Gold Coast Region; Tweed Shire alone experienced a -5.1% decline in value over the period.

**Figure 15 MEDIAN LAND VALUES BY RURAL RESIDENTIAL PROPERTIES, 1996 TO 2012**

The data also indicates that, on average, the value of rural residential land in Tweed Shire is below Regional NSW averages. Table 31 shows that rural residential property values in Tweed Shire falls behind neighbouring coastal municipalities of Gold Coast, Byron Bay and Ballina as well. Conversely, the data shows that the median value of Tweed Shire rural residential properties is higher compared to neighbouring inland municipalities of Lismore, Scenic Rim and Logan (Queensland). Rural land value data suggests a ‘coastal value premium’, whereby proximity to the coast is a key driver for rural residential land value in the region.

**Table 31 MEDIAN RURAL RESIDENTIAL LAND VALUE BY REGION, 2012**

<table>
<thead>
<tr>
<th>State</th>
<th>Region</th>
<th>Median Rural Residential Land Value 2012</th>
<th>1 Year Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>QLD</td>
<td>Scenic Rim</td>
<td>$215,000</td>
<td>-3.4%</td>
</tr>
<tr>
<td></td>
<td>Gold Coast</td>
<td>$320,000</td>
<td>-3.0%</td>
</tr>
<tr>
<td></td>
<td>Logan</td>
<td>$260,000</td>
<td>-10.3%</td>
</tr>
<tr>
<td>NSW</td>
<td>Ballina</td>
<td>$407,000</td>
<td>-9.6%</td>
</tr>
<tr>
<td></td>
<td>Byron Bay</td>
<td>$349,000</td>
<td>-12.8%</td>
</tr>
<tr>
<td></td>
<td>Tweed Shire</td>
<td>$277,000</td>
<td>-5.1%</td>
</tr>
<tr>
<td></td>
<td>Lismore</td>
<td>$242,000</td>
<td>-8%</td>
</tr>
<tr>
<td>Regional NSW</td>
<td></td>
<td>$332,378</td>
<td>-6.6%</td>
</tr>
</tbody>
</table>


**TWEED SHIRE LOCALITY TRENDS**

Property values within the localities of Tweed Shire are also reflective of the ‘coastal value premium’ trend seen in regional areas. Table 32 shows that Rural Living 1(c) zoned residential land in close proximity to coastal areas have significantly high median land values. These coastal rural areas include Tanglewood (with a median land value of $460,000), followed by Bilambil Heights ($412,500) and Banora Point ($406,000). It is also important to note that the values of rural land in these localities are comparable to the median land values in Byron Bay and Ballina (seen in Table 31).

In contrast, the value of rural residential land in Tweed Shire’s rural inland areas are found to be well below regional land values in Tweed Shire coastal rural localities. Despite the value differences, data shows that all localities in Tweed Shire recorded significant growth in rural residential land value between 2003 and 2012; in particular, rural inland areas saw strongest capital growth rates of 9% to 14% over the period.

**Table 32 RURAL LIVING ZONE 1(C) – MEDIAN LAND VALUE TREND BY LOCALITY, 1993 TO 2012**

<table>
<thead>
<tr>
<th>Locality</th>
<th>2003</th>
<th>2012</th>
<th>2003-12 Annual Change</th>
<th>Average Distance to Coast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal Rural</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanglewood</td>
<td>$190,000</td>
<td>$460,000</td>
<td>10%</td>
<td>4.4 km</td>
</tr>
<tr>
<td>Bilambil Heights</td>
<td>$173,500</td>
<td>$412,500</td>
<td>10%</td>
<td>10 km</td>
</tr>
<tr>
<td>Banora Point</td>
<td>$205,500</td>
<td>$406,000</td>
<td>8%</td>
<td>5 km</td>
</tr>
<tr>
<td>Terranora</td>
<td>$186,000</td>
<td>$367,000</td>
<td>8%</td>
<td>10.2 km</td>
</tr>
<tr>
<td>Burringbar</td>
<td>$116,000</td>
<td>$303,000</td>
<td>11%</td>
<td>11.2 km</td>
</tr>
<tr>
<td>Dunbible</td>
<td>$106,000</td>
<td>$277,000</td>
<td>11%</td>
<td>10.4 km</td>
</tr>
<tr>
<td>Kunghur</td>
<td>$80,300</td>
<td>$254,000</td>
<td>14%</td>
<td>44 km</td>
</tr>
<tr>
<td>Uki</td>
<td>$93,600</td>
<td>$249,000</td>
<td>11%</td>
<td>31.2 km</td>
</tr>
<tr>
<td>Nunderi</td>
<td>$91,500</td>
<td>$203,500</td>
<td>9%</td>
<td>14.1 km</td>
</tr>
</tbody>
</table>

5.7.3. RURAL AND AGRICULTURAL PROTECTION LAND VALUE TRENDS

Figure 16 depicts the change in the median land value per square metre, rural land use type.

The data shows that in 1993, the median value for protected farmland in Tweed Shire was $2.6/m². By 2012, the value of farmland grew to $6.8/m², with an average annual growth rate of 5.8%.

The data also indicates that the significant growth trends were seen in Rural Living Zone 1(c) land and Rural 1(a) land, over the same period. The median land value per of Rural Living zone land grew from $16/m² in 1993 to $50/m² in 2012, at an average annual growth rate of 6.2%. Similarly the median land value of Rural zone land grew from $3.5/m² to $12/m² over the same period, at an average annual growth rate of 6.8%. The land value increases reflected national property market trends from 2003 to 2006.

**FIGURE 16 MEDIAN LAND VALUE PER SQUARE METRE BY ZONE – TWEED SHIRE, 1993-2012**

The land value data suggests that changes in the value of rural living residential land may be influencing the value of rural agricultural land, above its productive values.

Figure 17 depicts the changes in median value of agricultural land by lot size. The data shows that significant increases in value were found as the size of agricultural lots decreased.

Similar trends were seen in rural land in Tweed Shire. Figure 18 depicts the changes in median value of Rural Land 1(A) Zone land by lot size. The data also shows that significant changes in value were found as the size of agricultural lots decreased.

The data suggests that, as size of rural and agricultural lots decreases, the financial incentives to convert these allotments to residential uses increases. This may have supported the significant increases in values, from 2003 onwards, in line with the Australian residential property market trends.

**FIGURE 17 AGRICULTURAL PROTECTION (FARMLAND) – MEDIAN LAND VALUE PER SQM BY LOT SIZE (HECTARES), 1993-2012**

**FIGURE 18 RURAL LAND 1(A) ZONE – MEDIAN LAND VALUE PER SQM BY LOT SIZE (HECTARES), 1993-2012**

TWEED SHIRE LOCALITY TRENDS

Figure 19 and Table 33 depicts the average Rural Land 1(A) Zone land value by locality in Tweed Shire. The data shows that the highest land values are concentrated in the urban and peri-urban areas of Tweed Heads and Murwillumbah.

The data reflects increasing urban pressure surrounding Tweeds Heads and Murwillumbah, to sub-divide existing rural allotments into urban, residential areas. The data also indicates that Duranbah, Cudgen, Environ and surrounding areas are experiencing high land values, suggesting that these localities are facing increasing pressure to transition away from agricultural activities to residential development.

In contrast areas with the lowest rural land values are concentrated in the western and central areas of Tweed Shire. The data suggests that proximity to urban and coastal areas are supporting higher rural land prices in Tweed Shire.

**FIGURE 19 AGRICULTURAL PROTECTION (FARMLAND) – MEDIAN LAND VALUE PER SQM BY LOCALITY, 1993-2012**

**FIGURE 20 RURAL LAND 1(A) ZONE – MEDIAN LAND VALUE PER SQM BY LOCALITY, 1993-2012**
### TABLE 33 MEDIAN VALUE OF RURAL ZONED LAND (1A), 1993–2012

<table>
<thead>
<tr>
<th>Rural Zones</th>
<th>1993</th>
<th>2003</th>
<th>2012</th>
<th>1993-2012 Annual Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinderah</td>
<td>$25</td>
<td>$39</td>
<td>$95</td>
<td>7%</td>
</tr>
<tr>
<td>Crabbes Creek</td>
<td>$15</td>
<td>$30</td>
<td>$71</td>
<td>8%</td>
</tr>
<tr>
<td>Morellumbah</td>
<td>$11</td>
<td>$18</td>
<td>$47</td>
<td>8%</td>
</tr>
<tr>
<td>Cudgen</td>
<td>$5</td>
<td>$7</td>
<td>$16</td>
<td>7%</td>
</tr>
<tr>
<td>Dunoonbik</td>
<td>$5</td>
<td>$6</td>
<td>$16</td>
<td>6%</td>
</tr>
<tr>
<td>Cudgen</td>
<td>$4</td>
<td>$5</td>
<td>$14</td>
<td>6%</td>
</tr>
<tr>
<td>Chlithman Creek</td>
<td>$4</td>
<td>$5</td>
<td>$13</td>
<td>6%</td>
</tr>
<tr>
<td>Blisset</td>
<td>$4</td>
<td>$6</td>
<td>$11</td>
<td>5%</td>
</tr>
<tr>
<td>Culpara Creek</td>
<td>$3</td>
<td>$4</td>
<td>$11</td>
<td>7%</td>
</tr>
<tr>
<td>Kerrev</td>
<td>$3</td>
<td>$5</td>
<td>$10</td>
<td>6%</td>
</tr>
<tr>
<td>Lki</td>
<td>$3</td>
<td>$4</td>
<td>$10</td>
<td>6%</td>
</tr>
<tr>
<td>Tyalgum</td>
<td>$2</td>
<td>$3</td>
<td>$9</td>
<td>9%</td>
</tr>
<tr>
<td>Kutkole</td>
<td>$2</td>
<td>$3</td>
<td>$6</td>
<td>7%</td>
</tr>
<tr>
<td>Monville</td>
<td>$2</td>
<td>$2</td>
<td>$6</td>
<td>7%</td>
</tr>
<tr>
<td>Zuntine</td>
<td>$1</td>
<td>$2</td>
<td>$5</td>
<td>8%</td>
</tr>
<tr>
<td>Burringbar</td>
<td>$1</td>
<td>$1</td>
<td>$3</td>
<td>8%</td>
</tr>
<tr>
<td>Rural Zones</td>
<td>$3</td>
<td>$5</td>
<td>$12</td>
<td>7%</td>
</tr>
</tbody>
</table>

FIGURE 19 AVERAGE RURAL LAND 1(A) ZONE VALUE PER SQM BY TWEED SHIRE LOCALITY, 2012

Source: Tweed Shire Council.
5.8. LOCATION OF SOCIAL AND PUBLIC INFRASTRUCTURE IN RURAL TWEED SHIRE

The following is a summary of the provision of social and public infrastructure in rural Tweed Shire. This provides a guide for accessibility to existing infrastructure to support residents in rural areas.

SEWERAGE SUPPLY

Tweed Shire wastewater system includes 5 major treatment plants located at Tweed Heads, Banora Point, Kingscliff, Hastings Point and Murwillumbah, and 3 minor plants located at Tumbulgum, Tyalgum and Uki. Council has recently undertaken the construction of a new wastewater treatment plant (WWTP) to service the villages of Burringbar and Mooball. Approximately 82% of the residential population of Tweed Shire is connected to reticulated sewerage.

WATER SUPPLY

The Tweed River catchment remains as the bulk source of water supply for all towns in Tweed Shire, with the majority sourced directly from Bray Park weir and the Bray Park Water Treatment Plant. Only the townships of Uki and Tyalgum currently source water supply from local estuaries and treated plants.

The Tweed Shire Urban and Land Release Strategy (2008) indicates that Tweed Shire’s water supply is capable of sustaining a future population of 189,000 residents. As the forecast well-above population projections, the report finds that water supply remains secure for future communities in Tweed Shire.

PUBLIC TRANSPORT

Rural Tweed Shire is currently serviced by a network of bus corridors, supporting linkages to key regional centres including Murwillumbah, Tweed Heads (and the rail network) and Lismore. Research indicates that public transport use in Tweed Shire is low, with only 1% of workers utilising bus services to travel to work, below benchmark 3.5% usage in Gold Coast.

COMMUNITY RESILIENCE AND SOCIAL CONNECTIVITY

The Northern Rivers Catchment Action Plan 2013-2023 [Draft] provides an analysis of community resilience to change and social connectivity to communities, services and public infrastructure in the Northern Rivers Region and Tweed Shire. The report has found that:

- Coastal towns and communities have a greater level of community connection compared to settlements in the western portions of Northern Rivers Region;
- Economic resources and employment opportunity are also lowest along the escarpment and mountainous areas of the region;
- Social connectivity of the Northern Rivers region is hampered by lack of public transport. As such, residents rely heavily on the north south highways for accessing public facilities, communities and services.

The Report classifies Tweed Shire within the Northern Socio-ecological Landscape (SEL). The report finds Tweed Shire and the Northern SEL are characterised with the following attributes:

- The region has the greatest potential influence from population growth and development, because of its close proximity to Brisbane and Gold Coast. Tweed Shire in particular is a growing destination for “Queenslander looking to move for lifestyle reasons”.
- Given its strategic location to major markets, the region has the lowest transport to market costs for primary industry. This has supported ‘higher production and farm viability’ through opportunities to expand and diversify agricultural land uses to meet changing market demands.
- Smaller towns to the west (including Kyogle and Woodenbong) are undergoing decline. Nevertheless, the region as a whole has a “higher general resilience to cope with change” given that its proximity and connection south-east Queensland and its services, and its larger base of economic and work opportunities.

Further review of the Northern Rivers Catchment Action Plan 2013-2023 [Draft] is provided in Section 13 of the report.

SOCIAL INFRASTRUCTURE

Figure 20 depicts the key social infrastructure in rural Tweed Shire. The availability of accessible social infrastructure is a significant contributor to community well-being, including providing residents with adequate access to educational establishments (primary and secondary schools, TAFE and universities), health facilities (hospitals, medical centres and aged care facilities) and primary retail services (supermarkets).

The figure shows that social infrastructure is highly concentrated in Murwillumbah, including major establishments such as the Murwillumbah District Hospital, North Coast TAFE Campus and 5 primary and secondary schools.

In contrast, areas to the western parts of rural Tweed Shire (including Tyalgum, Uki and Chillingham) are found to contain gaps in the provision of social infrastructure. The infrastructure gaps aligned with SEIFA data findings, whereby areas of low socio-economic disadvantage are found the same areas.

The data suggests that the lack of available retail, health and educational services may be a contributing factor to the socio-economic attributes of the west of rural Tweed Shire (as described in Section 3.2.6). The low residential catchment base (for supporting viability of such facilities) is a major factor to the existing low provision of social infrastructure in these areas of need.

14 Ibid.
15 Tweed Shire Public Transport Strategy.
FIGURE 20 RURAL SOCIAL INFRASTRUCTURE MAP

Source: Map prepared by Urban Enterprise, 2013.
5.9. PROPERTY AND SETTLEMENT RESEARCH

OVERVIEW

The following is a summary of key regional and municipal trends and drivers for rural property settlement patterns in Tweed Shire, as informed by a literature review.

5.9.1. OVERVIEW OF ECONOMIC IMPLICATIONS OF SOUTHEAST QUEENSLAND ON THE NORTHERN RIVERS REGION (2005)

Overview of Economic Implications of South East Queensland on the Northern Rivers Region (SGS Economics and Planning, 2005) has found that:

- The Northern Rivers Region is undergoing substantial social and economic change, driven by rapid increase in the region’s population, with changing land uses impacting the region’s natural environment. Many of the issues affecting economic development are driven by trends and influences that are sourced beyond region’s borders, particularly South East Queensland.
- Tweed Shire and the Northern Rivers Region are heavily influenced by the South East Queensland residential market, one of Australia’s fastest growing metropolitan regions. Tweed Shire’s proximity to Gold Coast in particular has supported employment opportunities for Tweed Shire residents. The report has found that the Shire is expected to support the majority of future dwelling and residential growth in the Northern Rivers region.
- Furthermore, the report highlights that Tweed Shire’s relatively affordable property values and its accessibility has also placed greater demand for housing from migrating interstate working migrants, fuelling residential developments in Tweed Heads and along the coastal corridor (particularly in Casuarina, Bogangar, Pottsville and Hastings Point).
- The report has also found that demand for ‘rural living’ housing opportunities in northern NSW is increasing, as land availability in Gold Coast continues to decrease. This region is experiencing development pressure in Tweed Shire’s coastal areas and productive agricultural land.

5.9.2. FAR NORTH COAST REGION RESIDENTIAL SUBMARKET ANALYSIS (2008)

Commissioned by the NSW Department of Planning, the Far North Coast Residential Submarket Analysis (Macroplan, 2008) provides an overview of the housing submarket, market segmentation and supply of the Far North Coast region of NSW. The following summarizes key findings of review of the document:

- The majority of future dwelling growth in Northern Rivers Region is expected to be supplied within Tweed Shire, with an estimated 19,100 new dwellings by 2031.
- The majority of new dwellings are expected to be concentrated in Tweed Heads and peri-urban areas (including Cobaki and Tweed Coast). The report highlights that ‘most development pressure appears to be centred on coastal communities [and] Murwillumbah’.
- The report identifies ‘seniors’ and ‘lifestylers’ as key market segments with the highest project population increases. As a result, there is likely to be increasing demand for retirement-related products, with accessibility to amenities and transport.
- Within the regional areas, Murwillumbah and Bray Park and areas close to the coast (e.g. Kiwale, Chinderah Kings Forest) will absorb the majority of regional dwelling growth.

5.9.3. TWEED URBAN AND LAND RELEASE STRATEGY (2009)

The Tweed Urban and Land Release Strategy (GHD, 2009) examines the population profile and forecasted land use demands from population growth in Tweed Shire. The Strategy identifies that:

- By 2031, population growth will create demand for approximately 16,000 houses and 10,000 units, requiring approximately 1,350 ha of urban land for development. Tweed Shire has approximately 1,533 ha of zoned residential land, which is estimated to support over 27 year supply of land for future population growth.
- Forecasted population will support the need for 35 additional community facilities, including 16 in Tweed Heads and 19 in Tweed Coast. The report indicates that, despite projected residential growth, the forecast population of rural Tweed Shire is unlikely to support the provision of additional social infrastructure facilities.
- Projected population growth has found that Cobaki Lakes and Kings Forest is anticipated to be classified as villages by 2031, while Tanglewood and Kunghur will be upgraded to a small village status.

5.9.4. COMPARISON OF POPULATION GROWTH PROJECTIONS

Figure 21 depicts the population growth projections outlined in the Far North Coast Residential Submarket Analysis (Macroplan Forecast - 2008) and Tweed Urban and Land Release Strategy (GHD Forecasts - 2009); in comparison to ProfileID population forecast data and actual population data (based on the ABS Estimated Resident Population - ERP).

The data shows that between 2006 and 2011, GHD and Macroplan forecasts have been marginally overestimated compared to Tweed Shire’s estimated resident population. However, in comparison to ProfileID forecast data, previous research undertaken has significantly underestimated Tweed Shire’s forecasted population level between 2026 and 2031.

ProfileID forecasts data suggests that the Far North Coast Residential Submarket Analysis and Tweed Urban and Land Release Strategy may be understating future dwelling and residential population levels in the long-term.

FIGURE 21 TWEED SHIRE POPULATION GROWTH PROJECTIONS
6. Tourism Profile

6.1. Introduction
Tweed Shire, together with the Gold Coast Region, is a significant national tourism destination. This section provides an analysis of the regional and local contexts for tourism.

Regional context is provided for the Gold Coast Region and Northern Rivers region, depicted in the figure below.

Local context is provided for Tweed Shire, including the rural areas (defined to include ABS geography of Tweed (A) – Pt B SLA) and urban/coastal areas (defined to include the ABS geographies of Tweed Coast and Tweed (A) – Tweed-Heads SLAs). These are depicted in the figure below.

Data relating to tourism visitation and visitor market profile is sourced from Tourism Research Australia (TRA) National Visitors Survey.

FIGURE 22 LOCAL TOURISM CONTEXT MAP

6.2. Summary of Tourism Profile
The following is a summary of the tourism industry in rural Tweed Shire:

- Tweed Shire is strongly linked to key tourism economy of Gold Coast Region. In 2011, the Gold Coast Region alone attracted 10.3 million visitors. In the same year, Tweed Shire attracted 147,700 visitors, comprising of 108,100 visitors to Coastal/Urban region and 39,600 visitors to Rural Region.
- Over the past 10 years, the Coastal/Urban has seen marginal levels of growth, in line with trends seen in the Gold Coast Region. However, the rural Tweed Shire have seen an average 8.1% annual growth in visitation over the same period, contributing the majority of visitor growth to the Shire. In particular, rural Tweed Shire has supported visitors from regional Queensland (including Gold Coast residents) and tourists of younger age brackets (both singles and couples).
- Development and marketing of rural tourism product has supported increased visitation over the past decade, through absorption of existing coastal visitor markets in Gold Coast and Tweed Coasts. Tourism in rural Tweed Shire features its network of villages and riverside hamlets, providing a quiet rural and rustic alternative to the coastal destinations of Gold Coast City.
- Rural Tweed Shire also hosts a number of nature-based activities within its World Heritage rainforests and mountain ranges, including the Wollumbin/Mt Warning Caldera, which was nominated on a list of 8 iconic sites across Australia. The National Park offers camping, cabins and hiking/bushwalking trails for nature-based visitors to Tweed Shire’s rural hinterland.

6.3. Gold Coast and Northern Rivers Regional Context
The following is a summary of the tourism industry profile for the Gold Coast Region and Northern Rivers region.

6.3.1. Total Visitation to Gold Coast and Northern Rivers Region
In 2011, the Gold Coast Region attracted 10.3 million visitors. In the same year, the Northern Rivers Region attracted 5.8 million visitors. For the major part of the decade, the tourism industry to both regions saw little change between 2001 and 2009. However, in recent years, the regions have seen an increase in visitation peaking at a combined total of 16 million visitors.

FIGURE 23 TOTAL VISITATION BY REGION, 2001–2011

Source: Tourism Research Australia, Year Ending 2013.
Figure 24 further indicates that the Northern Rivers Region managed to maintain a relatively constant visitor night trend, attracting 7.8 million visitor nights in 2011.

Over the same period, the Gold Coast Region suffered significant declines in visitor nights, peaking in 2002 at 16.7 million visitors. In 2011, the region attracted 13.3 million visitor nights. The data indicates that while the number of overnight visitors remains relatively contact to Gold Coast Region, they are having shorter stays.

**FIGURE 24 TOTAL VISITOR NIGHTS TO GOLD COAST AND NORTHERN RIVERS REGION, 2001–2011**

### 6.3.2. GOLD COAST AND NORTHERN RIVERS VISITOR SEGMENTS

Figure 25 shows that visitation growth to Gold Coast and Northern Rivers Region has been driven by the daytrip visitor markets, which represented 63% of total regional visitation. The overnight visitor market remained relatively unchanged over the past decade. The market accounted for 5.2 million visitors in 2011 or 32% of regional visitors.

The international market attracts a small yet strong presence within the region, supporting 832,000 visitors in 2011 or 5% of total regional visitation. The market also remained relatively unchanged over the past decade.

**FIGURE 25 TOTAL VISITATION BY VISITOR SEGMENT TO GOLD COAST AND NORTHERN RIVERS REGION, 2001–2011**

Source: Tourism Research Australia, Year Ending 2013.

### 6.3.3. VISITATION DISPERSAL

Figure 26 (on the following page) provides a detailed map of tourism visitation in 2011, adjusted to the size of the geographical areas. The tourism data shows that visitation is predominantly concentrated to the Gold Coast City, including the coastal areas of Tweed Shire. The data also shows high levels of visitation to Ballina and Byron Shire, driven by the picturesque Byron Bay.

Although rural and regional tourism is notably under-represented, tourism data indicates that the regional centres of Casino, Murwillumbah, Goonellabah and Scenic Rim support a moderate level of visitation.
FIGURE 26 TOTAL VISITATION PER SQUARE KILOMETRE, YEAR ENDING DECEMBER 2011

Source: Map compiled by Urban Enterprise using Tourism Research Australia, Year Ending December 2011 data.
6.4. LOCAL CONTEXT
The following is a summary of the tourism industry profile for Tweed Shire.

6.4.1. TWEED SHIRE TOURISM PRODUCT
The following provides a local context to the key tourism products and destinations within Tweed Shire. The local context has been informed by a literature review of the report Product Development Strategy Destination Tweed 2011 (Draft Report).

PASTORAL/RURAL SETTING AND VILLAGE HISTORY AND HERITAGE
- Pastoral setting and rural experience. Tweed Shire is characterised by its unique pastoral setting and scenic rural landscapes. This has supported the development of tourism products that compliment ‘rural escape’ experience (e.g. village arts and craft, farmers market, Rainforest Way), in contrast to coastal tourism settings of Gold Coast City and Northern Rivers Region.
- Village heritage. Tweed Shire, characterised by its network of villages, is also home to rich architectural heritage, including taverns and pubs along the river. Village museums offer an insight into the heritage and story of early settlers in Tweed Shire.
- Indigenous heritage. Tweed Shire is also home to a number of Indigenous tourism attractions including the Wollumbin/Mt Warning Caldera and Minjungbal Aboriginal Cultural Centre, which exhibiting local artefacts, craft and heritage of the Minjungbal people.

NATURE BASED AND ADVENTURE TOURISM
- World Heritage Rainforest. Nominated by Tourism Australia as a National Landscape, Tweed Shire offers World Heritage rainforests and mountain ranges in the hinterland regions, in close proximity to coasts and beaches.
- Mt Warning (Wollumbin). In 2008, the Wollumbin/Mt Warning Caldera was nominated on a list of 8 iconic sites across Australia. The National Park offers camping, cabins and hiking/bushwalking trails for nature-based visitors to Tweed Shire’s rural hinterland.
- Wildlife tours. The Shire offers wildlife viewing opportunities, including whale watching cruises and snorkelling with turtles along its coastal areas.
- Eco tours. Tweed Shire supports eco tours and school activities of wildlife and indigenous rainforests heritage in its National Parks.
- Rainforest Way. The Way represents a road touring product that circuits a number of townships and rainforests parks in Tweed Shire and South East Queensland, allowing visitors panoramic views of ranges, waterfalls and creeks.
- Water based tourism
  - Water sports activities. Tweed Shire offers a number of water sport opportunities along its river and coastal water bodies, including swimming, surfing, windsurfing, kayaking and canoeing. These activities are concentrated to Tweed Heads and coastal areas.
  - Snorkelling and diving. Tweed Shire supports diving and snorkelling opportunities along the coast, including activities with wildlife (turtle viewing).
  - Deep sea fishing charters and rivers cruises. The Shire supports tours to the Tweed River and Pacific Ocean; activities include deep sea fishing, crab catching and a tour of oyster farming in Tweed Heads.

FESTIVALS, ARTS AND CRAFT
- Village arts and craft. The Shire is characterised by its network of villages, providing a quiet rural and rustic alternative to the coastal destinations of Gold Coast City. Outside Tweed Heads, Tweed Shire supports visitation to a number of hamlets, river ports and seaside fishing villages.
- Tweed Valley Art and History Trail. The natural landscapes of the Tweed Valley have supported inspiration for artistic activities within the Shire. The Art and History Trail offers visitors self-guided tours of village, craft producers and art galleries, dispersed along the Tweed Valley.
- Festivals and events. A number of festivals are hosted in the Shire, inspired and supported by the agricultural and rural landscape of the region. These include the Tweed River Festival, Tweed River Agricultural Show and a number of art and music festivals. The Shire also hosts a number of sporting events including the Greenback Fishing Competition, Head of the Tweed and various Surf and Life Saving carnivals.

FOOD AND WINE TOURISM
- Farmers markets. Given its agricultural landscape, Tweed Shire is home to a number of farmers markets, selling unique local produce and food products. The farmers markets are located in the various village and urban centres of Twee Shire’s coastal areas and rural hinterland.
- Farm gate. Local farmers provide roadside stalls for visitors, selling freshly harvested produce. In particular, destinations like Tropical Fruit World and Buck’s Farm support samplings of locally-grown fruits and nuts. Tweed Shire supports tours to major food processing plants including Condong sugar mill.
- Coffee and tea production. The climate of Tweed Shire supports coffee and tea growing, unique to the Australian climate. Visitors are able to visit local farms and processing plants, and sample locally grown coffee and tea in the rural hinterland.
- Wine. Ilam Estate is a major winery in Tweed and a significant rural tourist attraction, offering wine tours and tastings.

ENTERTAINMENT
- Clubs, taverns and pubs. Entertainment is concentrated toward the urban areas, including 8 registered clubs, 12 pubs and a number of village taverns.
**ACCOMMODATION**

The following table depicts the number of accommodation establishments and rooms in Tweed Shire, by regional location.

In 2011, tourist visitation supported over 67 accommodation establishments and 1860 guest rooms in Tweed Shire. The data indicates that over 42% of accommodation establishments are located within the rural areas of Tweed Shire, with the remaining 58% located along the coastal/urban areas. However, when accounting for room capacity, the data indicates that 88% of room supply is located within the coastal/rural areas, with the remaining 12% located in rural areas.

**TABLE 34 TWEED SHIRE ACCOMMODATION SUPPLY, 2011**

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Establishments</th>
<th>% of total establishments</th>
<th>Number of Rooms</th>
<th>% of total room capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural area</td>
<td>28</td>
<td>42%</td>
<td>222</td>
<td>12%</td>
</tr>
<tr>
<td>Coastal/urban areas</td>
<td>39</td>
<td>58%</td>
<td>1638</td>
<td>88%</td>
</tr>
<tr>
<td>Total - Tweed Shire</td>
<td><strong>67</strong></td>
<td><strong>100%</strong></td>
<td><strong>1860</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>


Figure 27 suggests this is attributed to the concentration of high density accommodation (hotels, resorts, apartments) along the coastal and urban areas; conversely, low density fixed accommodation was concentrated in the rural areas (motels, retreats/lodges, bed and breakfasts, etc).

**FIGURE 27 PROPORTION OF ROOM CAPACITY, BY ACCOMMODATION TYPE AND LOCATION, 2011**

**VISITOR TRENDS**

6.4.2. TWEED SHIRE – VISITOR MARKET PROFILE

**VISITOR TRENDS**

Figure 28 depicts total visitation to Tweed Shire between Year Ending December 2001 to Year Ending December 2011.

In 2011, Tweed Shire attracted 1,477,000 visitors, comprising of 1,081,000 visitors to Coastal/Urban region and 396,000 visitors to Rural Region. Over the past 10 years, the Coastal/Urban has seen marginal levels of growth, achieving an annual change of 0.9%.

In contrast, the rural areas have seen an average 8.1% annual growth in visitation, with positive changes especially seen between 2009 and 2011. Growth may reflect emerging product in rural villages (e.g. new cafes) and impact of regional marketing campaigns (including promotion of the Rainforest Way touring loop).

**FIGURE 28 VISITATION TREND – TWEED SHIRE, 2001 – 2011**

RURAL VISITOR SEGMENTS

In 2011, visitation to Tweed Shire mainly comprised of the daytrip market, which supported 296,000 visitors or 74% of rural tourist visitation. This is followed by the overnight visitor markets, including 100,000 visitors or 25% of rural visitation. The rural areas only attracted a small number of international visitors, comprising of 1% of total visitation to rural Tweed Shire.

FIGURE 29 MARKET TYPE

PURPOSE OF VISIT

Figure 30 depicts the proportion of visitors to rural and urban-coastal Tweed Shire, by purpose of visit in 2011.

Visitors to Urban-Coastal Tweed Shire comprised mainly of visitors on ‘holiday or leisure’ (58% of the market), followed by ‘visiting friend and relatives (31%).

In contrast, visitors ‘visiting friend and relatives’ comprised of nearly half the visitor market to rural Tweed Shire. This is followed by visitors for ‘holiday or leisure’ purposes, with 38% of total rural visitors.

FIGURE 30 PROPORTION OF VISITORS BY PURPOSE OF VISIT, YEAR ENDING DEC 2011

LENGTH OF STAY

The following figure depicts length of stay to rural and urban/coastal Tweed Shire in year ending December 2011.

Tourism Research Australia data indicates that the average length of stay in rural Tweed Shire is 1.7 nights; in comparison, coastal/urban Tweed Shire supports an average length of stay of 3.7 nights.

Rural Tweed Shire is found to attract a high proportion of 1-2 night visitors, representing 65% of the market. In contrast, 1-2 night visitors represent 44% of overnight visitors to urban/coastal Tweed; a larger proportion of visitors stay from 4 to 7 nights in the urban and coastal regions, suggesting that a higher provision of accommodation and tourism product in these areas, compared to rural Tweed Shire.

FIGURE 31 LENGTH OF STAY – RURAL TWEED SHIRE, 2011

Source: NVS Tourism Research Australia data, Year Ending Dec 2011.
VISITOR ORIGIN

Figure 32 and Figure 33 depict the proportion of overnight and daytrip visitors to Tweed Shire, by place of origin.

Figure 32 shows that the majority of daytrip visitors to rural Tweed Shire originate from Regional Queensland (45% of the market). In contrast, urban and coastal Tweed Shire visitors mainly originate from Regional New South Wales (55%).

**FIGURE 32 VISITOR ORIGIN – DAYTRIP VISITORS TO TWEED SHIRE, 2011**

![Daytrip Visitors to Tweed Shire](image)

Figure 33 shows that the majority of overnight visitors to rural Tweed Shire originate from Queensland (including 31% from Regional Queensland and 31% from Brisbane). Regional New South Wales contributes a sizable 28% to overnight visitation in rural areas. Similar trends were seen in urban and coastal Tweed Shire, with visitors originating mainly from Brisbane (32%), regional Queensland (23%) and Regional New South Wales (14%). However, the urban and coastal areas are found to have a higher proportion of visitors from Sydney and Victoria compared to rural Tweed Shire.

**FIGURE 33 VISITOR ORIGIN – OVERNIGHT VISITORS TO TWEED SHIRE, 2011**

![Overnight Visitors to Tweed Shire](image)

LIFECYCLE GROUP

Figure 34 depicts the proportion of visitors by lifecycle group for rural and urban/coastal Tweed Shire. Due to low sample sizes, data has been sourced to the average visitation for Year Ending December 2008 to December 2011.

The tourism data indicates that the major lifecycle groups to rural Tweed Shire include ‘young single living at home’ (15% of market), ‘young/midlife couple, no kids’ (15%) and ‘parent with youngest child aged 15+’ (12%).

In contrast, major lifecycle groups visiting urban/coastal Tweed Shire include ‘parent with youngest child age 5 or less’ (18% of market), old non-working married person (17%) and ‘older working married person’ (13%).

The data indicates that the family markets are prominent in both urban and rural Tweed Shire. However, younger visitors (singles and couples) have a higher proportion of visitation to rural Tweed; urban/coastal areas are found to have a higher proportion of older couples (reflecting the retiree market).

**FIGURE 34 PROPORTION OF VISITORS BY LIFECYCLE GROUP, TWEED SHIRE – AVERAGE 2008 TO 2011**

![Lifecycle Group Distribution](image)
VISITOR AGE PROFILE

Figure 35 depicts the proportion of visitors by age group, in rural and urban/coastal Tweed Shire. Due to low sample sizes, data has been sourced to the average visitation for Year Ending December 2008 to December 2011.

The data shows that compared to urban/coastal Tweed Shire, rural coastal Tweed Shire attracts a higher proportion of younger visitors; 32% of the rural visitor market is represented by visitors aged 15-24 years.

In contrast, urban/coastal Tweed Shire is found to have a higher proportion of older visitors. The largest age group represented includes visitors aged 45-64 years, representing 32% of the urban/coastal visitor market.

**FIGURE 35** PROPORTION OF VISITORS BY AGE GROUP, TWEED SHIRE – AVERAGE 2008 TO 2011

Source: NVS Tourism Research Australia data, Average Year Ending Dec 2008 to Dec 2011.

ACCOMMODATION TYPE

Figure 36 depicts the proportion of visitors by accommodation type used, in rural and urban/coastal Tweed Shire. Due to low sample sizes, data has been sourced to the average visitation for Year Ending December 2008 to December 2011.

The data shows that in both rural and urban/coastal areas, ‘friends and relatives property’ formed the major type of accommodation used.

Urban/coastal Tweed Shire is found to have a higher proportion of visitors for all types of commercial accommodation (except for Guest House or B&B), compared to rural Tweed Shire. The data suggests a lack of commercial accommodation provision in the rural areas.

**FIGURE 36** PROPORTION OF VISITORS BY ACCOMMODATION USED, TWEED SHIRE – AVERAGE 2008 TO 2011

Source: NVS Tourism Research Australia data, Average Year Ending Dec 2008 to Dec 2011.
This section provides an overview of rural land use and assessment of land capability in Tweed Shire.
7. Principal Rural Land Uses

7.1. Area of Land Uses in Tweed River Basin

The following table provides the statistical breakdown by area of rural land use categories in Tweed Shire as defined by the Commonwealth Government’s Australian Resources Atlas.

The table identifies that the main rural land use categories in Tweed Shire by area and percentage cover are agriculture, ‘Minimal use’ (understood to be uncleared private land and ‘nature conservation’ on public land. The document Soil Landscapes of the Murwillumbah-Tweed Heads 1:10000 Sheet (Morand, 1996) provides a succinct description of rural land use across the Shire.

The area designated as agriculture contains a full range of property sizes from large commercial farms to small lot rural living properties. There is no category identified rural lifestyle living. As rural lifestyle living land is often used for agriculture or other uses, the area of land used for rural lifestyle living per se has not been defined.

Table 35 Area of Land by Area and Percentage Occupied by Main Rural Land Use Categories in Tweed Shire

<table>
<thead>
<tr>
<th>Land Use Description</th>
<th>Total Extent (000 ha)</th>
<th>Total Extent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>57.4</td>
<td>53.40%</td>
</tr>
<tr>
<td>Minimal use (uncleared private land)</td>
<td>28.2</td>
<td>26.10%</td>
</tr>
<tr>
<td>Nature conservation (public land)</td>
<td>17.4</td>
<td>16.20%</td>
</tr>
<tr>
<td>Forestry</td>
<td>2.4</td>
<td>2.20%</td>
</tr>
<tr>
<td>Built environment</td>
<td>1.7</td>
<td>1.60%</td>
</tr>
<tr>
<td>Waterbodies not elsewhere classified</td>
<td>0.5</td>
<td>0.50%</td>
</tr>
</tbody>
</table>

Source: Australian Natural Resources Atlas Website (2001)

7.2. Primary Industry

7.2.1. Agriculture (Including Farming and Horticulture)

Fertile soils and a favourable subtropical climate produce a diversity of agricultural landscapes in Tweed Shire. The volcanic soils of the Cudgen-Duranbah plateau enable intensive horticulture production. The floodplains primarily support sugar cane production. Elevated basaltic slopes and marginal lands support bananas and cattle grazing and contain much retained biodiversity.

Tweed Shire’s main agricultural industries, based upon their monetary value, are: Sugar (29%), Vegetable and Nurseries (27%), Beef (17%), Bananas (15%), and Dairy (6%). (Source ABS 2010-11 Agricultural Census).

Sugar, horticulture and bananas are the Shire’s key agricultural commodities. Together, they make up more than half Tweed Shire’s agricultural production in gross value in 2010-11. Tweed Shire produced almost 27 per cent of the state’s sugar in 2010-11, on almost 8000 hectares. During the same financial year, Tweed Shire produced over 30 per cent of the state’s bananas on 600 hectares. In recent years the area of bananas planted has diminished due to competition from growers in north Queensland and the spread of the soil-borne Panama Disease.

Tweed Shire farming community is ageing, in line with NSW and national trends. Younger people are less likely to enter the agricultural industry as market conditions render it increasingly difficult for farmers to achieve viable returns.

While the volcanic soils of the Cudgen-Duranbah plateau and the floodplains are identified as state and regionally significant agricultural land and are protected from non-agricultural development, there is an increasing demand for non-agricultural uses of unprotected agricultural land. In particular, more people are seeking to purchase agricultural land as a lifestyle option.
FIGURE 37 LOCATIONS OF WHERE CROPS AND GRAZING HAVE OCCURRED (1998)

Locations of Where Crops and Grazing Occurred in 1998
- Intensive vegetable crops and horticultural tree crops
- Sugar cane, soya beans, grazing
- Vegetables and horticultural tree crops
- Grazing
- Bananas using special plantation management
- Horticultural tree crops using special orchard floor management
- Not suitable for agriculture (Suitable for forestry, nature conservation, parks, passive tourism and water catchment)

Source: Tweed SP, AGRIC, LAND, SUIT, POLYGON
Agricultural Land Suitability, NSW Department of Agriculture (1996)
Traditional log products include sawlogs, veneer logs, poles, piles and girders. Specialist timber makers include furniture, joinery, engineered structural components, parquetry and strip flooring utilising higher value hardwoods. The region is the only area in Australia that produces such a wide range of timber products. The NSW Government has encouraged policies that attract investment in value adding facilities. There is considerable current interest and trials into the use of forest and sawmill residues as bio-fuels.

Changes in land use in Tweed Shire since the 1960s have led to the proliferation of the noxious weed Camphor Laurel. In particular, the transition from intensive dairy farming to extensive beef cattle grazing, with its increase in absentee ownership of land and reduced commitment of labour to weed control, has led to the spread of the species across considerable areas of former dairying land. The species has also infested the sites of abandoned banana plantations, and roadside verges. It also prevails along stream banks, and in gullies, on steep slopes, and on rocky and other less accessible areas.

The study From Pest to Profit: Prospects for the Commercial Utilisation of Camphor Laurel (Cinnamomum camphora) in the Northern Rivers Region of New South Wales by the Centre for Coastal Management, Southern Cross University, 1999 identifies that at 1999 formal and informal trading in the harvesting, milling and value adding of camphor laurel in north-eastern New South Wales exceeded one million dollars per annum in turnover, and involved the full-time and part-time employment of more than thirty persons. The capacity for this turnover to expand exists primarily because of the confirmation of a significant available resource of more than 50,000 cubic metres of millable timber, which could support in the long term substantially higher rates of usage than at present, and secondly because of the opportunity to integrate the conventional timber harvesting techniques with removal and clearing of camphor trees for the establishment of eucalypt plantations, the marketing of biomass for green power production, and the extraction of natural oils. The report stated that timber production alone could expand substantially provided that adequate support is given to nurture a structure that will develop standards and procedures able to meet the commercial demands of the market.

7.3. RURAL INDUSTRIES (INCLUDING VALUE ADDING ENTERPRISES) AND EXTRACTIVE INDUSTRY

7.3.1. AGRIBUSINESS

Major agribusiness in Tweed Shire includes the sugar mill at Condong, Tropical Fruit World and Murwillumbah cattle yards (recently closed). A number of businesses operating in Tweed Shire provide agricultural merchandising, agricultural financing and rural real estate.

Various agricultural processors also operate near the Shire. These include sugar milling at Broadwater and Harwood, poultry processing at Byron Bay, dairy processing at Casino and Lismore, cattle abattoirs at Casino and macadamia processing near Lismore (RDA 2010).

Training in agriculture is limited in Tweed Shire. The TAFE College offers one course in biological farming and one high school offers a subject on agriculture, a remnant of the former Murwillumbah Agricultural College. The closest tertiary agricultural training occurs in Gatton or Armidale. Lismore’s TAFE campus offers courses in various agricultural subjects.

7.3.2. EXTRACTIVE INDUSTRIES

A number of quarries that are widely distributed within Tweed Shire (depicted in Figures 37 and 38) provide stone for road making and construction purposes.

Rural living development close to extractive industry sites can be problematic due to potential for noise and dust creation. The Draft LEP (2012) identifies that the Mineral Resources branch of the NSW Department of Industry and Investment has been involved with Tweed Shire Council in the ongoing consultations regarding the draft LEP. Council has been provided with latest Mineral Resource Audit (May 2011). The zoning of resource areas has been analysed and no changes that might prohibit or restrict mining or quarrying have been identified.

Tweed Shire has many extractive industry sites including four identified by the Department of Urban Affairs and Planning as being of regional significance (DUAP, 1999). These sites should be protected from encroachment by incompatible urban land uses until the resource has been exhausted. The NSW Department of Primary Industries identifies in a Section 117 Direction a suitable buffer for each site and these should be regarded as unsuitable for urban development.
7.4. BUILT DEVELOPMENT IN RURAL SETTINGS

This topic includes any built development proposals located in rural settings such as development related to rural lifestyle living and other rural based accommodation (e.g. tourism).

The current Tweed LEP provides strong emphasis on the economic and social importance of rural lifestyle living within and to the Shire.

‘Rural lifestyle living’ can be broadly described as living in a rural setting, on land not primarily used for agriculture. The Rural Living Zone in Tweed Shire LEP is based on a more specific development definition. While agriculture may occur, it will be ancillary to the use for a dwelling and the amenity of a rural setting. The agriculture on rural living land is likely to be carried on for ‘lifestyle’ reasons and is unlikely to provide a major source of household income. Because its function is primarily lifestyle, it can typically also generate expectations for Council services that may normally be provided in urban sectors. Rural lifestyle living can include dwellings on existing single lots, or on subdivided lots, or on clustered low-density lifestyle developments.

Tourism facilities developed to capitalise on the scenic resources of the shire are considered less likely to require more intensive Council services.

Rural lifestyle living is widespread in the Shire and it is widely understood in Australia that its effects can have environmental, social and economic consequences. These effects can be broadly summarised as follows:

- Much of the land in the Shire is not well suited to common septic systems mainly due to slope, shallow soil depth, or flooding. In addition, septic systems require maintenance to remain efficient. On sloping land, degradation hazard becomes progressively greater with increasing steepness and development and maintenance costs rise commensurately. Lack of maintenance of effluent disposal systems can result in public health issues including odour problems and waterway pollution.
- Increased costs and inefficient allocation of public resources for infrastructure and services including: roads and bridges, and environmental, social, and health services.
- Land use conflict commonly occurs where agricultural activities are relatively close to dwellings and other accommodation that are not associated with agriculture. This can be associated with activities such as (but not limited to) the use of farming plant and equipment (tractors, trucks motor bikes, pumps, lights, scare guns etc), the use of guns, sprays and fertilizers, the movement of stock transports, or other actions, which may be of concern mainly to local non-farming landowners (either in adjoining urban areas or on rural living properties). New residents into farming areas may not have appropriate experience, skills or interests in land management, or the appropriate control of domestic pets including dogs and cats. Non farming residents on land adjoining farms are often unwilling to accept the need to adapt to rural living needs, and rural landowners may have to deal with matters including stray dogs and cats, lack of weed control, ineffective effluent management. The same matters can arise where urban development abuts farming land.
- Conversion of land from agriculture to rural living or small scale production units through subdivision and associated development of domestic/non-farming infrastructure becomes a permanent land use change. The loss of agricultural land to rural living can affect the ability of farm businesses to consolidate and achieve economies of scale. This can also impact on the longer-term viability of particular agricultural enterprises from impacts such as the elevation of land prices to ‘non-agricultural levels’ where reasonable return on investment cannot be anticipated.

7.5. RURAL RESIDENTIAL OPPORTUNITIES AND VILLAGE EXPANSION

Tweed Shire and the Northern Rivers Region are heavily influenced by South East Queensland property settlement trends. South East Queensland remains one of Australia’s fastest growing metropolitan regions, encompassing the major Gold Coast and Brisbane growth areas. The Queensland government projects that the Gold Coast Region will grow by 371000 between 2006 and 2031. However, the urban sprawl of Gold Coast across the NSW-QLD border has placed greater demand for housing from interstate working migrants, fuelling residential developments in Tweed Heads and along the coast, as seen in Casuarina, Kingscliff, Cabarita and Pottsville.

Tweed Shire is expected to provide the majority of future dwelling and residential growth in the Northern Rivers region, given its location in close proximity to Gold Coast City and the Queensland border. Research anticipates the continued need to provide a range of housing types within Tweed Shire, to cater for the ageing population and younger migrating families.

Research indicates that the majority of future dwelling growth will be concentrated within the Tweed Heads urban area, the peri-urban Cobaki growth area and Tweed Coast. Within the rural Tweed Shire, Murwillumbah, Bray Park and areas close to the coast (e.g. Kielvale, Kings Forest) will absorb the majority of regional dwelling growth. By 2031, Cobaki Lakes and Kings Forest is anticipated to be classified as Villages, while Tanglewood and Kunghur will be upgraded to a small village status.

Rural villages have historically been located near the base of valley floors, above high frequency flood levels, below steeper hill country, and adjacent to agricultural land. This provided ease of access to the village water supplies, transportation and other infrastructure services.

Village boundaries have generally remained static since the early days of settlement. With increased population pressure and improved access, transportation and utilities infrastructure, village boundaries may periodically require expansion.

The following principles for expansion of villages onto rural land reflect sound planning practice and cater for the protection of public assets and human life. These principles are sourced from a range of planning documents including State housing code documentation. Principles for rural village expansion include the following:

- The Shire Council has identified a strategic need for such expansion on the basis that there is limited supply of land in the village that is suitable for residential development, and that expansion is seen as orderly and efficient development that should occur in the interests of the wider community.
- Designation of village expansion land will be subject to a detailed study of the capability and suitability of the land for such purpose, in order that the implications of development are clearly understood, for matters including the installation of underground services including reticulated water and sewerage (where or if intended), and power.
- As a fundamental basis of orderly planning, any expansion should cater for future demand for a planning period of up to 15 years.
- Any expansion should occur in areas where reticulated services are capable of being installed.

19 Tweed Urban and Land Release Strategy 2009
• Expansion cannot occur into land that is designated to be high hazard or high risk flood control lots including floodways, flood storage areas, a flowpath or areas identified in local flood plans as high hazard or high risk.

• Expansion cannot occur into land that is designated high risk bush fire prone land (BAL 40+ or BAL FZ).

• Expansion cannot occur into areas of designated high quality native vegetation.

• Expansion cannot occur on high quality or strategically important agricultural land unless strategically justified to do so.
FIGURE 39 EXTRACTIVE INDUSTRY SITES BY OPERATIONAL STATUS
8. NATURAL RESOURCES PROFILE

8.1. INTRODUCTION
Tweed Shire contains a diverse natural resource profile. It consists of a wide range of geological and soil landform types. It also contains exceptional biodiversity and other natural environmental assets (including landscape and scenic appeal) across public and private land. Linear reserves along streams and road reserves also contain strong biodiversity values both in their biodiversity content and in their functions as biodiversity corridors.

Acid sulphate soils, flooding, soil erosion and mass movement present important and widespread land degradation hazards to agricultural land, streams, coastal areas, and the built environment.

8.2. GEOLOGY
The Tweed Heads 1:250 000 Geological Map (1972) 1st Edition identifies the geology of Tweed Shire. The map is depicted in Figure 40, on the following page.

8.2.1. GEOLOGICAL HISTORY
The following descriptions of the geological history of Tweed Shire are sourced from descriptions of Stevens 1977, and Graham 2001 via the Tweed Vegetation Management Strategy 2004 (Volume 2).

The shire contains the remnant caldera of the Mount Warning shield volcano. The caldera consists of three distinct geomorphological features; the central elevated massif (Mt. Warning), the erosion caldera and the dissected outer rim. The Mount Warning caldera is one of the major examples of this landform in the world. It is notable for its size, for the presence of a prominent central mountain mass and because the Tweed River has eroded the caldera floor down to basement rock. The caldera landscape started to form about 360 million years ago when the land was below sea level on the continental shelf. Inland of the coastline at that time a barren volcanic mountain range underwent relatively rapid weathering and erosion due to the moist climate. The resulting sediments were washed onto the continental shelf and into a deep offshore trench. They accumulated and compressed over millions of years to produce sedimentary rocks. Movement of and underneath the continental shelf forced the sedimentary layers upward. Numerous folds and faults occurred due to the extreme pressure. These rock layers became known as the Beenleigh Block and the rock series as the Neranleigh-Fernvale Beds. These emerged as dry land around 245 million years ago.

Twenty million years later the Chillingham Volcanic seam opened between the Beenleigh Block and the Clarence-Moreton Basin to the west. This produced flows of rhyolite and layers of tuff, agglomerates and breccia. These were later largely covered in sediments known as the Woogaroo Sub-group and the Bundamba Group. Later still the Walloon Coal Measures were laid down over the Clarence-Moreton Basin to the west. This was followed by around 120 million years of relative inactivity.

Continental drift occurred northwards until approximately 25 million years to above a hot spot in the earth’s surface overlying a large volume of molten magma of largely basaltic origin. This forced its way up through lines of weakness in the earth’s crust, creating fissures and flows of lava onto the surface and into the drainage lines and valleys of the landscape. These fissures would have developed into cones as the volume of magma increased. The main flow would most probably have been the Mount Warning central mass but a number of other satellite flows would have occurred from other vents and fissures in the region. These flows covered most of the earlier volcanic and sedimentary deposits stretching from Tamborine in the north to Cobaki in the south and Kyogle in the west and out to sea. It is understood that over several million years these flows formed a low dome or shield volcano approximately 2000 metres high.

It is thought that the newly formed mountain would have attracted high coastal rainfall particularly on the eastern slopes. This would have commenced weathering of the lava flows, and a drainage system of radial stream patterns would have formed around the central cone. This process continued over time leading to the slow deepening and broadening of the original streams. Stepped valley sides, escarpments and steep cliffs formed where more resistant rock formations were encountered. Broadening continued as softer materials eroded around the resistant flows and old vents, which are now visible as rock outcrops or “doughboys” and rocky coastal headlands. Waterfalls developed at the heads of gullies on particularly resistant flows and these too eroded gradually upstream forming steep sided gorges.

The Tweed River eroded in a north-east direction. Stevens (1977) asserts that while it is not possible to determine if the river breached the crater and increased its catchment, it is probable that tributaries eroded back along a slope with very little gradient change. The headwaters of the river eroded westward to form the amphitheatre-like structure of the northern and north-western erosion caldera. The irregular escarpment shape is then the result of wider stream spacing and ‘hard rhyolite overflows that protect these basaltic promontories’. In the western area of the caldera, erosion through parallel scarp retreat was aided by the presence of soft sandstones and shale. The escarpment has receded uniformly from activity associated with drainage by closely spaced parallel streams. Much of the eastern rim of the caldera escarpment has completely eroded and sediments carried downstream have deposited as alluvium on the increasingly broad floodplain adjacent to the Tweed River system.

The Tweed Vegetation Management Strategy states that the continuing historical erosion has been accelerated by the clearing of vegetation for agriculture and timber particularly on the lower slopes and floodplains of the region.

Section 8.3 describes the landforms that more broadly contribute to the character and physical capabilities of the land across the shire to support human activity.

The geological parent material and the dominant geomorphic processes associated with the Caldera combined with climate are responsible for the formation of the soil and present landscape, valued biodiversity, and land use capability. These features are discussed throughout this report.
FIGURE 40 GEOLOGY OF TWEED SHIRE AND SURROUNDS

Source: Tweed Shire Council.
8.3. MAJOR LANDFORMS

Landform is a function of geology and geomorphic processes. Tweed Shire contains a diverse range of landforms that closely reflect its complex geology, variable topography, and wide range of soil types.

The Shire’s main landforms are identified and described in Morand 1996 and depicted in Table 36. Primarily, the Shire is encircled by three mountain ranges: the McPherson Range in the north, the Tweed Range (west) and the Border-Nightcap Range (south). (Note: Figure 41 provides the best landform map available at October 2013)

The former NSW Department of Land and Water Conservation (DLWC) described eight physiographic regions in Tweed Shire, as identified and described in the following map and table.

The NSW Soil and Land Information System (SALIS) provides a substantial database of information collected by earth scientists and other technical experts. SALIS contains descriptions of soils, landscapes and other geographic features, and is used by the NSW Government, other organisations and individual people to improve planning and decision-making for land management. SALIS contains physical and chemical data from more than 70,000 points across NSW. The information is collected by field staff and many other contributors, who are stated on the webpage to add thousands of extra collection points annually.

However no soil type maps that cover Tweed Shire are published. The Soil Landscape descriptions in Table 37 provide broad description of the soils for Soil Landscape groups, suitable for strategic planning purposes.

<table>
<thead>
<tr>
<th>TABLE 36 LANDFORM DESCRIPTIONS FOR TWEED SHIRE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Landform</strong></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Tweed-Byron Coast</td>
</tr>
<tr>
<td>Tweed Estuary</td>
</tr>
<tr>
<td>Burringbar Hills</td>
</tr>
<tr>
<td>Border-Nightcap Range</td>
</tr>
<tr>
<td>Mount Warning Massif</td>
</tr>
<tr>
<td>Tweed Volcano Caldera</td>
</tr>
<tr>
<td>Terranora Hills</td>
</tr>
<tr>
<td>Mackellar Hills</td>
</tr>
</tbody>
</table>

Source: Soil Landscapes of the Murwillumbah-Tweed Heads, Morand, D.T.

---

FIGURE 41 LANDFORMS OF TWEED SHIRE

Source: Soil Landscapes of the Murwillumbah-Tweed Heads, Morand, D.T.
8.4. SOIL LANDSCAPES

In this report the primary basis for interpreting the land and its capabilities for a range of uses is described in the NSW Department of Land and Water Conservation (DLWC) report 'Soil Landscapes of the Murwillumbah-Tweed Heads 1:100000 Map Sheet' (Morand, 1996). Soil Landscapes combine land and soil characteristics. They are not soil units and Soil Landscape maps are not soils maps, but include common slope ranges, land shapes and soil associations. They are used because they consider land as a whole. At the strategic level, the land within a Soil Landscape has similar land capability for a nominated use and responds in a similar way to management. Soil Landscapes can be used to provide an indicative view of land capability limitations for a range of uses including agricultural and other uses such as for roads, excavation, batter stability, and the operations of on-site waste management systems.

A Soil Landscape area contains a common suite of soil types and landscape attributes. These are described by Morand as areas that have been subject to similar geomorphological processes with ‘recognisable and specifiable topographies and soils that are capable of presentation on maps, and can be described by concise statements’. They provide a useful basis for considering issues relating to land degradation and land capability. Soil Landscapes in Tweed Shire are described in Table 37 and depicted in Figure 1. Soil Landscape map unit boundaries were delineated at 1:25 000 scale and published at 1:100 000. Soil Landscape units of less than 40 hectares were generally not mapped.


There are 42 Soil Landscapes in Tweed Shire within eight broader Soil Landscape Groups:

- Estuarine Soil Landscape
- Beach, Aeolian and Swamp Soil Landscapes
- Residual Soil Landscape
- Colluvial Soil Landscapes
- Erosional Soil Landscapes
- Erosional, Transferral And Alluvial Soil Landscapes

8.5. USE OF SOIL LANDSCAPES IN EVALUATING THE LAND

Land evaluation is a key process for sound land use planning by landowners, local and State government agencies, and rural community groups. It helps avoid mistakes that can be costly to the user and permanently damage the land itself. Land evaluation can help optimise land use where demands and objectives are multiple and often conflicting, and is essential in identifying best land management practice.

Rural land in Tweed Shire is under pressure for subdivision and rural lifestyle development. Accompanying such pressure there is potential for soil and landscape related problems including acid sulphate soils, landslips, flooding, on-site and regional waste disposal, soil erosion and sedimentation. Morand (1996) states that the Soil Landscape map of Tweed Shire provides a soil and landscape inventory and identifies major soil and landscape limitations for both urban and rural development, which will assist with the orderly planning and development of the Shire. He further states that the use of Soil Landscapes as mapping units allows the integration of soil and topographic constraints into one unit so the map can be viewed in terms of limitations for urban and rural development.

For each Soil Landscape Morand describes both soil limitations and landscape limitations, and describes hazards for development and agriculture. Landscape limitations may include steepness of slope, mass movement hazard and rock outcrop. Soil limitations may include erodibility, erosion hazard, linear shrinkage, mass movement, permeability, stoniness and fertility. These limitations impact on, for example, the land capability for septic absorption, building foundations, cultivation and grazing.

A good description of Soil Landscapes and their use in land evaluation and land use planning is provided in the information document of the former DLWC, titled ‘Take the Guesswork out of Land Use Decision Making: Soil Survey for Wise Land Management’, Soil Facts No. 2. The document can be found on the NSW Government website.21

The content of the document is summarised as follows:

Soil Landscape maps and accompanying reports involve the collection and interpretation of data, which is essential for the broad planning of land use, land management, and the prevention and remediation of land degradation. They provide a clear and consistent picture of the soils across NSW in a landscape context for:

- resource allocation to address land and water quality degradation issues;
- identifying areas where sustainable development opportunities exist; and
- providing a reliable base for land use and land management decisions.

The Soil Landscapes concept recognises that soils occur naturally. The landscape (land surface shape, soil parent material and vegetation) can be used to distinguish mappable areas of soils because the formation of landscapes and soils is interrelated. Both have been subject to the same processes and influences over time. Soil Landscapes provide a means to merge soil and landscape qualities into a single mapping unit, recognising that land management constraints relate to both land and soil limitations. Soil Landscapes are also the key to understanding catchment processes and can help predict how ecosystems and hydrology will react if an aspect of the catchment is altered.

Each Soil Landscape map and report produced by DLWC includes a comprehensive report, an accompanying map and the ability to interpret and create a series of derivative maps. Derivative maps combine and filter Soil Landscape information to show how soil and land varies in its behaviour or suitability for specific purposes. The information can be combined and recombined in a number of ways to help resolve a large number of regional landscape management problems.

Soil Landscapes and derivative products are designed for regional decision making by providing an indication of what can be expected at any particular site. They are not designed for critical or expensive land use decisions for specific sites or at property level. In such cases, on-site inspections are appropriate.

In this Project derivative maps are provided that illustrate land capability limitations for rural subdivision development and agricultural uses at a scale suitable for strategic planning. These maps show land capability limitations for building foundations, septic absorption, regular cultivation and grazing for all soil landscapes in Tweed Shire.
8.5.1. SOIL LANDSCAPES AND URBAN LAND CAPABILITY

Urban land capability is considered here to the extent that development in rural villages will be impacted by limitations in relevant Soil Landscapes for urban development. Urban capability is ranked on the basis of the severity of limitations which are likely to affect urban land uses. Morand (1996) provides three degrees of limitations for urban capability:

- Areas where minor limitations present no physical limitations;
- Moderate limitations where limitations may influence design and impose certain management requirements; and
- High to severe limitations where limitations are difficult to overcome, requiring detailed site investigation and engineering design, and some areas may be so limited that they are best left undisturbed.

8.6. EXPANATION OF METHODOLOGY

The methodology used in the current project for reviewing, describing, and analysing the land resource base and its capabilities for uses most relevant to the development of Tweed Shire Rural Land Strategy is summarised below:

- Inspection of Tweed Shire rural lands by vehicle by EnPlan Partners (G David, D Brewin) and Urban Enterprise (M Ruzzene) with Tweed Shire Council strategic planning officer (S Russell).
- Obtain available background technical data from Tweed Shire Council’s 2006 development of the Council’s draft *Tweed Vegetation Management Strategy Volumes 1-3 (2004)*.
- Distil relevant material for inclusion in the report and for the associated *Community Consultation Paper (prepared for posting on Website with Inventory report)* to coincide with completion of Stage 1.
- Evaluate the potential to apply physical land resource data sets from Sinclair Knight Merz (2001), *Tweed Rural Land Use Strategy, Stages 1-4* in a meaningful way to the strategic requirements of the current project. (Note: Although the SKM (2001) series was extremely thorough much information was dated and the Shire, ABS and other sources have been able to provide more up to date data.)
- Review and accept data set of Soil Landscape mapping and descriptions as the preferred basis for ongoing project work.
- Identify the 42 Soil Landscapes that occur in Tweed Shire from the existing Soil Landscape maps.
- Review Soil Landscape descriptions for their derivative statements on limitations for regular cultivation and grazing, building foundations and septic effluent absorption, for extrapolation to respective derivative maps.
- Prepare strategic level derivative maps for limitations for cultivation and for grazing, and for building foundations and septic effluent absorption as primary indicators for land capability for main rural land uses.
- Check for mapping anomalies and inconsistencies.
- Include Soil Landscape and above-mentioned land limitations maps in *Resource Inventory and Land Capability Assessment Report* and in the associated *Community Consultation Paper (prepared for posting on Website with Inventory report)* to coincide with completion of Stage 1.
- Display and discuss the above maps of Soil Landscape and associated land limitations at July 2013 Community Consultation Forums.
- Establish criteria for extraction from Soil Landscape descriptions into aggregations of Soil Landscapes that best satisfy the needs of strategic rural landuse planning including definition of land capabilities for agriculture and those with potential for other non-agricultural uses.
- Establish tabulation formats for collating and summarising the key information requirements from the above.
- Prepare summary tabulations of the identified Soil Landscape aggregations.

From and within the above process, the 42 Soil Landscapes in Tweed Shire have been collated into eight aggregated groups of ‘like’ Soil Landscapes, specifically to assist in broad level description and interpretation for strategic planning purposes. The aggregations prepared for this project differ slightly from those used in the parent report of Morand (1996), based on professional judgement on the needs of the *Tweed Shire Rural Land Strategy*. The aggregation titles used for the current project are as follows:

- Coastal landscapes
- Estuarine landscapes
- Coastal swamps and marshes
- Extensive marine floodplain
- Gently undulating to undulating plateau
- Mid to upper catchment narrow floodplains and valley flats
- Steep Hills and Mountains (primarily >20% slope)
- Gently undulating to undulating plateau
- Moderate slopes and rolling hills
- Steep Hills and Mountains (primarily >20% slope).
### TABLE 37 DESCRIPTION OF SOIL LANDSCAPES IN TWEED SHIRE

<table>
<thead>
<tr>
<th><strong>ESTUARINE SOIL LANDSCAPES</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General landscape description</strong></td>
<td>Estuarine landscapes comprise the coastal floodplains. They occur where rivers and streams enter large bodies of water such as the sea or inland lakes. Channel flow is dissipated and is also modified by wave and/or tidal action. Soil materials may be influenced by saline conditions. Estuarine soil landscapes include estuaries, deltas, tidal creeks and tidal flats.</td>
</tr>
<tr>
<td><strong>Soil Landscapes</strong></td>
<td>Includes the following Soil Landscapes: Cobaki (cb); Ukerabagh (uk); Tweed (tw).</td>
</tr>
<tr>
<td><strong>Terrain</strong></td>
<td>Extensive alluvial-deltaic plains. Includes levees, abandoned channels, backswamps, backswamps and estuarine flats. Formed by depositional and aggrading processes resulting from infilling of drowned valleys following the Holocene marine transgression that began approximately 10,000 years ago (the sea level stabilised at the current level about 6,000 years ago). The presence of potential and actual acid sulphate soil materials generally determines the extent of this region. Terrain subdivisions: There are no terrain subdivisions.</td>
</tr>
<tr>
<td><strong>Geology</strong></td>
<td>Recent marine and estuarine sulphidic clays, which are commonly overlain by fluvial sediments derived from inland. Organic peaty materials are common.</td>
</tr>
<tr>
<td><strong>Soils</strong></td>
<td>Deep soils formed on alluvium. Alluvial plains and levees generally consist of deep brown and dark Dermosols (Prairie Soils), which often overlie sulphidic clays at varying depths. Backswamps contain waterlogged Sulphidic/Sulphuric Hydrosols (Humic Gleys), these generally consisting of organic material overlying grey clays. Similar soils occur throughout tidal mudflats in association with saline Intertidal Hydrosols (Solonchaks). Potential and actual acid sulphate soils are common.</td>
</tr>
<tr>
<td><strong>Land use</strong></td>
<td>Sugar cane on Tweed Shire. Improved pastures and cropping on levees and opportunistic grazing on backswamps. Valuable marine habitats in mangroves.</td>
</tr>
<tr>
<td><strong>Land degradation</strong></td>
<td>Extensive drainage works have exposed acid sulphate soils causing acid runoff into waterways, and drainage spoil heaps are often unvegetated and can locally leach acid. Peat fires have occurred in dry periods.</td>
</tr>
<tr>
<td><strong>Critical landscape drivers</strong></td>
<td>Tidal saline waters. Flooding. Acid sulphate soils. Fertile levee soils.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>BEACH, AEOLIAN AND SWAMP SOIL LANDSCAPES (Coastal Lowlands)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General landscape description</strong></td>
<td>These Soil Landscapes combined form the coastal lowlands. Beach soil landscapes have ground surfaces and soil parent materials, which have been deposited by wave action. Beach landscapes typically occur near sandy coastlines and lake edges. Typical landform elements include beaches, berms, beach ridges, and some plains. Due to map scale limitations, associated foredunes and windblown soils are included. Aeolian soil landscapes have accumulated by deposition of sand-sized particles by wind action. Aeolian landscapes include dune fields, dunes, blowouts, sand sheets and lunettes. Swamp soil landscapes are dominated by ground surfaces and soils, which are at least seasonally wet. Soil parent material includes large amounts of accumulated decayed organic matter. Water tables are frequently close to the surface. Landform elements may include swamps and some relic ox-bows, abandoned channels, lagoons and swales.</td>
</tr>
<tr>
<td><strong>Soil Landscapes</strong></td>
<td>The Beach Soil Landscape group consists of Angels Beach Soil Landscape (ab). The Aeolian Soil Landscape group consists of the following soil landscapes: Bogangar (bo), Kingscliff (ki) and Wooyung (wy). Pottsville (po) is considered an Aeolian/Swamp landscape. The Swamp Soil Landscape group consists of the Pottsville (po).</td>
</tr>
<tr>
<td><strong>Terrain</strong></td>
<td>Level to undulating barrier sand-plains of the coastal lowlands. Elements include beach ridge swale systems, transgressive dunes, perched swamps, and outer barrier beach and foredune systems. Formation of the system began about 120,000 years ago on a rapidly prograding shore periodically cut by storms. The transgressive dunes near the coast formed from sand blown from the exposed sea floor during low sea level. Terrain subdivisions: (i) Beach and foredunes. (ii) Sandplains and beach ridges. (iii) Transgressive dunes. (iv) Interbarrier streams and lagoons. (v) Backbarrier swamps/plain.</td>
</tr>
<tr>
<td><strong>Geology</strong></td>
<td>Quaternary aeolian and barrier sands. Quaternary alluvium in streams and a mix of Quaternary alluvium and marine clays and sands in tidal/backbarrier areas. The low hills and rises comprise metasediments of the Coffs Harbour Formation (claystone, siltstone, argillite and wackes) and sandstones (Bundamba Group).</td>
</tr>
</tbody>
</table>
### Soils

(i) Rudosols and Tenosols (Siliceous Sands) comprise the beach and young foredunes.

(ii), (iii), (iv) Podosols (Podzols, Humus Podzols) occur at sandplains, beach ridges and transgressive dunes.

(iv), (v) Hydrosols (Humic Gleys), Organosols (Acid Peats) and Podosols (Peaty Podzols) are common in interbarrier streams and lagoons, and through the backbarrier swamps/plains. Acid sulphate soil materials are generally localised at tidal flat areas.

### Land use

- Nature reserves and national parks. Residential development (e.g. Pottsville)

### Land degradation

Wind erosion associated with cropping, vehicle tracks, and sand mining. Gully erosion on bedrock rises.

### Critical landscape drivers

- Fire regimes

### Critical issues


### RESIDUAL SOIL LANDSCAPES

#### General landscape description

Residual landscapes are volcanic plateaux. They are dominated by sites where deep soils have formed from in-situ weathering of parent materials (this has presumably taken place over long periods where the rate of soil formation has been greater than rate of erosion). Residual landscapes typically have level to undulating elevated topography. Landform elements include some summit surfaces, plateaux, terrace plains, peneplains and old ground surfaces. Stream channels are usually poorly defined.

#### Soil Landscapes

Contains the Cudgen Soil Landscape (cu).

#### Terrain

- Generally gently undulating/undulating rises to rolling low hills on distinct plateau surfaces. Six prominent plateaux have been identified in the Northern Rivers.
- Terrain subdivisions: (i) Cudgen-Duranbah plateau - Tweed. (ii) Alstonville plateau

#### Geology

Miocene/Pliocene basalt flows over older land surfaces. Derived from four main sources, all central volcano complexes including the Tweed Shield Volcano. Other associated rocks include agglomerate, breccia, tuff, dolerite, trachyte and rhyolite. Outcrops of Palaeozoic metamorphics (Neranleigh-Fernvale Group), sandstones (Bundamba Group) and rhyolites (Chillingham Volcanics) are included as parts of the Alstonville plateau

#### Soils

Deep Red Ferrosols (Krasnozems), often with associated Dermosols (Chocolate Soils, Prairie Soils) are the predominant soils on all the plateaux. Although highly weathered, the Ferrosols of this landscape are among the most fertile soils to be found in the Northern Rivers.

#### Land use

Horticulture, sweet potatoes and potatoes, grazing for beef and formerly dairy. Urban

#### Land degradation

Some gully erosion and soil structure decline; acidification within macadamia areas

#### Critical landscape drivers

High rainfall erosivity. Acid, highly weathered soils. Physically fertile soils but have some poor chemical/nutrient properties

#### Critical issues

Erosion and deposition hazards and their effects on water quality. Soil structure decline on continually cultivated areas. Land use conflict
### COLLUVIAL SOIL LANDSCAPES

**General landscape description**
Colluvial landscapes make up the volcanic ranges. These are affected by mass movement. Soil parent material mostly consists of colluvial mass movement debris including scree and talus along with other landslide, mudflow and creep deposits. Colluvial landscapes usually include alcoves, cliffs, cliff-footskips, scarps, landslides, talus, some moderately inclined to precipitous hillslopes and areas of commonplace evidence of mass movement.

**Soil Landscapes**
Consists of the following Soil Landscapes; Carool (ca), Georgica (ge), Korrumbyn (ko), Mount Warning (mw), Nullum (nu) and Pinnacle (pi).

**Terrain**
Rolling to steep low hills and hills, and mountains derived from the extensive lava flows of the Focal Peak and Tweed Shield Volcanoes. Includes the Mount Warning and Mount Nullum massif within the Tweed valley. Rock outcrop and escarpment development is common, particularly in the northern areas. Basaltic caps over metamorphic rocks are a feature of the Terranora-Bilambil area.

Terrain subdivisions: (i) Mt Warning - Mt Nullum. (ii) Eastern ranges (red soil dominant). (iii) Western ranges (dark soil dominant)

**Geology**
Miocene to Pliocene age basalts and associated tuffs and agglomerates. The geology of Mount Warning is complex and consists of acid rocks such as syenite. Nearby Mount Nullum is a granitic mass. Prominent outcrops of rhyolite, a more viscous and acid lava than basalt, occur throughout the Tweed Range. Areas of exhumed sedimentary rocks of the Clarence-Moreton Basin (Bundamba Group, Grafton Formation, Kangaroo Creek Sandstone, Woodenbong Beds, Walloon Coal Measures) have been included. Many of these occur as localised outcrops adjoining the main drainage lines.

**Soils**
Commonly Brown and Black Dermosols (Chocolate Soils, Prairie Soils) with associated Black Vertosols (Black Earths). Red Ferrosols (Krasnozems) are dominant throughout the hills north of the Alstonville plateau but they also as localised associated soils throughout the Dermosol country. Brown and Yellow Kurosols are common on the rhyolites, granites and sedimentary rocks. Generally Leptic Rudosols occur throughout the steeper country, including Mount Warning. Red Ferrosols (Krasnozems) are widespread in the eastern parts of this region.

**Land use**
National parks and state forests. Grazing, horticulture.

Urban (Terranora-Bilambil area)

**Land degradation**
Some gully erosion, mass movement on cleared areas. Soil structure decline and acidification on the red soils

**Critical landscape drivers**
Steep slopes. High and erosive rainfall. High biodiversity

**Critical issues**
Mass movement. Erosion and sedimentation. Land use conflict

### EROSIONAL SOIL LANDSCAPES

**General landscape description**
Erosional soil landscapes form the escarpment ranges, which have been primarily sculpted by erosive action of running water.

Streams are well defined and competent to transport their sediment load. Soil depth is usually shallow (with occasional deep patches) and mode of origin is variable and complex. Soils may be either absent, derived from water washed parent materials or derived from in situ weathered bedrock. Erosional soil landscapes usually include tors, benches, and areas of rock outcrop. Evidence of mass movement is rare.

**Soil Landscapes**
This group consists of the following soil landscapes; Byrill (by), Frogs Hollow (fh), Green Pigeon (gp), Kungthur (ku), Limpinwood (li), Mount Terragon (mt) and Wollumbin (wl). The Mebbin (me) unit is considered as an Erosional/Colluvial landscape.

**Terrain**
Steep to precipitous hills and mountains with deeply incised valleys and narrow gorges occurring along the eastern boundary of the New England Tablelands. Slopes are often rectilinear and talus may be common on lower slopes.

Terrain subdivisions: (i) Great Escarpment. (ii) near coastal
## Geology
- Triassic-Permain granites and adamellites occur throughout. In the north Permain volcanics (Drake Volcanics), dominated by rhyolite, are associated with the granites. Permain volcanics also occur in the central area but Permo-Carboniferous metasediments (including the Coffs Harbour Association) become dominant. Within the metasediments, rocks are generally fine-grained and include siltstone, mudstone and wackes. Minor outcrops of Pliocene/Miocene basalt.

## Soils
- Shallow, stony Red and Yellow Kandosols (Red and Yellow Earths) are widespread with shallow to moderately deep, stony Brown Kandosols (Brown Earths) on footslopes and alluvial flats. Soil fertility varies from low on stony ridges to moderately high downslope but topsoil fertility is generally high.
- Red Chromosols (Red Podzolic Soils and Red Dermosols (Terra Rossa Soils) occur on the limestones.

## Land use
- Natural amenity with high scenic value and catchment protection. Nature reserves, national parks, and state forests.

## Land degradation

## Critical landscape drivers
- Steep slopes. High rainfall erosivity. High stream energy. Fire regimes

## Critical issues

### ALLUVIAL SOIL LANDSCAPES

#### General landscape description
- Alluvial soil landscapes are the inland floodplains formed by deposition along rivers and streams.
- Soil parent material is alluvium. Alluvial soil landscapes include floodplains and alluvial deposits. Typical landform elements include those found on meander plains; including bars, backplains, scroll plains, flood-outs, ox-bows, levees, terraces, prior and current stream channels.

#### Soil Landscapes
- Consists of the following soil landscapes: Brays Creek (bc), Crabbies Creek (cr), Cudgera (cd), Nobby’s Creek (no), Oxley (ox) and Rous (ru).

#### Terrain
- Floodplains of the major river systems and their tributaries. Backswamps and oxbows are common. Terrace development is apparent on most of the major floodplains.
- Terrain subdivisions’ Tweed-Brunswick.

#### Geology
- (i) Generally Black, Brown and Red Dermosols (Prairie Soils, Brown and Red Earths). Rudosols (Alluvial Soils) common on bar plains and current floodplain. Brown and Yellow Kandosols and Dermosols (Yellow Earths) are common where metamorphics are the main source of sediment. These are often dispersive.
- (ii) Predominantly Black, Brown and Grey Vertosols (Black Earths, Brown and Grey Clays). Aquic Vertosols (Weisenboden) occur within backswamps and oxbows. Fresh sediment often lines the channels and Tenosols (Earthy Sands) have developed. Red Dermosols and Kandosols (Red Earths) have formed on terrace remnants.
- (iii) Brown and Black Dermosols are common on the older terrace surfaces. Red Ferrosols and Dermosols (Krasnozems, Red Earths) have developed on the oldest terrace surfaces. Stratic Rudosols (Alluvial Soils, Earthy Sands), often gravelly, are typical of bar plains.

#### Land use
- Grazing and occasional cropping on floodplains. Some sugar cane. Irrigation for agricultural and domestic uses from pools. Sand and gravel extraction from floodplains and channel beds where permitted. Environmental conservation within National Parks. Recreation and tourism. Urban

#### Land degradation
- Riparian vegetation composition has substantially changed throughout the region since European settlement due to catchment clearing, de-snagging, grazing by domestic stock, and subsequent erosional processes from flood events.
- Stream bed and bank erosion can episodically be locally severe, especially where riparian vegetation has been removed or there has been major planform position change. Localised stream bed erosion can be present along tributary streams and on floodplain surfaces due to bed level adjustments within associated major streams. Moderate soil structure decline is present on floodplains in many areas from compaction by machinery and cattle.
- Weeds have dominated many impacted sections of the riverine corridor, reducing environmental function (eg: camphor laurel).

#### Critical landscape drivers
- Flow regime, channel slope, sediment load, riparian vegetation. Active fluvial landscape, floodwater inundation hazards, and streambank erosion. Fertile floodplain soils.

#### Critical issues
These are the undulating to rolling hills and low hills, formed from a combination of erosional, transferral and alluvial soil landscapes. Erosional landscapes have been primarily sculpted by erosive action of running water. Streams are well defined and competent to transport their sediment load. Soil depth is usually shallow (with occasional deep patches) and mode of origin is variable and complex. Soils may be either absent, derived from water washed parent materials or derived from in situ weathered bedrock. Erosional soil landscapes usually include tors, benches, and areas of rock outcrop. Evidence of mass movement is rare.

Transferral landscapes are deep deposits of mostly eroded parent materials washed from areas directly upslope. Stream channels are often discontinuous and slopes are generally concave. Transferral landscapes include footslopes, valley flats, fans, bajadas and piedmonts.

Alluvial landscapes are formed by deposition along rivers and streams. Soil parent material is alluvium. Alluvial soil landscapes include floodplains and alluvial deposits. Typical landform elements include those found on meander plains; including bars, backscours, scours, scull plains, flood-outs, ox-bows, levees, terraces, prior and current stream channels.

**General landscape description**

**Soil Landscapes**

The Billinudgel (bi), Burringbah (bu) Soil Landscapes are Erosional Soil Landscapes.

The Transferral soil landscape in this group consists of a single soil landscape; Ophir Glen (og).

The Alluvial Soil Landscapes in this group consists of Crabbes Creek (cr), Cudgera (cd), Nobby’s Creek (no), Oxley (ox) and Rous (ru) SLU’s.

**Terrain**

Undulating to rolling hills and low hills with wide valleys at low elevation (generally below 300 metres), forming the lower valley slopes and hills. Generally forms a band between the higher and more rugged escarpment and ranges landscape and the coastal floodplains/lowlands landscape.

Terrain subdivisions: (i) Low hills. (ii) Tweed hills - the Tweed valley and adjoining metamorphics.

**Geology**

The north section of this landscape lies predominantly within the Clarence-Moreton Basin, a large structure formed during the Mesozoic Era. The low hills are generally quartz sandstones and conglomerates of the Bundamba Group; lithic sandstones and siltstones of the Grafton Formation; sandstones, siltstones and mudstones of the Walloon Coal Measures and quartz sandstones of the Kangaroo Creek Sandstone. Carboniferous metasediments also occur. Numerous outcrops of Miocene/Pliocene basalt, generally as caps overlying the sedimentary rocks, are present throughout the northern section.

Exhumed sedimentary rocks of the Clarence-Moreton Basin dominate the western part of the Tweed basin. They include the Walloon Coal Measures and the Bundamba Group. Basalts also occur throughout much of this western area, with benching being particularly well developed in the Chillingham area. The Palaeozoic metamorphic rocks (phyllite, schist, wacke) of the Neranleigh-Fernvale Group comprise the eastern sections. Dividing these two groups of rocks is the narrow north to south outcropping Chillingham Volcanics (basalt, andesite, mudstone). These are Triassic and are not related to the more recent volcanic activity of the Tweed Shield Volcano. Small basalt outcrops occur as caps in the metamorphic hills.

**Soils**

Most soils in this landscape have low fertility and are not arable.

(i) Red and Yellow Kurosols (Red and Yellow Podzolic Soils) predominate, with moderately deep sodic soils on areas with low relief. The arable soils are limited in extent and comprise deep Red Ferrosols (Krasnozems, Red Earths), Vertosols (Black Earths) and deep alluvial Dermosols (Prairie Soils) and Rudosols (Alluvial Soils). Poor quality well structured Red and Brown Dermosols (Red and Brown Earths) occur predominantly on fine-grained metasedimentary rocks (shales, mudstones and phyllites). Deep Red Ferrosols (Krasnozems) and shallower Brown Dermosols (Chocolate Soils) occur on basalt.

(ii) Predominantly Brown and Yellow Chromosols/Kurosols (Yellow Podzolic Soils) throughout the sedimentary hills, with a notable occurrence of Red Kurosols (Red Podzolic Soils) and Red Ferrosols (Red Earths) on the Walloon Coal Measures west of Tyalgum. Brown, Yellow and Red Kurosols and Kandosols (Yellow Podzolic Soils, Red Podzolic Soils, Yellow and Red Earths) are typical of the metamorphics. Red and Brown Dermosols (Red and Brown Earths) occur on the Chillingham Volcanics. Brown and Black Dermosols (Chocolate Soils, Prairie Soils) and some Red Ferrosols (Krasnozems) occur on basalts.

**Land use**

Grazing, perennial horticulture, forestry, occasional cropping, rural living and urban.

**Land degradation**

Soil erosion and soil structure decline. Agricultural and environmental weeds. Localised salinity.

**Critical landscape drivers**

Moderate slopes with low relief and low to moderate erosion hazards. Low fertility, sodic soils, some localised salinity. High rainfall with high intensity summer dominant rainfall pattern of high variability. Bushfire hazard. Although soils are of low to intermediate quality the unit is the most agriculturally utilized component of the board area leading to increased likelihood of land use beyond its capability.

**Critical issues**

Several soil landscapes occupy relatively small areas of land in the Shire and are represented more fully outside of the Shire.

This group consists of the following soil landscapes: Bald Mountain (bm), Calico (cl), East Ballina (eb), Mackellar (ma), Minyon (mi), Mount Burrell (mb) and Terania (te).

The Bald Mountain (bm) and Minyon (mi) soil landscapes form part of the Border Nightcap Range; the Calico (cl) and Mt Burrell (mb) soil landscapes form part of the Tweed Volcano Caldera and the Mackellar (ma) soil landscape forms part of the Mackellar Hills.
8.7. LAND DEGRADATION HAZARDS

Land degradation is deterioration of the biophysical environment. It can be caused by a combination of human-induced processes acting upon the land. Land degradation has important adverse implications for primary production, infrastructure development and maintenance, and the environment.

Land degradation hazards in Tweed Shire are identified and described in Volume 2 of the Tweed Vegetation Management Strategy 2004. Rainfall, rainfall intensity, soils, geology and associated landforms contribute to land degradation hazards. Within the wider Tweed area some of the more prevalent factors affecting the potential for land degradation are described. The following descriptions are primarily sourced from the Morand D 1996 document Soil Landscapes of the Murwillumbah-Tweed Heads 1:100000 Sheet.

SOIL ERODIBILITY

Erodibility is the susceptibility of a soil to erosion. It is based solely on soil properties. Landscape properties such as slope gradient, slope length, landform element, and rainfall characteristics are not included in the assessment. Disturbance should be minimised on erodible soils, and disturbed areas protected by vegetation cover as soon as possible. Although many areas of erodible soil soils have been cleared, retention of native vegetation will in general reduce the risk of erosion in these areas.

STEEP SLOPES

A number of landscape hazards increase with increasing slope. Soil erosion is more severe, and various forms of mass movement are more likely with increasing slope. Figure 43 illustrates slope variability in the Shire. The figure indicates that a high proportion of Tweed Shire has slopes of at least 10% (with a significant proportion over 20%). As a key factor in planning strategies to minimise land degradation, state agencies involved in rural land use have developed land classification systems that allow the assessment of land capability for various uses. The Tweed Draft LEP 2012 contains a series of large scale maps depicting the steep land overlay of over 18 degrees slope (approximately 32.5%).

MASS MOVEMENT

Mass movement is a general term for a number of forms of slope failure. It includes rock falls, earth slumps, slips and flows on steep, and often wet, slopes. It may lead to severe damage to buildings and infrastructure and presents a considerable constraint to agricultural production. As a consequence of the large number of Eroisonal and Colluvial landscapes in Tweed Shire, mass movement is prevalent and conspicuous.

The Tweed Council has mapped Special Category land (under the Native Vegetation Act 2003). The maintenance of vegetation cover especially deep-rooted trees is important in areas susceptible to mass movement.

STREAMBANK STABILITY

Due to high and often intensive rainfall in the catchment and the almost complete clearing of floodplain areas, stream and riverbanks are exposed. Their protection has become a priority land degradation issue over much of the Shire. The Tweed River Committee’s Tweed River Estuary Bank Management Plan (Patterson Britton) 1998 addresses this matter. The protection of lands within, or within 20m of a prescribed stream is also mandated under the Native Vegetation Act 2003. Consent must be sought to clear native vegetation and exotic trees in these areas.

ACID–SULPHATE SOILS

Acid sulfate soils are clays, muds and sometimes sands associated with pyrite-rich marine sediments. They may also occur in association with some sulfidic ore bodies and sulfur-rich deposits (eg: some coals). These soils acidify following exposure or drainage as sulfur compounds are oxidised and converted to sulfuric acid. Apart from corrosive effects on infrastructure, the acidification of estuarine waters commonly kills estuarine fauna. In Tweed Shire, many of the coastal landscapes (Estuarine, Alluvial, Aeolian) are acutely affected by acid-sulfate potential.

The sugar industry in particular has been very active in acid-sulfate research and most landholders are aware of the issues and are active participants in measures for management and rehabilitation through the implementation of State Government approved Best Practice Guidelines.

Tweed LEP makes special provision for works in other areas affected by acid sulfate soils. The Draft Tweed LEP 2012 also contains considerable content on Acid Sulfate soils with the aim of ensuring that development does not disturb, expose or drain acid sulfate soils and cause environmental damage.

Trials are being conducted to examine the utility of some native vegetation species to assist in rehabilitating affected areas.

COASTAL EROSION

Wind and wave action can cause significant and rapid change in the coastal landforms. In geomorphological terms the coastline is dynamic advancing and retreating with prevailing conditions. Sand mining and urban development since the 1950s have resulted in removal of native vegetation and reshaping of the natural dune systems for much of the Tweed coast. The persistent human desire to be as close as possible to the sea has meant that the protection of these areas has become paramount. The maintenance of appropriate vegetated buffer zones is generally considered to be the most appropriate long-term solution to minimising coastal erosion. Accordingly, Tweed Shire LEP attempts to enforce strict setbacks and allowable land uses in these areas.

8.8. NATIVE VEGETATION MANAGEMENT

Steep or highly erodible areas of land (generally above 18 degrees slope) supporting native vegetation, were mapped in 2005 by the former Department of Natural Resources. Certain provisions under the Native Vegetation Act 2003 apply to the clearing of vegetation cover on these areas. These provisions are covered in 24 NSW Government Information sheets on native vegetation management.

Under the Act, the former ‘state protected land’ (SPL) was more accurately mapped using the Department of Lands 25m DEM. It generated steep or highly erodible land with a gradient of 18 degrees (32.5%) or more, which was classified as ‘vulnerable land’. These areas of NSW are especially vulnerable to soil erosion, sedimentation and landslip if appropriate techniques are not used when clearing native vegetation. This land is categorised as:

- Steep or Highly Erodible Land, sloped at over 18 degrees (formerly Category A)
- Protected Riparian Land (formerly Category B)
- Special Category Land (formerly Category C).

Under the Act, all regrowth on Steep or Highly Erodible Land and Protected Riparian Land has been classified as protected regrowth.

All clearing of native vegetation on vulnerable land requires approval unless it is excluded clearing or can be cleared under a routine agricultural management activity (RAMA). However there are restrictions to the RAMAs available for clearing on Protected Riparian Land. These are described in the Information Sheet No 11.
While the Native Vegetation Act 2003 regulates clearing of live native vegetation, the clearing of dead native vegetation or exotic vegetation on state protected land (SPL) is still regulated by the former Native Vegetation Conservation Act 1997. The State Protected Land areas are identified on maps held by OEH and NSW Catchment Management Authorities.

Clearing of dead trees or exotic trees on SPL does not require approval if it is done in accordance with the Guideline for the Clearing of Exotic Trees and Dead Native Trees on SPL, or under exemptions that have been carried forward from the Native Vegetation Conservation Act 1997 (ie: 7 trees/hectare/year, and less than 2 hectare/year).

For more clearing of exotics or dead natives on SPL than allowed under the Guidelines or the Native Vegetation Conservation Act 1997, approval must be sought from the Department that administers that Act.

8.9. WEED CONTROL AND MANAGEMENT

Northern Rivers Invasive Plants Action Strategy 2009-2013 (Northern Rivers Catchment Management Authority, 2008) provides a framework and guide to Tweed Shire and other Shires for progressing policy and programs for weed control and management.

The aim of the Strategy is to provide a regional framework to guide and enhance weed management across the entire region, to reduce the economic, environmental and social impact of weeds. The purpose is to align the direction, actions and resource allocation of all organisations concerned with weed management in the NRCMA region, toward a common direction, and in line with national and state legislative requirements. The strategy provides:

- A regional framework to guide all weed managers; and to facilitate a coordinated and catchment approach to invasive plant management
- A decision-making tool to assist land managers to assess and prioritise individual weed species within landscapes, within and between Local Government Areas.

The strategy identifies seven landscapes that capture the complexity of environments and the diversity of weed issues in the NRCMA region: aquatic, agricultural, coastal, forest, riparian, tablelands and urban. It also emphasises the importance of preventing new weeds from establishing, and the need to respond quickly to incursions, as these are the most cost-effective techniques for managing weeds.

The six goals of the Strategy are:

- Prevent new weed problems (early detection);
- Reduce the impact of existing weeds;
- Increase awareness, education and training;
- Improve weed management co-ordination;
- Enhance the use of legislation and enforcement;
- Improve monitoring and evaluation.

The Strategy specifies how local government, including the Tweed Shire Council, can assist in weed management by adopting the following procedures:

- Enforce the Noxious Weeds Act 1993 on private and public land;
- Assist in the development of local stakeholder networks;
- Train and support staff in ways to reduce the spread of weeds;
- Help weeds officers circulate weed information to new landowners;
- Restrict the distribution of environmental weeds through the LEP;
- Support and promote the Bushland Friendly Nursery Scheme and participating nurseries;
- Assist and promote community weed control projects and help protect them from vandalism;
- Work with other shires to ensure appropriate public consultation, control techniques and replacement species are used when controlling weed street trees;
- Investigate and promote establishment of an environmental levy, for use on all important environmental issues including weeds;
- Encourage the control of noxious and other threatening weeds using best management practices and commencing in high priority areas wherever possible;
- Consolidate and promote formal green waste dump sites located away from watercourses;
- Educate the community about threats posed by deliberate dumping of garden refuse and consider increasing penalties.

8.10. FLOODING AND FLOODPLAIN MANAGEMENT

The Tweed Shire Development Control Plan, Section A3 - Development of Flood Liable Land, VERSION 1.4 (2010) states the following regarding flooding of the Shire’s rural lands.

Flooding can generate rapid rises in water levels and warning times are often very short. The coastal creeks and the lower reaches of the Tweed River can be flooded from the effects of a cyclone or its remnant rain depression that creates extraordinarily high tide or ocean levels combined with heavy local rain. Flooding of this type will generally occur with little warning except for weather forecasts predicting cyclones and rain depressions. Council’s flood mitigation strategy is to ensure that only appropriate compatible development occurs on flood prone land in the future, by implementing both structural protection and planning controls, to minimise future potential flood damage and ensure safe occupation without undue reliance on emergency response agencies.

In rural areas minor flooding is controlled by leveeing and flood gated outlets in many areas on the Tweed River Floodplain downstream of Murwillumbah, where the agricultural use and potential flood damage has justified the expenditure. Many other areas of the floodplain, adjacent to local creeks and streams, and the Tweed River upstream of Murwillumbah, are liable to rapid flood inundation with little warning. Records and information in many of these areas are very limited. Persons proposing new developments on areas near rivers and streams that could be flood liable should seek out and heed reliable local historical information.

The Tweed Valley Flood Study (2009) by BMT WBM Pty Ltd, modelled two 100 year ARI flood events: a 100 year ARI catchment rainfall event and a 100 year ARI storm surge event. The study report provides the following general description of flood behaviour in the Tweed Catchment.

The catchment rainfall flood dominates (i.e. produces higher peak flood levels) along the Tweed River floodplain downstream to Shallow Bay, as well as the Cobaki / Piggabeen floodplains down to Terranora Creek. The storm surge flood dominates along the lower Tweed River floodplain from Shallow Bay to the mouth, and the Terranora Creek floodplain from the lower Bilambil/Duroby floodplains down to Tweed Heads. As discussed in Section 6.5.8, stormwater flood events (i.e. from localised short-duration, high intensity storm events) has not been assessed as part of this Tweed Valley catchment study. In the 100 year ARI event (see Figure 6-23), the main high flow areas in the upper Tweed include the Bray Park flowpath upstream of Murwillumbah and the flowpath from Blacks Drain to Condong Creek via the Murwillumbah airport. In the mid Tweed, there are large areas of floodplain conveying high flow between the Tweed and Rous Rivers, as well as from Condong to Stotts Island. In the lower Tweed, the valleys of the Broadwater tributaries (Cobaki, Piggabeen, Bilambil and Duroby Creeks) all convey high flows.

With respect to the interactions of the Tweed and Rous Rivers, during smaller flood events, water is predicted to flow from the Rous River to the Tweed River via Mayal Creek. As the floodwaters rise the Tweed River becomes the dominant flow and floodwater flows from the Tweed River to
the Rous River. Most of the floodplain between the Tweed and Rous Rivers becomes a ‘high flow area’ (see Figure 6-23) in the 100 year ARI flood event. The Tweed Valley is generally quite wide and flat with few structures that significantly control the hydraulics of the floodplain. Low natural and man-made banks and levees are present along much of the Rous and Tweed Rivers but are generally exceeded in small flood events. One exception is the constriction at Murwillumbah created by the town levees, the Murwillumbah Bridge and the sharp bend of the river immediately downstream of the bridge. In the lower Tweed, the embankment and drainage structures of the Pacific Highway influence flood behaviour in large events. In the extreme and PMF events, flood levels in the lower Tweed area are controlled by the constriction at the river mouth/entrance and the dunes between Kingscliff and Fingal Head. Much of the floodplain is presently covered by sugar cane farms. Due to the dense vegetation of this crop, these areas have been represented in the hydraulic model as areas of high ‘roughness’ or resistance to flow (see Table 3-3). This means that flooding behaviour could differ if it occurred, for example, after harvesting, or if there is a significant change in land use in the floodplain. A decrease in the ‘roughness’ of the floodplain could result in a decrease in flood levels in these areas, coupled with an increase in downstream flood levels due to the quicker conveyance of floodwaters down the valley.

Figure 44 identifies flood liable land in Tweed Shire.

### 8.10.1. FLOODING IMPACT ON LAND CAPABILITY

Flooding is a main consideration in determining the capability of land for any use. Good planning practice ensures that residential development of any sort does not occur on flood prone land and consideration must be given to the full range of floods to the probable maximum flood (PMF). Tweed Shire’s flooding Development Control Plan – Section A3, Development of Flood Liable Land defines flood liable land using the PMF.

Such development is generally as a result of pressures associated with population expansion. In most areas (not just Tweed Shire) flood prone land is therefore reserved for non-residential uses. Where not retained for agriculture it is often used for facilities such as golf courses, recreation grounds, parklands and general passive recreation areas. There have been many well publicized examples in Australian rural and urban areas in recent years that demonstrate that such flood protection strategies have not always been adopted, with catastrophic consequences.
FIGURE 43 TWEED SHIRE GRADIENT MAP

Tweed Shire Gradient Map in Percent Rise

Source: DFL_Contours, Tweed Shire Council.
FIGURE 44 FLOOD LIABLE LAND: PROBABLE MAXIMUM FLOOD

Source: Tweed Shire Council.
FIGURE 45 FLOOD LIABLE LAND: DESIGN FLOOD LEVELS – INUNDATION AREAS

Design Flood Levels
Inundation Areas
WMR 2006 Flood Study
Based on 1 in 100 Year Flood Event

Legend
Inundation Areas
- 0.5 to 3.0
- 3.0 to 3.5
- 3.5 to 4.0
- 4.0 to 4.5
- 4.5 to 5.0
- 5.0 to 5.5
- 5.5 to 6.0
- 6.0 to 6.5
- 6.5 to 7.0
- 7.0 to 7.5
- 7.5 to 8.0
- 8.0 to 8.5
- 8.5 to 9.0
- 9.0 to 9.5
- > 9.5

Flood level contour
(Metres AHD)
- Main Towns
- Tweed Shire Boundary
- Waterways

Source: Tweed Shire Council.
8.11. CLIMATE AND CLIMATE CHANGE IMPACTS

8.11.1. CLIMATE

The Bureau of Meteorology (BOM) website identifies that Tweed Shire has a sub-tropical climate with more than 250 days of sunshine each year on average. The following is a general guide to the climate:

- **Summer** (December - February): Warm nights with warm to hot days, afternoon rain or thunderstorms common with air temperatures in the range, 20°C to 30°C.
- **Autumn** (March - May): Generally warm, some rain showers, with air temperatures in the range, 15°C to 25°C.
- **Winter** (June - August): Cool to cold nights with warm sunny days, with air temperatures in the range, 5°C to 20°C.
- **Spring** (September - November): Cool to warm nights with warm (occasionally hot) days, isolated showers, with air temperatures in the range of 20°C to 22°C.

The daily sunshine average ranges from 6.5 hours during July (winter) increasing to 8.7 hours during December (summer). Summer months tend to produce periods of increased cloud cover and rain, while winter is fine and sunny, but cooler.

The mean annual rainfall is 1687mm, with most of this falling from mid-December through to mid-April, but heavy falls can occur at any time of year.

8.11.2. CLIMATE CHANGE IMPACTS

Any climate change will affect all land in one way or another through impacts on weather patterns, storm frequency and severity, flooding behaviour, reliability of water supply and rising sea levels. However, low lying areas are affected directly by any changes to sea level and any increases in flood depth.

The following points summarise possible impacts of climate change as described in the NSW Department of Environment and Climate Change (DECC) document *Climate Change Impacts North Coast Region (2008)*. The document is on the Tweed Shire Council website.

- **Reduced winter rainfall and decreased in soil moisture in winter and spring** is projected for this region. Sea levels will rise, changing flood patterns and affecting the coast. Minimum temperatures across all seasons are projected to be warmer, with winter maximum temperatures rising more than summer maximum temperatures.
- **Days are projected to be hotter over all seasons (1 to 3°C).** The greatest increases are projected for winter (2 to 3°C) and the smallest increases in summer (1 to 1.5°C). Nights are also projected to be warmer, with mean minimum temperatures projected to increase by 2 to 3°C in all seasons.
- **Summer and autumn rainfall is projected to increase slightly** while winter rainfall is projected to decrease slightly. Spring rainfall is not projected to change. Evaporation is projected to increase in all seasons. Combined with changes to rainfall, this is projected to make conditions in winter and spring drier.
- **The frequency of high or extreme fire-risk days is predicted to increase across NSW.** Increases in temperature, evaporation and high fire-risk days are likely to increase fire frequency and intensity across the region. The fire season is likely to be extended as a result of warmer temperatures.
- **Widespread changes are likely in natural ecosystems.** Rising sea levels, increased acidity, increased water temperature and changes to salinity and invasive animal and plant species are likely to cause widespread impacts on biodiversity within estuaries. For terrestrial and freshwater biodiversity, the major impacts are likely to be from the rise in sea levels, increased temperatures, changes to water availability, and fires. The ecological communities most at risk are those on the coastal lowlands, saline wetlands and fragmented forests and woodlands on the hinterland. More widespread and fire-adapted forests are likely to be relatively resilient to climate change and undergo more subtle changes.
- **Soil erosion is likely to increase on the steeper slopes in the upper catchments, potentially causing sedimentation on the floodplains and adversely affecting agriculture.** The reduced net water balance in winter and spring is likely to reduce the risk of guilty expansion which is controlled by high soil moisture and seepage flow. Significant increases in saline incursions into coastal plain subsoils are likely to make agriculture on some low-lying lands unsustainable. Acid sulfate soil problems on coastal plains are likely to worsen in the short term but improve over the longer term. Mass movement is likely to increase in all currently vulnerable slopes in coastal hinterlands due to slightly higher summer and spring rainfalls. Potential higher biomass accumulations should help organic matter build-up and hence nutrient storage potential. However this is likely to be offset by higher leaching, acidification and salinity changes in local areas.
- **The major impact on the coastal zone of the region is likely to be from sea level rise and resulting inundation and erosion.** Rising seas are likely to have a significant impact on all beaches, coastal rivers and estuaries in the North Coast. Settlements adjacent to estuaries and the coast are likely to be at additional risk of flooding as sea levels rise. Private and commercial property and major infrastructure will be affected. Saltwater migrating further upstream is likely to have implications for farm irrigation and groundwater. Aquaculture is likely to be adversely affected. The rise in sea levels is also likely to increase the risk of flooding in parts of the lower floodplain with associated impacts upon the community. Increases in short and intense rainfall events are likely to result in flooding from urban streams and drainage systems. This is likely to reduce the level of protection provided by existing management measures such as levees, with associated impacts upon the community.
- **A slight increase in average annual runoff and stream flow** is more likely than not. Runoff is likely to increase in summer and autumn and decrease in winter and spring. In summer, there is likely to be a major increase in summer runoff depth (with estimates ranging from +4% to +15%), and a major increase in the magnitude of high flows. In autumn, there will more likely than not be a slight increase in autumn runoff depth, (with estimates ranging from -12% to +16%) and a slight increase in the magnitude of high flows. Current low flow levels will probably occur slightly less frequently, with decrease in runoff depth (with estimates ranging from -20% to +8%), and a slight decrease in the magnitude of high flows. Current levels of low flows are likely to occur moderately less frequently. In spring, there is likely to be a major decrease in runoff depth (with estimates ranging from -14% to +4%), and a major decrease in the magnitude of high flows. Current levels of low flows are likely to occur moderately less frequently. The consequences of the changed catchment runoff for streamflow and consumptive water users will clearly depend on what part of the reported range of change is realised, as well as the influence of water infrastructure. If the drier end of the range were realised, towns with...
smaller water supplies would need to consider that there is a risk of inflow reductions of 10 to 20% during drier periods.

Climate change is also addressed in the 2007 CSIRO publication *Climate Change in the Northern Rivers Catchment*, prepared for the NSW Government. The document states the following as ‘evidence’ of climate in Australia:

- Temperatures in the northern hemisphere at the end of the 20th century are believed to have been warmer than they have been at any time in the previous 1,000 to 2,000 years.
- The average global temperature in 2005 was the warmest on record, and eight of the ten warmest years have occurred since 1997.
- The Earth’s average surface temperature has risen 0.7°C since 1900.
- Heatwaves and extreme rainfall have become more common in many regions.
- The sea level has risen 1.8 mm per year since 1950 and that rate is accelerating.
- There have been fewer frosts and the ice sheets of Antarctica and Greenland are shrinking.
- The timing of physiological processes in plants and animals is changing throughout the world, and populations are shifting their distributions.
- Average temperatures in Australia rose 0.9°C from 1910 to 2004. There have been more heatwaves and fewer frosts.
- Since 1950, annual rainfall has declined on the eastern seaboard and in the south of the continent, but increased in the northwest.
- Since 1973, droughts have become more intense, and extreme rainfall events have increased in the northeast and southwest.

For NSW, the report states that in 2004 the CSIRO and the Bureau of Meteorology reported that between 1950-2003, NSW became 0.9°C warmer, with more hot days/nights and fewer cold days/nights. Annual total rainfall declined by an average of 14mm per decade, with the largest declines in rainfall near the coast due to an increase in EI Niño years since the mid-1970s. Extreme daily rainfall intensity and frequency have also decreased throughout much of the State. It then stated from the same report that:

- NSW is likely to become warmer than it was in around 1990.
- There will be more hot days over 35°C, and fewer frost days below 0°C.
- Annual rainfall is likely to decline.

Rainfall runoff and stream flows will be reduced.
- Droughts are likely to become more severe.
- The risk of bushfires is likely to increase.
- Extreme rainfall may become more intense in central and southeast NSW.

For the Northern Rivers Catchments the CSIRO report identifies two distinct environments exist within the region (the coastal environment and the eastern slopes) with the coastal zone’s river, estuaries and coastal ecosystems being particularly sensitive to the impact of urbanisation and economic growth. It then states the following:

The future climate of the Northern Rivers Catchment is likely to be warmer. Although projected changes in average rainfall are currently not clear, with projected increases in evaporation, the catchment is likely to be drier. Such climate change would also increase heat waves, extreme winds and fire risk. Nevertheless, despite this trend toward drier conditions, there is also potential for seasonal increases in extreme rainfall events.

The report is clear that its projections account for ‘a broad range of assumptions about future global greenhouse gas emissions, as well as differences in how various climate models represent the climate system’

On the matter of the impacts of climate change on the Northern Rivers Catchment, the CSIRO report summarises that although changes in average temperature, rainfall and evaporation will have long-term consequences for the catchment, the impacts of climate change are more likely to be felt through extreme weather events with more hot days, bushfires, droughts and intense storms. These in turn have implications for human life, and property, and put natural ecosystems at increased risk.

The following broad implications are also drawn in the CSIRO report.

**Water:** While reduced river flow will likely strain catchment water resources, and potentially undermine water security, larger peak flows are likely to result in only moderate overall impact on water storage and water storages. Lower flows and higher temperatures may also reduce water quality within the catchment. Additionally, greater fire activity could contaminate water catchments with sediment and ash. Salinity problems in the catchment may be exacerbated by changes in rainfall, temperature and stream flows.

**Farms:** The key consequence of climate change on farming will be increased stress linked with reduced rainfall and temperature increase, in turn leading to reduced soil moisture (for dryland cropping, irrigated agriculture may be affected by tighter constraints on water allocations and higher prices. Heavy rains and winds from storm events may increase crop damage and soil erosion. Indirect impacts due to changes in weeds, pests and international markets may also increase stress on farms.

More specific referenced potential impacts on farming include the following:

- Positive and negative impacts are likely for cropping and overall productivity. For example, higher atmospheric CO₂ levels may increase plant growth, but protein content may reduce. Low to moderate warming will help plant growth and extend growing seasons, but more very hot days or droughts could damage crops.
- Increased dry land grazing (eg: beef cattle) and broad acre cropping benefits from elevated CO₂ may also be offset by higher temperatures (eg: increased heat stress on livestock from warmer temperatures may affect growth and productivity, with implications for livestock management.
- Increased heat stress on dairy cattle could reduce milk production.
- Irrigation water use efficiency will become more important if water is less available. Reduced winter chilling of some fruit trees, may reduce fruit yield and quality, with future implications on selection of varieties and management practices. However as higher temperatures may reduce winter frosts, growing conditions may increasingly favour subtropical and tropical species.
- Sea-level rises will also impact on drainage and groundwater in low-lying coastal floodplains. This could increase flood durations, soil water logging, and soil salinity.
- These impacts may be exacerbated by the infiltration of saline water into coastal aquifers, reducing the quality and viability of groundwater for irrigation.

**Biodiversity:** Although current threats to biodiversity result from historical land clearing, alterations of river flows and water extraction, climate change may heighten need for conservation efforts. Climate change may change the distribution of some plant and animal species, driving some species out of the local area, and permit the incursion of ‘invaders’. Overall however, little is known about the potential impact of climate change on some endangered flora and fauna species and biodiversity including in ecologically important coastal freshwater wetlands and salt marshes.

**Bushfire:** Increased bushfire incidence could occur.
Forests: Australian temperate forests may increase in productivity with higher temperatures and increased concentrations of atmospheric carbon dioxide. However, these benefits may be offset by decreased rainfall, increased bushfires and changes in pests. Also, benefit from higher CO2 levels may be limited in the longer term by the availability of nutrients.

Other implications may include changes in the distribution of tree species and changes in pest incidence. Expansion of forestry may be facilitated, and the region’s low fire risk rating may provide competitive advantages over more arid areas.

Communities and built infrastructure: Some health implications may occur due to warmer winters and summers but spread of tropical diseases in the region is considered unlikely. Revision of building standards and designs may be needed, and increased flash flooding may increase road and infrastructure repair and maintenance costs. Higher temperatures and lower average rainfall are likely to lead to increased pressure on urban water and energy supplies, unless moderated by demand management measures.

Increased extreme winds and storm surges in association with rising sea levels will increase risk of coastal inundation, erosion, and damage to infrastructure and property. Some modelling of coastal responses to sea level rise along the NSW coast indicates potential for tens of metres of beach erosion over the next century, and potential for erosion exceeding 100m during severe storm events. However, the actual magnitude of beach erosion will vary significantly between locations.

RESPONSE TO CLIMATE CHANGE

The CSIRO report proposes that adaptation measures should be implemented. These broadly include the following:

- Improving water-use efficiency;
- Reducing dependency on surface water during low flow conditions;
- Changing to crops that are more tolerant of heat and drought;
- Changing planting times and practices for crops;
- Providing more shade and cooling for livestock;
- Providing migration corridors for vulnerable animals;
- Reviewing flood and fire management arrangements.

Adaptation strategies will be needed over time to implement these measures as required. Some indicative responses are alluded to in the CSIRO report.

The CSIRO report provides a list of 30 relevant references on the subject of climate change and its implications.

INCREASING SOIL CARBON IN TWEED VALLEY FARMLAND

An $800,000 ‘Action on the Action on the Ground’ Project largely funded by the Commonwealth Government with Tweed Shire financial assistance has been implemented. The project proposes a nutrient recycling program on 30 local farms across six industries (sugar cane, banana, vegetable, orchards, dairy, beef) both conventional and organic, aimed at increasing soil carbon while also reducing farm GHG emissions. The project is intended to demonstrate that through the application of compost, biochar/compost blend, animal manure, and use of legume cover crops, soil carbon levels consistently increase over various landscapes, soil types, activities and time.

The project is also expected to provide a platform to trial the production of local carbon-rich soil amendment products by recycling local resources (municipal green waste, dairy manure and effluent, forestry and road side wood chips) thus reducing need for transport and associated GHG emissions or financial cost (currently transport accounts for over 50% of the total cost of composts or manure).

The project is expected to provide information on the following:

- A comprehensive/ representative soil carbon database for Tweed Shire, able to inform application rates for use of alternatives to chemically based fertilizers;
- Increased and protected soil carbon;
- Reduced nitrous oxide emissions - Improved soil structure and fertility;
- Improved nutrient and water availability;
- Reduced input of chemically based fertilizers in sensitive areas hence improved farm and ecosystems productivity and resilience;
- Reduced soil acidification related to acid sulfate soils and optimized buffering capacity of soil conditioners;
- Decreased diseases and pest impacts;
- A framework for future larger scale (regional) project.

Information on the status of the project can be sourced from Tweed Shire website.

FLOODPLAINS

If the above climate change predictions occur, they would impact on floodplain areas though expansion of flood liable areas, greater depth of floodwaters and higher flow velocities. Increases in amount and intensity of rainfall in the catchment may contribute to increased soil erosion and sedimentation, and consequent deterioration in stream water quality.

SEA LEVEL

The Tweed Shire Council’s webpage on climate change states that since 1987 a sea level of 2.65m AHD has been used for Flood Modelling in Tweed Shire. This level is around 0.4m higher than the seal level adopted by adjoining Councils. Although the 0.4m was adopted for reasons other than climate change (overestimation of storm surge compared to later work), it now gives Tweed flood modelling a built in allowance for sea level rise due to climate change. In October 2008, DECC issued a guideline for incorporating climate change variables into flood studies. The guideline recommends the following variables be modelled in flood studies to examine the impacts of climate change.

For sea level rise:

- 0.18m (Low Level Ocean Impacts);
- 0.55m (Mid Range Ocean Impacts);
- 0.91m (High Level Ocean Impacts).

For increased rainfall intensity:

- 10% in peak rainfall and storm volume;
- 20% in peak rainfall and storm volume;
- 30% in peak rainfall and storm volume.

22 https://www.google.com.au/#q=INCREASING+SOIL+CARBON+IN+TWEED+VALLEY+FARMLAND
The Floodplain Risk Management Study modelling identified areas susceptible to increased flood levels and risk due to climate change and in 2008 the Tweed Shire Council resolved to:

- Incorporate climate change variables into the revision of the 2005 Tweed Valley Flood Study;
- Incorporate the results of this modelling into the Tweed Valley Floodplain Risk Management Study and Plan;
- Address climate change variables in the Coastal Creeks Flood Study.

The Tweed Urban Employment and Land Release Strategy (2009) prepared by GHD identified areas below 5m above sea level (ASL) and between 5m and 10m ASL to visualize one of the potentially direct impacts of climate change. While a 5m rise in sea level is not predicted, the level was to illustrate the extent of low lying areas. The mapping identifies that Tweed Shire contains considerable areas below 5m ASL, including the entire Tweed River valley, the areas around the Cobaki and Terranora Broadwater, and the areas around Tweed Shire coastal creeks' floodplains. Considerable parts of the existing urban areas are also below this level.

8.12. DRAINAGE AND WATER USE

The Tweed valley catchment covers 1303km². It is bound by the McPherson Range on the NSW-Queensland border, the Burringbar and Condong Ranges to the south-east, and the Tweed Range to the west. While the peak of Mount Warning is the highest point 1,156 metres, much of the catchment is at less than 300 metres.

The Tweed River begins near Mount Burrell in the south-west and flows approximately 80 km to the ocean at Tweed Heads. Upstream of Murwillumbah, the Tweed and Oxley rivers drain the rugged and compact caldera that encircles Mt Warning. Below Murwillumbah, the Tweed River crosses the extensive floodplain and is joined by the Rous River, which drains the moderately dissected mid north areas of the catchment, at Tumbulgum. The shallow tidal broadwaters at Terranora and Cobaki, are fed by Bilambil, Duroby, Piggabeen and Cobaki Creeks, and join the river near its mouth via the Terranora Inlet before the river discharges to the ocean at Point Danger, immediately south of the NSW-Queensland border.

Tidal influence penetrates up the Tweed River to the Bray Park Weir approximately 5 km upstream of Murwillumbah and dominates the river levels except during flood events. The major infrastructure that impacts on flows in the Tweed River system are Clarry Hall Dam and the Bray Park Weir (approx. 520 ML). Extraction primarily for town water supply occurs from the Bray Park Weir pool which is supplied by both the Tweed and Oxley Rivers. Releases are made from Clarry Hall Dam to top up the Bray Park Weir pool. At the end of the Tweed River two small coastal catchments that feed into Cobaki Broadwater and Terranora Broadwater. These shallow estuarine lakes form part of the lower Tweed estuary. Cobaki Broadwater is fed by Piggabeen and Cobaki Creeks, while Terranora Broadwater receives water from Bilambil and Duraby Creeks. The small coastal catchments of Cudgen, Cudgera and Mooball Creeks, south of the Tweed River mouth typify many small coastal estuarine creeks along the northern NSW coast in that they flow northwards behind a coastal sand barrier. They have dynamic, generally constricted entrances that largely control their tidal and morphological characteristics. As a result these catchments can be subject to a wide range of water levels and discharges, together with a variable salinity caused by the mixing of ocean water with freshwater runoff from the land.

8.12.1. CLIMATE AND STREAMFLOWS

As previously identified, Tweed Shire catchment has a warm temperate humid subtropical climate, with a pronounced summer/autumn wet season and a winter/spring dry season.

The caldera and proximity to the sea both have significant impacts on the climatic variability across the catchment. On average Tweed Shire records 12 rain days per month, with February and March having the highest and July, August and September the lowest number of rain days. This rainfall can vary from over 2000 mm on the McPherson and Nightcap Ranges scarps to around 1600 mm on the floodplain. This, in combination with mean daily maximum temperatures in the mid to high twenties can lead to relatively high humidity within the catchment, although altitude and sea breezes can lower this. The highest mean maximum daily temperature recorded at Murwillumbah is 29.6o C in January, while the coolest mean minimum temperature is 8.3o C in July.

Tweed Shire is located near the southern limit of cyclonic activity on the east coast of Australia, with the cyclone season extending from December to mid April. The Bureau of Meteorology estimates that an average of one cyclone in every two cyclone seasons is likely to affect the area. Gale force winds and torrential rains associated with these cyclones, or tropical depressions formed after cyclones, may cause flooding within the catchment.

Streams in the Tweed catchment are heavily influenced by seasonal climatic variability and display a similar flow regime with some minor variations. Generally high flows occur in all water sources during the periods from January through to July with peak flows typically occurring during January to March. During the period from August through to mid/late November when very low flows occur, some variation between basins is exhibited.

8.13. KEY WATER MANAGEMENT ISSUES

The rivers of the Tweed catchment have been affected in the past by land clearing, agricultural use, human settlement and recreation. Many streams on the coastal floodplain have been channelized and flow regimes changed by the installation of flood gates.

The rivers and creeks in the catchment are largely unregulated apart from Clarrie Hall Dam on Doon Doon Creek, a tributary of the Tweed River. Sharing the catchment's water resources fairly between competing water users such as town water, agriculture and industry can be a challenge, particularly during drought, when water is less and demand high. Water sharing rules have been developed to set long-term rules on how water can be accessed, used and traded within the catchment. This occurs under the NSW Water Management Act 2000 the objectives of which are the sustainable and integrated management of the state's water for the benefit of both present and future generations. The Act recognises that:

- the fundamental health of our rivers and groundwater systems and associated wetlands, floodplains, estuaries has to be protected
- the management of water must be integrated with other natural resources such as vegetation, soils and land
- to be properly effective, water management must be a shared responsibility between the government and the community
- water management decisions must involve consideration of environmental, social, economic, cultural and heritage aspects
- social and economic benefits to the state will result from the sustainable and efficient use of water
The Act controls the extraction of water, how water can be used, the construction of works such as dams and weirs, and the carrying out of activities on or near water sources in NSW. It requires approvals to be obtained for the taking and use of water, and for the construction and use of works (such as pumps, drains and pipes) relating to water use. Further detailed information on the Water Management Act 2000 is provided on the NSW Government website.  

FIGURE 46 TWEED SHIRE LAND SUSCEPTIBLE TO CLIMATE CHANGE

Climate Change Design Flood Mapping
Based on WBM 2009 Flood Study
1 in 100 Year Flood Event

Legend
- Flood level contour (metres ARO)
- Inundation Areas
  - 0.5 to 3.0
  - 3.0 to 3.5
  - 3.5 to 4.0
  - 4.0 to 4.5
  - 4.5 to 5.0
  - 5.0 to 5.5
  - 5.5 to 6.0
  - 6.0 to 6.5
  - 6.5 to 7.0
  - 7.0 to 7.5
  - 7.5 to 8.0
  - 8.0 to 8.5
  - 8.5 to 9.0
  - 9.0 to 9.5
- Probable maximum flood (PMF)

Source: Tweed Shire Council.
8.14. WATER SHARING PLANS

To preserve water resources in river and groundwater systems for the long term it is critical to balance the competing needs of the environment and water users. NSW state water sharing plans establish 10 year rules for sharing water between the environmental needs of the river or aquifer and water users, and also between different types of water use (eg: town supply, rural domestic supply, stock watering, industry and irrigation). The Water Sharing Plan for the Tweed River Area Unregulated and Alluvial Water Sources 2011 covers Tweed Shire.

8.14.1. WATER ENTITLEMENT AND USE

The largest use of water from the Tweed River is for town water supply for the growing urban area of Tweed Heads. Apart from urban use, other water users extract water for irrigation, and stock and domestic use. Horticultural crops include tropical fruits, avocados, macadamias, stone fruit, tomatoes, and other vegetables. Irrigation of the river flats is carried out for dairying, while sugarcane farming occupies large areas adjacent to the estuary.

The total annual volume of surface water licensed for extraction (at February 2009) within the area covered by the Tweed River water sharing plan is 35,207 ML from the total average annual flow of about 365,000 ML for the Tweed River at Brays Park Weir (Source: Integrated Water Supply Options for North East NSW and South East Queensland - SMEC, 2007). There is also 780 ML of authorised annual groundwater extraction from the ‘upriver’ alluvial aquifers and the ‘coastal floodplain’ alluvial aquifers within the plan area. This volume has been included in the plan due to the significant connectivity of the aquifers with their parent streams.

The licensed extraction is separated into three ‘extraction management units’ (EMU).

- For the Tweed River Catchment Extraction EMU, the total volume of surface water licensed for extraction is 33,197 ML. This includes up to 27,567 ML (about 83 per cent) for town water supply from the Mid Tweed water source for Tweed Heads and Murwillumbah (current annual usage is approximately 11,000 ML). The total volume of ground water licensed for extraction is 295 ML.
- For the Burringbar River Catchment EMU, the total annual volume of surface water licensed for extraction from the EMU is 1,278 ML. Of this, approximately 771 ML (or 60 per cent) is extracted for irrigation purposes within the Burringbar River Water Source. The total volume of ground water licensed for extraction is 245 ML.
- The Clothiers Creek Catchment EMU has a total annual licenced surface water extraction volume of around 732 ML. There is 597 ML (or 82 per cent) extracted from the Cudgen Lake water source mainly for irrigation on the agricultural areas on the Cudgen plateau, while the total volume of ground water licensed for extraction is 240 ML.

8.15. GEOLOGICAL HAZARD (MASS MOVEMENT)

Mass movement is the natural process by which soil, rock and other material move downslope under the force of gravity. The main mass movement classification types are:

- Slides: Rock and/or sediment slides along earth’s surface with well-defined zone or plane of sliding/slumping.
- Creep: A long term process with a combination of small movements of soil or rock in different directions downslope over time. The creep makes trees and shrubs curve to maintain their perpendicularity, and they can trigger landslides if they lose their root footing.
- Falls: Chunks of soil or rocks detach and fall or bounce through the air. They can be triggered by rains, floods, earthquakes, and other natural causes as well as human-made causes, such as deforestation, grading, terrain cutting and filling, excessive development, etc. which can destabilise already fragile slopes.

Mass movement can occur on any terrain given the right conditions of soil, moisture, and the angle of slope. There are three main factors that control the type and rate of mass movement:

- Slope gradient: The steeper the slope of the land, the more likely that mass movement will occur (refer to Figure 47). Erosion of the toe of a slope by rivers or earthworks increases the immediate slope steepness. The incidence of mass movement and other forms of soil erosion increase substantially on slopes of 18-20 % and above. Slope consolidation: Sediments and fractured or poorly cemented rocks and sediments are weak, and more prone to mass wasting.
- Moisture: If slope materials are saturated with water, they may lose cohesion and flow easily. Groundwater pressure also acts to destabilise the slope.

As development pressures increase, so does the likelihood of building in areas susceptible to mass movement (as for development on flood prone land). Steep land particularly along the northern, western, north western, south western and southern perimeter of the Shire and in the vicinity of Mt Warning is particularly susceptible to mass movement (refer to the following figure).
FIGURE 47: TWEED SHIRE SOIL EROSION AND MASS MOVEMENT HAZARD MAP
8.16. BIODIVERSITY AND NATURAL LANDSCAPE
This section summarises key biodiversity and natural landscape features of Tweed Shire and associated planning matters.

8.16.1. INTRODUCTION
Tweed Shire’s biodiversity has been intensively studied and is the subject of a range of key reports. The shire contains exceptional biodiversity and other natural environmental assets (including landscape and scenic appeal). It’s National Park and other public land classification areas contain very strong biodiversity values. The same applies across private land particularly in the hills. Linear reserves along streams and road reserves also contain strong biodiversity values both in their biodiversity content and in their functions as biodiversity corridors.

8.16.2. BIODIVERSITY
The Tweed Vegetation Management Strategy (2004)24 (TVMS) describes the shire as an area of high conservation significance at all levels; local, regional, national and international. It identifies that the shire lies within a zone of overlap between two major bio-geographical regions, the Toressian Region of tropical northern and north eastern Australia, and the Bassian Region of temperate, south east Australia. The overlap zone encompasses the area from Lamington National Park in south east Queensland to Barrington Tops in NSW. It contains a diverse mix of flora and fauna species and communities, many of which are at the southern or northern limits of their range, and endemic species not found in other regions.

The highlights of the biodiversity values in Tweed Shire (as identified in the TVMS include:

- The Region supports Australia’s highest concentration of Threatened plants species.
- 105 significant animal species with 17 listed as Endangered and 88 as Vulnerable under the Threatened Species Conservation Act 1995.
- Over 50 species of migratory birds protected under international agreements including Japan-Australia Migratory Bird Agreement (JAMBA) and China-Australia Migratory Bird Agreement (CAMBA).
- More species of birds, fish, amphibian and mammals than Kakadu and a similar number of reptiles.
- World Heritage Rainforests: Tweed’s National Parks are listed on the UNESCO World Heritage Register.

The Shire’s rural areas are significant for the protection and enhancement of these biodiversity values, with about half the Shire being covered by bushland mostly on steeper areas and outside National Parks. Figure 48 shows that very high and high ecological status vegetation is common in the Shire’s rural areas.

The rural areas of the Shire are significant for the protection and enhancement of these biodiversity values with about half the Shire being covered by bushland mostly of which occurs in steeper areas and outside National Parks. Figure 9 also illustrates that the very high and high ecological values are found in the rural areas.

TWEED VEGETATION MANAGEMENT STRATEGY
The three volume TVMS represents Tweed Council’s adopted approach to environmental protection and management. It forms the basis for Council’s Biodiversity Program, with its aims and recommendations embedded in Council’s Community Strategic Plan 2013/2023 and Delivery Program. The goals of the TVMS are to:

- Encourage the protection and enhancement of regional and local native biological diversity in Tweed Shire by promoting ecologically sustainable management practices.
- Promote a holistic and co-ordinated planning framework in accordance with the Native Vegetation Act 2003 and the Environmental Planning and Assessment Act 1979 for the management of ecological processes and systems in Tweed Shire.
- Adopt a balanced and equitable approach in developing the framework that takes into account the environmental, economic, social and cultural interests of the State and Tweed Shire community.

The preparation of the TVMS involved extensive community consultation (including rural interests) built around a number of detailed technical assessments relating to the shire’s ecological values, soil and water resources, socio-economic and cultural conditions and strategic planning framework. The Strategy provided recommendations relating to Council’s Strategic Planning, operational management functions and for providing support and incentives for landholders and the community to better manage the very substantial biodiversity values of the shire.

Ensuring consistency with the TVMS is a key issue for the preparation of the Rural Lands Strategy.

More broadly, the TVMS identifies Tweed Shire within NSW’s North Coast Bio-geographic Region. This Region has a rich assemblage of plant species forming complex mosaics of vegetation communities that include the greatest diversity of rainforest types in NSW, some of World Heritage status. Most of the national parks and reserves in the Tweed valley are part of the Gondwana Rainforests of Australia World Heritage Area. They contain ancient rainforest communities, plants and animals with evolutionary links to Gondwana, and form part of the largest node of subtropical rainforest in Australia. Over ninety species of Eucalyptus occur in the bioregion making it one of the richest areas on the continent for this genus.

Two islands in Tweed Shire estuary are included in the Directory of Important Wetlands in Australia. Stotts Island contains the only substantial remnant of lowland floodplain subtropical rainforest in NSW. Ukerebah Island Nature Reserve is one of the largest estuarine wetlands in Tweed Shire. It protects endangered communities of littoral rainforest, mangroves, saltmarsh and seagrasses.

The rural areas of the Shire are significant for the protection and enhancement of these biodiversity values with about half the Shire being covered by bushland most of which occurs in steeper areas and outside National Parks. Figure 46 shows that very high and high ecological status vegetation categories are common in the Shire’s rural areas.
**Tweed Vegetation Management Strategy**

The three volume *Tweed Vegetation Management Strategy 2004* (TVMS) links Tweed LEP 2000 with the NSW *Native Vegetation Act 2003*. The Strategy contains a detailed assessment of the ecological values, status, and sensitivity of Tweed vegetation. The following is a description of criteria for ecological status and sensitivity:

- **Ecological status** in the Shire varies across Very High, High, Medium, Low and Not Determined, based on the criteria detailed in Table 3.5 of the Volume 2 Report. Ecological status of rural land in Tweed Shire is depicted in Figure 48.

- **Ecological sensitivity** is rated as High, Moderate, Low and Not Determined, based on the criteria at Table 3.6 of Volume 2. Ecological sensitivity for rural land in Tweed Shire is depicted in Figure 49. Refer to Appendix D for the criteria for assessment of the mapped categories of ecological status and sensitivity.

Volume 1 of TVMS includes a review of land-use planning mechanisms used in the protection and management of native vegetation. A key consideration for land use planning from the findings of the Technical Report (Volume 2) was the use of the Ecological Status criteria and mapping to guide strategic planning for habitat protection. This is being used by Council to inform protection and enhancement of environmental values during the current Tweed LEP review.

Volume 2 of TVMS identifies the following key threatening processes relevant to land use planning:

- Clearing of native vegetation.
- Fragmentation effects.
- Alteration of natural flow regimes of rivers and streams and their floodplains and wetlands.
- Biodiversity protection is afforded throughout the LEP, including in all ‘7’ Zones, in the objectives of the LEP, Clause 5 ESD, and elsewhere.

The existing planning tools applied for biodiversity protection in the LEP 2000 include the following:

- Land Use Zoning via the Environment Protection 7(a), 7(f)
- Environment and resource provisions.

- **Zone map overlay provisions.**

**Draft LEP 2012**

The Shire is proposing a revised environmental strategy that includes the proposed following zoning revisions and supporting LEP clauses that primarily relate to biodiversity:

- A refined E2 Environment Conservation zone as per the draft LEP 2010 and LEP 2000 (Amendment 21). The proposed mapping of this zone focuses mostly on Tweed Coast, public lands and areas already protected are likely to have limited implications for private land in the rural areas.

- A new but flexible E3 Environmental Management zone based on the Rural 1(a1) Steep Land/ Escarpment proposed in LEP 2000 (Amendment 21). This zone identifies environmental constraints and potential for land and water degradation. The Council would augment the objectives to include encouragement of sustainable agricultural production compatible with topographical and ecological constraints of the land, enable development including a limited range of tourism and residential development that has adequate protection from natural hazards, and maintaining and improving natural conservation and scenic values including habitat areas and wildlife corridors.

- Revised Waterways zones to more closely reflect existing waterway character and uses. There are three waterway zones. W1 Natural Waterways relates directly to the protection of ecological and scenic values.

- A new Steep Bushland overlay map and revised clause to reflect the provisions of the clause 28 of LEP 2000 (Amendment 21) and the Tweed Vegetation Management Strategy. This relates to protecting both biodiversity and scenic values in the rural areas of the Shire.

- A new riparian land overlay map and revised clause to reflect existing consent provisions for development adjoining waterways under clause 31 of LEP 2000. This has importance for biodiversity both in terms of protecting remnant native vegetation and protecting and the function as a wildlife corridor.

A revised approach to tree preservation that is consistent with LEP 2000 (Amendment 21) and the *Tweed Vegetation Management Strategy* which acknowledges important biodiversity and amenity values but also recognises State administered clearing controls and practical considerations relating to vegetation management. The revised approach is outlined in the Shire’s Fact Sheet 8 Draft Trees and Vegetation Preservation Code and relates to proposed Clause 5.9. Potential problems for achieving the objective of Clause 5.9 for the objective of this clause ‘to preserve the amenity of the area’ relates to the exemption of Camphor Laurel as a declared noxious weed with the issue being that Camphor Laurel often occurs in large stands in sensitive parts of the landscape (e.g. steep land and riparian areas), commonly supports Threatened plants species and often contributes to scenic amenity. In these circumstances the Shire is concerned that large scale removal of Camphor Laurel will be difficult to regulate and have impacts on land degradation, biodiversity values and scenic amenity.
FIGURE 48 ECOLOGICAL STATUS IN TWEED SHIRE

Source: TWSM_EcoStatus, Tweed Shire Council
FIGURE 49 ECOLOGICAL SENSITIVITY IN TWEED SHIRE

Source: TVM04_EcoSensitivity, Tweed Shire Council
8.16.3. **VISUAL CATCHMENTS AND ICONIC AND SCENIC LANDSCAPES**

This section discussed natural landscape features of Tweed Shire, and the protection of scenic values.

**TWEED SHIRE SCENIC LANDSCAPE EVALUATION 1995**

The Tweed Council’s 1995 ‘Tweed Shire Scenic Landscape Evaluation’ identifies 11 Scenic Districts. Its purpose was to: evaluate the scenic landscape; identify scenic routes; and develop a procedure for management of the scenic landscapes including landscapes on the Register of the National Estate for the Tweed Shire Council. The evaluation also provided a detailed resource of the landscape features and values of the whole shire and formulation of a planning process and scenic landscape management strategy that addresses possible changes to scenic landscape that may arise from development proposals.

*Volume 1* of the evaluation classified the Shires into: landscapes of relative scenic quality; scenic management zones; scenic routes and viewpoints; scenic features; and, townships and scenic cultural places.

*Volume 2* contains folio data sheets for the 11 identified Scenic Districts.

*Volume 3* contains:

- Scenic evaluation maps for: (1) Scenic Routes and Viewpoints; (2) Significant Scenic Landscapes; and (3) Scenic Districts.
- District and Units Scenic Landscape Evaluation Maps and Field Assessments for the 11 scenic districts.

This scenic landscape evaluation provides information to help inform the Shire Council about decisions on planning applications in zones in rural and urban areas.

**LEP 2000**

The Tweed LEP 2000 includes objectives for protection of landscape amenity relevant to rural lands in a number of the zones. These are as follows:

- In Zone 1 (a) Rural - To protect rural character and amenity, and to provide non-urban breaks between settlements to give physical identity to each settlement.
- In Zone 1 (c) Rural Living - To enable rural residential development in selected areas where, among other matters, it will not detract from the quality of the rural and natural environment.
- In Zone 7 (a) Environment Protection (Wetlands and Littoral Forest) - To protect the scenic values of wetlands and littoral rainforests.
- In Zone (7d) Environment Protection (Scenic / Escarpment) - To protect and enhance the areas of particular scenic value to the area of Tweed Shire.
- In Zone 7 (l) Environment Protection (Habitat) - To protect areas of scenic value.

**TWEED VEGETATION MANAGEMENT STRATEGY 2004**

The previously identified Tweed Vegetation Management Strategy (Volume 1, p. 3-6) identified the need for the LEP to include zoning protection for areas of high scenic value, and for zone objectives to include scenic considerations and assessment guidelines.
9. LAND CAPABILITY

9.1. DEFINING LAND CAPABILITY

Land capability is the inherent physical capacity of land to safely and effectively sustain use without resultant degradation of land or water resources. Failing to use land within its capability may have significant adverse consequences. Common on-site and off-site environmental impacts include soil erosion and sedimentation, contamination or other degradation of water resources (both surface water and groundwater), release of acid solutions from acid sulfate soils, and other forms of land degradation. The long-term effectiveness of a land use may be threatened by factors such as failure of building foundations, mass movement of land including collapse of cutting batters, flooding, poor performance of sewerage treatment systems, and restricted plant growth.

Land capability assessment examines the inherent capability of the land to support nominated rural land uses through identifying the biophysical characteristics of the land and its constraints. It provides information for consideration of the following:

- the land uses that are most physically suited to an area (ie: the uses with the best match between the physical requirements of the use and the physical qualities of the land);
- the potential hazards and limitations associated with specific uses;
- the inputs and management requirements associated with specific land uses.

The importance of land capability assessment in protecting soils and other natural resources is recognised in the NSW Total Catchment Management Policy 1987 which commits the NSW Government to ‘ensuring that land within the state’s catchments is used within its capability and on a sustained basis’. Likewise, the NSW State Soils Policy 1987 states that the ‘use of the state’s soils for any purpose should not lead to their loss or degradation and must therefore be within the bounds of their inherent capability to ensure continued utility, stability [and] productivity’. It also states that ‘land capability and land suitability assessments which take full account of soil characteristics and limitations are essential prerequisites to determination of the best use of the state’s lands and associated soils’.

In this project, Soil Landscapes as described in Soil Landscapes of the Murwillumbah-Tweed Heads 1:100 000 Sheet (Morand, 1996) are defined that identify and describe areas of land that have limited variability with respect to the characteristics that affect land use, including geology, landform and soils. Soil landscapes are not soils maps, but include common slope ranges, land shapes and soil associations.

By comparing biophysical criteria specific for nominated land uses to the biophysical characteristics describing each soil landscape, land capability maps can be derived. Each area of a particular soil landscape has similar natural attributes, which control capability for nominated uses and respond in a similar way to management.

The limited variability within soil landscapes at the scale of mapping (1:100 000) provides a good basis land capability assessment and derived maps for various land uses at regional scale. In this assessment, the soil landscapes and derived land capability maps are delineated at a strategic scale. Their described characteristics and properties are derived from other studies and land descriptions noted in Section 8.

The land capability assessments in this instance are therefore broad scale and strategic, providing an overview. These assessments and maps are useful for strategic analysis, but cannot be used for definitive judgments about specific land use proposals or for specific rural properties.

Tweed Shire’s diverse range of landforms reflects the Shire’s complex geology, variable topography, and wide range of soil types. The diversity results in a range of inherent capabilities of the land to support various rural and urban uses. These can vary substantially in short distances within and between individual land titles.

If land is used such that the use activity exceeds the land’s natural capability to sustain the use, it will degrade. Further, all rural uses have the potential to cause land degradation if the land use pressure applied exceeds the land’s inherent capability. Also, sustainable use can occur on land with low inherent capability for that use, but additional resource application will be needed to achieve sustainability relative to land with higher inherent capability.

Land degradation hazards in Tweed Shire are well identified and described in the above-mentioned Soil Landscapes report and in Volume 2 of the Tweed Vegetation Management Strategy 2004, and other documents. Common degradation hazard types include:

- Soil erosion
- Mass movement / slope failure (including land slip and land creep)
- Streambank erosion
- Coastal erosion
- Acid sulphate soils
- Flooding.

Land degradation in the Shire has been common on cleared land - most commonly as sheet and gully soil erosion, erosion of beds and banks of streams, landslips or mass movement, and as acid sulphate soils on river flats. These forms of degradation in turn cause sedimentation, and other water pollution. Soil erosion also generally reduces water infiltration into the land and causes faster and increased rainfall runoff. This in turn contributes to higher and more rapid flood peaks.

Soil conservation is addressed in a series of Best Management Practice guides produced by the Northern Rivers CMA for a range of agricultural production types.

The detailed Morand (1996) document provides assessments for each Soil Landscape of agricultural land capability for grazing and regular cropping, and for on-site effluent absorption and for building foundations. The latter two are the primary indicators of land capability for rural lifestyle living. These matters are discussed below.
9.2. LAND CAPABILITY FOR DWELLING DEVELOPMENT ON RURAL LAND

9.2.1. LAND CAPABILITY MAPPING FOR RURAL DWELLINGS

As for land capability limitations for agriculture, Morand (1996) describes land capability limitations of all Soil Landscapes for building foundations and septic absorption in terms of hazard and limitations. Land capability for these two functions accounts for much of the land capability criteria for rural dwelling use. The report uses the following ratings:

- A four-class limitation rating is used for building foundations hazard: 'Extreme', 'High', 'Moderate' and 'Low'.
- A three-class limitation rating is used for septic absorption capability: 'Major', 'Moderate' and 'Minor'.

Table 38 and Table 39 depict the above ratings for the Shire’s lands derived directly from the ratings in the Soil Landscapes report. As these maps are at a strategic scale, they provide a ‘big picture’ guide and cannot be used for interpretation of individual sites or individual properties. For example, while the septic absorption map indicates ‘major’ limitations across most of the shire there this does not infer that septic systems cannot be installed or that limitations all sites would necessarily demonstrate that rating. It does infer however that across the Shire the land is not well suited for septic absorption and that assessment land is needed on a site by site basis in applications for approval of subdivisions where housing is anticipated and when individual approval applications are made for dwellings or other uses requiring on-site treated liquid waste disposal.

The two key constraints to dwelling development on rural land relate to:

- general land capability limitations that affect land, soil and water degradation hazard and engineering requirements for site safety and risk minimisation;
- compliance and exclusions under the NSW Rural Housing Code (2012).

Land capability assessment for dwelling development on rural land involves a series of assessments for associated works and changes to the land including; construction of roads, excavations for installation of underground services (water, power, telecommunications), building foundations and sewage waste.

A main source of information for this section is the 2010 NSW Department of Climate Change Environment and Water document titled Soil and land constraint assessment for urban and regional planning.

CONSTRUCTION OF UNSEALDED ROADS AND EXCAVATIONS FOR THE INSTALLATION OF UNDERGROUND SERVICES

Main information and directions for this matter are provided in the following publications of the NSW Department of Environment and Climate Change:

MANAGING URBAN STORMWATER: SOILS AND CONSTRUCTION, VOLUME 2A, INSTALLATION OF SERVICES.

Service installation projects include activities such as laying of pipelines for water, stormwater, sewerage or gas, the construction of power lines, and similar projects. They can vary significantly in their scale, location and construction technique. Proper planning and installation of erosion and sediment control measures is required to ensure that the land disturbance associated with such projects does not lead to significant detrimental impacts on the surrounding environment. This principle holds for all such work regardless of whether it is undertaken in urban, rural or bushland locations.

The purpose of the document is to provide guidelines, principles and recommended design standards for managing erosion and sediment control during service installation. The target audience for this document is anyone involved in the planning, design, approval and construction of service installation projects including officers from local government, state government agencies, utilities, consulting firms, contractors, etc. This document guides the user in applying the principles and practices of erosion and sediment control.

MANAGING URBAN STORMWATER: SOILS AND CONSTRUCTION, VOLUME 2C, UNSEALDED ROADS.

Unsealed roads are common in rural areas, forests, parks and other areas where traffic volumes are low. They can generate a significant amount of erosion during their construction and operation. This can have a negative environmental impact through accelerated erosion and the subsequent deposition of sediment in waterways and on adjacent land, with potential impacts on flora and fauna. Appropriate planning and design, good construction practice and active maintenance of unsealed roads can minimise erosion and off-site sedimentation significantly.

The purpose of this document is to provide guidelines, principles and recommended design standards for good management practice in erosion and sediment control for unsealed roads. The target audience for this document includes those within local government, State government, utility providers, consulting firms, landholders and contractors who have a role in the planning, design, construction or maintenance of unsealed roads in New South Wales. This document guides the user in applying the principles and practices of erosion and sediment control described in volume 1 of Managing urban stormwater: soils and construction (Landcom 2004d) to the planning, design, construction and maintenance of unsealed roads.

BUILDING FOUNDATIONS

The Department of Environment, Climate Change and Water NSW, 2010 publication titled Soil and Land Constraint Assessment for Urban and Regional Planning (2010) and Morand (1996) address the constraints associated with the installation of building foundations.

The former publication states that the stability of foundations is important for all land uses involving construction works, including buildings, roads and other infrastructure (above and below ground). Ground instability, soil weakness, potential chemical attack or other limitations of the foundation material may lead to partial or complete failure of a structure or facility.

The above-mentioned soil and land constraint assessment document provides a rating tabulation for Rural Residential Development Constraints. This includes ratings for foundation hazard assessment affecting an area that cover potential soil and landscape constraints. The table refers to low intensity residential development in rural settings, typically in the hinterland of urban centres, for lots of at least one hectare in area. This assumes that there is no reticulated sewerage system, thus domestic sewage treatment is carried out on-site, and roads are generally unsealed.

9.2.2. ON-SITE WASTE MANAGEMENT

The NSW State Agencies (1998) Environment and Health Protection Guidelines for On-site Sewage Management for Single Households specifically addresses site suitability for on-site sewage management. It identifies that choosing the appropriate site for on-site sewage management can be the single most important factor in establishing an
on-site sewage management system that is functional and environmentally sound in the long term. The site factors listed in Table 38 can place constraints on on-site sewage treatment technologies and land application systems. It is therefore necessary that land capability assessments are conducted on sites proposed for such development to identify land capable of sustaining the development and to provide the basis for appropriate system design. ..


- Standard Residential Development Constraint Rating.
- Medium Density Residential Development Constraint Rating.
- High Density Residential Development Constraint Rating.
- Rural Residential Development Constraint Rating.
- On-site Domestic Wastewater Disposal: Trench Absorption - Transpiration System Constraint Rating.
- On-site Domestic Wastewater Disposal: Surface Irrigation Constraint Rating.
- On-site Domestic Wastewater Disposal: Pumpout System Constraint Rating.
- Tables are also provided on:
  - Agriculture - Cropping;
  - Agriculture - Grazing.

These tables are not reproduced here, but can be accessed from the document on the internet. The tables include rating classifications across the following constraint features: Slope (%); Flooding potential and implications; Mass movement; Shrink swell characteristics of soils; Soil depth, Drainage/waterlogging; Watertable depth and pollution hazard; Stoniness; and Phosphorus sorption. The Tables are appropriate for use in the preparation and assessment of planning development applications, for all categories of rural living development including single dwellings, and multiple dwellings on land titles.

ON-SITE SINGLE DOMESTIC WASTEWATER MANAGEMENT

The following content is extracted from the NSW Government Health Department website27.

ACCREDITATION OF SEWAGE MANAGEMENT FACILITIES

Under the provisions of Clauses 40 and 41 of the NSW Local Government (General) Regulation 2005, a local council must not approve of the installation of certain sewage management facilities unless they have been accredited by the NSW Department of Health. This is the only statutory role of NSW Health in on-site single domestic wastewater management.

The types of sewage management facilities to which accreditation applies include septic tanks, collection wells, aerated wastewater treatment systems, greywater treatment systems, composting toilets and incinerating toilets which are available for purchase by retail. A full list is detailed in clause 40 of the above regulation. It only includes sewage management facilities that treat domestic sewage from premises occupied by a maximum of 10 persons or where the average daily flow of sewage is less than 2000 litres.

Accreditation does not apply to the drains which are connected to the facility nor to any land application system. Similarly, accreditation does not apply to models under test or if the facility is specifically designed for a particular premises (see Advisory Note 1 for an explanation of exemption to accreditation).

Accreditation guidelines have been prepared for most sewage management facilities - see Advisory Note 2 for an overview.

ACCREDITATION GUIDELINES

The following accreditation guidelines have been prepared and can be accessed via the above mentioned webpage:

- Septic Tank and Collection Well Accreditation Guideline December 2001 (includes septic tanks, collection wells, septic closets, grey water tanks, CED pre-treatment tanks and sewage ejection pump stations).
- Sewage Management Facility, Sewage Treatment Accreditation Guideline (incorporating AWTS and Sand Filters), May 2005.

ADVISORY NOTES

The following Advisory Notes are available:

- Exemption of Sewage Management Facilities to be Accredited.
- Accreditation Guidelines Overview.
- Destruction, Removal and Reuse of Septic Tanks and AWTS.
- Effluent Treatment Standard Required for Land Application Systems.

REGISTER OF ACCREDITED SEWAGE MANAGEMENT FACILITIES

The following information is also available on the above mentioned Health Department webpage

- Recent Changes.
- AWTS - (Updated Apr 2012).
- Biological Filter Systems - (Updated January 2010).
- Greywater Diversion Devices - (Updated January 2012).
- Greywater Treatment Systems - (Updated Nov 2011).
- Incinerating Toilets - (Updated August 2005).
- Septic Closets - (Updated April 2011).
- Septic Tanks and Collection Wells - (Updated Dec 2012).
- Sewage Ejection Pump Stations - (Updated December 2011).
- Waterless Composting Toilet Systems - (Updated September 2011).
- Wet Composting Closet Systems - (Updated November 2011).
- Constructed Wetland Treatment System - (Updated September 2009).

MAIN ASSOCIATED LINKS

The following can be pursued as relevant links on this matter:

- Australian Standards.
9.2.3. CONSTRAINTS RELEVANT TO RESIDENTIAL DEVELOPMENT IN RURAL AREAS, RURAL DWELLING DEVELOPMENT AND WASTE WATER DISPOSAL

Clause A5.5 of the draft Tweed Shire Development Control Plan Section A5 Subdivision Manual (2013) provides guidelines for rural planning and subdivision design. It states that onsite effluent disposal in rural areas not connected to the sewer is an environmental constraint which may result in the need for increased allotment sizes, buffer distances to watercourses, dams and corresponding revision of the proposed layout of lots.

The NSW Department of Environment, Climate Change and Water (2010) publication ‘Soil and land constraint assessment for urban and regional planning’ specifies assessment of landscape, soil physical and soil chemical constraints as the basis for rural development and wastewater disposal uses.

- **Landscape constraints** include: steepness of slope, water erosion hazard, flood hazard, acid sulfate soils, mass movement, wave attack, poor site drainage/waterlogging, general foundation hazard, shallow soils and rock outcrop.

- **Soil physical constraints** include: shrink swell, low soil strength, low or high permeability, plant available waterholding capacity and stoniness.

- **Soil chemical constraints** include: salinity, acid and alkaline soils, sodicity, low fertility/nutrient availability and low phosphorus sorption.

The relevance of constraint to particular land uses is depicted in Table 38.
## TABLE 38 CONSTRAINTS FOR TREATED WASTE DISPOSAL RELEVANT TO RESIDENTIAL DEVELOPMENT ON RURAL LAND

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Rural living</th>
<th>Wastewater disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Surface irrigation</td>
</tr>
<tr>
<td><strong>Landscape constraints</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steepness of slope</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Water erosion hazard</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Flood hazard</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Acid sulfate soils</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Mass movement</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Wave attack</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Poor site drainage/waterlogging</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>General foundation hazard</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Shallow soils</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Rock outcrop</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td><strong>Soil physical constraints</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shrink swell potential</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Low soil strength</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Low or high permeability</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Stoniness</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td><strong>Soil chemical constraints</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salinity</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Acid and alkaline soils</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Sodicity</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Low phosphorus sorption</td>
<td>√</td>
<td></td>
</tr>
</tbody>
</table>

Source: DECCW (2010) publication, Soil and land constraint assessment for urban and regional planning, Table 6 Constraints relevant to key land uses
## Table 39 Site Assessment Rating for On-Site Systems

<table>
<thead>
<tr>
<th>Site features</th>
<th>Relevant systems</th>
<th>Minor limitations</th>
<th>Moderate limitations</th>
<th>Major limitations</th>
<th>Restrictive feature</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flood potential</strong></td>
<td>All land application systems</td>
<td>Rare, above 1 in 20 year flood contour</td>
<td>Frequent, below 1 in 20 year flood contour</td>
<td>Transport of wastewater off-site</td>
<td></td>
</tr>
<tr>
<td>All treatment systems</td>
<td>Vents, openings and electrical components above 1 in 100 year flood contour</td>
<td>Vents, openings and electrical components below 1 in 100 year flood contour</td>
<td>System failure and electrocution hazard</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Exposure</strong></td>
<td>All land application systems</td>
<td>High sun and wind exposure</td>
<td>Low sun and wind exposure</td>
<td>Poor evapotranspiration</td>
<td></td>
</tr>
<tr>
<td><strong>Slope%</strong></td>
<td>Surface irrigation</td>
<td>0-6</td>
<td>6-12</td>
<td>&gt;12</td>
<td>Run-off, erosion</td>
</tr>
<tr>
<td></td>
<td>Sub-surface irrigation</td>
<td>0-10</td>
<td>10-20</td>
<td>&gt;20</td>
<td>Run-off, erosion</td>
</tr>
<tr>
<td></td>
<td>Absorption system</td>
<td>0-10</td>
<td>10-20</td>
<td>&gt;20</td>
<td>Run-off, erosion</td>
</tr>
<tr>
<td><strong>Landform</strong></td>
<td>All systems</td>
<td>Hill crests</td>
<td>Concave side slopes and footslopes</td>
<td>Drainage plains and incised channels</td>
<td>Groundwater pollution hazard. Resurfacing hazard</td>
</tr>
<tr>
<td><strong>Run-on and upslope seepage</strong></td>
<td>All land application systems</td>
<td>None-low</td>
<td>Moderate</td>
<td>High - diversion not practical</td>
<td>Transport of wastewater off-site</td>
</tr>
<tr>
<td><strong>Erosion potential</strong></td>
<td>All land application systems</td>
<td>No sign of erosion potential present</td>
<td>Signs of erosion, eg rills, mass movement and slope failure present</td>
<td>Soil degradation and transport, system failure</td>
<td></td>
</tr>
<tr>
<td><strong>Site drainage</strong></td>
<td>All land application systems</td>
<td>No visible signs of surface dampness</td>
<td>Visible signs of surface dampness, such as moisture tolerant vegetation, seepages, soaks and springs</td>
<td>Groundwater pollution hazard. Resurfacing hazard</td>
<td></td>
</tr>
<tr>
<td><strong>Fill</strong></td>
<td>All systems</td>
<td>No fill</td>
<td>Fill present</td>
<td>Subsidence. Variable permeability</td>
<td></td>
</tr>
<tr>
<td><strong>Buffer distance</strong></td>
<td>All land application systems</td>
<td>For buffer distances refer to details in table below.</td>
<td></td>
<td>Health and pollution risk</td>
<td></td>
</tr>
<tr>
<td><strong>Land area</strong></td>
<td>All systems</td>
<td>Area is available</td>
<td>Area is not available</td>
<td>Health and pollution risk</td>
<td></td>
</tr>
<tr>
<td><strong>Rocks and rock outcrop (% of land surface containing rocks&gt;200mm diameter)</strong></td>
<td>All land application systems</td>
<td>&lt;10%</td>
<td>10-20%</td>
<td>&gt;20%</td>
<td>Limits system performance</td>
</tr>
<tr>
<td><strong>Geology/regolith</strong></td>
<td>All land application systems</td>
<td></td>
<td>Major geological discontinuities, fractured or highly porous regolith</td>
<td>Groundwater pollution hazard</td>
<td></td>
</tr>
</tbody>
</table>
The most limiting feature determines the land/site capability for a land application system or on-site sewage management system. In some cases the problems posed by a limiting feature or features can be overcome by using special designs or by modifying the site.

The above criteria provide a rational science and technical based approach to the assessment of the suitability of land for rural living. Its use by development proponents, land use planners and Councils in considering and making decisions on land use and development applications provides for consistent outcomes and hence increased certainty. It can also be used in more generalised indicative form for strategic decision making over Land Management Units or part thereof.

### TABLE 40 RECOMMENDED BUFFER DISTANCES FOR ON-SITE SYSTEMS

<table>
<thead>
<tr>
<th>Type of on-site wastewater disposal system</th>
<th>Recommended buffer distances</th>
</tr>
</thead>
<tbody>
<tr>
<td>All land application systems</td>
<td>100 metres to permanent surface waters (eg river, streams, lakes etc)</td>
</tr>
<tr>
<td></td>
<td>250 metres to domestic groundwater well</td>
</tr>
<tr>
<td></td>
<td>40 metres to other waters (eg farm dams, intermittent waterways and drainage channels, etc)</td>
</tr>
<tr>
<td>Surface spray irrigation</td>
<td>6 metres if area up-gradient and 3 metres if area down-gradient of driveways and property boundaries</td>
</tr>
<tr>
<td></td>
<td>15 metres to dwellings</td>
</tr>
<tr>
<td></td>
<td>3 metres to paths and walkways</td>
</tr>
<tr>
<td></td>
<td>6 metres to swimming pools</td>
</tr>
<tr>
<td>Surface drip and trickle irrigation</td>
<td>6 metres if area up-gradient and 3 metres if area down-gradient of swimming pools, property boundaries, driveways and buildings</td>
</tr>
<tr>
<td>Subsurface irrigation</td>
<td>6 metres if area up-gradient and 3 metres if area down-gradient of swimming pools, property boundaries, driveways and buildings</td>
</tr>
<tr>
<td>Absorption system</td>
<td>12 metres if area up-gradient and 6 metres if area down-gradient of property boundary</td>
</tr>
<tr>
<td></td>
<td>6 metres if area up-gradient and 3 metres if area down-gradient of swimming pools, driveways and buildings</td>
</tr>
</tbody>
</table>


9.2.4. LAND CAPABILITY MAPPING FOR RURAL DWELLING DEVELOPMENT

Land capability considerations for rural dwellings must include the constraints on building foundations and on-site septic absorption. Under descriptions of each Soil Landscape, Morand (1996) describes land capability for building foundations and septic absorption in terms of hazard and limitations. Land capability for these two uses can account for much of the land capability criteria for rural dwellings.

Morand rates building foundation hazard against four degrees of limitation severity (extreme, high, moderate and low). Morand rates septic absorption capability against absorption limitation descriptions. These septic absorption limitation descriptions have been interpreted and categorised as major, moderate and minor, consistent with the descriptions of limitations in this report, shown in Table 39 Site Assessment Rating for Onsite Systems. They are intended only for regional planning purposes.

Using Morand’s ratings, land capability maps for building foundations and septic absorption are depicted for each Soil Landscape in Figure 50 and Figure 51.
FIGURE 50 LAND CAPABILITY LIMITATIONS FOR BUILDING FOUNDATIONS

Source: Soils, Murwillumbah Tweed Heads, QDAFW, NSW Department of Land and Water Conservation
FIGURE 51 LAND CAPABILITY LIMITATIONS FOR SEPTIC ABSORPTION

Source: Soils_Murwillumbah Tweed Heads GD494, NSW Department of Land and Water Conservation
9.2.5. NSW RURAL HOUSING CODE

The State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 (the Codes SEPP) identifies the range of exempt and complying development across the State. The document contains a section of titled SEPP - Part 3A - Rural Housing Code.

The Rural Housing Code came into operation in 2011. It specifies compliance requirements and exclusions and is used when planning to build a house or undertake alterations and additions to a house on rural land zoned ‘Primary Production’, ‘Rural Landscape’ or ‘Primary Production Small Lots’, as well as lots of more than 4,000 square metres zoned for ‘Large Lot Residential’, provided they meet certain rules and development standards.

The Code allows the development of new single and two storey dwelling houses, alterations and additions to existing dwelling houses, and ancillary development on rural lots as complying development, subject to meeting the following minimum standards:

- To be complying development, the property must meet any minimum lot size requirement in an LEP for a new dwelling house (complying development for a new dwelling house cannot be undertaken if the land is a concessional lot or is reliant on a dwelling entitlement for the erection of a dwelling house.)
- New dwelling houses can be built on rural zoned properties (RU1, RU2, RU4) that have an area of at least 4,000m². (Alterations and additions can be undertaken on any rural zoned property).
- Different standards have been set for different types of rural lots, these being:
  - lots within the R5 (or equivalent) Zone (ie: Village Zone) under 4,000m²
  - lots within the R5 (or equivalent) Zone over 4,000m²
  - lots within the RU1, RU2, RU3, RU4 or R5 Zone (or equivalent) over 4,000m²
- If a restriction is created under s.88B of the Conveyancing Act 1919 that specifies a building envelope for the lot, a dwelling house must be located wholly within the envelope, irrespective of other development standards in the Codes SEPP.
- Rural lots must have lawful direct access (via direct frontage or a Right of Carriageway but not by a Crown Road Reserve) to a public road which is owned and maintained by the local council.

SETBACKS

- The following setback provisions apply
  - A new dwelling house cannot occur as complying development if within 250 metres of the boundary of a property where the following uses occur: intensive livestock agriculture; intensive plant agriculture; rural industries; mines and extractive industries; forestry; railway lines.
  - A 40m setback from the bank of a perennial watercourse identified by a 1:50,000 topographic map published by the Land and Property Management Authority is required.
  - A development application needs to be lodged with the local council if it is proposed to develop within these setback areas.
  - The topmost point of a new dwelling house must be at least 5 metres below the nearest ridgeline to a hill.

BUSH FIRE PRONE LAND

- Complying development can be undertaken on low risk bush fire prone land.
- Complying development will not be able to be undertaken on high risk bush fire prone land (BAL 40+ or BAL FZ).
- Where complying development can be undertaken, a suitably qualified consultant, the Rural Fire Service (RFS) or the council will be required to certify the level of bush fire risk and the certifier will sign off on that relevant development standards and protective measures have been met.

The NSW RFS maintains a webpage ‘Documents Master List’ on current ‘how policy in practice’ operates within the RFS.28

FLOOD PRONE LAND

- Complying development can occur on low risk flood prone land.
- Complying development cannot be undertaken on high risk flood prone land.
- Where complying development can be undertaken, a suitably qualified person or the council will be required to sign off that relevant development standards and protective measures in accordance with a council’s flood study have been adhered to.

GUIDE TO ASSESSING COMPLYING DEVELOPMENT

A Checklist is available for assessing applications for Complying Development Certificates (CDCs) made under State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 (the Codes SEPP).

This Checklist is accompanied by the Guide to Assessing Complying Development under the Codes SEPP that explains and adds details to a number of items in the Checklist. The Checklist and Guide relate to complying development under Part 3 (General Housing Code) of the Codes SEPP.

The checklist provides a step-by-step planning approvals process for applicants wanting to build a home, shed or farm building on their property. Table 41 lists the land exclusions that apply to the process.
## TABLE 41  LAND EXCLUSIONS UNDER THE GENERAL EXEMPT DEVELOPMENT AND RURAL HOUSING CODES

### Summary - Land Exclusions under the General Exempt Development Code

<table>
<thead>
<tr>
<th>Clause</th>
<th>Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>576 of EP&amp;A Act</td>
<td>Land that is critical habitat of an endangered species, population or ecological community (identified under the Threatened Species Conservation Act 1995 or the Fisheries Management Act 1994). Land within a wilderness area (identified under the Wilderness Act 1987).</td>
</tr>
<tr>
<td>1.16</td>
<td>Meet the relevant provisions of the Building Code of Australia. Must not be designated development as defined under section 77A of the EP&amp;A Act. Land that comprises, or on which there is, an item that is listed on the State Heritage Register under the Heritage Act 1977 or that is subject to an interim heritage order under the Heritage Act 1977. Must not involve removal or pruning of a tree or vegetation unless approval is obtained where required.</td>
</tr>
<tr>
<td>1.19</td>
<td>Land described or otherwise identified on a map specified in Schedule 4 of the Codes SEPP. Land identified as an environmentally sensitive area being: • the coastal waters of the State, • a coastal lake, • land to which State Environmental Planning Policy No 14 - Coastal Wetlands or State Environmental Planning Policy No 26 - Littoral Rainforests applies and land within 100m, • land reserved as an aquatic reserve under the Fisheries Management Act 1994 or as a marine park under the Marine Parks Act 1997 and land within 100m, • land within a wetland of international significance declared under the Ramsar Convention on Wetlands or within a World heritage area declared under the World Heritage Convention and within 100m, • land identified in this or another environmental planning instrument as being of high Aboriginal cultural significance or high biodiversity significance, • land reserved under the National Parks and Wildlife Act 1974 or land to which Part 11 of that Act applies, • land reserved or dedicated under the Crown Lands Act 1989 for the preservation of flora, fauna, geological formations or for other environmental protection purposes, • land identified as being critical habitat under the Threatened Species Conservation Act 1995 or Part 7A of the Fisheries Management Act 1994.</td>
</tr>
<tr>
<td>1.17A</td>
<td>Land identified as an environmentally sensitive area being: • the coastal waters of the State, • a coastal lake, • land to which State Environmental Planning Policy No 14 - Coastal Wetlands or State Environmental Planning Policy No 26 - Littoral Rainforests applies and land within 100m, • land reserved as an aquatic reserve under the Fisheries Management Act 1994 or as a marine park under the Marine Parks Act 1997 and land within 100m, • land within a wetland of international significance declared under the Ramsar Convention on Wetlands or within a World heritage area declared under the World Heritage Convention and within 100m, • land identified in this or another environmental planning instrument as being of high Aboriginal cultural significance or high biodiversity significance, • land reserved under the National Parks and Wildlife Act 1974 or land to which Part 11 of that Act applies, • land reserved or dedicated under the Crown Lands Act 1989 for the preservation of flora, fauna, geological formations or for other environmental protection purposes, • land identified as being critical habitat under the Threatened Species Conservation Act 1995 or Part 7A of the Fisheries Management Act 1994.</td>
</tr>
<tr>
<td>1.19</td>
<td>Land identified as an environmentally sensitive area. Land that comprises, or on which there is, an item that is a draft heritage item. Land that is within a heritage conservation area of a draft heritage conservation area, unless the development is a detached outbuilding or swimming pool. Land that is reserved for a public purpose in an environmental planning instrument and identified on an Acid Sulphate Soils vegetation plan under the Native Vegetation Act 2003. Land that is subject to a biobanking agreement under Part 7A of the Threatened Species Conservation Act 1995 or a property vegetation plan under the Native Vegetation Act 2003. Land in a foreshore area. Land that is in the 25 ANEF (Australian Noise Exposure Forecast) contour or a higher ANEF contour, unless the development is only for the erection of ancillary development, the alteration of or an addition to ancillary development or the alteration of a dwelling house. Unsewered land to which Drinking Water Catchments Regional Environmental Plan No 1 applies, or Unsewered land in any other drinking water catchment identified in any other environmental planning instrument. Land that is declared to be a special area under the Sydney Water Catchment Management Act 1998. Excluded land identified by an environmental planning Instrument being: • within a buffer area, • within a river front area, • within an ecologically sensitive area, • environmentally sensitive land; • within a protected area, or • land identified by an environmental planning instrument, a development control plan or a policy adopted by the council as being a coastal erosion hazard.</td>
</tr>
</tbody>
</table>

Source: Guide to Complying Development under the Rural Housing Codes, Department of Planning and Infrastructure (2012); Appendix B - Land Exclusions under the General Exempt Development & Rural Housing Codes Housing.
9.3. LAND CAPABILITY FOR AGRICULTURE

Agricultural land capability is the ability of an area of land to sustain permanent agricultural or pastoral production without permanent damage. Land that is used beyond its capability will deteriorate rapidly, resulting in loss of production and a permanent loss of the soil resource.

The Australian Natural Resource Atlas website states that good quality agricultural land is a limited resource. The Atlas identifies that in 2001 agricultural land used in Tweed Shire occurred on 57,400 hectares or 53.4% of the total area.

Agricultural land is under threat from various sources. Urbanisation and land degradation alienate and deplete agricultural land resources. The reduced availability of lands that are highly suited to agricultural production reduces the sustainability of existing agricultural systems and encourages the use of more marginal lands for agriculture. Knowledge of the relative capability of land for agriculture helps development of strategic plans, which specify protection of land of high capability for agriculture and identify land more suited to non-agricultural activities.

9.3.1. HISTORY OF ASSESSING LAND CAPABILITY FOR AGRICULTURE IN NSW

Rural lands in NSW have been mapped for agricultural use according to two different land classification systems:

- The former NSW Soil Conservation Service/Department of Land and Water Conservation (now within the Office of Environment and Heritage) classified land into eight classes known as Land Capability Classes.
- As previously discussed, the NSW. Department of Primary Industries (DPI) classifies land into five classes known as Agricultural Suitability Classes. (NSW Agriculture (2002) Agricultural Land Classification Actec AC.25, Agdex 520, and DLWC (1988), Systems to Classify Rural Lands in NSW). This publication provides a comprehensive description of land suitability within the context of the NSW agricultural land classification system.

The 8-class DECCW Land Capability Classification delineates land according to its capability to remain stable under particular land uses. The system considers the land's inherent physical characteristics or physical constraints, and denotes measures needed to protect the land from soil erosion and other forms of land degradation. It therefore considers the optimum use of land rather than the maximum use. The system does not imply any aspects of agricultural suitability, which can involve connotation of closeness to markets, availability of water or processing facilities.

The 5-class DPI Agricultural Suitability classification uses land capability as a basis and then incorporates social and economic factors to determine an appropriate Suitability Class. Thus land is classified by evaluating how and to what degree these factors may constrain the use of land for agriculture. These factors determine the types of agricultural enterprises that are, or could be, adapted to an area. In general the fewer the constraints on the land, the greater is its suitability and value for agriculture.

This system was developed specifically to meet the objectives of the Environmental Planning and Assessment Act 1979, in particular its section 5(a) (i): "to encourage the proper management, development and conservation of natural and man-made resources, including agricultural land for the purpose of promoting social and economic welfare of the community and a better environment".

Agricultural land capability maps have been used to recommend rural land that should be zoned for agricultural production and protected from incompatible development. Higher capability lands have fewer constraints and a greater versatility for agriculture than the lower capability lands, and their long-term value to the state is often greater than a strict economic appraisal might indicate. Their relative lack of constraints allows greater flexibility in management and enables landholders to more easily adapt to changing economic conditions. The high capability of these lands, also, significantly reduces the potential for environmental damage from agricultural activities. Land use planning recommendations need to be drawn up on the basis of local government areas using the principle of protecting the land of greatest agricultural value, and directing non-agricultural uses onto lands less capable for supporting agriculture.

In 2012 the Department of Primary Industries decided it was necessary to develop a new process for classifying and mapping agricultural land called Important Agricultural Land maps. It was decided that the previous Agricultural Suitability Maps developed in the 1980s and 90s were outdated and flawed and were usually unsuitable for digitising. They also failed to identify important resource lands for all agricultural industries (Briggs, G 2012).

9.3.2. LAND SUITABILITY FOR AGRICULTURE

The DPI process of agricultural land suitability classification relies upon interpretation of information by an expert, and maps produced mark a point in time reflecting current understanding of agricultural systems, infrastructure, and market and resource conditions. The following list of factors may be considered:

**BIOPHYSICAL FACTORS**

- Environmental impact: fertilisers, pesticides, wastes, erosion, salinisation, siltation, vegetation clearing.
- Topography: slope (angle and length), erosion hazard, aspect, altitude, flood liability, exposure, land slip, surface drainage.
- Soil physics: texture, structure, erodibility, depth, water holding capacity, internal and surface drainage, rockiness, stoniness, depth to watertable, permeability, clay type, surface crusting, density, aeration, trafficability, stability under irrigation.
- Soil chemistry: fertility, toxicity, organic matter, soil reaction, cation exchange capacity, salinity, sodicity, rates of fixation, dispersibility.
- Climate: length of growing season, temperatures, rainfall, evaporation, wind, humidity, frost occurrence, irrigation, hail, exposure.
- Pests and diseases: presence of noxious or pest animals, noxious weeds, insects, plant or animal pathogens (field and storage).

**SOCIAL FACTORS**

- Legislative and/or regulatory constraints.
- Potential conflict with other land users: eg. noise, odour, dust.
- Availability of permanent or seasonal, skilled or unskilled labour.

**ECONOMIC FACTORS**

- Regional and local infrastructure to support agriculture.
- Geographic location.
- Accessibility and location with respect to transport requirements and costs.
- Accessibility to local and export markets.
- Presence of any comparative market advantage.
- Structure of local farming and marketing, e.g. co-operatives and marketing bodies.
- Availability and cost of land locally and elsewhere.
- Costs of removing biophysical constraints.
- Site contamination from previous land use.
With regard to Tweed Shire, the last shire-wide strategic agricultural land suitability map was produced by the DPI in 1998 (refer to Figure 52).

9.3.3. DEVELOPMENT OF IMPORTANT AGRICULTURAL LAND MAPS
In 2011-12 the DPI investigated a new process for mapping agricultural lands. The pilot project mapped highly suitable lands for each leading agricultural sector in six case study local government areas (LGAs), which did not include Tweed Shire.

These Important Agricultural Land maps identify lands that are highly suitable for important agricultural industries at a local and regional scale. They complement the mapping of state/nationally significant agricultural lands developed for Strategic Regional Land Use Plans (Department of Planning & Infrastructure).

The maps were developed using currently available spatial data sets and were verified by stakeholder workshops. They are supported by a series of agricultural industry profiles.

Important Agricultural Land maps and associated information was developed to inform:

- Local government strategic land use planning, in particular the development of Local Environmental Plans and strategies,
- Local / regional economic development strategies and industry development strategies.

Important Agricultural Land maps are not suitable for assessing development proposals; rezoning proposals; or for property specific planning purposes. The smallest area able to be accurately identified on the data used for mapping Important Agricultural Lands is 250 hectares.

Source: Briggs, G (2012) Interpreting Important Agricultural Land Maps. Fact Sheet PUB 12/53, Department of Primary Industries, NSW

9.3.4. AGRICULTURAL LAND CAPABILITY CLASSING IN THIS REPORT
In a variation to the former NSW Soil Conservation Service’s eight classes, land-classing system for agricultural land capability, Morand (1996) in the Department of Land and Water Conservation report, Soil Landscapes of the Murwillumbah-Tweed Heads 1:100000 Sheet, classifies agricultural land capability on the basis of severity of the limitations, which are likely to affect regular cultivation and grazing practices. Morand lists and describes in some detail, the soil limitations and landscape limitations for each soil landscape in Tweed Shire. He then nominates capability limitations for specific uses, including agricultural (rural) uses. Morand uses four degrees of severity for land capability limitations for regular cultivation and grazing. They are low, moderate, high and severe. This system has been adopted in this Report.

The derived maps (Figures 48 and 49) depict that assessment. The maps show the outlined boundaries of the soil landscapes within the land capability limitations for the nominated uses. The maps are produced from direct translation of Morand’s statements on degrees of limitations on land capability in each soil landscape for the nominated uses described below. His criteria applied to the soil landscapes for the nominated uses are detailed in the text and tables in chapter 4 of Soil Landscapes of the Murwillumbah-Tweed Heads.

Land capability maps for regular cultivation and grazing use are depicted in Figure 52 and Figure 53. The maps in this report use Morand’s Soil Landscapes as the base mapping units and his criteria above for applying land capability to each Soil Landscape.

Land limitations maps for regular cultivation and grazing use are depicted in Table 42 and Table 43. These agricultural limitations maps are derived from Morand’s 1996 Soil Landscapes descriptions that include descriptions of land capability based on the criteria identified in Table 42 and Table 43. The Soil Landscapes with their derived limitations/capability statements provide the base strategic level mapping units used in this report. As strategic level maps the maps cannot be used for interpretation of individual sites or individual properties.

**TABLE 42 LAND CAPABILITY CLASSIFICATIONS FOR REGULAR CULTIVATION**

<table>
<thead>
<tr>
<th>Land capability classification</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low limitations for regular cultivation</td>
<td>No special soil conservation practices are necessary to maintain a stable land surface apart from sound soil management.</td>
</tr>
<tr>
<td>Moderate limitations for regular cultivation</td>
<td>Intensive soil conservation measures such as graded banks, waterways, diversion banks and contour cultivation are adequate to maintain stability.</td>
</tr>
<tr>
<td>High and severe limitations for regular cultivation</td>
<td>Due to the severity of limitations present, land is not capable of supporting regular cultivation, which should be avoided.</td>
</tr>
</tbody>
</table>


It is recognised that in Tweed Shire many locations with high and severe limitations for cultivation and other soil disturbance support banana plantations. Bananas are grown on steep, well drained northerly and north-easterly slopes to provide frost free, warm growing conditions and it is essential that permanent ground cover is maintained to prevent water erosion.

**LAND CAPABILITY FOR GRAZING**

Table 43 summarises land classification categories for the grazing of livestock as described by Morand (1996).

**TABLE 43 LAND CAPABILITY CLASSIFICATIONS FOR GRAZING**

<table>
<thead>
<tr>
<th>Land capability classification</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low limitations for grazing</td>
<td>Simple soil conservation practices such as pasture improvement, fertilisation, grazing pressure control and vermin control are necessary to maintain a stable land surface.</td>
</tr>
<tr>
<td>Moderate limitations for grazing</td>
<td>Intensive soil conservation measures such as graded banks, diversion banks and gully control structures as well as pasture improvement and fertilisation, controlled grazing pressure and vermin control are necessary to maintain a stable soil surface.</td>
</tr>
<tr>
<td>High and severe limitations for grazing</td>
<td>The land is best suited to retention of native vegetation or forestry. Livestock should be excluded.</td>
</tr>
</tbody>
</table>

FIGURE 52 TWEED SHIRE LAND CAPABILITY FOR AGRICULTURE – LIMITATIONS FOR REGULAR CULTIVATION

Source: Soils, Morwell Tweed Heads, GDAM, NSW Department of Land and Water Conservation
9.4. PRINCIPLES FOR CONSIDERING AGRICULTURE IN RURAL LAND USE PLANNING

Land capability is a key factor when considering agriculture in rural land use planning. Other agricultural factors also influence strategic planning for managing land use change. The principles described below, for considering agriculture and agricultural land in land use planning are distilled from the NSW DPI report: *Agricultural Land Classification Agfact AC.25, Agdex 520 (2002)*, and the authors own experience of the needs of agricultural industries.

**PRINCIPLES**

- The main agricultural industries in the Shire should be able to access sufficient area and types of agricultural land to ensure that land of sufficient diversity is available that is suited to enterprise needs and security of production.
- Agricultural land with low landscape and soil limitations for intensive use should be protected from competing land uses.
- Give priority protection to agricultural land of state and regional significance.
- It is preferable to use land with higher landscape and soil limitations for competing uses where this is available and suitable for the purpose.
- Lands which, by their nature are unique in the state for agricultural activity need to be protected unless there are strong economic reasons for not doing so. This includes areas, which by virtue of their remoteness or special location, are under cultivation for foundation seed, bud stock or root stock production, or used as quarantine zones.
- Irrigated areas should be retained in agriculture because of the existing infrastructure (channels, pipes, dams etc.) and relatively high production potential.
- Some farm forestry enterprises require good quality agricultural land, and may need to be situated on agricultural land.
- Agricultural lands that can use organic wastes need to be identified so that agricultural industries are able to use these wastes sustainably.
- When land use changes are proposed, requirements for the particular use need consideration to minimise the inappropriate loss of land from agriculture. For example, rural residential use may best be located on land with high limitations for agriculture, while rural lifestyle living (hobby farms) may require land with pastures suitable for year round grazing.
- Agriculture provides a number of landscape services including pest plant and animal control, and broadscale agriculture maintains the rural ambience in the landscape. These services need consideration when land use change is proposed.

TWEED SHIRE AGRICULTURAL LAND USE

The locations of agricultural uses in the shire are depicted in Figure 54. This land suitability map published in 1998, is the most recent map available to the project. The area and location of some land uses may have changed since its production.

9.5. AGRICULTURAL LAND OF STATE AND REGIONAL SIGNIFICANCE

The shire contains substantial areas of land designated as ‘agricultural land of State and Regional significance’. This land is protected exclusively for agriculture and while considered in the current project, it is not the focus of the project. Agricultural land of state and regional significance is depicted in Figure 54.
This section extracts the most directly relevant aspects of the NSW planning system relating to the use and zoning of rural land. The most up-to-date specific explanations of the NSW planning framework are contained on the NSW Government's planning website.
10. ROLES OF COMMONWEALTH, STATE AND LOCAL GOVERNMENT IN LAND AND ENVIRONMENTAL PLANNING

10.1. INTRODUCTION

The Australian Constitution does not deal explicitly with environmental powers, and the 1992 Intergovernmental Agreement on the Environment coordinates the approach to environmental management by the three tiers of government. In broad terms, the Commonwealth is not involved in land use planning and land management. These functions are the responsibility of State and Local Governments, whereby the State Government sets the overarching legislative and policy framework, which Local Government interprets and applies locally. In NSW for land use planning this applies through Local Environment Plans (LEPs). The following text elaborates on this position.

The Federal Government has responsibility for environmental issues of national significance, national environmental reporting and the implementation of international treaties and obligations. The Commonwealth can influence land use in some situations through some aspects of Commonwealth Legislation, potentially via default. For example, the under the Commonwealth’s Environmental Protection and Biodiversity Act 1989 (EPBC Act) the relevant Federal Minister can reject proposed projects where it is deemed that adverse impacts would occur on ‘listed’ biodiversity species or communities, being species or communities of high national significance. Commonwealth legislation also deems mineral resources to belong to the Crown, and this can have ultimate land use implications, broadly where access to or extraction of such resources is required in the national interest.

State and Territory governments are involved in the management of land and water use, and environmental protection. They typically have legal and administrative powers over ownership and use of land, the environment, urban, regional and rural planning and development. State and Territory Governments set overarching policies and mechanisms that are commonly interpreted and applied by local government at the local level. In land use planning for example, State Governments commonly determine the range of land use zones to be applied by local Government across the state.

While the severity and extent of environmental problems vary across the States and Territories, those jurisdictions have generally similar land management and environmental legislation and programs. These typically cover matters such as aspects of natural resource management, land use planning, water management and water quality, environmental protection (air, land and water), soil conservation, pest plant and animal matters, and biodiversity conservation.

Local Government plays a key role in planning and land use decisions, such as the application of land-use zoning and related planning tools (via LEPs in NSW) and native vegetation preservation or clearing by-laws. In particular, local government approves or does not approve land uses that require permits in given land use zones. Local government also determines the conditions under which land use zones are administered, for example the minimum size of subdivision allowed in a rural zone. There are various mechanisms by which such conditions may be applied including development permit conditions, and the attachment of ‘Section 149’ Planning Certificates on land titles.

10.2. COMMONWEALTH LEGISLATION

In November 1997, the Council of Australian Governments (COAG) agreed in principle to the Heads of Agreement on Commonwealth/State Roles and Responsibilities for the Environment. Subsequently, all heads of governments and the Australian Local Government Association signed the agreement. In the agreement, the States and Territories and the Commonwealth agreed that reform in the following five areas was needed to develop a more effective framework for intergovernmental relations on the environment:

- matters of National Environmental Significance;
- environmental assessment and approval processes;
- listing, protection and management of heritage places;
- compliance with State environmental and planning legislation; and
- better delivery of national environmental programmes.

A number of key aspects of the Heads of Agreement have been implemented by the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

ENVIRONMENT CONSERVATION AND BIODIVERSITY PROTECTION ACT 1999

The ECPB Act is the Commonwealth’s main legislation that relates to the development and implementation of the Tweed Rural Land Strategy is the (EPBC Act). The Act is the Australian Government’s central environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places – defined in the EPBC Act as matters of national environmental significance.

10.3. STATE LEGISLATION

The following main legislation relates to rural land in NSW

<table>
<thead>
<tr>
<th>Legislation</th>
<th>Relevant content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment Planning and Assessment Act 1979</td>
<td>Local Environmental Plans</td>
</tr>
<tr>
<td>Zoning and development controls</td>
<td></td>
</tr>
<tr>
<td>Environmental impact assessment procedures</td>
<td></td>
</tr>
<tr>
<td>Review and appeals Land and Environment Court</td>
<td></td>
</tr>
<tr>
<td>Local Government Act 1993</td>
<td>Opportunity for additional ‘nuisance’ controls, including</td>
</tr>
<tr>
<td>Domestic animals</td>
<td></td>
</tr>
<tr>
<td>Review and appeals Land and Environment Court</td>
<td></td>
</tr>
<tr>
<td>Water Act 1912</td>
<td>Licensing and compliance</td>
</tr>
<tr>
<td>Water Management Act 2000</td>
<td>Groundwater and surface water extraction</td>
</tr>
<tr>
<td>Protection of the Environment Operations Act 1997</td>
<td>Building a dam</td>
</tr>
<tr>
<td>Pollution regulation - noise, odour, waste, pollution, air pollution (burning)</td>
<td></td>
</tr>
<tr>
<td>Sets strict standards and penalties</td>
<td></td>
</tr>
<tr>
<td>Notice to persons breaching Act</td>
<td></td>
</tr>
<tr>
<td>Native Vegetation Act 2003</td>
<td>Negotiation commonly used to resolve ‘incidents’</td>
</tr>
<tr>
<td>Protection of Aboriginal sites</td>
<td></td>
</tr>
<tr>
<td>Native Vegetation Act 2003</td>
<td>Clearing of native vegetation and conservation</td>
</tr>
<tr>
<td>Threatened Species Conservation Act 1995</td>
<td>Enhancement of native vegetation</td>
</tr>
<tr>
<td>Protected flora and fauna on private and public lands.</td>
<td></td>
</tr>
<tr>
<td>Fishes Management Act 1994</td>
<td>Protection of Aboriginal sites</td>
</tr>
<tr>
<td>Works that may impact on aquatic habitat</td>
<td></td>
</tr>
<tr>
<td>Works in waterways or wetlands (dredging, reclamation and obstructions to free passage of fish)</td>
<td></td>
</tr>
<tr>
<td>Threatened aquatic species</td>
<td></td>
</tr>
<tr>
<td>Aquaculture</td>
<td></td>
</tr>
<tr>
<td>Forestry Act 2012</td>
<td>Establishing of a new fence or maintenance of an existing fence</td>
</tr>
<tr>
<td>Regulates forestry activity within State forests and other Crown lands</td>
<td></td>
</tr>
<tr>
<td>Dividing Fences Act 1991</td>
<td>Establishment of a new fence or maintenance of an existing fence</td>
</tr>
<tr>
<td>National Parks and Wildlife Act 1974</td>
<td>Protection of native flora and fauna</td>
</tr>
<tr>
<td>Protection of Aboriginal sites</td>
<td></td>
</tr>
<tr>
<td>Soil Conservation Act 1938</td>
<td>Soil conservation</td>
</tr>
<tr>
<td>Land management</td>
<td></td>
</tr>
<tr>
<td>Nuisious Weeds Act 1993</td>
<td>Nuisious weeds</td>
</tr>
<tr>
<td>Pest Animals Act 1986</td>
<td>Use of pesticides</td>
</tr>
<tr>
<td>Spray drift</td>
<td></td>
</tr>
<tr>
<td>Rural Fires Act 1997</td>
<td>Burning in rural areas</td>
</tr>
<tr>
<td>Rural Fire Service</td>
<td></td>
</tr>
<tr>
<td>Rural Land Protection Act 1998</td>
<td>Keeping of stock</td>
</tr>
<tr>
<td>Pest animals including wild dogs</td>
<td></td>
</tr>
<tr>
<td>National Parks and Reserves Act 1999</td>
<td>Establishing planted forests</td>
</tr>
</tbody>
</table>

Source: Living Working in Rural Areas: A handbook for managing land use conflict issues on the NSW North Coast
10.3.1. ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

The overarching legislation for land use planning in NSW is the Environmental Planning and Assessment Act 1979 (EP&A Act). The objects of this Act are:

- to encourage:
  - the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,
  - the promotion and co-ordination of the orderly and economic use and development of land,
  - the protection, provision and co-ordination of communication and utility services,
  - the provision of land for public purposes,
  - the provision and co-ordination of community services and facilities, and
  - the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats;
- ecologically sustainable development, and
- to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and
- to provide increased opportunity for public involvement and participation in environmental planning and assessment.

Together with land use planning generally, the Act provides for the protection of native species, communities and habitat.

Further detail on the Act is not provided here. The complete Act is on the NSW Government Website.29 A range of other Acts link directly and indirectly with the EP&A Act.

10.3.2. OTHER MAIN RELEVANT NSW LEGISLATION

A wide range of legislation including Government Acts and underlying regulations is relevant to the preparation of a council rural land strategy. Main Acts are listed below. Other Acts may interface with aspects of the development and implementation of the Tweed Rural Land Strategy:

COASTAL PROTECTION ACT 1979

This Act provides for sustainable use and occupation of the coastal areas to preserve and protect their values. It also provides for the carrying out of certain coastal protection works.

FORESTRY ACT 2012

The Act provides for the dedication, management and use of State forests and other Crown-timber land for forestry and other purposes.

NATIONAL PARKS AND WILDLIFE ACT 1975

This Act provides for the care, control and management of all national parks, historic sites, nature reserves, reserves, Aboriginal areas and state game reserves. State conservation areas, karst conservation reserves and regional parks are also administered under the Act.

NATIVE VEGETATION ACT 2003 (AND ACCOMPANYING NATIVE VEGETATION REGULATION 2005)

This Act and its regulations regulate the clearing of native vegetation on all land in NSW, except for excluded land listed in Schedule 1 of the Act. The Act outlines what landowners can and cannot do in clearing native vegetation.

PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997

Objectives of this Act in part include:

- to protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development,
- to reduce risks to human health and prevent the degradation of the environment.

SOIL CONSERVATION ACT 1938

This Act provides for the conservation of soil resources and farm water resources and for the mitigation of erosion.

THREATENED SPECIES CONSERVATION ACT 1995

This Act provides for the conservation of threatened species, populations and ecological communities of animals and plants (generally apart from fish). It sets out of specific objectives for the conservation of biological diversity and the promotion of ecologically sustainable development.

WATER ACT 2012

This Act consolidates previous Acts relating to Water Rights, Water and Drainage, Drainage Promotion, and Artesian Wells. The Act is being progressively phased out and replaced by the Water Management Act 2000, but some provisions are still in force.

WATER MANAGEMENT ACT 2000

The objective of this Act is to provide for the sustainable and integrated management of the state’s water for the benefit of both present and future generations. The Act recognizes that:

- the fundamental health of our rivers and groundwater systems and associated wetlands, floodplains, estuaries has to be protected
- the management of water must be integrated with other natural resources such as vegetation, soils and land
- to be properly effective, water management must be a shared responsibility between the government and the community
- water management decisions must involve consideration of environmental, social, economic, cultural and heritage aspects
- social and economic benefits to the state will result from the sustainable and efficient use of water

10.4. NSW STATE ENVIRONMENTAL PLANNING POLICIES (SEPPS)

The NSW Government’s State Environmental Planning Policies (SEPPs) aim to achieve orderly and economic use and development of the State’s lands, including rural lands for rural and related purposes. The policies

provide direction for development of State significance at the State and local government level. Local Government is obliged to implement State policy, which prevails over local policy where any discrepancy may occur. The full list of NSW SEPPs is provided on the NSW State website.

SEPPs with direct relevance to the Tweed Rural Land Strategy include:

- **SEPP (State and Regional Development) 2011**
- **SEPP (Rural Lands) 2008**
- **SEPP No 30—Intensive Agriculture**
- **SEPP No 15—Rural Landsharing Communities**
- **SEPP (Mining, Petroleum Production and Extractive Industries) 2007**

The following text provides a brief summary overview of the above SEPPs.

### SEPP (State and Regional Development) 2011

This policy applies to all of NSW, and is applied under the *Environmental Planning and Assessment Act 1979*. It aims:

- to identify development to which the State significant development assessment and approval process under Part 4 of the Act applies,
- to identify development that is State significant infrastructure and critical State significant infrastructure,
- to confer functions on joint regional planning panels to determine development applications.

The SEPP carries considerable weight as it prevails over any other environmental planning instrument (ie: including the Tweed LEP) in the extent of any inconsistency between the SEPP and such other instrument. It is conceivable that the policy could be implemented by the state within Tweed Shire from time to time on rural or other lands.

### SEPP (Rural Lands) 2008

The NSW Planning Circular PS 08 002 State Environmental Planning Policy (Rural Lands) 2008 identifies that the ongoing orderly and economic development of the rural lands in NSW is vital to the State economy. The document states that:

> In addition to the importance of agriculture to the State’s economy, the proper planning of rural lands provides opportunities for rural lifestyle, settlement and housing, which contribute to the social and economic welfare of rural communities.

The aims of SEPP (Rural Lands) 2008 are to:

- facilitate the orderly and economic use and development of rural lands for rural and related purposes;
- identify Rural Planning Principles and the Rural Subdivision Principles so as to assist in the proper management, development and protection of rural lands for the purpose of promoting the social, economic and environmental welfare of the State;
- implement measures designed to reduce land use conflicts; identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture on that land, having regard to social, economic and environmental considerations;
- amend provisions of other environmental planning instruments relating to concessional lots in rural subdivisions.

The SEPP (Rural Lands) 2008 policy identifies rural land use zones for collective application to all rural land. Under the policy rural zones include any of the following, or an equivalent land use zone to replace the rural zones that are currently applied through Tweed LEP 2000.

- **Zone RU1 Primary Production**
- **Zone RU2 Rural Landscape**
- **Zone RU3 Forestry**
- **Zone RU4 Rural Small Holdings**
- **Zone RU5 Transition**

The associated state Practice Note of April 2006 recommends on application of the above zones.

SEPP (Rural Lands) 2008 also introduces the **Large Lot Residential Zone** (RL) that is a designated Residential Zone (not defined as a ‘rural’ zone) which is the replacement equivalent of the Zone 1(c) **Rural Living** currently applied in Tweed Shire (see below). Its objectives relevant to the current project are:

- To provide residential housing in a rural setting while preserving, and minimising impacts on, environmentally sensitive locations and scenic quality.
- To ensure that large residential lots do not hinder the proper and orderly development of urban areas in the future.

---

31 The NSW economy in 2020: A Foresighting study (Accos Economics)

32 RaboBank (Undated). Global sugar to 2021 - long-term prospects for production, consumption and trade in key markets.
To ensure that development in the area does not unreasonably increase the demand for public services or public facilities.

To minimise conflict between land uses within this zone and land uses within adjoining zones.

The list of permissible land uses in the Zone R5 Large Lot Residential matches land uses in current Zone 1(c) Rural Living, which has limited application in Tweed Shire. While home occupation and environmental works are to be permitted in the R5 Zone without need for consent, a range of other uses requires consent (including but not limited to: Animal boarding or training establishments; Bed and breakfast accommodation; Boarding houses; Child care centres; Community facilities; Dwellings; Environmental facilities; Home businesses; Home industries; Information and education facilities; Kiosks; Neighbourhood shops; Places of public worship; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Respite day care centres; Roads; Veterinary hospitals; Water supply systems). However it does not follow that because a use can be approved, it should be approved. All other uses are prohibited in the Zone R5.

The NSW Primary Industries Policy Number 0-104 Maintaining Land for Agricultural Industries also reinforces the objectives of the SEPP (Rural Lands) 2008. Its stated purpose is:

| To guide the planning system in providing certainty and security for agricultural enterprises on the long term and to enable those enterprises to respond to future market, policy, technology and environmental changes. |

Key elements of the Policy are that:

- Land with the best combination of soil, climate, topography and water for agricultural production is a limited resource in New South Wales and should be maintained for future generations;

- Agricultural land should not be alienated directly through lands being used for non-agricultural purposes and indirectly by incompatible developments on adjacent land restricting routine agricultural practices; and

- Agricultural industries are a fundamental asset to the state of NSW as they provide a long term means of providing employment, raw materials and fresh safe secure food, while supporting regional communities.

Its policy statement then (in part) includes the following:

1. Environmental planning instruments should be structured to:
   i. promote the continued use of agricultural land for commercial agricultural purposes, where that form of land use is sustainable in the long term;
   ii. avoid land use conflicts;
   iii. protect natural resources used by agriculture;
   iv. protect other values associated with agricultural land that are of importance to local communities, such as heritage and visual amenity;
   v. provide for a diversity of agriculture enterprises, including specialised agricultural developments, through strategically planned locations to enhance the scope for agricultural investment in rural areas; and
   vi. allow for value adding and integration of agricultural industries into regional economies.

Other primary policies associated with SEPP (Rural Lands) include in brief:

- Conversion of land. The conversion of land used by agricultural enterprises to other uses should only take place where fully justified in the strategic planning context.

- Re Minimum size of holdings for dwelling entitlement policy: Criteria (in planning instruments) to determine the minimum size of holdings necessary for a dwelling entitlement in rural areas need to be based on sustainable productive agriculture.

- Re Minimising land use conflict policy: Councils should also consider other approaches to achieving the goal of minimising conflict in agricultural production zones so that farms can operate without unnecessary restrictions.

In short, the State’s rural planning principles reinforce the importance of protecting productive agricultural land, and the efficient allocation of public resources in planning future rural land use.

The SEPP (Rural Lands) 2008 also introduces the Large Lot Residential Zone (R5) as a designated Residential Zone (ie: it is not ‘rural’ zone). It is the replacement equivalent for the Rural Living Zone that is currently applied sparingly in Tweed Shire via the Tweed LEP (see below). Its objectives relevant to the current project are:

To provide residential housing in a rural setting while preserving, and minimising impacts on, environmentally sensitive locations and scenic quality.

To ensure that large residential lots do not hinder the proper and orderly development of urban areas in the future.

To ensure that development in the area does not unreasonably increase the demand for public services or public facilities.

To minimise conflict between land uses within this zone and land uses within adjoining zones.

The list of permissible land uses in the Zone R5 Large Lot Residential matches land uses in current Zone 1(c) Rural Living, which has limited application in Tweed Shire. While home occupation and environmental works are permitted in the R5 Zone without need for consent, a range of other uses requires consent. These include but are not limited to: Animal boarding or training establishments; Bed and breakfast accommodation; Boarding houses; Child care centres; Community facilities; Dwellings; Environmental facilities; Home businesses; Home industries; Information and education facilities; Kiosks; Neighbourhood shops; Places of public worship; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Respite day care centres; Roads; Veterinary hospitals; Water supply systems. However it does not follow that because a use can be approved, it should be approved. All other uses are prohibited in the R5 Zone.

RURAL SUBDIVISION PRINCIPLES

The SEPP (Rural Lands) 2008 includes the State’s rural subdivision principles. The principles seek to minimise the fragmentation of rural land for non-productive uses, and associated land use conflicts (particularly between residential land uses and other rural land use, primarily agricultural production).

Section 117 Direction 1.5 - Rural Lands of SEPP (Rural Lands) 2008 requires that where a council seeks to review its minimum lot sizes in rural lands through its LEP, it does so in accordance with the rural subdivision principles.
If a council chooses to review the minimum lot size provisions it can consider a range of lot sizes that may be appropriate for its rural areas. The Direction states that this may better reflect the existing or emerging trends of agriculture in the local government area and assist in providing a range of appropriately located housing opportunities.

The SEPP also provides objectives for rural subdivision for agricultural purposes, matters to be considered in determining development applications for rural subdivisions or rural dwellings, and amendment of concessional lot provisions.

**TABLE 4.4 NSW STATE PLANNING PRINCIPLES FOR RURAL PLANNING AND FOR RURAL SUBDIVISION**

<table>
<thead>
<tr>
<th>Principles category</th>
<th>Principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Planning Principles</td>
<td>- the promotion and protection of opportunities for current and potential productive and sustainable economic activities in rural areas, - the identification and protection of natural resources, having regard to maintaining biodiversity, the protection of native vegetation, the importance of water resources and avoiding constrained land, - the provision of opportunities for rural lifestyle, settlement and housing that contribute to the social and economic welfare of rural communities, - the consideration of impacts on services and infrastructure and appropriate location when providing for rural housing, - ensuring consistency with any applicable regional strategy of the Department of Planning or any applicable local strategy endorsed by the Director-General.</td>
</tr>
<tr>
<td>Rural Subdivision principles</td>
<td>- the minimisation of rural land fragmentation, - the minimisation of rural land use conflicts, particularly between residential land uses and other rural land uses, - the consideration of the nature of existing agricultural holdings and the existing and planned future supply of rural residential land when considering lot sizes for rural lands, - the consideration of the natural and physical constraints and opportunities of land, - ensuring that planning for dwelling opportunities takes account of those constraints.</td>
</tr>
</tbody>
</table>

Source: SEPP (Rural Lands) 2008

**10.4.1. STATE SIGNIFICANT AGRICULTURAL LAND AND THE PROTECTION OF PRIME AGRICULTURAL LAND**

Part 4 of SEPP (Rural Lands) 2008 provides for the Minister for Planning to designate land as *State Significant Agricultural Land* as explained in the SEPP. Land that may be included in this schedule is agricultural land of State or regional significance, which may be under pressure for uses not compatible with the current agricultural use and where its protection will result in a public benefit.

Significant areas of the rural Tweed are categorised as *State Significant Agricultural Land and Zone 1(b) Agricultural Protection*. This mainly applies to land used for sugar cane in the lower to mid Tweed Valley, other smaller floodplains, and on the Cudgen basalt plateau.

The objectives for *State Significant Agricultural Land* are as follows:

- to identify State significant agricultural land and to provide for the carrying out of development on that land, and
- to provide for the protection of agricultural land:
  - that is of State or regional agricultural significance;
  - that may be subject to demand for uses that are not compatible with agriculture;
  - if the protection will result in a public benefit.

The objectives of the 1(b) Agricultural Protection Zone in Tweed LEP 2000 are:

- to protect identified prime agricultural land from fragmentation and the economic pressure of competing land uses (particularly urban development),
- to allow other development that is compatible with agricultural activities.

*Draft Tweed LEP 2012* maintains the same sentiments for the proposed replacement Zone *RU1 Primary Production*, (ie: to minimise the fragmentation of the land resource base and protect prime agricultural land from the economic pressure of competing and use. It is noted that prime agricultural land in Tweed Shire has already been identified mapped and protected by legislation and under the Tweed LEP.

The **RU1 Primary Production** zone is intended for all types of primary industry production, and aims for the land to be used in a sustainable manner. Its application is intended for ‘large contiguous areas of land mapped as most important for current and/or future food, fibre and timber production, and rural employment’. 32 Flood plain areas growing sugar cane, and the horticultural land on the Cudgen-Duranbah plateau are such areas.
Other main relevant policies are identified and discussed below.

10.4.2. SEPP (MINING, PETROLEUM PRODUCTION AND EXTRACTIVE INDUSTRIES) 2007:
This policy recognises the importance of mining, petroleum production and extractive industries to NSW, and provides for ‘the proper management and development of mineral, petroleum and extractive material resources for the purpose of promoting the social and economic welfare of the State’.

10.4.3. SEPP NO 15—RURAL LANDSHARING COMMUNITIES 2011
This policy encourages and facilitates the development of rural land-sharing communities committed to environmentally sensitive and sustainable land use practices. It sets tight conditions for such development, broadly relating to (but not limited to) land use, land title, land capability, community populations, development quality and density, physical infrastructure and environmental health standards, management planning, and decision guidelines.

10.4.4. SEPP NO 30—INTENSIVE AGRICULTURE
This policy requires development consent for cattle feedlots for 50 or more cattle or piggeries of 200 or more pigs. It identifies information and public notification requirements to ensure effective planning controls over this rural industry.

10.4.5. SEPP (EXEMPT AND COMPLYING DEVELOPMENT CODES) 2008
The SEPP (Exempt and Complying Development Codes) 2008 (the Codes SEPP) is intended to remove ‘red tape’ for low risk and low impact development.33 The following is of particular relevance here:

- ‘Exempt development’ is minor development that does not require any planning or construction approval. It typically covers the minor ‘do it yourself’ renovation work (eg: replacement of interior tiles; erecting a prefabricated garden shed). Exempt development is identified in Tweed LEP.
- ‘Complying development’ is a combined planning and construction approval. Where a building meets all of the predetermined standards established in either a State or local council planning document, approval is intended to be catered for via a 10-day fast track process based on assessment against numerical compliance standards or rules. For example, if a complying development height is 8.5m, the proposed building’s height cannot exceed 8.5m. A complying development certificate can be issued by either the local council or an accredited certifier.

A proposed building that will not meet either the exempt or compliance rules requires assessment via a development application that can in turn only be approved by the Council via assessment against its own development standards. A building that does not exactly fit the development standards can still be approved ‘on its merits’. Building work cannot commence until there is both an approved development application and a construction certificate.

The Codes SEPP contain a section titled SEPP - Part 3A - Rural Housing Code. This allows development of new single and two-storey dwelling houses, alterations and additions to existing dwelling houses, and ancillary development on rural lots as complying development, subject to meeting the following minimum standards:

- New dwellings houses can be built on rural zoned properties (RU1, RU2, RU4) that have an area of at least 4,000m². (Alterations and additions can be undertaken on any rural zoned property. (New dwelling houses in the Village Zone RU5 are captured under the General Housing Code.))

- Different standards have been set for different types of rural lots, these being
  - lots within the R5 (or equivalent) Zone (ie Village Zone) under 4,000m²
  - lots within the R5 (or equivalent) Zone over 4,000m²
  - lots within the RU1, RU2, RU3, RU4 or R5 Zone (or equivalent) over 4,000m²

- To be complying development, the property must meet any minimum lot size requirement in a LEP for a new dwelling house (complying development for a new dwelling house cannot be undertaken if the land is a concessional lot or is reliant on a dwelling entitlement for the erection of a dwelling house.)

- If a restriction is created under s.88B of the Conveyancing Act 1919 that specifies a building envelope for the lot, a dwelling house must be located wholly within the envelope, irrespective of other development standards in the Codes SEPP.

- Rural lots must have lawful direct access (via direct frontage or a Right of Cantiagway) or not by a Crown Road Reserve) to a public road which is owned and maintained by the local council.

Setbacks, and protection of high visibility ridgelines

The Codes SEPP applies the following setback provisions:

- A new dwelling house cannot occur as complying development if within 250 metres of the boundary of a property where the following uses occur: intensive livestock agriculture; intensive plant agriculture; rural industries; mines and extractive industries; forestry; railway lines.

- A 40m setback from the bank of a perennial watercourse identified by a 1:50,000 topographic map published by the Land and Property Management Authority is required.

- A development application needs to be lodged with the local council if it is proposed to develop within these setback areas.

- The topmost point of a new dwelling house must be at least 5 metres below the nearest ridgeline to a hill.

Bush fire prone land
The Codes SEPP states that complying development can occur on low risk bush fire prone land but cannot occur on high risk bush fire prone land (BAL 40+ or BAL FZ). Where complying development can occur, a suitably qualified consultant, the Rural Fire Service or the council will be required to certify the level of bush fire risk and the certifier will sign off that relevant development standards and protective measures have been met. (Refer to RFS webpage34 ‘Documents Master List’ on current ‘how policy in practice’ operates within the RFS).

Flood prone land
The Codes SEPP states that complying development can occur on low risk flood prone land, but cannot occur on high risk flood prone land. Where complying development can be undertaken, a suitably qualified person or the council will be required to sign off that relevant development standards and protective measures in accordance with a council’s flood study have been adhered to.

Native vegetation protection
The Codes SEPP states that complying development cannot occur on land that is a critical habitat of an endangered species, population or ecological community (identified under the Threatened Species Conservation Act 1995 or the Fisheries Management Act 1994). In addition, the Rural Housing Code does not apply to the part of the land that is identified as being environmentally sensitive.

The Native Vegetation Act 2003 (NV Act) and the Native Vegetation Regulation (NV Regulation) currently allows the clearing of trees for the minimum extent necessary to erect a single dwelling house issued with development consent. As complying development is included in the
definition of development consent, the same requirements under the NV Act and NV Regulation for a single dwelling house apply.

The NSW Government through Planning NSW considers that the Rural Housing Code, the NV Act requirements, and the existing conditions of complying development certificates ‘are sufficient to limit the removal of native vegetation’.

10.5. LOCAL ENVIRONMENT PLANS

A LEP is a legal instrument that imposes standards to control development. LEPs are also used to reserve land for open space, schools, transport or other public purposes as well as control advertising and protect trees and vegetation. The purpose of a LEP is to achieve the objects of the Environmental Planning and Assessment Act 1979 (EP&A Act). They are a means to implement strategies. A LEP generally comprises a written document and accompanying maps.

LEPs apply to a particular area, generally the whole, or part of, a local government area. A LEP applying to a particular area is referred to as the principal LEP. The process for making a principal LEP and for amending a principal LEP is the same. That is, in order to amend a principal LEP, it is necessary to make another LEP. For convenience, a LEP being made to amend a principal LEP is referred to as an amending LEP.

Most LEPs remain in force until they are amended or repealed by an amending LEP. This is important to provide certainty in the planning system. Where appropriate it is possible to specify that a LEP will have effect only for a specified period, or in specified circumstances. The occasions when this is appropriate, however, will be limited. [EP&A Act s. 26(3A)]

All principal LEPs must be made in a standard form prescribed in the Standard Instrument (Local Environmental Plans) Order 2006. Maps which accompany LEPs, such as zoning maps, must also conform with the Standard Technical Requirements for LEP maps (Department of Planning, 2009). The Standard Instrument and Standard Technical Requirements for LEP maps provide consistency in the appearance of LEPs and assist users interpreting planning controls across different local government areas.

Generally only the Minister for Planning (or delegate) can make a LEP following a process set out in the EP&A Act and described in section 4 of these guidelines. [s.53 EP&A Act]. However a LEP can be initiated by either the council for the local government area to which the LEP is to apply, or, the Minister. [ss. 54-55 EP&A Act]

Whether it is a council that has initiated a LEP or the Minister, the body responsible for carrying out the process is known as the relevant planning authority (RPA). For council initiated LEPs the RPA will be the council.

Further detail on the content and process for preparing LEPs is on the NSW Department of Planning Website.


TWEED LEP 2000 AND DRAFT LEP 2012

The Tweed Local Environment Plan (TLEP) is the primary planning tool used to control and guide the future development of land in the whole of the Tweed Shire by dividing land in the Shire into various zones. It sets out what development can be carried out within them, whether Council approval is needed and/or whether any special requirements apply, in relation to proposed development. LEP 2000 has been amended several times since 2000.

In 2006, the State Government sought to simplify the planning system in NSW by introducing an LEP Template (the Standard Instrument) to standardise the format, zones, definitions and some of the objectives and clauses of all NSW LEPs. It aimed to simplify and improve strategic plan making by introducing a common set of provisions so government, industry and the community could better understand and communicate the plans.

The Tweed Council has subsequently prepared draft Tweed LEP 2012, based on the NSW Governments standard LEP Template format used by all Councils in NSW. It contains a written document and a set of maps. It is proposed that LEP 2012 will replace the current LEP.

The content of the draft Tweed LEP 2012 is based on the standardised template, local provisions converted from Tweed LEP 2000, and various other local strategies and policies. Its text contains compulsory, optional and local provisions.

10.6. STRATEGIC RURAL LAND USE PLANS

The NSW Government has a Strategic Rural Land Use Planning Policy to create a system to protect strategic agricultural land and water resources, and create jobs and investment for regional communities by providing certainty for landholders and mining companies. The policy includes 27 new joint measures to identify, map and protect the State’s most valuable or strategic agricultural land (SAL) and critical underground water resources. Protection and balance is to be achieved through the following:

• The mapping of two million hectares of strategic agricultural land across the Upper Hunter and New England North West Regions.

• The requirement for Agricultural Impact Statements at exploration stage.

• The establishment of a Land and Water Commissioner to oversee regulation of exploration activity before it occurs, and oversee land access agreements between land holders and miners.

• An Aquifer Interference Policy that modifies assessment and protection of underground water.

• The new Gateway assessment by an independent panel of experts to scientifically assess impacts on agricultural land and water before any mining proposal on Strategic Agricultural Land can proceed to a DA stage.

• New Codes of Practice for the Coal Seam Gas industry covering well integrity and hydraulic fracturing.

The policy provides for greater input from local communities, landholders and scientific experts into assessment of exploration and mining proposals. It is intended to give certainty to companies wanting to invest in NSW to develop mining and coal seam gas projects, and to provide the platform to resolve conflicts over competing land use. However, a Strategic Rural Land Use Plan has been prepared for the Upper Hunter and New England North West no such plan has yet been prepared covering Tweed Shire.
11. TWEED LEP

The Tweed LEP is the Council’s principle land use planning instrument. The LEP must comply with various State Environmental Planning Policies (SEPPs), including the SEPP (Rural Lands) 2008. These collectively provide the framework for local interpretation and expression through the LEP. LEPs are required for all local government areas in NSW.

The Tweed LEP (at October 2013):

- is a statutory plan prepared under the Environmental Planning and Assessment Act to control and guide the future development of land in the whole of Tweed Shire.
- results from and seeks to implement a number of studies previously carried out by Council (such as the Tweed Shire 2000+ Strategic Plan, Pottsville Village Strategy, Jack Evans Boat Harbour Study etc), State Government policies (such as the North Coast Regional Environmental), Council policies and general planning principles.
- categorises all rural and urban land in the Shire into one or other landuse zone (eg, Rural, Agricultural Protection, Low Density Residential, Open Space etc), and identifies what development can be carried out in those zones, whether Council approval is needed for respective uses, and whether any special requirements apply.
- consists of a written document, 45 land use Zone Maps, 2 Heights of Buildings Maps, a Designated Roads Map, land liable to flooding maps, and various other maps.

The written document sets out the planning controls for development in the Shire. The Zone Maps show the zoning of all land to which this plan applies in the Shire.

The NSW Standard Instruments (Local Environmental Plans) Order 2006 require all NSW Council’s to translate their existing LEPs into a Standard Instrument Template format. At October 2013 the Tweed Shire Council is in the process of upgrading its LEP to conform to the requirements of this legislation. The translated LEP will present a new suite of land use zones translated as ‘best-fit’ to the requirements of the Order.

11.1. WHAT DO THE TWEED LEP 2000 AND DRAFT LEP 2012 SAY ABOUT THE SHIRE’S RURAL LANDS?

The Tweed LEP provides landuse planning principles, objective and controls for the planning development and management of all land within Tweed Shire. The LEP in part seeks to promote ecologically sustainable development consistent with the four ESD principles relating to: the precautionary principle; inter-generational equity; conservation of biological diversity and ecological integrity, and improved valuation, pricing and incentive mechanisms.

Through the application of land use zones and associated local and state policies, the challenge in Tweed Shire as in many local government areas in NSW and nationally, is to achieve a balance that maximises the overall community benefit of the land for the present and the future. This can mean that the interests of the community often need to outweigh the interests of the individual.

The primary land zones applied across Tweed’s private rural land under the LEP at October 2013 are the 1(a) Rural Zone, 1(b) Agricultural Protection, and the Environmental Protection Zones. There are also small areas of the Zone 1(c) Rural Living at scattered locations, but generally less frequent in the Shire’s western hinterlands. Rural villages are in Zone 2 (d) Village, which is not a formal rural zone.

The LEP zoning map clearly identifies that most private rural lands in the Shire are (by area) currently within Zones 1(a) Rural and 1(b) Agricultural Protection. Other zones including 1(c) Rural Living are applied over limited areas. Most land zoned Rural Residential is located in the hinterland areas from just inland of the coast to further south west along the valley of the Tweed River and its tributaries. The zone map also identifies that there is very little land zoned Rural Residential in the western half of the Shire.

All land is subject to land use and subdivision controls that are prescribed through the land use zone. The objectives for, and land uses provided for and prohibited in the above-mentioned Zones, are identified in Table 45.

The following text identifies some key elements of Tweed LEP 2000 and Draft Tweed LEP 2012 and that relate to the Shire’s rural lands.

11.1.1. STEEP LAND

Clause 7.9 Steep Land in Draft LEP 2012 has the following objectives:

- to protect scenic landscape values;
- to protect soils on steep land susceptible to soil erosion.
- to protect rural character and amenity;
- to minimise sedimentation and contamination of waterways and water storage facilities.

The clause applies to land shown on the LEP’s Steep Land Maps as reference for land use planning matters. The Steep Land map identifies land above and below 18 degrees (~32 per cent) slope. Consent must not be granted to development on land to which this clause applies. Map STL 008 is provided here as an example.

FIGURE 55 EXAMPLE STEEP LAND MAP IN DRAFT TWEED LEP 2012 DEPICTING LAND OVER 18 DEGREES

Source: Draft Tweed LEP 2012
11.1.2. DRINKING WATER CATCHMENT

Figure 56 and Figure 57 identify the Tweed River Catchment and the Tweed Drinking Water Catchment. Clause 7.10 in Tweed LEP 2012 addresses ‘Drinking Water Catchment’. The clause applies to all land identified here in Section 12.1.2. The objective of the clause is ‘to protect drinking water catchments by minimising the adverse impacts of development on the quality and quantity of water entering drinking water storages’. Before determining a development application for development on land to which this clause applies, the above clause states that the consent authority (ie: Tweed Shire Council) must consider the following:

1. Whether or not the development is likely to have any adverse impact on the quality and quantity of water entering the drinking water storage, having regard to the following:
   i. the distance between the development and any waterway that feeds into the drinking water storage,
   ii. the on-site use, storage and disposal of any chemicals on the land,
   iii. the treatment, storage and disposal of waste water and solid waste generated or used by the development,

2. Any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.

Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:

1. the development is designed, sited and will be managed to avoid any significant adverse impact on water quality and flows, or
2. if that impact cannot be reasonably avoided the development is designed, sited and will be managed to minimise that impact, or
3. if that impact cannot be minimised, the development will be managed to mitigate that impact.

The above content is consistent with the information provided in the Tweed Shire council information document titled ‘Tweed Catchment and Water Quality’. The document identifies that the Tweed water supply catchment covers 570km², entirely within the boundary of the Tweed local government area. It extends from the Nightcap Ranges in the south to the Border Ranges in the west and McPherson Ranges to the north, all within the western portion of Tweed Shire. Most of the catchment is on rural land supporting agricultural land uses, small residential villages, sclerophyll open forest and sub-tropical rainforest. Average annual rainfall is about 1600mm. For most of the year the Tweed valley is supplied by natural flows in the Tweed and Oxley Rivers. When required, these natural flows can be supplemented by releasing water from Clarrie Hall Dam into Doon Doon Creek, a tributary of the Tweed River.
The above-referenced Shire brochure on the catchment states that Clarrie Hall Dam is protected by 926 hectares of Council-owned, forested Border Ranges in the west and McPherson Ranges to the north, all within the western portion of Tweed Shire. Most of the catchment is on rural land supporting agricultural land uses, small residential villages, sclerophyll open forest and sub-tropical rainforest. Average annual rainfall is about 1600mm. For most of the year the Tweed valley land and Mount Jerusalem National Park. There is also some privately-owned land.

The referenced Tweed Council brochure states that poor water quality in Bray Park Weir (the main take off point of water for domestic use the lower catchment) is caused by a combination of poor land-use practices in rural areas, run-off from intensive agriculture and run-off from nearby villages. The main raw water quality risks to drinking water generally from the catchment are discussed in the Council’s brochure are: residential stormwater; residential development and land clearing; algal blooms and aquatic weed outbreaks. Also water quality recording over time has identified the following water quality issues:

- Changes in turbidity with storm and flood-related events
- Low raw water alkalinity during high turbidity events
- Moderate organic content
- Disinfection by-product formation due to moderate levels of organics in the raw water
- Soluble iron and manganese
- Algal toxins
- Taste and odour compounds

The main pollution source for the upper Tweed River catchment is stated to be rural stormwater run-off from past agricultural and earthwork practises. More specifically the Council document states that water quality risks can potentially relate to the following:

- Land clearing
- Residential development
- Pollution from agricultural run-off including sediments, insecticides, herbicides and fertilisers, and nutrients, including from access of agricultural livestock to riverbanks
- On-site sewage treatment system failures.
- Riparian (riverbank) vegetation clearing, causing loss of riparian vegetation, and nutrient loadings cause algal pollution.
11.1.3. **VEGETATION PRESERVATION**

Clauses 5.9 and 5.9AA of the *Draft Tweed LEP 2012* introduce the need for a Development Control Plan for the protection of trees and other vegetation. A draft plan has been prepared titled *DCP A16 Tree and Vegetation Preservation Code* (the Code) which aims to protect the biodiversity, amenity and cultural values of Tweed Shire through the preservation of trees and vegetation. It prohibits the clearing of native vegetation in areas to which it applies (see below) except clearing that is authorised by development consent or a property vegetation plan under the *Native Vegetation Act* (2003).

The Code is to be read in conjunction with the *Draft Tweed LEP 2012*, specifically the following clauses:

- Clause 5.9 Preservation of trees or vegetation;
- Clause 5.9AA Trees or vegetation not prescribed by development control plan;
- Clause 5.10 Heritage conservation;
- Clause 5.11 Bushfire hazard reduction
- Clause 7.8 Biodiversity.

The Code states that in the case of any inconsistencies between the Code and Tweed LEP 2012, the provisions of the LEP 2012 prevail. The Code applies to the whole of Tweed Shire. It particularly but not only applies to:

- Native vegetation comprising trees (including palms and tree ferns) that are locally indigenous and are equal to or greater than five metres (5m) in height.
- Native vegetation (of any height) that is locally indigenous and occurs within the vegetation communities described as forest, woodland, heathland, shrubland, scrubland, sedgeland, fernland, forbland, rushland, mangrove, saltmarsh, seagrass, or wetland.

The Code mainly (but not only) aims to ensure the preservation of locally indigenous trees and vegetation which contribute to the biodiversity, social and amenity value of Tweed Shire, and to provide a process for identifying, listing and preserving trees of ecological, heritage, aesthetic and cultural significance through a Significant Vegetation Register.

It implements key elements of the NSW *Native Vegetation Act 2003* (NV Act) which provides for the management of the state’s native vegetation through preventing ‘broadscale clearing’ unless it improves or maintains environmental outcomes. Relevant to the *Tweed Rural Land Strategy* the *NV Act* is most applicable to the following land use zonings under Tweed LEP 2012: Rural Zones (RU1, RU2), Environmental Protection Zones (E2, E3) and Waterway Zones (W1, W2, W3). It does not apply to the public land Environmental Protection Zones (E1 -National Parks and Nature Reserves).

The Code does permits clearing of non-protected regrowth (as defined by the NV Act), and clearing for Routine Agricultural Management Activities (as defined by the NV Act and Native Vegetation Regulation 2005). It also permits continuation of existing farm practices that do not involve the clearing of remnant native vegetation (as defined by the NV Act) and sustainable grazing.

A person, who contravenes the Code or causes the Code to be contravened, may be found guilty of an offence under the *Environmental Planning and Assessment Act* 1979, and may be subject to prosecution under the provisions of that Act.

Rural subdivision proposals that involve clearing of native vegetation must comply with the provisions of the Native Vegetation Conservation Act 1997, and a development consent is required from the Minister for any clearing of state protected lands (unless exemptions apply). Significant vegetation and habitat areas should be retained in public land or in parts of lots that are not intended for uses incompatible with environmental protection objectives. Subdivision works should also contain proposals for environmental repair and revegetation of degraded areas and/or remnants of native vegetation.
## TABLE 45 CURRENT LAND USE ZONES (AT OCTOBER 2013) MOST APPLICABLE TO RURAL AREAS OF TWEED SHIRE

<table>
<thead>
<tr>
<th>Zone</th>
<th>Development provisions within the zone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Objectives</strong> Enable the ecologically sustainable development of land that is suitable primarily for agricultural or natural resource utilisation purposes and associated development. Protect rural character and amenity. <strong>Land uses</strong></td>
</tr>
<tr>
<td>Zone 1 (a) Rural</td>
<td><strong>Item 1: Allowed without consent</strong> Agriculture; Environmental facilities; Forestry. <strong>Item 2: Allowed only with consent</strong> Bed and breakfast; dwelling houses (if each is on an allotment of at least 40 hectares or on an allotment referred to in clause 57); Multi-dwelling housing (if (a) not more than two dwellings are involved, and (b) they are attached, and (c) they are on an allotment of at least 40 hectares or an allotment referred to in clause 57). Any other buildings, works, places or land uses not included in Item 1, 3 or 4. <strong>Item 3: Allowed only with consent and must satisfy the provisions of clause 8 (2)</strong> Boat repair and servicing facilities; boating facilities; car parks; caravan parks (other than camping grounds) if connected to a reticulated sewerage system; child care centres; clubs; educational establishments; helipads; heliports; hospitals; hotels; housing for older people or people with disabilities; institutions; junkyards; light industries; marinas; markets; motels; offensive or hazardous industries; places of assembly; places of public worship; public buildings; service stations; storage units; transport terminals (other than airline terminals). <strong>Item 4: Prohibited</strong> Airline terminals; boarding-houses; boat showrooms; brothels; bulky goods retailing; car repair stations; caravan parks (other than camping grounds) if not connected to a reticulated sewerage system; commercial premises; display homes; dwelling houses not included in Item 2; industries (other than home industries, light industries, offensive or hazardous industries, rural industries or industries directly associated with or dependent on extractive industries); integrated housing; manufactured home estates; motor showrooms; multi-dwelling housing not included in Item 2; professional consulting rooms; restricted premises; roadside stalls if requiring direct access to an RTA classified road; shops (other than general stores).</td>
</tr>
<tr>
<td>Zone 1 (b) Agricultural Protection</td>
<td><strong>Objectives</strong> Protect identified prime agricultural land from fragmentation and the economic pressure of competing land uses. <strong>Land uses</strong></td>
</tr>
</tbody>
</table>
Zone 1 (c) Rural living

Objectives
Enable rural residential development in selected areas possessing particular environmental and servicing attributes which do not compromise the viability of rural activities on land in the vicinity, do not detract from the quality of the rural and natural environment and do not create unreasonable or uneconomic demands, or both, for the provision or extension of public amenities or services.

Provide rural residential development of a design integration, quality and scale compatible with, and making a positive contribution to, the character of the rural area in the vicinity.

Land uses

Item 1: Allowed without consent
Environmental facilities
Item 2: Allowed only with consent
Bed and breakfast; dwelling houses if not more than two dwellings and are attached and are on allotment that complies in clause 21 or an allotment referred to in clause 57; educational establishments; any other buildings, works, places or land uses not included in Item 1, 3 or 4.
Item 3: Allowed only with consent and must satisfy the provisions of clause 8 (2)
Bus depots; bus stations; car parks; depots; generating works; helipads; places of assembly; places of public worship; public buildings; recreation establishments; recreation facilities; retail plant nurseries; road transport terminals; rural industries; utility installations being gas holders or generating works.
Item 4: Prohibited
Abattoirs; airline terminals; animal establishments; boarding-houses; boat repair and servicing facilities; boat showrooms; boating facilities; brothels; bulk stores; bulky goods retailing; camping grounds; car repair stations; caravan parks; clubs; commercial premises; cruise craft docks; depots; display homes if adjoining an RTA classified road; dwelling houses not included in Item 2; extractive industries; forestry; heliports; hospitals; hotels; housing for older people or people with disabilities; industries (other than home industries or rural industries); institutions; integrated housing; junkyards; light industries; liquid fuel depots; manufactured home estates; marinas; markets; mines; motels; motor showrooms; multi-dwelling housing not included in Item 2; offensive or hazardous industries; outdoor eating areas; professional consulting rooms; recreation vehicle areas; refreshment rooms; restricted premises; road transport terminals; roadside stalls if requiring access to an RTA classified road; rural tourist facilities; rural workers’ dwellings; sawmills; service stations; shops; stock and sale yards; storage units; tourist accommodation; tourist facilities; tourist resorts; transport terminals; warehouses.

Zone 2 (d) Villages

Objectives
Provide for residential development and a full range of services and facilities traditionally associated with a rural village which is of a design and scale that makes a positive contribution to the character of the village.

Land uses

Item 1: Allowed without consent
Environmental facilities.
Item 2: Allowed only with consent
Bed and breakfast; dwelling houses if each is on an allotment of at least 450m2; rural workers’ dwellings; any other buildings, works, places or land uses not included in Item 1, 3 or 4.
Item 3: Allowed only with consent and must satisfy the provisions of clause 8 (2)
Forestry; heliports; sawmills; stock and sale yards.
Item 4: Prohibited
Abattoirs; airline terminals; animal establishments; brothels; display homes if adjoining an RTA classified road; extractive industries; heliports; junkyards; liquid fuel depots; mines; offensive or hazardous industries; recreation vehicle areas; restricted premises; tourist resorts.

Zone 2 (f) Tourism

Objectives
Encourage integrated tourist development and uses associated with, ancillary to or supportive of the tourist development, including retailing and service facilities, where such facilities are an integral part of the tourist development and are of a scale appropriate to the needs of that development.

Ensure that prime sites are developed for the best use and fulfill their economic and employment generating potential for the area.

Land uses

Item 1: Allowed without consent
Environmental facilities.
Item 2: Allowed only with consent
Bed and breakfast; dwelling house if for a caretaker; any other building, works, places or land uses not included in Item 1, 3 or 4.
<table>
<thead>
<tr>
<th>Zone 5 (a) Special uses</th>
<th><strong>Objectives</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Identify land which is developed or is proposed to be developed, generally by public bodies, for community facilities and services, roads, railways, utilities and similar things.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Zone 6 (b) Recreation</th>
<th><strong>Objectives</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Designate land, whether in public or private ownership, which is or may be used primarily for recreational purposes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Zone 7 (a) Environmental protection (wetlands and littoral rainforests)</th>
<th><strong>Objectives</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Identify, protect and conserve significant wetlands and littoral rainforests. Prohibit development which could destroy or damage a wetland or littoral rainforest ecosystem.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Land uses</th>
<th>Land uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1: Allowed without consent</td>
<td></td>
</tr>
<tr>
<td>Beach maintenance.</td>
<td></td>
</tr>
<tr>
<td>Item 2: Allowed only with consent</td>
<td></td>
</tr>
<tr>
<td>Agriculture; bed and breakfast; bushfire hazard reduction; camping grounds; car parks; child care centres; clubs; community buildings; cruise craft docks; dwelling houses if for caretakers; earthworks; emergency service facilities; environmental facilities; forestry; general stores; hotels; marinas; markets; motels; outdoor eating areas; places of assembly; public buildings; public utility undertakings; recreation areas; recreation establishments; recreation facilities; refreshment rooms; roads; tourist accommodation; tourist facilities; urban stormwater water quality management facilities; utility installations (other than gas holders or generating works); works for drainage and landfill.</td>
<td></td>
</tr>
<tr>
<td>Item 3: Allowed only with consent and must satisfy the provisions of clause 8 (2)</td>
<td></td>
</tr>
<tr>
<td>Caravan parks; educational establishments; helipads; heliports; retail plant nurseries; tourist; ports.</td>
<td></td>
</tr>
<tr>
<td>Item 4: Prohibited</td>
<td></td>
</tr>
<tr>
<td>Any buildings, works, places or land uses not included in Item 1, 2 or 3.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Land uses</th>
<th>Land uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1: Allowed without consent</td>
<td></td>
</tr>
<tr>
<td>Nil.</td>
<td></td>
</tr>
<tr>
<td>Item 2: Allowed only with consent</td>
<td></td>
</tr>
<tr>
<td>Beach maintenance; bed and breakfast; bushfire hazard reduction that is not exempt development; environmental facilities; home businesses; noxious weed control that is not exempt development; real estate signs.</td>
<td></td>
</tr>
<tr>
<td>Item 3: Allowed only with consent and must satisfy the provisions of clause 8 (2)</td>
<td></td>
</tr>
<tr>
<td>Agriculture; earthworks; emergency service facilities; public utility undertakings; roads; urban stormwater water quality management facilities; utility installations (other than gas holders or generating works); works for drainage and landfill.</td>
<td></td>
</tr>
<tr>
<td>Item 4: Prohibited</td>
<td></td>
</tr>
<tr>
<td>Any buildings, works, places or land uses not included in Item 1, 2 or 3.</td>
<td></td>
</tr>
</tbody>
</table>
### Zone 7 (d) Environmental Protection (Scenic Escarpment)

**Objectives**
To protect and enhance those areas of particular scenic value to the area of Tweed, minimise soil erosion from escarpment areas, prevent development in geologically hazardous areas, and maintain the visual amenity of prominent ridgelines and areas.

**Land uses**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Allowed without consent&lt;br&gt;Beach maintenance.</td>
</tr>
<tr>
<td>2</td>
<td>Allowed only with consent&lt;br&gt;Bed and breakfast; bushfire hazard reduction that is not exempt development; business identification signs; camping grounds; dwelling houses if each is on an allotment of at least 40 hectares or an allotment referred to in clause 57 and if the number of dwellings does not exceed one for each 40 hectares of land contained within the allotment; earthworks; home businesses; home industries; multi-dwelling housing (if more than two dwellings are involved, and they are attached, and they are on allotment of at least 40 hectares or an allotment referred to in cl. 57); noxious weed control that is not exempt development; real estate signs; roadside stalls; utility installations.</td>
</tr>
<tr>
<td>3</td>
<td>Allowed only with consent and must satisfy the provisions of clause 8 (2)&lt;br&gt;Agriculture; emergency service facilities; environmental facilities; extractive industries; forestry; public utility undertakings; recreation areas; refreshment rooms; roads; rural tourist facilities; rural workers’ dwellings; telecommunications infrastructure; urban stormwater water quality management facilities; utility installations (other than gas holders or generating works); works for drainage and landfill.</td>
</tr>
<tr>
<td>4</td>
<td>Prohibited&lt;br&gt;Any buildings, works, places or land uses not included in Item 1, 2 or 3.</td>
</tr>
</tbody>
</table>

### Zone 7 (f) Environment Protection (Coastal Lands)

**Objectives**
Identify land susceptible to coastal erosion and protect it from inappropriate development. Protect and enhance the scenic and environmental values of the land.

**Land uses**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Allowed without consent&lt;br&gt;Beach maintenance; environmental facilities.</td>
</tr>
<tr>
<td>2</td>
<td>Allowed only with consent&lt;br&gt;Bed and breakfast; bushfire hazard reduction that is not exempt development; earthworks; emergency service facilities; noxious weed control that is not exempt development; public utility undertakings; real estate signs; recreation areas; recreational beach activities; roads; urban stormwater water quality management facilities; utility installations (other than gas holders or generating works); works for drainage and landfill.</td>
</tr>
<tr>
<td>3</td>
<td>Allowed only with consent and must satisfy the provisions of clause 8 (2), but not on land at South Kingscliff (Portions 194, 301 and 312)&lt;br&gt;Agriculture; camping grounds; car parks; caravan parks; community buildings; mineral sand mines.</td>
</tr>
<tr>
<td>4</td>
<td>Prohibited&lt;br&gt;Any buildings, works, places or land uses not included in Item 1, 2 or 3.</td>
</tr>
</tbody>
</table>

### Zone 7 (l) Environment Protection (Habitat)

**Objectives**
Protect areas or features which have been identified as being of particular habitat significance. Preserve the diversity of habitats for flora and fauna. Protect and enhance land that acts as a wildlife corridor.

**Land uses**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Allowed without consent&lt;br&gt;Nil.</td>
</tr>
<tr>
<td>2</td>
<td>Allowed only with consent&lt;br&gt;Bed and breakfast; bushfire hazard reduction that is not exempt development; business identification signs; dwelling houses if on an allotment of at least 40 hectares or an allotment referred to in cl. 57 and if the number of dwellings does not exceed one for each 40 hectares of land contained within the allotment; earthworks; environmental facilities; home businesses; noxious weed control that is not exempt development.</td>
</tr>
<tr>
<td>3</td>
<td>Allowed only with consent and must satisfy the provisions of clause 8 (2)&lt;br&gt;Agriculture; camping grounds; emergency service facilities; forestry; public utility undertakings; roads; urban stormwater water quality management facilities; utility installations (other than gas holders or generating works); works for drainage and landfill.</td>
</tr>
<tr>
<td>4</td>
<td>Prohibited&lt;br&gt;Any buildings, works, places or land uses not included in Item 1, 2 or 3.</td>
</tr>
</tbody>
</table>

Source: Distilled by EnPlan from Tweed LEP 2000
<table>
<thead>
<tr>
<th>Zone</th>
<th>Development provisions within the zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 1 (a) Rural</td>
<td>Objectives</td>
</tr>
<tr>
<td></td>
<td>• to prevent the potential for fragmentation of ownership of rural land that would: (i) adversely affect the continuance or aggregation of sustainable agricultural units, or (ii) generate pressure to allow isolated residential development, and provide public amenities and services, in an uncoordinated and unsustainable manner.</td>
</tr>
<tr>
<td></td>
<td>• to protect the ecological or scenic values of the land.</td>
</tr>
<tr>
<td></td>
<td>• to protect the area of Tweed’s water supply quality.</td>
</tr>
<tr>
<td>Zone 1 (b) Agricultural protection</td>
<td>Consent may only be granted to the subdivision of land:</td>
</tr>
<tr>
<td></td>
<td>• within Zone 1(a), 1(b2), 7(a), 7(d) or 7(l) if the area of each allotment created is at least 40 hectares, or</td>
</tr>
<tr>
<td></td>
<td>• within Zone 1 (b1) if the area of each allotment created is at least 10 hectares.</td>
</tr>
<tr>
<td>Zone 7 (a) Environment Protection (wetlands and littoral rainforest)</td>
<td>Despite sub-clause (2), consent may be granted to the subdivision of land where an allotment to be created is less than 40 hectares, or 10 hectares in the case of Zone 1 (b1), if the consent authority is satisfied that the allotment will be used for a purpose, other than for an agricultural or residential purpose, for which consent could be granted.</td>
</tr>
<tr>
<td></td>
<td>For the purposes of sub-clauses (2) and (3):</td>
</tr>
<tr>
<td></td>
<td>• land is taken to be within Zone 1(b1) if it is shown on the zone map by the marking ‘1(b1)’.</td>
</tr>
<tr>
<td></td>
<td>• land is taken to be in Zone 1(b2) if it is shown on the zone map by the marking ‘1(b2)’.</td>
</tr>
<tr>
<td>Zone 7 (d) Environment Protection (scenic / Escarpment)</td>
<td>Zone 1 (c) Rural living Objective:</td>
</tr>
<tr>
<td></td>
<td>• To ensure that the semi-rural character and environmental values of the locality are protected.</td>
</tr>
<tr>
<td></td>
<td>Consent may be granted to the subdivision of land in Zone 1(c) for residential purposes only if:</td>
</tr>
<tr>
<td></td>
<td>• each allotment will be connected to a reticulated water supply system, or a tank water supply will be provided to the satisfaction of the consent authority, and</td>
</tr>
<tr>
<td></td>
<td>• the consent authority is satisfied that each allotment created is capable of accommodating adequate facilities for the treatment and disposal of sewage or will be connected to the Council's reticulated sewerage system, and</td>
</tr>
<tr>
<td></td>
<td>• in the case of land to be connected to the Council's reticulated sewerage system - the area of each lot created is not less than 0.4 hectare, and</td>
</tr>
<tr>
<td></td>
<td>• in the case of land not to be connected to the Council's reticulated sewerage system - the area of each lot created is not less than 1 hectare.</td>
</tr>
<tr>
<td>Zone 7 (f) Environment Protection (Coastal Lands)</td>
<td>Objectives</td>
</tr>
<tr>
<td></td>
<td>• to protect the ecological or scenic values of coastal lands</td>
</tr>
<tr>
<td></td>
<td>• to protect land that may be susceptible to coastal erosion processes from inappropriate development.</td>
</tr>
<tr>
<td></td>
<td>Consent may be granted to the subdivision of land within Zone 7 (f) only if:</td>
</tr>
<tr>
<td></td>
<td>• the area of each allotment created is at least 40 hectares, or</td>
</tr>
<tr>
<td></td>
<td>• the consent authority is satisfied that the allotment will be used for a purpose, other than for an agricultural or a residential purpose, for which consent could be granted.</td>
</tr>
</tbody>
</table>
### TABLE 47 OBJECTIVES OF LAND USE ZONES COMMON OR POTENTIALLY APPLICABLE IN THE RURAL TWEED AS PROPOSED IN DRAFT TWEED LEP 2012

<table>
<thead>
<tr>
<th>Zone</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>RU1 Primary Production</td>
<td>To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.                                                                                     To encourage diversity in primary industry enterprises and systems appropriate to the area. To minimise the fragmentation and alienation of resource lands. To minimise conflict between land uses within the zone and adjoining zones.</td>
</tr>
<tr>
<td>RU2 Rural Landscape</td>
<td>To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.                                                                 To maintain the rural landscape of the zone. To provide for a range of compatible uses, including extensive agriculture. To provide for a range of tourism accommodation-based land uses, including agri-tourism and any other like tourism that is linked to an environmental, agricultural or rural industry use of the land, such as bush foods, forestry, crafts and the like. To provide for a range of compatible land uses that support tourism in the hinterlands and Tweed generally, such as teahouses, macadamia farms, specialised produce farms and the like.</td>
</tr>
<tr>
<td>RU5 Village</td>
<td>To provide for a range of land uses, services and facilities that are associated with a rural village.</td>
</tr>
<tr>
<td>R5 Large Lot Residential</td>
<td>To provide residential housing in a rural setting while preserving, and minimising impacts on, environmentally sensitive locations and scenic quality. To ensure large residential allotments do not hinder the proposer and orderly development of the urban areas in the future. To ensure that development in the areas does not unreasonably increase the demand for public services and facilities. To minimise the conflict between land uses within the zone and land uses within adjoining zones. To maintain the rural and scenic quality of the land.</td>
</tr>
<tr>
<td>SP2 Infrastructure</td>
<td>To provide for infrastructure and related uses. To prevent development that is not compatible with or that may detract from the provision of infrastructure.</td>
</tr>
<tr>
<td>SP3 Tourism</td>
<td>To provide for a variety of tourist-orientated development and related uses.</td>
</tr>
<tr>
<td>E2 Environmental Conservation</td>
<td>To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values. To prevent development that could destroy, damage or otherwise have an adverse effect on those values.</td>
</tr>
</tbody>
</table>

Source: Collated by EnPlan from Draft Tweed LEP
11.1.4. HAZARDS AND BUFFERS

LEP 2000 contains clauses on the following ‘Hazards and Buffers’ for which it provide development provisions

LEP 2000 and Part 7 of Draft LEP 2012 contain ‘local provisions’ for land use hazard matters of direct relevance to the development of the Tweed Rural Land Strategy. The hazard matters are identified in Table 48. The provisions provide objectives for either on-site or off-site protection from threats associated with the issues, and stipulate considerations that must be taken into account by consent authorities in making decisions on development applications. They require particular attention in further development of the Tweed Rural Land Strategy.

The Draft LEP 2012 identifies more hazards than the current LEP. The Tweed Council adopted the LEP 2012 in principle in mid-2013. While the document has not been endorsed by the Department of Planning, the Council’s in-principle adoption ‘by definition’ includes its concerns regarding the hazard ratings hazard, and means that the document is a ‘seriously entertained’ planning document at the local level.

### TABLE 48  LEP 2000 AND DRAFT LEP 2012 CATEGORIES FOR PROVISIONS TO PROTECT AGAINST HAZARDS.

<table>
<thead>
<tr>
<th>Clause</th>
<th>Title</th>
<th>(Draft) LEP 2012 (Public Exhibition Draft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEP 2000</td>
<td>Clause</td>
<td>Title</td>
</tr>
<tr>
<td>31</td>
<td>Development adjoining waterbodies</td>
<td>7.12</td>
</tr>
<tr>
<td>32</td>
<td>Aircraft noise</td>
<td>7.5</td>
</tr>
<tr>
<td>33</td>
<td>Obstacles to aircraft</td>
<td>7.4</td>
</tr>
<tr>
<td>34</td>
<td>Flooding</td>
<td>7.6</td>
</tr>
<tr>
<td>35</td>
<td>Acid sulfate soils</td>
<td>7.1</td>
</tr>
<tr>
<td>36</td>
<td>Coastal erosion outside Zone 7(f)</td>
<td>7.16</td>
</tr>
<tr>
<td>37</td>
<td>Electricity transmission line corridor</td>
<td>7.15</td>
</tr>
<tr>
<td>38</td>
<td>Future road corridors</td>
<td>7.15</td>
</tr>
<tr>
<td>39</td>
<td>Remediation of contaminated land</td>
<td>7.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.14</td>
</tr>
</tbody>
</table>

* Relates to the supply of water; the supply of electricity; the disposal and management of sewage; stormwater; drainage; on-site conservation; suitable road access.

** Draft LEP 2012 does not define ‘Steep Land’ but defines ‘Steep Land Map’ as ‘the Tweed Local Environmental Plan 2012 Steep Land Map’.

* * * Draft LEP 2012 does not define ‘Steep Land’ but defines ‘Steep Land Map’ as ‘the Tweed Local Environmental Plan 2012 Steep Land Map’.

### NATIVE VEGETATION

The draft Tweed LEP 2012 proposes three environmental zones: E1 National Parks and Nature Reserves, E2 Environmental Conservation and E3 Environmental Management. These zones are supported by a complementary package of clauses, including: Clause 7.8 Biodiversity, Clause 7.9 Steep Land, Clause 5.9 Preservation of Trees or Vegetation, Clause 7.10 Drinking Water Catchment, Clause 7.14 Stormwater Management, Clause 7.11 Earthworks and Drainage, Clause 7.1 Acid Sulfate Soils and Clause 7.16 Coastal Risk Planning.

In addition, Council has developed a Tweed DCP Section A16 Trees and Vegetation Preservation Code, which aims to protect the biodiversity, amenity and cultural values of Tweed Shire through the preservation of trees and vegetation. It also provides a process for identifying, listing and preserving trees of ecological, heritage, aesthetic and cultural significance.

11.1.5. OTHER MAIN POLICIES AND STRATEGIES

There are other policies and strategies that are relevant to preparation of the Tweed Rural Land Strategy. These include:

- Tweed 4/24 Strategic Plan 2004-2024 (also known as Tweed Futures) and associated underpinning documents (NOTE: Tweed 4/24, as previously advised, was deposed about 4 years ago and replaced with Council’s Community Strategic Plan (CSP). Suggest reading content at: [http://6410/IntegratedReporting/Default.aspx](http://6410/IntegratedReporting/Default.aspx)
- Tweed Vegetation Management Strategy 2004 (TVMS)
- Northern Rivers Catchment Action Plan 2013-2023 (CAP2).
- Tweed Urban and Employment Land Release Strategy, will impact the location of urban and employment lands, and associated residential living opportunities and therefore potential conflicts.
- Far North Coast Regional Strategy.

11.2. SECTION 149 PLANNING CERTIFICATES

Section 149 Planning Certificates are issued in accordance with the EP&A Act 1979. They contain information on how a property may be used and the restrictions on development. A person may request a 149 Certificate to obtain information about his or her own property but generally a 149...
A Section 149 Planning Certificate is typically requested from the relevant local council at time of property sale. The Certificate, which has a fee attached, can provide valuable information as to the zoning of the land and any possible restriction on the use of the land.

Councils may provide a Notice to Purchasers of Rural Land as an Annexure to the standard Section 149 Planning Certificate. This annexure may outline:

- Council’s support for the ‘right’ to carry out legitimate farming practices.
- That council will not support any action to interfere in such uses provided they are carried out according to industry standards, relevant regulations or approvals.
- Legitimate rural land uses.
- That intending purchasers consider their actions in the light of potential conflicts.

An example of a Notice to Purchasers of Rural Land is included in the following text box.

**Example of Notice to Rural Land Purchasers as annexe to Section 149 Planning Agreements for notifying of local rural land uses.**

```
[Name of council] supports the rights of persons to carry out legitimate rural and agricultural uses and practices in rural areas. [Name of council] supports responsible and sustainable rural land management and rural enterprises. Landholders should avail themselves to all relevant information, guidelines, codes and best practice notes that are relevant to their industry and enterprise.

[Name of council] will not support any action to interfere with the legitimate rural and agricultural use of rural land where such activities or uses are carried out in accordance with industry standards, relevant regulations and policies or approvals. [Name of council] notes that some of the activities listed below will require formal consent of council and/or government agencies or the Catchment Management Authority. These organisations should be contacted if any person has any doubt as to the approvals required for these land uses.

Intending purchasers are advised that legitimate rural and agricultural uses of land include:

- Agricultural processing establishments
```

This notice does not exempt any activity or development from any statutory requirements that applies. This notice does not affect the rights of individuals to take action under common or statutory law.

Source: Department of Primary Industries et al; Living and Working in Rural Areas: A Handbook for Managing Land Use Conflicts on the NSW North Coast.

30 Department of Primary Industries et al; Living and Working in Rural Areas: A Handbook for Managing Land Use Conflicts on the NSW North Coast.
12. **Tweed Development Control Plan 2008**

The Development Control Plan (DCP) applies across the Shire. It contains detailed guidelines that illustrate the controls that apply to particular development types or in a particular area. The DCP supplements the Tweed LEP and clause 72 of the Environmental Planning and Assessment Act 1979 (EP&A Act). Regulations require the DCP to be consistent with the LEP and to accord with Section 74(C) of Part 3 of the Environmental Planning and Assessment Regulations 2000. The plan came into effect on 30 April 2008, and may be amended only as prescribed in the Regulation. The DCP aims to:

1. Achieve development that is consistent with the social, economic and environmental values of the shire;
2. Promote ecologically sustainable development and aims to provide a safe living and working environment;
3. Form part of a range of documents that provides a guide towards a more sustainable future for Tweed Shire; and
4. Provide design issues, performance criteria and standards for development both on a shire wide basis and those that relate specifically to particular development areas.

The DCP operates in two parts to account for (Part A) shire-wide development standards, and for development controls (Part B) that apply to specific sites or localities. The shire-wide controls also apply to the site specific areas. The shire-wide controls that are most directly relevant to the preparation and implementation of the *Tweed Rural Land Strategy* appear to be the following:

- **A1. Residential and Tourist Development Code.**
- **A3. Development of Flood Prone Land.**
- **A5. Subdivision Manual.**
- **A10. Exempt and Complying Development.**
- **A11. Public Notification of Development Proposals.**
- **A13. Socio-Economic Impact Assessment.**

In seeking approval for a development application, compliance with the provisions in the DCP does not necessarily imply that Council will grant consent. Council must also take into consideration those matters listed under Section 90(1) of the EP&A Act 1979. In special circumstances, Council may consent to an application that departs from the provision of the plan.

The following sub-sections identify key elements of the DCP most relevant to preparation of the Tweed Rural Land Strategy. Reference here however does not replace the need for readers to use the relevant section of the DCP, as this document can provide only an overview on main matters.

### 12.1. **A1. Residential and Tourist Development Code**

The *Residential and Tourist Development Code* applies to all residential and tourist development within Tweed Shire, except to the extent of inconsistency with a site specific development provision contained in the Tweed LEP or adopted area specific locality/development control plan, masterplan, or concept plan. It can therefore be considered of limited relevance development in non-urban areas, but it is noted that tourist development can be proposed in rural areas. Development in rural villages should also be considered in context of residential development. The Code identifies the following ‘Topography, cut and fill’ objectives and building control guidelines which appear to be equally relevant residential development in rural areas.

The Code’s ‘Topography, cut and fill’ controls relate in part to positioning development in context of land sustainability objectives.

- To retain the existing landform.
- To limit the extent of excavation.
- To moderate the effects of building height and bulk on sloping land.
- To minimise the extent of earth works on residential land and earthworks associated with residential development.
- To ensure that the building design is appropriate for site topographical conditions.
- To ensure development is sympathetic with the existing topography and water cycle of the site.

Again under the ‘Topography, cut and fill’ sub-heading the Code identifies under that deep excavations can substantially alter the pattern of subsoil water flow and soil stability which may adversely affect neighbouring properties and the natural environment. It states that alternatives to slab on ground construction are to be encouraged where it is obvious that due to the gradient and characteristics of the site, major excavation or filling as a result of raft slab construction would be inappropriate. The following building control guidelines are specified under the ‘sub-heading:

- **Building siting is to relate to the original form of the land.**
- **Alternatives to slab on ground construction are to be encouraged where it is obvious that due to the gradient and characteristics of the site, major excavation or filling as a result of raft slab, construction would be inappropriate.** Example of alternative construction includes: Bearer and joint construction; Deepened edge beam; Split level design; Suspended slab design.
- **On sloping sites, step buildings or utilise site excavation and suspended floors to accommodate changes in level rather than levelling the site via cut and fill.**
- **Dwellings must not be designed to be on a contiguous slab on ground type if the building site has a slope of greater than 10%. Development on such land is to be of polite or pier construction or multiple slabs or the like that minimise the extent of cut and fill.**
- **Site excavation / land re-forming is to be kept to a minimum required for an appropriately designed site responsive development.**
- **The maximum level of cut is 1m and fill is 1m except for areas under control j.**
- **Retaining walls maximum 1.2m.**
- **Cut areas are to be set back from the boundaries at least 900mm; fill areas are to be setback from the boundary a minimum of 1.5m.**
- **Cut and fill batters shall not exceed a slope of 1:2 (v:h) unless geotechnical reports result in Council being satisfied with the site stability. All batters are to be provided with both short term and long term stabilisation to prevent soil erosion.**
- **Excavations in excess of one metre within the confines of the building and on driveways may be permitted, to allow for basement garages providing the excavations are adequately retained and drained, in accordance with engineering details.**
- **Filled areas are to be located where they will not impact on the privacy of neighbours.**
- **Stormwater or surface water runoff shall not be redirected or concentrated onto adjoining properties so as to cause a nuisance.**
and adequate drainage is to be provided to divert water away from batter.

- The top of any battered cut (or retaining wall) and the toe of any battered fill (or retaining wall) is not to be closer than 900mm to any property boundary, where the overall height at any point exceeds 500mm.

12.2. A3 DEVELOPMENT OF FLOOD LIABLE LAND

General flooding occurs when rainfall exceeds the capacity of creeks and rivers to convey runoff water.

Tweed Development Control Plan Section A3 - Development of Flood Liable Land as part A3.2.2 Rural Areas states the following for Tweed Shire:

**Minor flooding is controlled by leveeing and floodgated outlets in many areas on the Tweed River Floodplain downstream of Murwillumbah, where the agricultural use and potential flood damage has justified the expenditure.**

**Many other areas of the floodplain, adjacent to local creeks and streams, as well as the Tweed River upstream of Murwillumbah, are liable to rapid flood inundation with little warning. Records and information in many of these areas are very limited. Persons proposing new developments on areas near rivers and streams that could be flood liable should seek out and heed reliable local historical information.**

The coastal creeks and the lower reaches of the Tweed River can also be flooded from effects of a cyclone or its remnant rain depression that creates extraordinarily high tide or ocean levels combined with heavy local rain. This type of flooding will generally occur with little warning except for weather forecasts predicting cyclones and rain depressions. This type of flooding will generally occur with little warning except for weather forecasts predicting cyclones and rain depressions.

The Section A3 document follows from clause 34 in Tweed LEP, the objectives of which are ‘to minimise future potential flood damage by ensuring that only appropriate compatible development occurs on flood liable land’ and ‘to minimise the adverse effect of flooding on the community’.

![FIGURE 58 DEVELOPMENT OF FLOOD LIABLE LAND: MAP 20 (LOWER TWEED CATCHMENT)](image-url)
The Council is required to consider a range of matters relating to the protection of life, property and the environment in considering development applications on flood prone land.

The DSCP Section 3 provides necessary information in planning to avoid adverse implications of flooding. It incorporates the latest data from the Tweed Valley Flood Study 2009 and the Coastal Creeks Flood Study 2009 and includes scenarios to investigate the potential impacts of climate change on flooding behaviour. It contains development standards and other provisions in respect of floodplain management in Tweed Shire and it relates to Tweed LEP 2000.

The full contents of the Section are not included here but must be considered and applied in the further development of the Tweed Rural Land Strategy. The following text summarises key content and principles, but is not a substitute for interested persons reading the Section in full.

The Section contains detailed maps covering the following:

- Design Flood Level;
- Probable Maximum Flood Level;
- High Flow;
- Climate Change.

The above mentioned Flood Level maps show at fine detail both ‘Areas predicted to be inundated in ARI 100 year flood (Incorporating Climate Change), and flood levels (as metres AHD), and areas subject to inundation in a Probable Maximum Flood (PMF). These areas are similar but (mainly in the Lower Tweed) the delineated PMF levels are slightly more extensive. Figure 58 and Figure 59 present examples of the maps is in the Lower and mid Tweed catchment. The maps provide critical information for the planning of future development in the Shire, and need to be referred to for development proposals that are or may be in flood prone land in the mid to lower parts of the Tweed Catchment.

Where any inconsistency arises between the Section and any environmental planning instrument applying to the same land, the provisions of the environmental planning instrument prevail. (An environmental planning instrument means a State Environmental Planning Policy, a Regional Environmental Plan or a Local Environmental Plan.)
Council takes the provisions of the Section into consideration in determining a development application. However, compliance with the provisions of the document does not imply that Council will grant development consent to an application. Council must also consider those matters listed under Section 79C of the Environmental Planning and Assessment Act (1979).

The following steps are necessary in preparing a development application relevant to the matters within the Section:

- Identification of the flood levels pertaining to of the site;
- Whether the site is in a high flood flow area;
- Whether emergency response provisions are required; and
- The development controls applying to the subject locality using this Section;
- Reference to other applicable Sections and Policies.

The following text is summarized from the Section.

- Council’s flood mitigation strategy is to ensure that only appropriate compatible development occurs on flood prone land in the future. This is by implementing structural protection and planning controls to minimise future potential flood damage and ensure safe occupation without undue reliance on emergency response agencies.
- It is expected that future mitigation works will be limited to possible modifications of the existing levees. The document states that often discussed Flood Storage Dams are not feasible in the Tweed Valley.
- Residents in flood prone areas should be very conscious of their situation, be alert during any periods of predicted high rainfalls and be prepared to evacuate all possessions that are located on land liable to flooding.

In newer release areas, the land should already be filled to the design flood level current at the time of subdivision, however the design flood level changes from time to time as more up to date flood studies are completed. Proponents are advised to obtain a Section 149 Certificate to determine the actual design flood levels of specific parcels of land.

Parts in the Section A3 document provide information and criteria relating to flood levels, high flow levels, and flooding planning provisions for rural land use zones defined in the Section A3 document are identified in Table 49.

<table>
<thead>
<tr>
<th>TABLE 49 FLOODING PLANNING PROVISIONS FOR RURAL LAND USE ZONES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Land use Zone (LEP 2000)</strong></td>
</tr>
<tr>
<td>--------------------------------</td>
</tr>
</tbody>
</table>
| 1(a) Rural and 1(b) Agricultural | Exclude all new residential development from the mapped high flow areas. Other development only permissible within high flow areas if the development will not change ground levels by more than 300mm (for local drainage purposes) or obstruct flood flows. Examples of permissible development include:
- Buildings with footprints less than 80m², and separated from other structures by no less than 30m;
- Large soakage bunds or road foundations no more than 300mm above natural ground level;
- Wire strand fencing. |
| Rural Zones RU1 and RU2 and Residential Zone R5 Large Lot Residential, and Environmental Protection Zones E1 and E2 | Permit residential redevelopment within the mapped high flow areas provided total enclosure below design flood level is less than 50 m² or less. |
| Rural Zone R5 (Village) and Residential Zones R1, R2, and R3 | Development only permissible if it will not result in significant adverse impact on local flood behaviour or net loss in flood conveyance function, as demonstrated by a hydraulic assessment/flood study by a suitably qualified professional. The assessment must consider the impact of the development in isolation as well as in a cumulative development scenario. Development controls for high flow areas take precedence over the locality specific clauses in Section A3 of the DCP. |
| Waterway Zones W1, W2 and W3 | The provisions of the Section need to be incorporated as key elements of the Tweed Rural Land Strategy. |

Regarding emergency response (as defined in the Tweed LEP) in flood liable land, the Subdivision Manual in the DCP Tweed (see next section) in part provides criteria for the following:

- Essential Community Facilities & Critical Services
- Habitable development

That Manual needs to be referred to for further information on this subject.

Under the Tweed LEP, rural subdivision proposals (unless entirely for non-residential purposes) must substantiate that a nominated residential building platform on each lot has Q100 flood immunity at least to the predicted Average Recurrence Interval (ARI) 100 year flood level. (The ARI is a statistical estimate of the average period in years between the occurrences of a flood of a given size). For example, the 10 year ARI event will occur on average once every 10 years: this is equivalent to a 10 year ARI having a 10% probability (AEP) of occurring in any given year).

Each building platform must also have a high level road and/or pedestrian route to land above the probable maximum flood (PMF) level. The high level evacuation route must be at a level not less than the ARI 100 year flood level for its entire length.

12.3. AS TWEED SUBDIVISION MANUAL

The Tweed Development Control Plan (DCP) Section A5 Subdivision Manual presents Council’s strategic plan objectives for the development of subdivisions where subdivision is defined as ‘the division of land into two or more parts’ and includes the creation of lots including those in strata and community title subdivisions. It also covers registration of the plan of subdivision at the Land Titles Office in strata and community title subdivisions. The Manual aims to:

- Achieve the highest quality and ‘best practice’ of subdivision development in the Shire.
- Implement the policies and provisions of the NSW State Government in terms of seeking to achieve quality of subdivision planning and development.
- Provide guidelines and development standards for the development of subdivisions.
- Advise on:
  - preliminary planning and design of the subdivisions;
  - the approval processes;
  - procedures and documentation for seeking subdivision approvals;
12.4. OTHER DEVELOPMENT CONTROL

12.4.1. BUSHFIRE PROTECTION

The DCP (2008) identifies that the Rural Fires Act 1997 includes provisions for development on bushfire-prone land in rural and urban areas, where development sites are close to areas likely to be affected by bushfire events. The need for to account for bushfire in development in rural areas is also covered in clause 39A of the Tweed LEP where the primary objective is ‘to minimise bushfire risk to built assets and people and to reduce bushfire threat to ecological assets and environmental assets’. In determining whether to grant consent to development in areas that, in the opinion of the consent authority, are likely to be affected by bushfire, the consent authority must take into account a range of matters relating to safety and conservation of life property and the natural environment.

Subdivision proposed in bushfire-prone land is ‘integrated development’ and requires authorisation under section 100B of the Rural Fires Act 1997 in respect of bush fire safety. A bushfire threat assessment must accompany all proposals where the development site adjoins bushland or other potential sources of bushfire risk. If a threat is identified, the proposal must account for this threat in accordance with ‘Planning For Bushfire Protection - A Guide For Land Use Planners, Fire Authorities, Developers And Home Owners - NSW Rural Fire Service 2001 and with the development standards in the Tweed Development Control Plan (DCP) Subdivision Guidelines. The threat assessment must examine impacts of the proposal within and external to the site, including the capacity of the existing road network serving the site and its capacity to accommodate traffic in emergency situations.

In addition, access roads in rural subdivisions with bushfire risk must comply with Clause A5.4.2 in the above-mentioned Planning for Bushfire Protection guide and the design and staging of such rural subdivisions must comply with the provisions in that guide. Also, the provision of bushfire safe building sites, adequate asset protection zones within each lot, and provision of bushfire safe access roads may be a significant constraint for rural subdivision design.

The ‘Planning For Bushfire Protection’ document identifies five main ways of protecting life and property from bushfire:

1. Planning and implementing bushfire hazard reduction activities such as prescribed burning;

2. Incorporating bushfire protection measures into subdivision design and housing development;

3. Incorporating construction standards into building design;

4. Ongoing maintenance of bushfire protection measures by landowners; and

5. Emergency firefighting and evacuation.

The document provides a comprehensive overview of planning and bushfire prevention and protection measures. These broadly include the following:

- A bushfire management plan must accompany the development application for subdivision.
- Where a bushfire hazard exists on or adjacent to the development site, an asset protection zone is to be established on the hazard side of the development in accordance with the Planning for Bushfire Protection guide. A range of stringent measures apply regarding asset protection zones covering matters such as placement wholly within lots, buffer distances to boundaries, title restrictions, avoidance of environmentally sensitive locations.
- No development is permitted on land designated in SEPP No 26 Littoral Rainforests, and buffer requirements apply between development and areas containing littoral rainforest. Further, ecologically significant vegetation (as defined in the subdivision guide) and stands of vegetation and individual trees that contribute to the scenic amenity or distinct local identity of the landscape must be located, mapped and assessed.

12.4.2. LANDSCAPE VISUAL CHARACTER

Rural subdivision should be integrated with the surrounding rural environment and complement existing scenic rural landscapes. Roads and dwelling platforms must be sensitive to the landscape of the area and must not occupy ridgelines and prominent locations that detract from the scenic quality and external views of the locality.

12.4.3. SUITABILITY FOR ON-SITE EFFLUENT DISPOSAL

Suitability for onsite effluent disposal in rural areas not connected to the sewer is an additional environmental constraint, which may result in the need for increased allotment sizes, buffer distances to watercourses, dams and corresponding revision of the proposed lot layout.
12.4.4. NATURAL WATERCOURSES AND DRAINAGE SYSTEMS
Rural subdivisions and associated works must be designed to preserve natural drainage systems.

12.4.5. BUFFER DISTANCES
There is a need for buffer areas between subdivisions and some other specified land uses to minimise landuse conflicts, protect water quality and environmentally sensitive areas, minimise risk to life and property and protect agricultural, environmental and extractive resource assets. The Appendices in the guidelines contain recommended buffers between rural land uses. Sub headings in the Appendix include:

• Agriculture: Pesticides, noise, dust and odour (eg from intensive animal operations), cattle dip sites
• Extractive Industries
• Forestry
• Environmentally Sensitive Areas, Bushfire Risk
• Rivers, Streams and Watercourses
• Sewerage Treatment Works

12.4.6. COMMUNITY TITLE SUBDIVISION WORKS
Community title is a form of land subdivision that enables shared property to be created within conventional Torrens title subdivisions. The Urban Institute of Australia (UDIA) describes it as ‘essentially a horizontal form of strata title’ where community title is common ground. The UDIA states that there has been an increase in the use of community title since its introduction in this state in 1989, and that to June 2007, 450 community title schemes had been registered in NSW accounting for approximately 144,000 residents. The subdivision guidelines identify that a construction certificate is required for subdivision works, which include internal community owned infrastructure as well as external works and/or connections. The requirements for compliance certification of these works are the same as for conventional subdivisions. Operation, maintenance, repair and replacement of internal infrastructure is the responsibility of the community Body Corporate, and management plans will be required to direct and fund these activities.

12.4.7. ROADSIDE STALLS
The Tweed Shire Roadside Stalls Fact Sheet identifies the Council’s requirements on this matter from the Tweed LEP 2000. The LEP defines a roadside stall as ‘a building or place not exceeding 20m² in floor space or area and which only displays or sells primary products which are grown or produced on the property on which the building or place is situated’. It must be an integral part of the property from which the produce originates and must be entirely located within the property’s boundaries.

A roadside stall can be located on rural land zoned in the Tweed LEP 2000 as: 1(a) Rural; 1(b) Agricultural Protection; 1(c) Rural Living; 2(d) Village and 7(d) Environmental Protection (Scenic/Escarpment).
13. REGIONAL PLANS AND STRATEGIES

13.1. FAR NORTH COAST REGIONAL STRATEGY

The NSW Far North Coast Regional Strategy<sup>40</sup> covers Tweed, Byron, Ballina, Lismore, Kyogle and Richmond Valley. Its intention is ‘to manage the Region’s expected high growth rate in a sustainable manner’. The Strategy identifies the following main planning challenges in context of continued population growth:

- Improved protection and enhancement of environmental assets, biodiversity and landscape values
- Sustainable use of natural resources
- Managing population growth to prevent urban sprawl and minimise damage to environmental values and rural production
- Building on the region’s excellent reputation, high environmental value, tourism, education and horticulture industries.

The strategy also covers a range of matters relevant to the Tweed Shire Rural Land Strategy, including identification of the following environmental, economic, and population and housing challenges for the Region including Tweed Shire.

ENVIRONMENTAL

- Improve protection and enhancement of environmental assets (including wetlands, littoral rainforest, koala habitat, and estuaries), biodiversity and landscape values.
- Improve understanding of Aboriginal and European cultural heritage values and the incorporation of this information within land use planning and natural resource management processes.
- Ensure sustainable management of, and access to, natural resources, and protection of rural landscapes from increased settlement.
- Ensure better understanding and management of natural hazards, including flooding, coastal erosion and inundation (including the impacts of climate change on these), land instability, bushfire and acid sulfate soils.

ECONOMIC

- Ensure sufficient employment lands are available in appropriate locations to accommodate growth in existing and emerging industries and businesses.
- Ensure that the planning system facilitates the development of these lands.
- Ensure future employment lands are located to take advantage of the transport network offered by upgrades to the Pacific Highway and other major roads in the Region.
- Utilise the Region’s reputation to build on the key industry sectors while protecting the natural resources on which these industries depend.
- Support and strengthen the Region’s economic base by implementing the specific strategies and actions identified in the Regional Industry and Economic Plan for the Northern Rivers (NRRDB 2005).

POPULATION AND HOUSING

- manage the expected population growth in a way that retains village character, enhances a sense of community, limits the spread of urban development, and minimises damage to environmental values and rural production.
- support the development of non-coastal centres.
- provide a framework for the planning of new infrastructure and facilities for the growing and ageing population.
- provide choice in housing form and affordability in appropriate locations that responds to changing demographics and the associated reduction in household occupancy rates.
- ensure that new development reflects and enhances the character of the settlement in which it is located and is based on best practice urban design principles.

13.2. NORTHERN RIVERS CATCHMENT ACTION PLAN (CAP2)

The 2013-2032 Northern Rivers Catchment Action Plan (CAP2)<sup>41</sup> of April 2013 is a 10-year statutory, non-regulatory plan developed by the Northern Rivers Catchment Management Authority with the community.

The CAP2 provides direction for managing natural resource issues in the Northern Rivers Region for the next 20 years. It covers nine local government areas and Tweed Shire is the northern most of these accounting for about 5 per cent or less of the total area. The Plan is intended to be reflected in LEPs and regional planning strategies. The objectives of the CAP2 are to:

- Identify and provide long term direction to address natural resource management issues impacting on the sustainability of our natural resources
- Establish a clear direction for government-funded investments to repair and rehabilitate natural resources in our catchments
- Direct the development of incentive programs to maximise environmental outcomes.

The CAP2 states that natural resource management has shifted fundamentally over the last 30 years from focus on individual threats like vegetation loss and soil erosion to focus on whole integrated systems, including the complex and dynamic social, environmental or economic relationships between people and the natural environment.

The document identifies that the Northern Rivers Region has two fundamentally distinct socio-ecological systems: the tablelands and coastal lands with markedly different social and ecological characteristics. It then identifies Socio-ecological Landscapes (SE Landscapes), being systems that represent ‘communities of similarity’ based on areas with ‘consistent and unique combinations’ of social and ecological characteristics. It also identifies SE Districts that sit within the SE Landscapes.

<sup>40</sup> Department of Planning, 2006, Far North Coast Regional Strategy 2006-31, NSW Government.

<sup>41</sup> Northern Rivers DMA (2013), 2013-2023 Northern Rivers Catchment Action Plan.
The Plan identifies four **SE Landscapes** in the Region (Northern, Central, Southern and New England Tableland) and 10 SE Districts, and that each **SE Landscape** has different drivers of change within. It also states that the **SE Landscapes and Districts** provide for planning and implementing NRM programs to suit the values and needs of their respective local communities. The **SE Landscapes and Districts** are also stated to provide for the planning and delivery of NRM at various scales from regional to local. They are social equivalents to Morand’s **Soil Landscapes** discussed in Section 11 of this document. Tweed Shire sits within the **Northern SE Landscape** (a coastal **SE Landscape**) and the Murwillumbah **SE District**. However as Tweed Shire sits within one **SE Landscape** and one **SE District** little definition can be derived from the use of either unit level to be of real assistance in development of the **Tweed Shire Rural Land Strategy**.

However, the CAP2 does provide broad strategic level information that can contribute to the **Tweed Shire Rural Land Strategy**. This includes confirmation on matters including conflict issues in rural areas, and main drivers of demographic and land use change within the Northern Rivers Region. These are identified below.

The CAP2 also discusses social/community ‘resilient systems’ for communities’ ability to cope with changes and shocks while retain their basic function and structure. The resilience approach is intended to help with understand of how the social, economic and environmental relationships between and within **SE Landscape** systems change in response to each other and to outside forces. It states that ‘in an ever-changing world, systems need to be resilient if they are to adapt to change’.

The CAP2 identifies two key land use conflict issues:

- Natural resource managers are being **pressured to modify operations** as a response to complaints from parties both next to the resource area (settlement next to farming) and within the area (eg: organic farming next to traditional farming on important agricultural land).
- Pressure on natural resources and the traditional rural use resulting from conflict with residential uses.

The CAP2 identifies five strategies to attain its goals:

- **Strategy 1**: Engage and support the community to build capacity and partnerships.
- **Strategy 2**: Manage landscapes and seascapes.
- **Strategy 3**: Sustain livelihoods.
- **Strategy 4**: Enrich lifestyles and culture.
- **Strategy 5**: Manage for change to enable the community and government to effectively carry out natural resource management (NRM).

Its priorities in part include the following:

- Managing threats to increase landscape and seascapes function, productivity and resilience, including managing threatened species and ecological communities.
- Managing conflicts around land and sea resource availability, use and security.
- Promoting best practice and innovation.
- Supporting planning and management processes that protect lifestyle and cultural values.

The CAP2 identifies the need to understand ‘whole systems’ and the complex and dynamic relationships between people and the natural environment. It also identifies that the Region has four ‘**Socio-ecological Landscapes**’ (**SE Landscapes**) being systems that represent ‘communities of similarity’ with consistent and unique combinations of social and ecological characteristics for which Natural Resource Planning (NRM) programs can be set. Tweed Shire is within the **Northern SE Landscape**.

The CAP2 states that farm viability is a function of four main components:

- Farmer succession;
- Farm aggregation;
- Land use diversification and intensification; and
- Market forces.

Other identified main relevant matters include: Industry viability; Community values and expectations; Climate change and variability; Invasive species; Infrastructure and technology; and Government directions and policies.

The CAP2 includes commentary on the following drivers of change occurring within the Northern Rivers Region. These are that:

- The population is changing;
- Lifestylers make a difference;
- Land (and sea) use is changing;
- Growth will have many forms;
- Producers are adapting;
- Infrastructure influences population change.

The following main summary points are taken from discussion on the above drivers of changes categories.

**Main features of the Northern SE Landscape** are summarised in the following table, as extracted from CAP2.

### TABLE 50 ASSESSMENT OF THE POTENTIAL INFLUENCE OF DRIVERS OF CHANGE ON NORTHERN SOCIO–ECOLOGICAL LANDSCAPE

<table>
<thead>
<tr>
<th>Group of change</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population demographics</td>
<td>Increasing, more so towards the coast. The exception is Kyogle District where growth is static as people are moving from farms into towns. Growth due to lifestyler movement is highest for this SEL, and in the Murwillumbah and Lismore Districts.</td>
</tr>
<tr>
<td>Farm viability</td>
<td>Static</td>
</tr>
<tr>
<td>1. Farmer succession</td>
<td>Increasing whereby farms are getting larger heading away from the coast towards hinterland areas. Aggregation is in pursuit of improved cattle grazing and timber production. The exceptions are sugar cane and dairy which are aggregating closer to the coast, while horticulture is increasing in area as the number of farms increases.</td>
</tr>
<tr>
<td>2. Farm aggregation</td>
<td>Is the highest in the Region and is increasing towards the coast (highest for the Murwillumbah and Lismore districts) with the development of more diverse, small acreage and multiple enterprise businesses.</td>
</tr>
<tr>
<td>3. Land use diversification and intensification</td>
<td>Has the lowest impact on this SEL because of high industry diversification, cheaper transport costs, closer proximity to markets, production and marketing centres (eg: Brisbane).</td>
</tr>
<tr>
<td>4. Market forces</td>
<td>Viability is highest in this SEL and increasing given high farm numbers and farm viability, particularly in Murwillumbah and Lismore Districts.</td>
</tr>
<tr>
<td>Industry viability</td>
<td>Is increasing across the SEL in response to a range of existing and emerging environmental issues (eg: coal seam gas extraction, mining, private native forestry, climate change impacts (eg: sea level rise)).</td>
</tr>
</tbody>
</table>

Key for RH column (relative to other **SE Landscapes**)

<table>
<thead>
<tr>
<th>Lowest Influence</th>
<th>Average Influence</th>
<th>Highest Influence</th>
</tr>
</thead>
</table>


The **NRNCA** with community help has produced trial maps of community capacity, including Aboriginal community capacity. It has also mapped soil health, biodiversity, rivers, estuaries, wetlands and coastal and marine environments, in part for input into planning considerations. These are at
very broad strategic level and are difficult to use for guidance in the current project.

The resources and key environmental assets referred to in the management target include: high value natural resources, State and regionally significant farmland, high conservation value vegetation and ecosystems, ecosystem corridors, significant mineral deposits, and extractive resources.
FIGURE 62 TWEED SHIRE LEP LAND USE ZONES

Source: Tweed Shire
A key role of land planning is to minimise the potential for conflict between land uses (and hence land users), to enable orderly and efficient land use and allocation of public resources.

Population in rural areas increases in part through land subdivision and dwelling approvals, and increases the potential for conflict. This is not confined Tweed Shire - it occurs widely across Australia particularly where dispersal has occurred from major population centres. The matter is well documented in the NSW DPI document titled Living and Working in Rural Areas A handbook for managing landuse conflict issues on the NSW North Coast. The handbook identifies that the root cause of conflict is when a land use or an action is incompatible with the views, expectations and values of the people living and working in an area. It also identifies that impacts can include: negative effects on individuals as a consequence of stress and anxiety; breakdown in communities; additional demands on government services; increased and costly demands on rural industries; degradation of the local environment, which can have flow-on effects for communities and businesses; and loss of culture and identity within communities.

Table 51 lists the conflict issues associated with living in rural areas, as described in the above publication. While it does not follow that all of the conflict issues occur in any given locality they cumulatively identify a conflict scenario that land planning seeks to avoid. This matter must be an important consideration in the current project.

### Table 51 Common Conflict Issues in Rural Land

<table>
<thead>
<tr>
<th>ISSUE</th>
<th>EXPLANATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absentee landholders</td>
<td>Neighbours may be relied upon to manage issues such as bush fires, stray livestock, trespassers etc. while the absentee landholder is at work or away.</td>
</tr>
<tr>
<td>Access</td>
<td>Traditional or informal ‘agreements’ for access between farms and to parts of farms may break down with the arrival of new people.</td>
</tr>
</tbody>
</table>

Litter | Injury and poisoning of livestock via wind blown and dumped waste. Damage to equipment and machinery. Amenity impacts. |
Noise | From farm machinery, scare guns, low flying agricultural aircraft, livestockearing and feeding, and irrigation pumps. |
Odour | Odour arising from piggyeries, feedlots, dairies, poultry, sprays, fertiliser, manure spreading, silage, burning carcass/s/crop residues. |
Pesticides | Perceived and real health and environmental concerns over the use, storage and disposal of pesticides as well as spray drift. |
Poisoning | Deliberate poisoning and destruction of trees/plants. Spray drift onto non-target plants. Pesticide or poison uptake by livestock and human health risks. |
Pollution | Water resources contaminated by effluent, chemicals, pesticides, nutrients and air borne particulates. |
Roads | Cost and standards of maintenance, slow/wide farm machinery, livestock droving, manure. |
Smoke | From the burning of crop residues, scrub, pasture and windrows. |
Soil erosion | Loss of soil and pollution of water ways from unsustainable practices or exposed soils. Lack of adequate groundwater or soil protection. |
Straying livestock | Fence damage, spread of disease, damage to crops, gardens and bush/forest regeneration. |
Theft/vandalism | Interference with crops, livestock, fodder, machinery and equipment. |
Tree removal | Removal of native vegetation without appropriate approvals. |
Trespass | Entering properties unlawfully and without agreement. |
Visual amenity | Loss of amenity as a result of reflective structures (igloos, hail netting), windbreaks plantings (loss of view). |

---

42 Department of Primary Industries et al; Living and Working in Rural Areas: A Handbook for Managing Land Use Conflicts on the NSW North Coast.
<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Competition for limited water supplies, compliance with water regulations, building of dams, changes to flows, Stock access to waterways, Riparian zone management.</td>
</tr>
<tr>
<td>Weeds</td>
<td>Lack of weed control particularly noxious weeds, by landholders.</td>
</tr>
</tbody>
</table>

14.1. ‘RIGHT TO FARM’

In farming areas the matter of conflict is tightly linked to that of individuals’ perception of the ‘right to farm’. ‘Right to farm’ has legal meaning and NSW does not have ‘right to farm’ legislation. In brief, under the legal meaning of ‘right to farm’ it will be a defence in any proceedings for a prescribed offence if it is proved that the alleged offence resulted from the defendant carrying out a protected farming activity and ‘no prescribed civil liability lies in respect of an act or omission that is a protected farming activity’. The NSW Protection of Agricultural Production (Right to Farm) Bill 2005 was proposed with the following objective: ‘…to provide for rural land use notices to be given to purchasers of land adjoining or adjacent to rural land and for those notices to be taken into account in any subsequent proceedings by such purchasers to limit or prohibit the use of that rural land for rural purposes.’ The substance of the Bill included the following:

- **Clause 4** requires a vendor under a contract for the sale of land that adjoins or is adjacent to rural land to attach a rural land use notice to the contract before it is signed by or on behalf of the purchaser. If such a notice is attached, the purchaser is taken to have been given the notice.

- **Clause 5** requires Councils to issue rural land use notices and sets out the matters that must be contained in the notices. Councils must also keep registers of rural land use notices provided by them and make the registers available for public inspection. The proposed section also enables Councils to charge a reasonable fee for the notices or inspection of the register of notices.

- **Clause 6** requires the fact that a notice was given to an owner of land that adjoins or is adjacent to rural land to be taken into account by a court or other body determining proceedings brought by the owner to limit, prohibit or otherwise impede the use of the adjoining or adjacent rural land for agricultural or agricultural management purposes.

Further content included that:

6. A Council must, on application by a prospective purchaser or vendor of land or any other person, issue a rural land use notice for land, if the land adjoins or is adjacent to rural land in the Council’s area.

7. The rural land use notice must contain the following:
   - particulars of the land (the affected land), and the adjoining or adjacent land, to which the notice applies,
   - a statement that the affected land adjoins or is adjacent to rural land,
   - a statement setting out the activities that are permissible on any adjoining or adjacent rural land,
   - a statement setting out any permissible activities known to the Council for which that rural land is used,
   - any other information that is prescribed by the regulations.

8. A Council is to keep a register of rural land use notices provided by it and is to make that register available for public inspection.

9. A Council may charge a reasonable fee for providing a rural land use notice or for inspection of its register of rural land use notices.

10. A rural land use notice may be included in any other notice issued by a Council in relation to a proposed sale of land.

As the Bill did not proceed to legislation right to farm has no legal carriage in NSW. It is raised here however in response to community submissions that have referred to the ‘right to farm’, and to identify that the matter has previously had impetus in NSW.

Care is therefore needed in referring to ‘right to farm’ where it is not covered by legislation which is the case in NSW.

14.2. ‘DUTY OF CARE’ AND ASSOCIATED CONCEPTS’

The Collins English Dictionary defines ‘duty of care’ as ‘the legal obligation to safeguard others from harm while they are in your care, using your services, or exposed to your activities’. However the NSW TAFE website states that there is no legal definition of the concept, except in occupational health and safety legislation. The website states that ‘duty of care’ comes under the legal concept of ‘negligence’, which belongs to the domain of common or ‘judge made’ law using legal precedence and community attitudes and expectations. In other words an Act of Parliament has not been passed defining what is legal or illegal but rather the decision is based on what is considered appropriate or not appropriate at a particular time in history.

Regarding negligence, four key factors are essential in deciding whether or not someone is negligent. They are duty of care; standard of care; breach of duty of care; and harm or loss.

The above mentioned NSW TAFE website explains the above terms as follows:

‘Duty of care’ refers to the obligation to take responsible care to avoid injury to a person whom, it can be reasonably foreseen, might be injured by an act or omission. A duty of care exists when someone’s actions could reasonably be expected to affect other people. If someone is relying on you to be careful, and that reliance is, in the circumstances, reasonable, then it will generally be the case that you owe them a duty of care. You need to be clear about exactly what the nature of the care or support is that you are providing, and on which the person is relying. Failure to exercise care in that situation may lead to foreseeable injury (in other words it could have been avoided with due care taken).

‘Standard of care’ refers to what is expected of any other reasonable person/worker who performs the same duties. This is not about having to be the perfect worker but about being good enough and doing your job as well as any other worker. Judges when making their decisions regarding whether or not a worker has failed to provide a reasonable standard of care looks at many factors such as:

- training that the worker has received
- laws and regulations
- practicalities relating to the situation
- needs of others in the situation
- current trends in the industry
- community values and attitudes.

A ‘breach of duty of care’ exists when it is proven that the person who is negligent has not provided the appropriate standard of care. That is, the worker (or agency) has done something that they shouldn’t have done or failed to do something they should have done.
Harm or loss must happen if someone is going to sue a worker for negligence. A worker is only deemed legally liable if a client is injured whilst in their care, if it can be proven that the worker has been negligent. This depends on a number of factors, such as whether: the worker owed the client a duty of care:

- the injury suffered by the client was reasonably foreseeable
- the worker failed to take reasonable care to prevent the injury from occurring
- the harm was a direct result of the breach of duty.
PART D: REFERENCES

The following list identifies the main resource references used in this study, under subject headings. Most of the references are identified in this report. It is normal for reference documents used in studies to contain reference lists of their own on matters relevant to the document topic. For example the document identified below as Learmonth, R et al, 2007 cites 35 references. It is also normal that documents draw from the references they cite. It follows that the documents cited below contain reference to a large body of resource information that can be followed by those interested in doing so, to gain additional information or background to a topic. In this project some other references may have also been used during internet searches which have identified some background information. It is possible that through oversight some of these and some other ‘lesser’ references are not identified here. It is also probable that other relevant references and information sources exist that have not been identified or cited. However the authors of this report have made every endeavour to be thorough in searching for and citing relevant information.

Not all resource documents cited below are explicitly referenced in text. Some cited documents could be also placed in one or another subject category and the authors have exercised judgements on appropriate placement within the reference list.

AGRICULTURE


Australia Corporation Consulting Pty Ltd, 2003, Tweed Valley Pack House Feasibility Study, NSW Department of State and Regional Development.

Briggs, G (2012) Interpreting Important Agricultural Land Maps. Fact Sheet PUB 12/53, Department of Primary Industries, NSW

Department of Primary Industries and Fisheries, 2007, An overview of food and fibre industries for Boonah and Beaudesert Shires, Queensland Government.


Department of Primary Industries. (2011). Maintaining land for agricultural industries. NSW Primary Industries Policy Number 0-104. NSW Government (Effective 20/5/2011)


Forrest, D, 2008, Northern Rivers Soil BMP Guide: Macadamia, Tuckombil Landcare and SoilCare Inc, NSW.

Forrest, D, 2008, Northern Rivers Soil BMP Guide: Vegetables, SoilCare Inc, NSW.


NSW Farmers Association (2010): The Effect of Coal Seam Gas on NSW Farmers.

NSW Department of Primary Industries, 2005, Northern Rivers Farmland Protection Project: Final Recommendations, NSW Government.

NSW Departments of Infrastructure, Planning and Natural Resources and Primary Industries, 2006, Primary Industries in the North Coast Region of NSW: Strategic Review, NSW Government.


Peasley, D, Baker, J and Biggs, T, 2000, Selecting Horticultural crops on the North Coast, Prepared for Northern Rivers Regional Development Board, Northern Rivers Area Consultative Committee and NSW Department of State and Regional Development.

Biodiversity


Purcell, J, 2009, Developing Best Practice Biodiversity Management - A Framework for Northern Rivers Graziers, Northern Rivers Catchment Management Authority, Coffs Harbour.

Building


Catchments


CSIRO, 2007. Climate Change in the Northern Rivers Catchment, New South Wales Government.

Department of Environment and Climate Change, 2008. Climate Change Impacts North Coast Region

Tweed Shire Council (Undated, but post 2009) Tweed Catchment and Water Quality

DEMOGRAPHICS AND EMPLOYMENT


ECONOMICS


Centre for Economic Modelling, 2002, The Economic Contribution of Rural Land Use Activities in the Tweed Shire: Stage 2 - No Intervention Scenario, University of Queensland.

Centre for Economic Modelling, 2002, The Economic Contribution of Rural Land Use Activities in the Tweed Shire: Stage 3 - Preferred Scenario, University of Queensland.

City Futures Research Centre, (2008). Common Ground: The Costs and Provision of Community Infrastructure in Community Title Schemes in NSW. Urban Development Institute of Australia NSW. University of New South Wales


RaboBank (Undated). Global sugar to 2021 - long-term prospects for production, consumption and trade in key markets.

SGS Economics and Planning, 2005, Overview of Economic Implications of South East Queensland on the Northern Rivers Region: A Discussion Paper as Input to the Draft Northern Rivers REIP V3, prepared for the Northern Rivers Regional Development Board, NSW.


Regional Development Australia, 2011, Northern Rivers Food: an appetising investment destination, Regional Development Australia - Northern Rivers, Lismore, NSW.

EXTRACTIVE INDUSTRIES

Mineral Resource Audit (May 2011)

FLOODING


Department of Planning, 2010, NSW Sea Level Rise Policy.


Tweed Shire Council (Undated). Draft DCP Section 3 Development of Flood Liable Land Options Version 1.3 with associated flood level and climate change maps.

Tweed Shire Council (2007) Tweed Valley Floodplain Risk Management Study

• Part 1 Establish Appropriate Flood Planning Levels for Residential Development

• Part 2 Planning Controls for High Flow Areas

• Part 3 Habitable Land Use on the Floodplain

• Adopted Flood Risk Management Policy


FORESTRY


LAND CAPABILITY AND LAND MANAGEMENT


Department of Environment, Climate Change and Water, 2010, Soil and land constraint assessment for urban and regional planning, NSW Government.

Agricultural Land Classification, Agfacts, Agfact

Tweed Shire Scenic Landscape Evaluation: Vol 3 Foli

Section 1A: Residential and Tourist Development Code.

Section A3 - Development of Flood Liable Land. Version 1.4

Section 5 - Subdivision Manual.

Common Ground - UDIA Community Title Principles.

Environment Conservation and Biodiversity Protection Act 1999

Coastal Protection Act 1979

Environmental Planning and Assessment Act 1979

Forestry Act 2012

National Parks and Wildlife Act 1975

Native Vegetation Act 2003 (and accompanying Native Vegetation Regulation 2005)

Environmental Planning and Assessment Act 1979


Threatened Species Conservation Act 1995

Soil Conservation Act 1938

Water Act 2012

Water Management Act 2000


NSW Department of Primary Industries, undated, Minimum lot size methodology, NSW Government.


Tweed Shire Council, 2013, Development Control Plan Section A5 Subdivision Manual

LANDSCAPE


Section 1A: Residential and Tourist Development Code.

Section A3 - Development of Flood Liable Land. Version 1.4

Section 5 - Subdivision Manual.

Common Ground - UDIA Community Title Principles.

A wide range of legislation including Government Acts and underlying regulations is relevant to the preparation of a council rural land strategy. Main Acts are listed below. The following is:

COMMONWEALTH

• Environment Conservation and Biodiversity Protection Act 1999

STATE

• Coastal Protection Act 1979

• Environmental Planning and Assessment Act 1979

• Forestry Act 2012

• National Parks and Wildlife Act 1975

• Native Vegetation Act 2003 (and accompanying Native Vegetation Regulation 2005)

• Environmental Planning and Assessment Act 1979

• Protection of the Environment Operations Act 1997

• Threatened Species Conservation Act 1995

• Soil Conservation Act 1938

• Water Act 2012

• Water Management Act 2000


Department of Climate Change Environment and Water NSW 2010, Soil and land constraint assessment for urban and regional planning, NSW Government


NSW and land constraint assessment for urban and regional planning


TWEED SHIRE RURAL LAND STRATEGY RESOURCE INVENTORY AND LAND CAPABILITY ASSESSMENT TWEED SHIRE COUNCIL DECEMBER 2013


Department of Planning (2011). Fact Sheet 4 - Part 3A Rural Housing Code. NSW Government.


Department of Planning and Infrastructure, 2012. Guide to Complying Development under the Rural Housing Code

Fisher WG,(2004). The future for rural land sharing communities in Far North Coast NSW, Southern Cross University. ePublications@SCU. School of Law and Justice


Tweed Shire Council (Undated) Draft Tweed LEP Fact Sheet 5: Rural Land.

Tweed Shire Council (Undated) Draft Tweed LEP 2012 Fact Sheet 1: Understanding the draft Tweed LEP 2012


PROPERTY

Gilmour, T, 2011, Mapping the Northern Rivers Housing Market to 2036, Presentation to the Northern Rivers Housing Forum, Elton Consulting.


MacroPlan, 2008, Far North Coast Region Residential Submarket Analysis, NSW Department of Planning.

REGIONAL AND COUNCIL STRATEGIES


Northern Rivers Catchment Management Authority, 2013, Northern Rivers Catchment Action Plan 2013-2023: Summary, NSW Government.

Northern Rivers Catchment Management Authority, 2013, Northern Rivers Catchment Action Plan 2013-2023 Technical Paper no. 1: Systems, resilience, models and maps - the new approaches for CAP2 in the Northern Rivers Region. NSW Government.

Northern Rivers Catchment Management Authority, 2013, Northern Rivers Catchment Action Plan 2013-2023 Technical Paper no. 3: An analysis of the Socio-ecological Landscapes of the Northern Rivers Region. NSW Government.

Northern Rivers Catchment Management Authority, 2013, Northern Rivers Catchment Action Plan 2013-2023 Appendices, NSW Government.

Northern Rivers Catchment Management Authority, 2013, Northern Rivers Catchment Action Plan 2013-2023: Evaluation of the Northern Rivers Catchment Action Plan, NSW Government.


Gilmour, T, 2011, Mapping the Northern Rivers Housing Market to 2036, Presentation to the Northern Rivers Housing Forum, Elton Consulting.

SOILS


Northern Rivers Catchment Management Authority, 2013, Northern Rivers Catchment Action Plan 2013-2023 Technical Paper no. 1: Systems, resilience, models and maps - the new approaches for CAP2 in the Northern Rivers Region. NSW Government.

Northern Rivers Catchment Management Authority, 2013, Northern Rivers Catchment Action Plan 2013-2023 Technical Paper no. 3: An analysis of the Socio-ecological Landscapes of the Northern Rivers Region. NSW Government.

Northern Rivers Catchment Management Authority, 2013, Northern Rivers Catchment Action Plan 2013-2023 Appendices, NSW Government.

Northern Rivers Catchment Management Authority, 2013, Northern Rivers Catchment Action Plan 2013-2023: Evaluation of the Northern Rivers Catchment Action Plan, NSW Government.


TOURISM


Northern Rivers Catchment Management Authority, 2013, Northern Rivers Catchment Action Plan, NSW Government.


Northern Rivers Catchment Management Authority, 2013, Northern Rivers Catchment Action Plan 2013-2023 Technical Paper no. 1: Systems, resilience, models and maps - the new approaches for CAP2 in the Northern Rivers Region. NSW Government.

Northern Rivers Catchment Management Authority, 2013, Northern Rivers Catchment Action Plan 2013-2023 Technical Paper no. 3: An analysis of the Socio-ecological Landscapes of the Northern Rivers Region. NSW Government.

Northern Rivers Catchment Management Authority, 2013, Northern Rivers Catchment Action Plan 2013-2023 Appendices, NSW Government.

Northern Rivers Catchment Management Authority, 2013, Northern Rivers Catchment Action Plan 2013-2023: Evaluation of the Northern Rivers Catchment Action Plan, NSW Government.


Tweed Shire Council (Undated). Tree and Vegetation Preservation Code: Tweed Development Control Plan - Section A16, (To be read in conjunction with (Draft) Tweed LEP 2012).


WASTE TREATMENT


WATER


WEEDS

Northern Rivers Catchment Management Authority, 2009, Northern Rivers Invasive Plants Action Strategy 2009-2013.

WELLBEING

Brasher, K, and J Wiseman The importance of community wellbeing in promoting physical and mental health. The McCaughey Centre, VicHealth Centre for the Promotion of Mental Health and Community Wellbeing,

NSW Rural Fire Service. Community Resilience Documents Master List.

OTHER

Tweed Shire Council meeting 19 April 2011. Item a32 (CNR-CM) Coal Seam Gas Exploration in the Tweed Shire

WEBSITES


APPENDICES
APPENDIX A NEW SOUTH WALES AND NORTHERN RIVERS REGION – BROADER REGIONAL AGRICULTURAL TRENDS

The following is a profile of the agricultural industry in the Northern Rivers Region and NSW. Due to changes in political boundaries, ABS defined geographies and availability of small area data, trend agricultural data for the Gold Coast Region was not available.

**AGRICULTURE LAND USE BY HECTARE**

Table 52 indicates that over 90% of rural land in Northern Rivers region is apportioned for agricultural uses. This is significantly lower compared to state average, where 96% of rural land in Regional NSW supports agricultural activities.

However, grazing land uses in the Northern Rivers Region (78% of rural land) is found to be in line with Regional NSW averages (79%). The data indicates that agricultural activity and land use is primarily driven by grazing activities, including meat and dairy cattle.

**TABLE 52 LAND USE OF RURAL LAND, 2010–11**

<table>
<thead>
<tr>
<th>Rural Land</th>
<th>Northern Rivers Region (ha.)</th>
<th>Regional NSW (ha.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land use crop (inc. broadacre and horticulture)</td>
<td>84,584</td>
<td>9% 8,968,703 16%</td>
</tr>
<tr>
<td>Grazing land (including pastures and range land)</td>
<td>735,349</td>
<td>78% 44,209,156 79%</td>
</tr>
<tr>
<td>Land under commercial forestry plantations</td>
<td>20,943</td>
<td>2% 103,522 0%</td>
</tr>
<tr>
<td>Other Agricultural Uses</td>
<td>1,686</td>
<td>0% 25,605 0%</td>
</tr>
<tr>
<td>Total Agricultural Uses</td>
<td>842,562</td>
<td>90% 53,306,986 96%</td>
</tr>
<tr>
<td>Total Non-agricultural Uses (e.g. conservation, national parks)</td>
<td>70,752</td>
<td>8% 2,478,527 4%</td>
</tr>
<tr>
<td>Land Use – Total area</td>
<td>913,318</td>
<td>100% 55,704,660 100%</td>
</tr>
</tbody>
</table>

**AGRICULTURE VALUE**

Table 53 depicts the gross value of agriculture in Northern Rivers Region and Regional NSW and Table 54 provides an overview of the top ten agricultural commodities produced in the regions.

In 2010–11 year, the Northern Rivers region contributed over $564 million in gross value of agriculture; this represents nearly 5% of the value of agricultural produce in NSW. In the same year, New South Wales produced nearly $11 billion in agricultural produce.

**LIVESTOCK SECTOR**

The data shows that the most significant agricultural sector in the Northern Rivers Region is the livestock sector, which contributes nearly $270 million (or 47%) of gross value to the region.

A large proportion of the livestock value is attributed to cattle and calves in the Northern Rivers region, which contributed $141.1 million to the agricultural industry. This is followed by whole milk ($62.1 million) and poultry ($52.9 million).

The livestock sector represents the second largest agricultural sector in Northern Rivers Region, consisting of 39% of total agricultural value. This is significantly larger proportion compared to state averages, where broadacre represents nearly half of NSW agricultural industry value, as the largest agricultural sector.

**HORTICULTURE SECTOR**

Horticulture represents the second largest agricultural sector within Northern River Region, consisting of 39% of total agricultural value. This is a significantly larger proportion compared to State averages, where horticulture only represents 12% of agricultural value to NSW.

In the Northern Rivers Region, the horticultural sector is led by berry fruits, valued over $71.2 million in 2010–11; given the prominence of the horticultural production, the Northern Rivers region is the largest berry fruit producer in NSW, contributing to 93% of industry value to NSW.

This is followed by nurseries, cut flowers and cultivated turf sector, valued at $51.4 million, and nuts (mainly macadamia), valued at $40.3 million.

The Northern Rivers Region is a primary producer of plantation fruits (mainly bananas), contributing to over 87% of industry to NSW or $22.6 million in value. Nursery and nuts (mainly macadamia) are also prominent in the industry.

The prominence of the region’s horticulture sector is attributed to the tropical and temperate climate, and accessibility to water supply.

**BROADACRE SECTOR**

The broadacre agricultural sector consists of $76.5 million or 14% of agricultural value in Northern Rivers Region. This is significantly lower compared to state averages, where broadacre represents nearly half of NSW agricultural industry value, as the largest agricultural sector.

The ABS data indicates that the broadacre sector in NSW is primarily supported by Cereal Crop production (mainly wheat) valued at $3.5 billion and Cotton and Other Crops, valued at $1.2 billion.

Given its temperate and tropical climate, the Northern Rivers Region cannot support agricultural activities in wheat, cotton and canola. Despite this, the region remains a prime producer of sugarcane broadacre crops, contributing over $61 million or 97% of total industry value to NSW. This highlights the region’s unique climate that supports the production of agricultural broadacre unique to areas of north-eastern Australia (Queensland).

**TABLE 53 GROSS VALUE OF AGRICULTURAL ACTIVITY, 2010–11**

<table>
<thead>
<tr>
<th>Agricultural Activity</th>
<th>Northern Rivers Region ($ mil.)</th>
<th>%</th>
<th>Regional NSW ($ mil.)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livestock</td>
<td>$267.7</td>
<td>47%</td>
<td>$4,635.4</td>
<td>40%</td>
</tr>
<tr>
<td>Horticulture</td>
<td>$220.0</td>
<td>39%</td>
<td>$1,388.3</td>
<td>12%</td>
</tr>
<tr>
<td>Broadacre</td>
<td>$76.5</td>
<td>14%</td>
<td>$5,660.2</td>
<td>49%</td>
</tr>
<tr>
<td><strong>Agricultural - Total Gross Value</strong></td>
<td><strong>$564.2</strong></td>
<td>100%</td>
<td><strong>$11,713.9</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Northern Rivers Region</th>
<th>Value ($ mil.)</th>
<th>%</th>
<th>Regional NSW</th>
<th>Value ($ mil.)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cattle and Calves</td>
<td>$141.1</td>
<td>25%</td>
<td>Cereal Crops</td>
<td>$3,508.9</td>
<td>30%</td>
</tr>
<tr>
<td>2</td>
<td>Barry fruits</td>
<td>$71.2</td>
<td>13%</td>
<td>Cattle and Calves</td>
<td>$1,616.1</td>
<td>14%</td>
</tr>
<tr>
<td>3</td>
<td>Whole milk</td>
<td>$62.1</td>
<td>11%</td>
<td>Cotton and other crops</td>
<td>$1,159.1</td>
<td>10%</td>
</tr>
<tr>
<td>4</td>
<td>Sugarcane</td>
<td>$61.5</td>
<td>11%</td>
<td>Wool</td>
<td>$686.0</td>
<td>7%</td>
</tr>
<tr>
<td>5</td>
<td>Poultry (Slaughtered)</td>
<td>$52.9</td>
<td>9%</td>
<td>Poultry (Slaughtered)</td>
<td>$504.7</td>
<td>4%</td>
</tr>
<tr>
<td>6</td>
<td>Nurseries, Cut flowers and Cultivated Turf</td>
<td>$51.4</td>
<td>9%</td>
<td>Sheep and Lamb (Slaughtered)</td>
<td>$609.8</td>
<td>5%</td>
</tr>
<tr>
<td>7</td>
<td>Nuts - Horticulture</td>
<td>$40.3</td>
<td>7%</td>
<td>Whole milk</td>
<td>$445.3</td>
<td>4%</td>
</tr>
<tr>
<td>8</td>
<td>Plantation fruits</td>
<td>$22.6</td>
<td>4%</td>
<td>Vegetables (Seed and Human Consumption) - Horticulture</td>
<td>$445.3</td>
<td>4%</td>
</tr>
<tr>
<td>9</td>
<td>Vegetables</td>
<td>$20.6</td>
<td>4%</td>
<td>Oilseeds</td>
<td>$438.1</td>
<td>4%</td>
</tr>
<tr>
<td>10</td>
<td>Tropical orchard fruit</td>
<td>$10.9</td>
<td>2%</td>
<td>Nurseries, Cut flowers and Cultivated Turf</td>
<td>$311.6</td>
<td>3%</td>
</tr>
</tbody>
</table>

Source: ABS 2010-11 Agricultural Census.
### APPENDIX B CHANGE IN VALUE BY AGRICULTURAL PRODUCT, NORTHERN RIVERS REGION, TWEED SHIRE AND GOLD COAST – 2005-06 TO 2011-11

<table>
<thead>
<tr>
<th>Agricultural Products</th>
<th>Northern Rivers Region</th>
<th>Tweed Shire</th>
<th>Gold Coast City</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2005-06</td>
<td>2010-11</td>
<td>% Change</td>
</tr>
<tr>
<td>Hay - Broadacre</td>
<td>$5.0</td>
<td>$5.3</td>
<td>6%</td>
</tr>
<tr>
<td>Cereal Crops - Broadacre</td>
<td>$2.5</td>
<td>$4.3</td>
<td>75%</td>
</tr>
<tr>
<td>Legumes - Broadacre</td>
<td>$0.0</td>
<td>$0.7</td>
<td>-29%</td>
</tr>
<tr>
<td>Oilsseeds - Broadacre</td>
<td>$4.2</td>
<td>$3.0</td>
<td>-6%</td>
</tr>
<tr>
<td>Sugarcane - Broadacre</td>
<td>$64.9</td>
<td>$61.5</td>
<td>-5%</td>
</tr>
<tr>
<td>Other crops - Broadacre</td>
<td>$2.5</td>
<td>$1.7</td>
<td>-31%</td>
</tr>
<tr>
<td>Nursery, Cut Flowers and Cultivated Turf - Horticulture</td>
<td>$58.5</td>
<td>$51.4</td>
<td>-12%</td>
</tr>
<tr>
<td>Vegetables (Seed and Human Consumption) - Horticulture</td>
<td>$20.5</td>
<td>$20.6</td>
<td>0%</td>
</tr>
<tr>
<td>Citrus fruits - Horticulture</td>
<td>$0.6</td>
<td>$0.5</td>
<td>-18%</td>
</tr>
<tr>
<td>Fruits and Stone fruits - Horticulture</td>
<td>$2.8</td>
<td>$2.5</td>
<td>-10%</td>
</tr>
<tr>
<td>Tropical orchard fruits - Horticulture</td>
<td>$12.5</td>
<td>$10.9</td>
<td>-13%</td>
</tr>
<tr>
<td>Nuts - Horticulture</td>
<td>$66.4</td>
<td>$40.3</td>
<td>-39%</td>
</tr>
<tr>
<td>Berry fruits - Horticulture</td>
<td>$49.9</td>
<td>$71.2</td>
<td>43%</td>
</tr>
<tr>
<td>Plantation fruits - Horticulture</td>
<td>$35.5</td>
<td>$22.6</td>
<td>-36%</td>
</tr>
<tr>
<td>Grapes - Horticulture</td>
<td>$0.0</td>
<td>$0.0</td>
<td>0%</td>
</tr>
<tr>
<td>Sheep and lamb (Slaughtered)</td>
<td>$0.0</td>
<td>$0.2</td>
<td>372%</td>
</tr>
<tr>
<td>Cattle and calves (Slaughtered)</td>
<td>$102.2</td>
<td>$141.1</td>
<td>38%</td>
</tr>
<tr>
<td>Pigs (Slaughtered)</td>
<td>$39.0</td>
<td>$9.4</td>
<td>-76%</td>
</tr>
<tr>
<td>Goats (Slaughtered)</td>
<td>$0.0</td>
<td>$0.2</td>
<td>0%</td>
</tr>
<tr>
<td>Poultry (Slaughtered)</td>
<td>$29.0</td>
<td>$52.9</td>
<td>82%</td>
</tr>
<tr>
<td>Eggs</td>
<td>$0.8</td>
<td>$1.0</td>
<td>28%</td>
</tr>
<tr>
<td>Wool</td>
<td>$0.1</td>
<td>$0.5</td>
<td>381%</td>
</tr>
<tr>
<td>Whole milk</td>
<td>$53.7</td>
<td>$62.1</td>
<td>16%</td>
</tr>
<tr>
<td>Value of Total Products</td>
<td>$550.5</td>
<td>$563.9</td>
<td>2%</td>
</tr>
</tbody>
</table>

### APPENDIX C CRITERIA FOR ECOLOGICAL MAPPING

#### CRITERIA FOR MAPPED CATEGORIES OF ECOLOGICAL STATUS

**Note:** Mapped areas allocated to Ecological Status Codes hierarchically starting with row 1

<table>
<thead>
<tr>
<th>Ecological Status Category</th>
<th>Regional Vegetation Type Status (see separate criteria table)</th>
<th>Significant Ecosystems (Riparian/Floodplain, Wetlands, Estuaries, Dune, Botanic) Growth Stage (Regional Old Growth e.g.)</th>
<th>Regional Key Habitats* (Core, Hot spots, Local etc.)</th>
<th>Remnant Size</th>
<th>Remnant Diversity (No of Vegetation Communities in Remnant) Connectivity/Isolation</th>
<th>Significant Species*</th>
<th>Threatened Communities and Critical Habitat (TSC Act 1999)</th>
<th>Vegetation Condition (see separate criteria table)</th>
<th>Exclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 - High</td>
<td>Class 1 AND class &lt;= 2ha OR</td>
<td>1.1 - Riparian/Floodplain Communities AND area &lt; 2ha OR</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>1.1 - TSC Endangered, Threatened AND Exclusions (not applicable) OR</td>
<td>NOT Site Condition = Highly Disturbed (except 104, 101, 603, TSC Act Critical Habitat)</td>
</tr>
<tr>
<td></td>
<td>Class 1 AND Remnant Size = 5 ha OR</td>
<td>1.2 - Dunes AND High Biodiversity (Heathland) OR</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td>N/A</td>
<td>NOT Site Condition = Highly Disturbed (except 1002 Early Regrowth Rainforest)</td>
</tr>
<tr>
<td></td>
<td>Class 2 AND Area &gt; 10ha OR</td>
<td>1.3 - Estuarine Communities OR</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td>N/A</td>
<td>NOT Site Condition = Highly Disturbed (except 1002 Early Regrowth Rainforest)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.5 - High Biodiversity (Rainforest) OR</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td>N/A</td>
<td>NOT Site Condition = Highly Disturbed (except 1002 Early Regrowth Rainforest)</td>
</tr>
<tr>
<td>3.1 - Moderate</td>
<td>Class 3 remaining OR</td>
<td>2.1 - Regional OR</td>
<td>2.1 - Any AND Remnant Size &gt; 10ha OR</td>
<td>2.1 - &gt; 50ha OR</td>
<td>2.1 - Vulnerable / Endangered AND Vegetation Type 101 - Litoral Rainforest 1002 Early Regrowth Rainforest</td>
<td>2.1 - Vulnerable / Exclusions not applicable OR</td>
<td>N/A</td>
<td>N/A</td>
<td>NOT Site Condition = Highly Disturbed (except 1002 Early Regrowth Rainforest)</td>
</tr>
<tr>
<td></td>
<td>Class 4 OR</td>
<td>2.2 - Moderate OR</td>
<td>2.2 - Any AND Remnant Size &lt; 10ha OR</td>
<td>2.1 - &gt; 50ha OR</td>
<td>2.1 - Vulnerable / Endangered AND Vegetation Type 101 - Litoral Rainforest 1002 Early Regrowth Rainforest</td>
<td>2.1 - Vulnerable / Exclusions not applicable OR</td>
<td>N/A</td>
<td>N/A</td>
<td>NOT Site Condition = Highly Disturbed (except 1002 Early Regrowth Rainforest)</td>
</tr>
<tr>
<td>4 - Low</td>
<td>Class 5 OR</td>
<td>3.1 - Regional OR</td>
<td>3.1 - &gt; 5ha Remaining OR</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td>N/A</td>
<td>NOT Site Condition = Highly Disturbed (except 1002 Early Regrowth Rainforest)</td>
</tr>
<tr>
<td>5 - Not Determined</td>
<td>Class 6 OR</td>
<td>3.2 - Partially Connected OR</td>
<td>3.2 - Partially Connected OR</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td>N/A</td>
<td>NOT Site Condition = Highly Disturbed (except 1002 Early Regrowth Rainforest)</td>
</tr>
</tbody>
</table>

*Analysis applies to all bushland vegetation types (see field = CONTVEG in Appendix 7).
* Supplementary Attribute - Not determined for all mapped areas
* Threatened species are not included formally within this model but their presence would classify remnants within the Ecological Status category included within this table.

**Includes the following layers modelled for CRA:**

a) Fauna key Habitats, Core Areas, Hot spots
b) Centres of Endemism (vertebrates and invertebrates)

---

**TWEED SHIRE RURAL LAND STRATEGY**

**RESOURCE INVENTORY AND LAND CAPABILITY ASSESSMENT**

154
### CRITERIA FOR MAPPED CATEGORIES OF ECOLOGICAL SENSITIVITY

<table>
<thead>
<tr>
<th>Code</th>
<th>Category</th>
<th>Sub Code</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>High</td>
<td>S1.1</td>
<td>Dunal Communities (except 1008 - Post Mining Regeneration); or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S1.2</td>
<td>Riparian Communities; or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S1.3</td>
<td>Wetland edges; or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S1.4</td>
<td>Littoral Rainforest Communities; or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S1.5</td>
<td>Other Rainforest edges; or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S1.6</td>
<td>Other Rainforest regrowth; or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S1.7</td>
<td>Small Remnants (&lt; 5 ha)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S1.8</td>
<td>Endangered or Vulnerable species present#</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NOT 1004-Camphor Dominated (except in riparian areas) or 1005 - Native Plantation or 998 - Not Assessed</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
<td>S2.1</td>
<td>Estuarine Communities; or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2.2</td>
<td>Other Wetland Communities; or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2.3</td>
<td>Remnant Size Moderate (5 - 25 ha); or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2.4</td>
<td>Non-Rainforest regrowth</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2.5</td>
<td>Other edges</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2.6</td>
<td>Camphor Co-dominant or Edges Only/Patchy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S2.7</td>
<td>Post Mining Regeneration; or</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NOT 1004-Camphor Dominated or 1005 - Native Plantation or 998 - Not Assessed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NOT in High category above</td>
</tr>
<tr>
<td>3</td>
<td>Low</td>
<td>S3.1</td>
<td>All remaining bushland</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NOT 998 - Not Assessed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NOT in categories above</td>
</tr>
<tr>
<td>4</td>
<td>Not Determined</td>
<td>S4.1 998</td>
<td>Not Assessed</td>
</tr>
</tbody>
</table>

*Allocation to categories hierarchical: High determined first, Moderate determined second etc.*

Mapped areas must meet at least one of the criteria listed for the relevant category. The results of the analyses are stored in a grid called ECOLSENS through which the values of all contributing sub-code attributes can be accessed.

# Supplementary attribute - not included formally within the associated mapping but presence would classify remnants within the category indicated within this table.