



# NORTHERN TABLELANDS REGION

# Natural Resource Management Plan

2022-2027



Local Land  
Services

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#### **More information**

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#### **Acknowledgments**

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**Disclaimer:** The information contained in this publication is based on knowledge and understanding at the time of writing Feb 2022. However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of Local Land Services or the user's independent adviser.

**Cover:** Little Llangothlin Lagoon.  
Terry Cooke - [tcooke1948@gmail.com](mailto:tcooke1948@gmail.com)

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# Acknowledgment of Country

The Northern Tablelands Local Land Services acknowledges the Aboriginal people residing within our region. We acknowledge the Aboriginal nations of **Kamilaroi, Anaiwan, Ngoorabul, Kwiambal, Banbai, Thungutti, Bundjalung** and **Gumbaynggirr** and the various Aboriginal tribes and language groups within those nations. We take this opportunity to pay our respects to Elders past, present and future of those nations.

*We pay our respects to Elders  
– past, present and emerging.*



## Acronyms and terms

ACRONYMS	TERMS
Actions	The activities to be undertaken in order to meet the targets and goals
ARAG	Aboriginal Reference Advisory Group, a formal Local Community Advisory group under s.33 of the Local Land Services Act 2013
CEEC	Expression of interest
EEC	The Commonwealth's Environment Protection and Biodiversity Conservation Act 1999
EOI	Groundwater Dependent Ecosystem
EPBC Act	Long-term, aspirational statements of the desired outcome for each NRM value
GDE	Local Aboriginal Land Council
Goals	Local Land Services
LALC	Monitoring, evaluation, reporting and improvement
LLS	A feature of the environment that is important to the community for environment, economic, social or cultural reasons
MERI	National Livestock Identification System

ACRONYMS	TERMS
Natural resource value	Natural Resource Management
NLIS	Property Identification Code
Priority threat	A process, issue or factor operating in the region which is known to contribute to the decline of a natural resource value
Projects	Specific, clearly defined and structured activities which are funded and undertaken each year to implement the NRM Plan's actions. Projects can vary in their characteristics. For example, grant programs, individual on-the-ground projects, education campaigns, or research projects.
RLP	Regional Land Partnerships
SELs	Socio-ecological landscapes
Targets	Measurable objectives to be achieved over the life of the NRM Plan
NRM Plan	Northern Tablelands Region Natural Resource Management Plan 2022 - 2027
TSRs	Travelling Stock Reserves
UNE	University of New England

# Part 1: Introduction

## 1 What is Natural Resource Management?

Natural resource management (NRM) refers to the improvement and protection of environmental assets which are valued by and support our communities. These assets provide us with a range of goods and services, including clean air, fresh water, food and fibre, amenity, and tourism. In fact, a large proportion of Australia's wealth is sourced from our natural resources.

Our natural resources are under increasing pressure from a range of threats, such as pollution, pests and weeds, poor land management practices and climate change. The purpose of NRM is to manage and minimise these threats to improve and protect environmental resources. This, in turn, protects the industries and communities which depend on these resources.

## 2 Purpose of this document

This NRM Plan has been developed to guide NRM services and investment in the Northern Tablelands Local Land Services (LLS) region over the next five years (2022 – 2027). It establishes a set of goals, targets and actions that reflect the region's key natural resource values and priorities for NRM services. These goals, targets and actions will be delivered through continued partnerships with the community, government, and other stakeholders.

The NRM Plan has been prepared to engage with a wide audience who play a role in NRM in the Northern Tablelands including:

- LLS staff
- Land managers
- Local Aboriginal people
- Government
- Community and volunteer groups
- Research and education institutions
- Industry groups

## 3 Planning context

LLS works with people in their communities to help them make better decisions about the land they manage. There are a number of plans and strategies that have been developed to help communicate and guide the work of LLS across NSW and within each of the eleven LLS regions. The relationship of some of these key documents to this NRM Plan are explained here and include the:

- LLS Strategic Plan, which is a 10-year, state-wide document that sets the visions, goals and strategies for the organisation
- Northern Tablelands Local Strategic Plan 2021-2026, which sits under the state-wide strategic plan to provide a regional specific outline of how decisions are made, and services are delivered in the Northern Tablelands
- LLS NRM Framework 2021-2026, which is a state-wide document that explains the strategic direction of LLS's NRM services

LLS Agricultural Services Framework 2021 - 2026, which is a state-wide document that explains the strategic direction of LLS's agricultural services.

The services provided by LLS are aimed at contributing to productive and sustainable land use across NSW. This is reflected in the state vision for 'vibrant communities in productive and healthy landscapes'.

The Northern Tablelands LLS Local Strategic Plan has adapted this state-wide vision to the regional level with the following local vision:

*'To provide trusted, relevant and integrated services to ensure our region's primary industries and natural resources are resilient, sustainable and profitable'*

Northern Tablelands LLS will support this vision through their four key service areas of Landscape Management, Biosecurity, Emergency Management, and Primary Production. Each of these service areas has a stated objective as follows:

- **Landscape Management:** The natural and cultural resources of our landscapes and waterways and Travelling Stock Reserves (TSRs) are managed to provide social, economic and environmental benefits
- **Biosecurity:** Animal, pest and plant biosecurity threats are actively managed to safeguard agricultural industries, market access and the environment

- **Emergency Management:** Our community, environment and economy are better prepared to respond and recover from natural disasters and biosecurity emergencies
- **Primary Production:** Our primary producers and local agricultural industries are innovative, profitable, sustainable, and responsive to increasing climate variability and change

Consistent throughout each of these service areas and objectives is the unique role for LLS in supporting and enabling land managers to improve the natural resources on their land. LLS seeks to drive NRM practice change through direct action, capacity building and investment and delivers outcomes at scale through ongoing partnerships and connections across private and public land.

### 3.1 LLS NRM Framework

The LLS NRM Framework outlines the strategic direction for NRM services across NSW for 2021 to 2026. The Framework establishes the key priorities for NRM services through five objectives and their associated key results and initiatives. The objectives are:

- To drive widespread NRM practice adoption by understanding and addressing our customer's social and behavioural drivers
- To help our customers realise returns from adoption of improved NRM practices
- To take action on the top threats to the health and resilience of NSW landscapes and catchments
- To champion opportunities for Aboriginal people and communities to care for Country and enhance contemporary land management practices
- To be the NRM service provider of choice and a trusted broker of NRM partnerships

This NRM Plan for the Northern Tablelands region has been developed to align with these objectives and contribute to the direction set out in the NRM Framework.

### 3.2 LLS AGRICULTURAL FRAMEWORK

The LLS Agricultural Services Framework 2021 – 2026 outlines the direction and defines the objectives for Local Land Services in the delivery of Agricultural Services across NSW. It provides guidance for Local Land Services' 11 regions to develop actions aligned to national, state and regional industry needs to support the key framework objectives. These objectives are:

- **Sustainable productivity:** A key challenge for agricultural enterprises is to remain viable amid increasing land and production cost, while continuing to increase their productivity in a sustainable way that does not deteriorate natural assets.

- **Natural assets:** Agriculture prospers through maintaining a healthy environment, enhancing the condition of on farm natural assets, increasing productivity and contributing to better environmental outcomes for all. There has, and will continue to be, increasing consumer and public demand for sustainable products and improved animal wellbeing.
- **Risks associated with climate variability and market disruption:** Climatic and market disruptor events have a negative effect on productivity and increase the risk of significant degradation to on farm natural assets. Managing the risks associated with major disruptors can significantly decrease the impact these events have on natural assets, the wellbeing of people and communities, recovery time and productivity.

### 3.3 Commonwealth Regional Land Partnerships Program

Northern Tableland LLS is one of the Commonwealth Government's service providers under the Regional Land Partnerships (RLP) program. This program is a major component of the National Landcare Program and takes a long term and strategic approach to NRM across Australia. The RLP aims to deliver against the following six five-year outcomes:

- By 2023, there is restoration of, and reduction in threats to, the ecological character of Ramsar sites, through the implementation of priority actions
- By 2023, the trajectory of species targeted under the Threatened Species Strategy, and other EPBC Act priority species, is stabilised or improved
- By 2023, invasive species management has reduced threats to the natural heritage Outstanding Universal Value of World Heritage properties through the implementation of priority actions
- By 2023, the implementation of priority actions is leading to an improvement in the condition of Environmental Protection and Biodiversity Conservation Act listed Threatened Ecological Communities
- By 2023, there is an increase in the awareness and adoption of land management practices that improve and protect the condition of soil, biodiversity and vegetation
- By 2023, there is an increase in the capacity of agriculture systems to adapt to significant changes in climate and market demands for information on provenance and sustainable production

All six outcomes are relevant to the Northern Tablelands region. This NRM Plan has been developed to meet the requirements of the RLP, align with the RLP outcomes and demonstrate how NRM services in the Northern Tablelands region will consider and appropriately prioritise Australian Government Investment Priorities in the region.

## 4 Snapshot of the Northern Tablelands region

The Northern Tablelands LLS region is in northern inland NSW. It covers an area of 40,000 km<sup>2</sup>, extending from the escarpment of the Great Dividing Range in the east, to the towns of Delungra and Yetman to the west, the Queensland border to the north, and past Nowendoc to the south..

The region's natural resources and land use reflect its diverse climate and geography. Average rainfall is high, varying from 650 mm per annum on the western slopes to 1,200mm on the eastern fall. The climate is also variable, ranging from temperate to subtropical with considerable differences between the west and the east.

The region straddles the Great Dividing Range and contains a variety of landforms including undulating hills, valleys, plateaus and mountains. It is a highland area with an average elevation of 1,000 metres above sea level, that ranges from 1,536m at Round Mountain near Ebor, down to 257m at Yetman in the north west. Streams that flow to the east of the Great Dividing Range form the headwaters of the coastal flowing rivers of the Clarence, Macleay and Manning. Streams on the western side make up the headwaters of the Murray-Darling Basin.

The region supports a population of 72,000 people centred around the towns of Armidale, Glen Innes, Guyra, Inverell, Tenterfield, Uralla, Walcha and a number of small villages. It is a highly productive rural landscape with grazing as the

dominant agricultural land use, boasting the highest livestock carrying capacity of all LLS regions in NSW. Beef and sheep grazing along with wool production comprise more than 80% of the total agricultural economic value for the region. Produce such as Tomatoes and Beans provide significant value to New South Wales total agricultural production outputs and add to the diversity of landuses within the Northern Tablelands Region. The geology, soils and terrain along the western boundary are diverse, enabling cropping that includes cereals, legumes and oil seeds, as well as mixed farming and other agricultural enterprises.

The east of the Northern Tablelands is characterised by large tracts of remnant vegetation with significant areas of land protected for conservation including the Gondwana Rainforests of Australia World Heritage Area.

There are eight Aboriginal nations that occur in the region: Ngarabal, Dainggatti, Anaiwan, Kamilaroi, Banbai, Gumbainggir, Bigambul and Nganyaywana. The Aboriginal Reference Advisory Group (ARAG) comprises Aboriginal community members who represent their Local Aboriginal Land Council (LALCs). Aboriginal involvement in landscape management is important to the region and LLS work closely with ARAG to support involvement and collaboration.

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## 5 How to navigate this NRM Plan

This NRM Plan identifies the natural resource values which are important to the Northern Tablelands community. These values are reflected at the whole-of-region level (Section 6), and at the sub-regional level based on the nine socio-ecological landscapes (SELS) that have been defined for the region (Section 7). The priority threats that have the potential to lead to a decline in these values are also identified and described (Section 8).

This NRM Plan presents a series of goals, targets and actions to be delivered over the next five years (Section 9). The goals, targets and actions help to define the strategic direction for NRM and Sustainable Agriculture core services in the Northern Tablelands. For the purposes of this NRM Plan:

- The goals represent long-term, aspirational statements of the desired outcome for each broad category of natural resource values
- The targets set a measurable objective to be achieved over the life of the NRM Plan
- The actions identify the activities to be undertaken in order to meet the targets and goals

The goals, targets and actions will be delivered through a range of projects each year. An annual process for identifying and prioritising projects is a critical element of the design of this NRM Plan. Annual prioritisation will allow LLS to take a flexible and adaptive approach to identify the specific projects to be undertaken. It provides the opportunity to:

- Respond to changes in the environment, such as drought, bushfires, or emerging landscape threats
- Incorporate new science and research
- Adapt based on the monitoring of performance under this NRM Plan
- Address the variability in annual funding

This process is described as part of implementation in Sections 10 and 11.

The methods and information base used to develop this NRM Plan are detailed in the supporting NRM Evidence Plan. The Evidence Plan sets out:

- How the NRM Plan was developed
- The science and knowledge that informed development of the NRM Plan
- The community and stakeholder engagement that was undertaken
- The methodology used for structuring and prioritising goals, targets and actions
- How the NSW NRM Framework and Australian Government RLP requirements are addressed
- How the NSW Sustainable Agriculture Framework and Australian Government RLP requirements are addressed

# Part 2: Values and threats

## 6 Natural resource values of the Northern Tablelands region

For the purposes of this NRM Plan, a natural resource value is defined as:

*A feature of the environment that is important to the community for environmental, economic, social or cultural reasons.*

The Northern Tablelands is a distinctive highland region of NSW that supports a large number and variety of values that are important to the community. These values have been arranged into thirteen parts which sit broadly within four core themes for the region including:

- Terrestrial biodiversity
- Water
- Soils
- People and communities

The thirteen values within each of these themes are listed in Table 1 and described briefly in the following sections. Detailed background for each value is provided in the NRM Evidence Plan.

**TABLE 1: NRM THEMES AND VALUES WITHIN THE NORTHERN TABLELANDS**

THEME	VALUES
Terrestrial biodiversity	• Native vegetation, including Threatened Ecological Communities
	• Species diversity and abundance, including threatened species
	• Travelling stock reserves and landscape corridors
	• Climate refugia
	• World Heritage, Ramsar and other protected areas
Water	• Rivers and streams
	• Wetlands
	• Groundwater
	• Water resources
Soils	• Soils
People and communities	• Indigenous people and knowledge
	• Landholders
	• Delivery partners
Agricultural Systems	• Climate resilience
	• Practice change
	• Emerging markets

### 6.1 Terrestrial Biodiversity

#### 6.1.1 NATIVE VEGETATION, INCLUDING THREATENED ECOLOGICAL COMMUNITIES

The Northern Tablelands region supports significant areas of native vegetation. These comprise woodlands, forests, heathlands, grasslands, and wetlands. It is estimated that almost 63 per cent of the region supports native vegetation cover. These areas provide important environmental and social benefits, including:

- Habitat and essential resources for plants and animals, including iconic species such as Koalas, and threatened species which are protected under State and Commonwealth legislation and migratory birds
- Landscape amenity values for rural communities
- Agricultural values, including shade and shelter for stock, increased drought resilience, reduced erosion, improved water quality, habitat for beneficial insects and improved soil health
- Carbon storage (Campbell & Scarlett, 2014; NSW DPIE, 2019)

From a biodiversity conservation perspective, native vegetation within the Northern Tablelands region provides habitat for twelve Threatened Ecological Communities (TECs) that are listed under the *NSW Biodiversity Conservation Act 2016* (BC Act). Of these, five are also listed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (NSW LLS, 2020). These are identified and described within the NRM Evidence Plan.

The Northern Tablelands is also home to a range of listed threatened species. Table 2 is an exhaustive list of EPBC Act listed TEC, a list of threatened species is also included. While this list (Table 3) is not exhaustive, the list does represent a summary of the key listed threatened species on the Northern Tablelands with supporting National Recovery Plans that provide landscape benefits to a range of listed species, or are endemic to the region.



**TABLE 2: LISTED TECS WITHIN THE NORTHERN TABLELANDS LLS REGION**

TEC NAME	BC ACT LISTING STATUS	EPBC ACT LISTING STATUS
New England peppermint ( <i>Eucalyptus nova-anglica</i> ) woodland on basalts and sediments in the New England Tableland Bioregion	Critically endangered	Critically endangered
White box-yellow box-Blakely's red gum woodland	Critically endangered	Critically endangered
Montane peatlands and swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps Bioregions	Endangered	Endangered
Upland wetlands of the drainage divide of the New England Tableland Bioregion	Endangered	Endangered
Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions	Endangered	Endangered
McKies stringybark/blackbutt open forest in the Nandewar and New England Tableland Bioregions	Endangered	Not listed
Ribbon gum-mountain gum-snow gum grassy forest/woodland of the New England Tableland Bioregion	Endangered	Not listed
Carex sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	Endangered	Not listed
Howell shrublands in the New England Tableland and Nandewar Bioregions	Endangered	Not listed
<i>Cadellia pentastylis</i> (Ooline) community in the Nandewar and Brigalow Belt South Bioregions	Endangered	Not listed
Carbeen open forest community in the Darling Riverine Plains and Brigalow Belt South Bioregions	Endangered	Not listed
Fuzzy box woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	Endangered	Not listed

**TABLE 3: SELECTION OF LISTED THREATENED SPECIES WITHIN THE NORTHERN TABLELANDS REGION**

THREATENED SPECIES NAME	BC ACT LISTING STATUS	EPBC ACT LISTING STATUS
<i>Acacia pycnostachya</i> (Bolivia Wattle)	Vulnerable	Vulnerable
<i>Almaleea cambagei</i> (Torrington Pea)	Endangered	Vulnerable
<i>Anthochaera phrygia</i> (Regent Honeyeater)	Critically Endangered	Critically Endangered
<i>Dasyurus maculatus maculatus</i> (SE mainland population) (Spotted-tail Quoll)		Endangered
<i>Eucalyptus mckieana</i> (McKie's Stringybark)	Vulnerable	Vulnerable
<i>Eucalyptus nicholii</i> (Narrow-leaved Peppermint, Narrow-leaved Black Peppermint)	Vulnerable	Vulnerable
<i>Lathamus discolor</i> (Swift Parrot)	Endangered	Critically Endangered
<i>Litoria castanea</i> (Yellow-spotted Tree Frog, Yellow-spotted Bell Frog)	Critically Endangered	Critically Endangered
<i>Petrogale penicillata</i> (Brush-tailed Rock-wallaby)	Vulnerable	Endangered
<i>Phascolarctos cinereus</i> (Koala)	Endangered	Endangered
<i>Polytelis swainsonii</i> (Superb Parrot)	Vulnerable	Vulnerable
<i>Pteropus poliocephalus</i> (Grey-headed Flying-fox)	Vulnerable	Vulnerable
<i>Wollumbinia belli</i> ( <i>Myuchelys bellii</i> ) (Bells Turtle)	Endangered	Vulnerable

### 6.1.2 NATIVE SPECIES DIVERSITY AND ABUNDANCE, INCLUDING THREATENED SPECIES

The Northern Tablelands region supports a high level of native species diversity and abundance, which are both important factors that contribute to healthy ecosystems. A large number of the species that occur within the Northern Tablelands region are also listed as threatened under the BC Act and EPBC Act. There are a total of 292 threatened species known or predicted to occur within the Northern Tablelands. Of these, 41 species are largely endemic to the region, and an additional 76 demonstrate a high level of reliance on the region.

### 6.1.3 THE IMPACT OF WEEDS

The negative impacts of weeds are well recognised. It has been estimated that the total annual economic cost of weeds to Australia is over \$4 billion. Weeds have a major impact on biodiversity conservation, threatened species and threatened communities. Weeds also reduce the quality and quantity of Australia's agricultural, horticultural and forestry products, affecting both industry and consumers. Weeds also impact Aboriginal connection to Country and the ability to undertake cultural activities.

There are a wide range of agricultural and environmental weeds impacting the Northern Tablelands that vary in effect and importance geographically across the region. With extensive areas of land managed for agriculture and conservation, including World Heritage Areas, invasive weeds are considered amongst the most serious threats to the region's natural resource base (NSW LLS, 2017).

### 6.1.4 TRAVELLING STOCK RESERVES AND LANDSCAPE CORRIDORS

Landscape connectivity is important for flora and fauna. It protects genetic diversity, enables dispersal, and provides escape routes for fauna to avoid threats such as bushfires. It is provided through different forms of landscape corridors in the Northern Tablelands region including:

- Travelling stock reserves (TSRs)
- Conservation areas
- Riparian zones

TSRs are a significant source of landscape connectivity, which allow movement of livestock across the landscape and provide supplementary feed and watering points. Additionally, TSRs provide cultural, recreational and environmental benefits. In particular, they often support areas of high biodiversity and provide connectivity through many otherwise heavily cleared and fragmented landscapes (NSW Environmental Trust, NSW LLS et al., 2017; NSW LLS, 2021c). There are almost 47,000 ha of TSRs within the Northern Tablelands region (NSW Environmental Trust, NSW LLS et al., 2017).

Along with TSRs, conservation areas are also important for landscape connectivity. The eastern side of the Northern Tablelands region contains large, well-connected conservation areas which provide a greater benefit to environmental values and connectivity compared to smaller, more isolated patches which are common in the western side of the region.

Riparian zones often contain native vegetation, even on private land. These riparian zones provide connectivity through otherwise cleared landscapes.

### 6.1.5 CLIMATE REFUGIA

Climate refugia are areas which are more resistant to impacts of climate change. These areas provide habitat for species to retreat to, persist in, and potentially expand from under changing environmental conditions (Morelli, Barrows et al., 2020). A large extent of important habitat corridors for climate change refugia have been identified in the Northern Tablelands region (NSW DECCW, 2010; NSW OEH, 2011a, 2011b). The region's features which contribute to its climate refugia value include:

- High elevation and cooler temperatures
- Comparatively abundant and reliable rainfall
- Waterbodies including upland wetlands

### 6.1.6 WORLD HERITAGE AND OTHER PROTECTED AREAS

There are a total of 118 conservation areas within the Northern Tablelands region, covering 6,280 km<sup>2</sup> (or almost 16 per cent of the total area of the region). Most conservation areas occur along the eastern border of the region. These areas comprise of:

- National Parks
- State Conservation Areas
- Protected Area
- Indigenous Protected Areas
- Flora Reserves
- Nature Reserves

Of the conservation reserves within the region, several National Parks and a Nature Reserve protect occurrences of the Gondwana Rainforests of Australia World Heritage Area. This World Heritage Area comprises major remaining areas of rainforest in southeast Queensland and northeast NSW and represents outstanding examples of major stages of Earth's evolutionary history, ongoing geological and biological processes, and high biodiversity. Many of the plant and animal communities within these areas have ancient lineages and are mostly or entirely restricted to these areas (UNESCO, 2021). Approximately 43 per cent of the Gondwana Rainforests of Australia World Heritage Area is located within the Northern Tablelands region.

Additionally, Little Llangothlin Nature Reserve, a Ramsar wetland, is located within a National Park in the region.

E CONSERVATION VALUE



**NORTHERN TABLELANDS LLS: TRAVELLING STOCK RESERVE CONSERVATION VALUE**

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**Sources:** Data used may include:  
NSW Land and Property Information, Topographic and Forests, roads, water, imagery, 2020 Dept of Industry - Administrative boundaries.  
The Coordinate System on this map uses the Geocentric Datum of Australia 1994 (GDA94).  
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FIGURE 2: LOCATIONS OF IMPORTANT HABITAT CORRIDORS FOR CLIMATE CHANGE

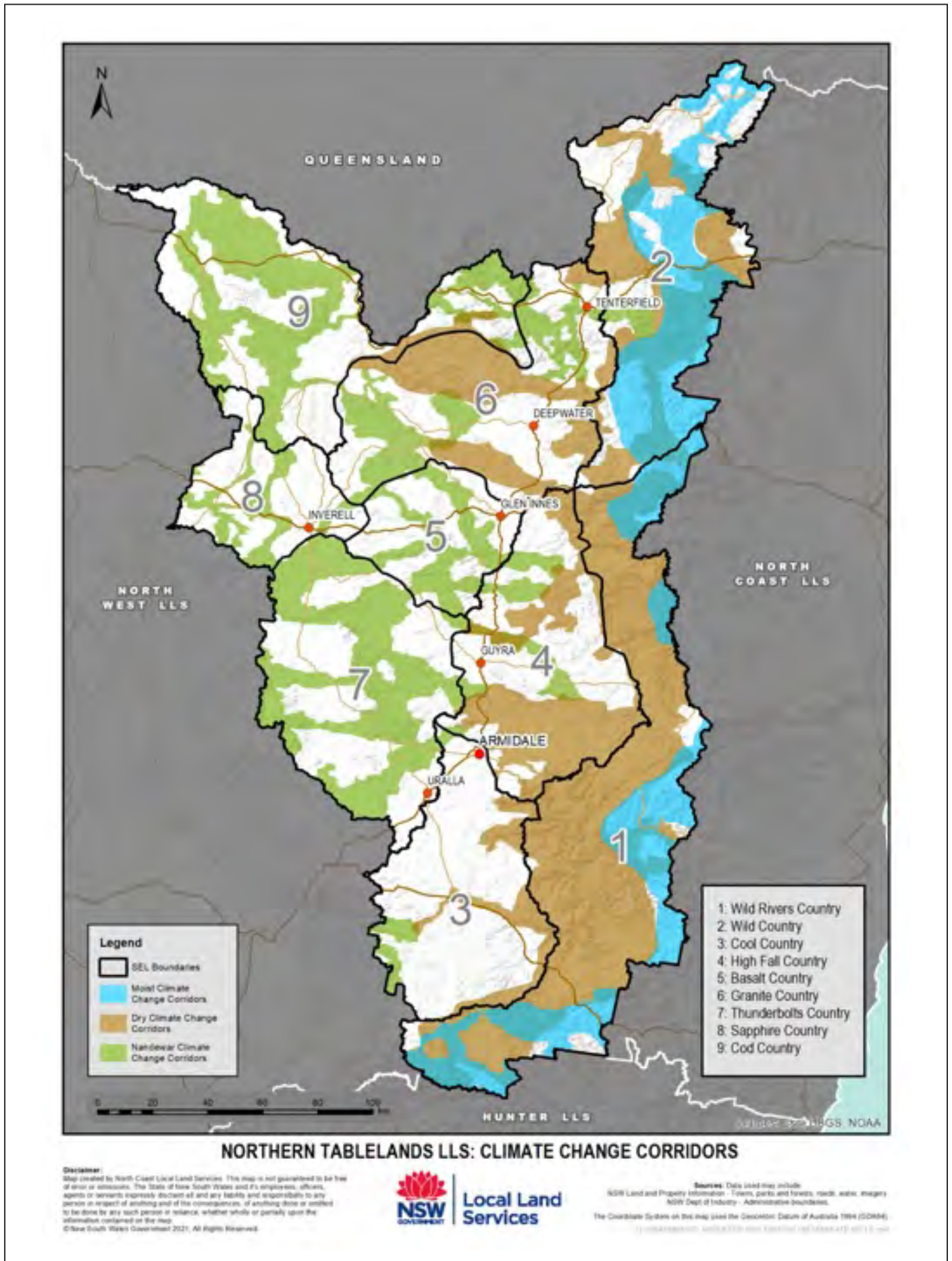


FIGURE 3: LOCATIONS OF CONSERVATION AREAS

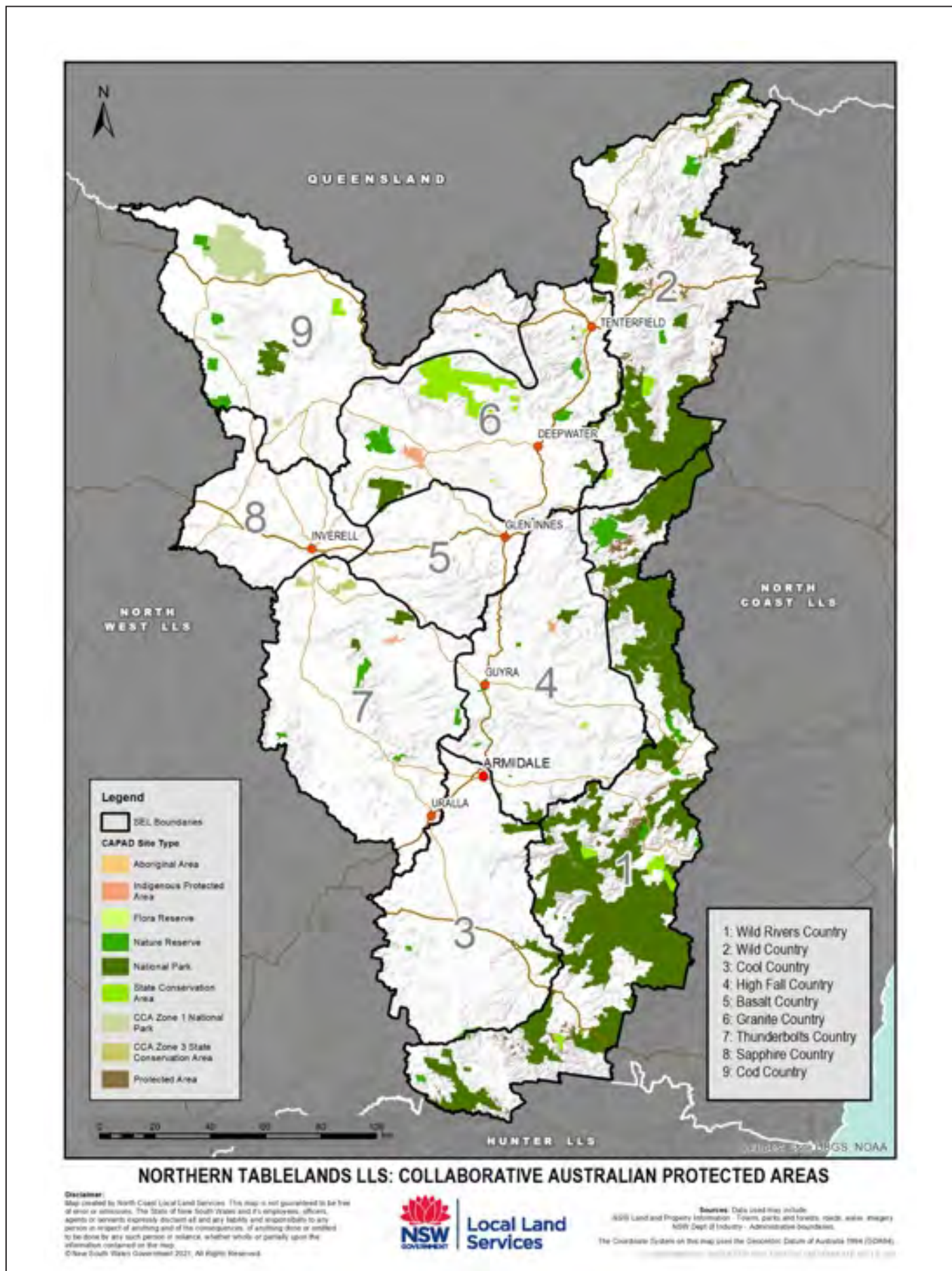
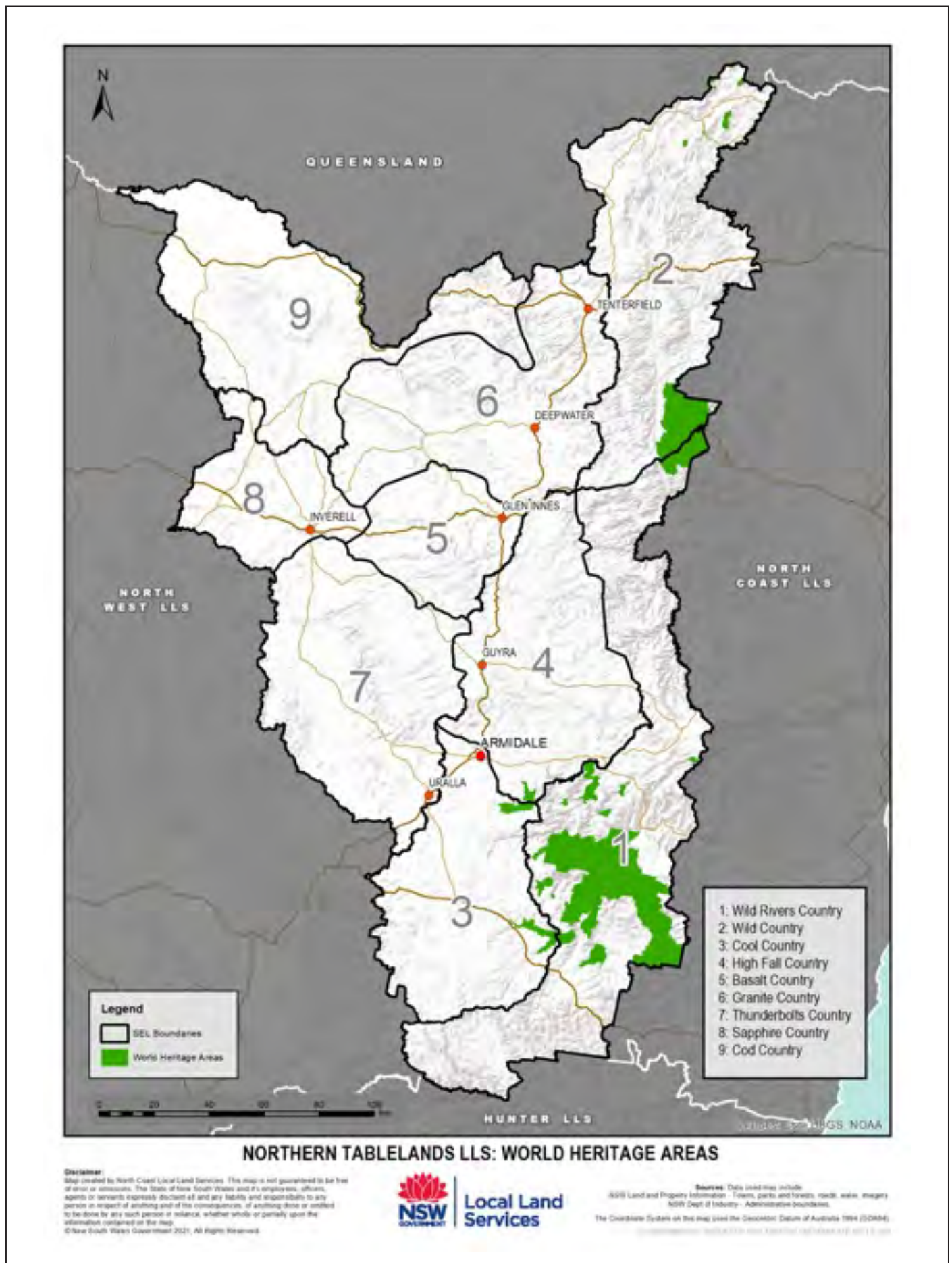


FIGURE 4: LOCATIONS OF WORLD HERITAGE PROPERTIES



## 6.2 Water

Water systems and resources are important values for the Northern Tablelands region as they provide a range of benefits including:

- Habitat for a range of species and ecosystems, including threatened, endemic and/or reliant species. Some notable aquatic species of the region include Bell's Turtle, Freshwater Spiny Crayfish, Murray Cod, Eastern Freshwater Cod and the Purple Spotted Gudgeon
- Recreational and amenity values for the community
- Sources of drinking, stock and irrigation water

The key water systems and resources in the Northern Tablelands region include rivers and streams, wetlands, groundwater and water resources.

### 6.2.1 RIVERS AND STREAMS

The Northern Tablelands region experiences high annual rainfall, which supports a number of major rivers and catchments. There is a total of approximately 9,822 km of stream length within the region (NSW Office of Water, 2012)

The eastern side of the region drains to the east towards the coast, forming the headwaters of the Clarence River, Macleay River and Manning River. The western side drains inland and to the west into the Murray Darling Basin, forming the headwaters of the Gwydir River, Namoi River, Macintyre River, Severn River and Deepwater River (NSW LLS, 2021c).

### 6.2.2 WETLANDS

Wetlands provide important habitat and resources for species and ecological communities in the region. There are 59 upland wetlands within the region, a majority of which are on private land. The region also contains a listed Ramsar site, Little Llangothlin Nature Reserve, which contains Little Llangothlin Lagoon (a large lagoon covering 105 hectares) and part of Billy Bung Lagoon, a smaller wetland in the same catchment. The site is important because it one of the largest examples of an upland lagoon, is in near-natural condition, and provides important habitat for a range of flora and fauna including threatened species (NSW DPIE, 2018).

### 6.2.3 GROUNDWATER

Groundwater within the region supports a range of Groundwater Dependent Ecosystems (GDEs) including:

- Little Llangothlin Lagoon
- Some upland wetlands
- Some areas of vegetation

It is noted that no specific targets within this NRM Plan relate to the protection of groundwater directly, as direct management of groundwater (through water licencing and extraction) is outside the scope of responsibilities of LLS. Management of groundwater is included indirectly through management of other natural resource values (such as rivers and streams, wetlands, and native vegetation) which have a relationship with groundwater

### 6.2.4 WATER RESOURCES

There are a number of water resources within the Northern Tablelands region including:

- 18 notable dams
- 108 weirs
- 4,440 known bores

These water resources are used to regulate water flow, and to supply irrigation, stock, domestic and environmental water to downstream communities.

### 6.2.5 LANDSCAPE REHYDRATION

Landscape rehydration is the process of restoring a range of biophysical processes that have been disrupted in a degraded landscape to improve the way that landscape functions, with a particular emphasis on the water cycle. The biophysical processes that affect how landscapes function are inter-related and include the capture of energy (solar and other forms), retention and use of water and cycling of nutrients. These processes drive biological productivity and are therefore critical to sustaining agricultural productivity.

Some features of hydrated, functional landscapes include high levels of vegetative groundcover, healthy, water-receptive soils, clean surface water flows, stable stream forms and high levels of primary productivity. Water moves through a hydrated landscape more slowly. The volume stored in soils and vegetation is greater. Stream pulse events are moderated, reducing the erosive energy of flows and increasing the permanency of streams.

A range of techniques are used to achieve landscape rehydration, including installing erosion control structures, changing vegetation management (e.g., rotational grazing, revegetation, cover cropping), and installing leaky rock and/or log structures in incised stream channels to restore a more natural flow regime (Mulloon 2021).

Northern Tablelands LLS is well placed to continue to support landholders, both individually and collectively in sub-catchments, to implement landscape rehydration extension and incentives to support principles of sustainable agriculture and landscape restoration outcomes. This work will build on the existing partnerships between the Northern Tablelands LLS, the Mulloon Institute and regional Landcare networks.

FIGURE 5: LOCATIONS OF MAJOR RIVERS AND CATCHMENTS

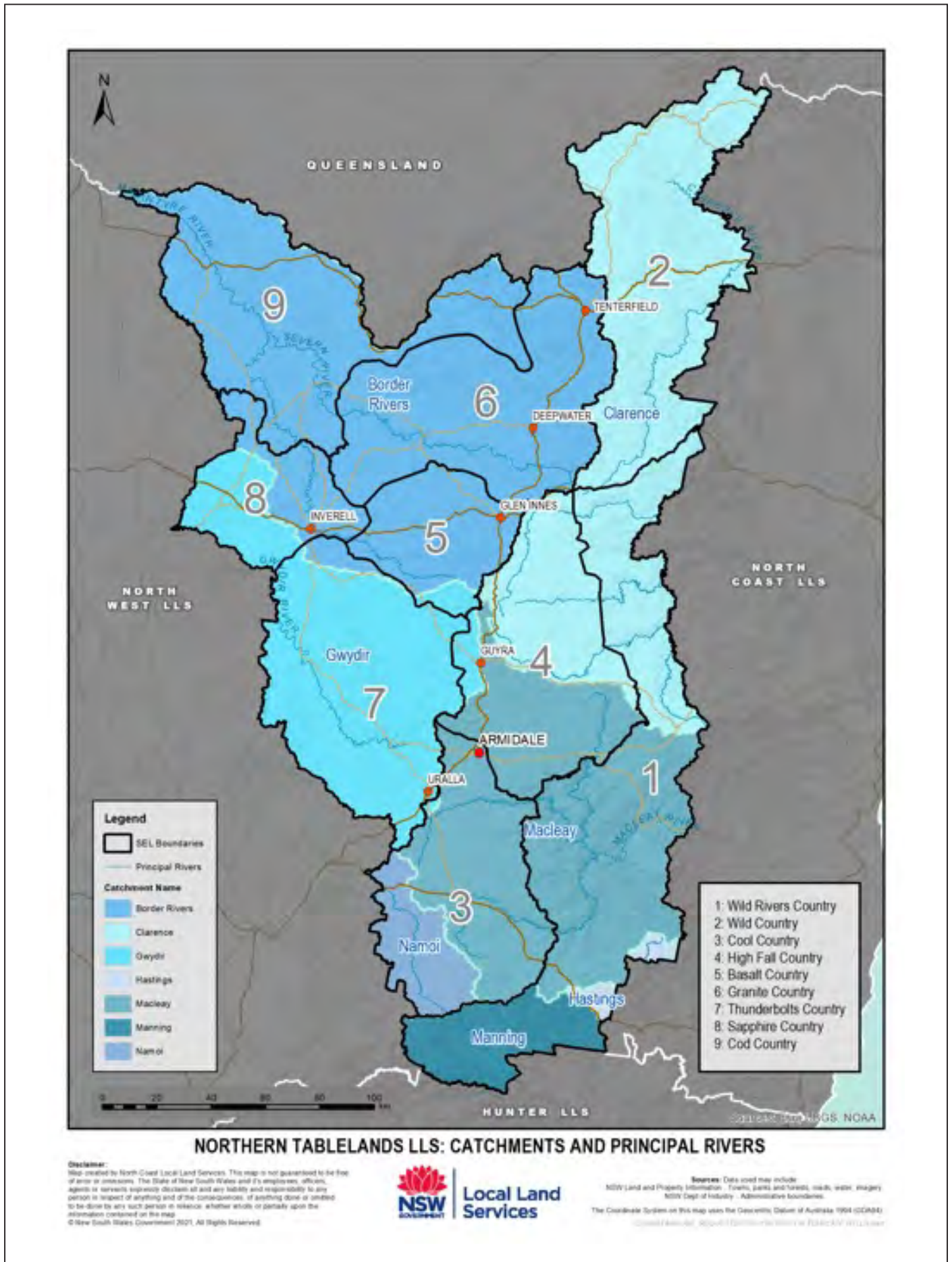




FIGURE 6: LOCATIONS OF STREAM LENGTHS FOR PRIORITY MANAGEMENT

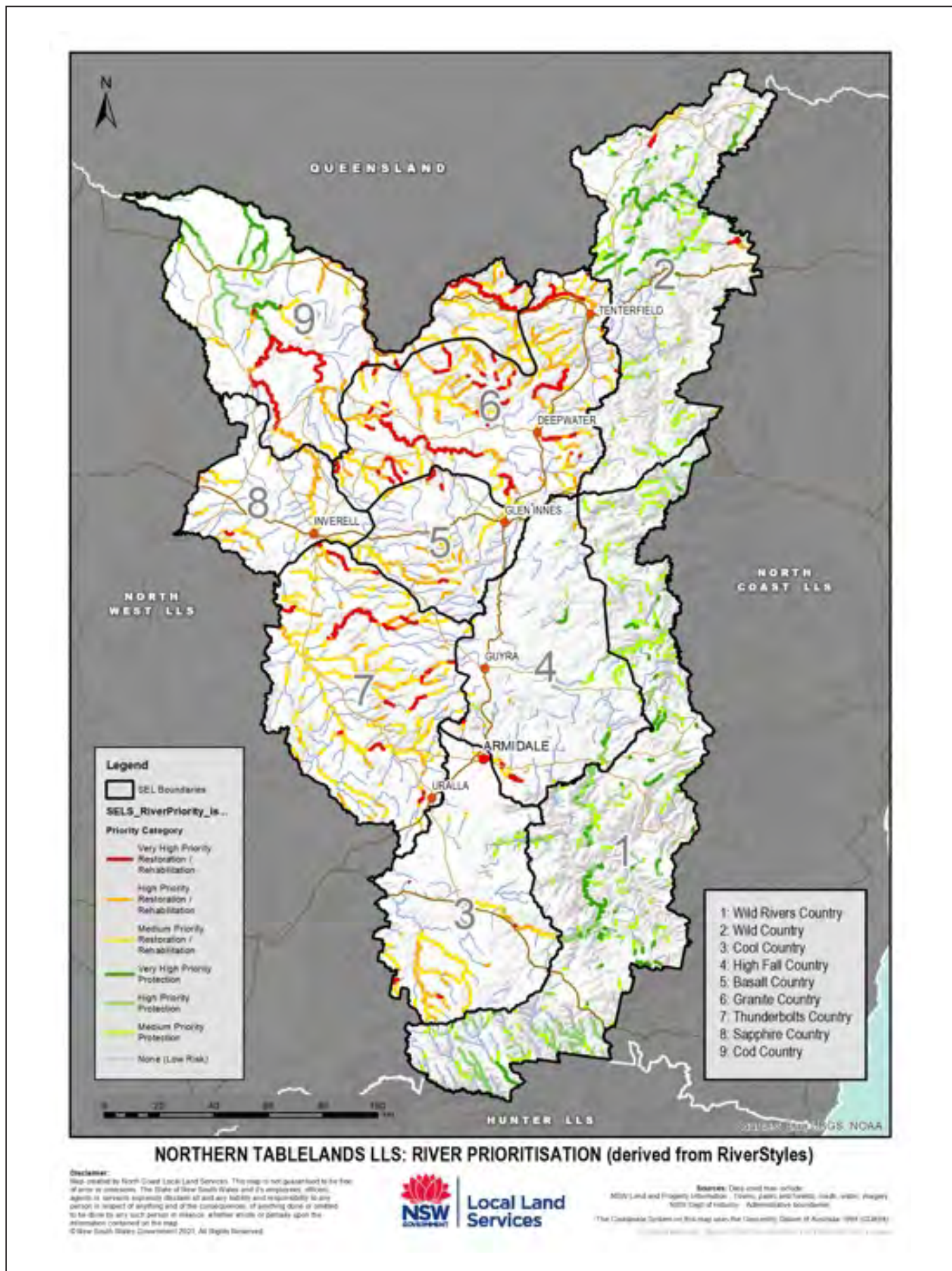


FIGURE 7: LOCATIONS OF UPLAND WETLANDS

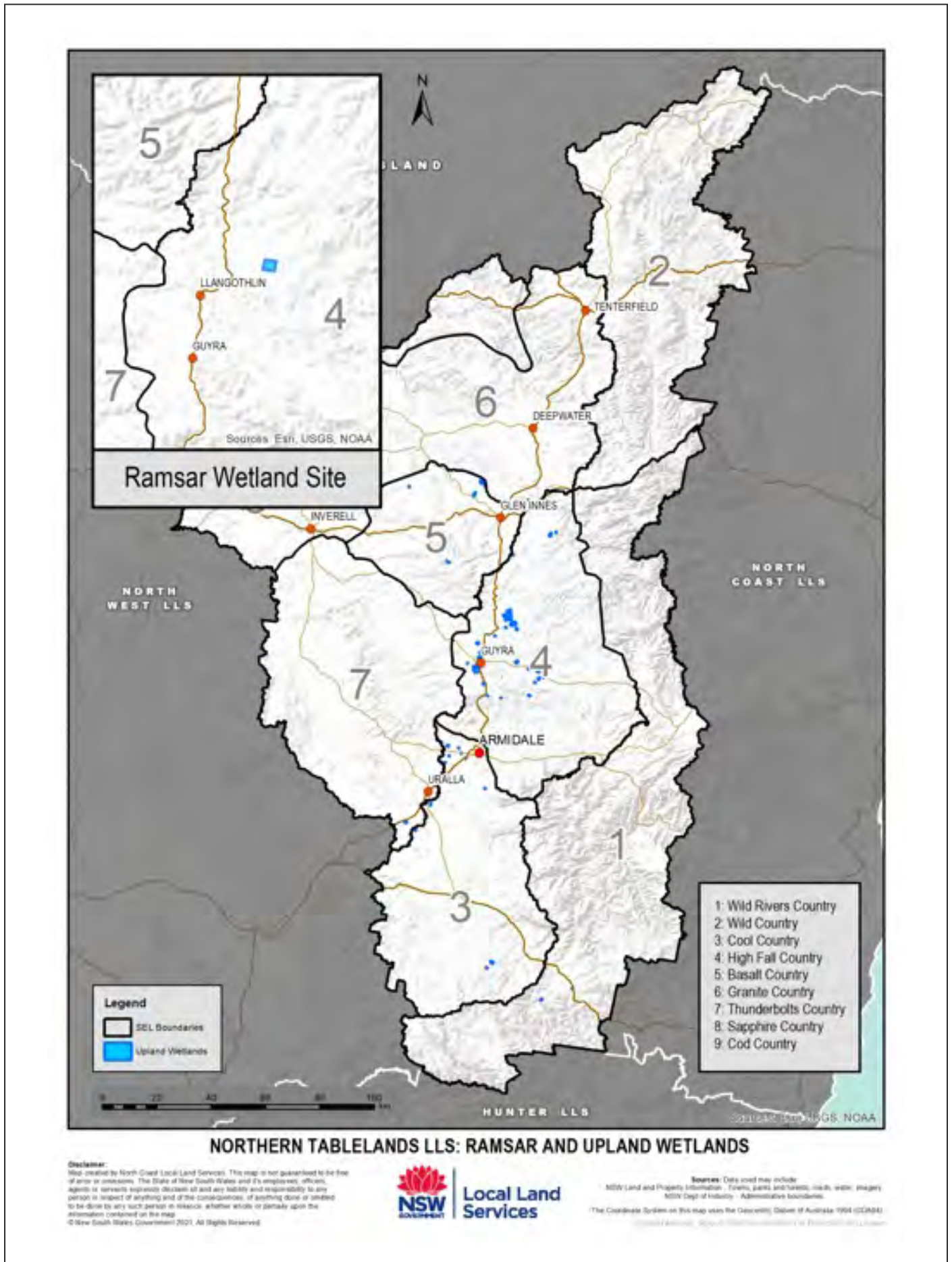


FIGURE 8: LOCATIONS OF POTENTIAL GROUNDWATER DEPENDENT ECOSYSTEMS

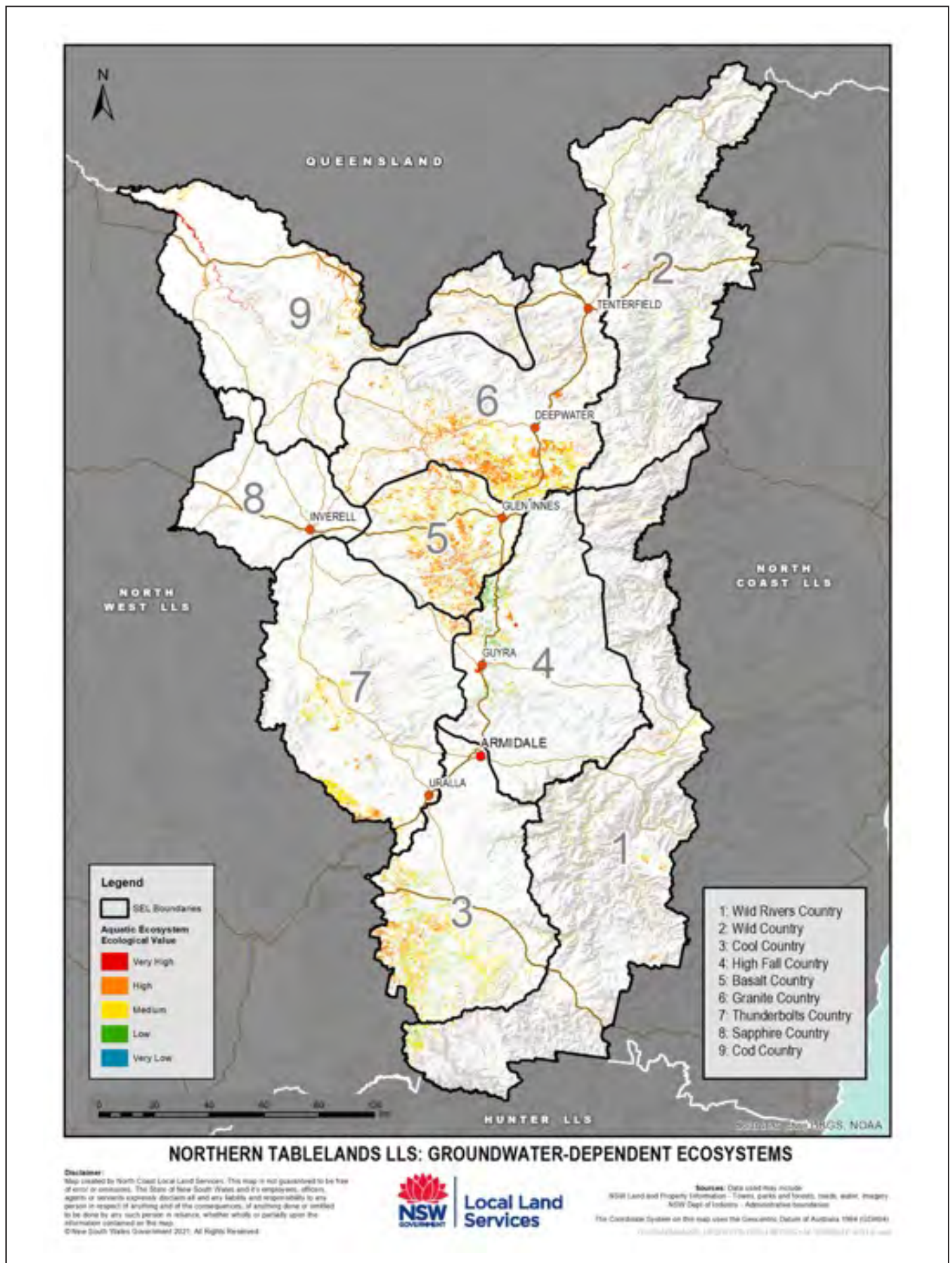


FIGURE 9: LOCATIONS OF NOTABLE PUBLIC DAMS



## 6.3 Soil

The Northern Tablelands supports a range of soil types, many of which are highly fertile with good land capability. Fertile soils are essential to the success and productivity of agricultural operations in the region. Soil types in the region range from:

- Ferrosols (highly fertile, clayey, iron-rich soils)
- Chromosols (red, brown, or yellow soils with coarse topsoil and clayey subsoil)
- Podisols (sandy soils)

The fertility and land capability of soil varies across the region. Fertile soils, which are important for the success and productivity of agriculture, typically occur along the valleys and rivers. Soil underpins a range of functions critical to environmental health. For example, it supports the growth of plant life; stores and filters water; stores and recycles nutrients and waste; aids in chemical decomposition; provides habitat for microbial communities; and globally stores more organic carbon than the atmosphere and vegetation (Schulte et al. 2014; Vogel et al. 2018; FAO 2017).

Soil health is vital for the overall resilience and productivity of the region, supporting native vegetation and ecological communities, and a range of agricultural practices including grazing, cropping, viticulture and vegetable and fruit production. A key factor in soil health is vegetation cover which improves soil quality (structure and nutrients) and protects it from impacts such as heat, wind and rain.

By enabling and empowering farmers to rebuild and restore soils, farmers can mitigate and adapt to climate change and other challenges while producing healthy, plentiful food and fibre in ways that are good for farmers, consumers and the planet (Soils for Life 2021). Similar aspirations are expressed in the National Soil Strategy 2021 – 2041. Northern Tablelands LLS will facilitate these aspirations in applying the National Soil Strategy's three goals (Australian Government 2021):

- **Goal 1:** prioritising soil health through advocacy, partnerships, knowledge, awareness and management
- **Goal 2:** empowering soil innovation and stewards through effective soil management and increasing/maintaining soil organic carbon
- **Goal 3:** strengthen soil knowledge and capability via increased knowledge, measurement and building/retaining diverse soil expertise

Ground cover has been identified by NTLLS a key indicator of productive state, ecosystem function and risk of soil erosion. NTLLS produces a Ground Cover Report which identifies the ground cover status and potential for erosion risk across the region on an annual basis since 2019. The report utilises the latest advancements in technology through remote sensing and satellite imagery and is building a baseline to measure ground cover changes through time. Soils and land can be improved by adoption of systems and practices that maximise soil health and function and reduce soil nutrient loss, soil erosion and the impacts of soil degradation. Programs with targeted strategic grazing management build landholders capacity to assess and budget standing feed, interpret soil tests and nutrient needs of grass cover and assess and manage pasture availability and seasonal opportunity.

The NTLLS aims to align with the National Soil Strategy which is a 20-year strategy that sets out how Australia will value, manage and improve its soil. The Strategy has been developed in collaboration with state and territory governments, the National Soils Advocate and other major stakeholders in soil science and land management. NTLLS will ensure that the goals and objectives in the Strategy underpin programs aimed at restoring and protecting soil, by driving collaborative and coordinated on-ground action, research, education, monitoring and governance.



FIGURE 10: DISTRIBUTION OF SOIL TYPE

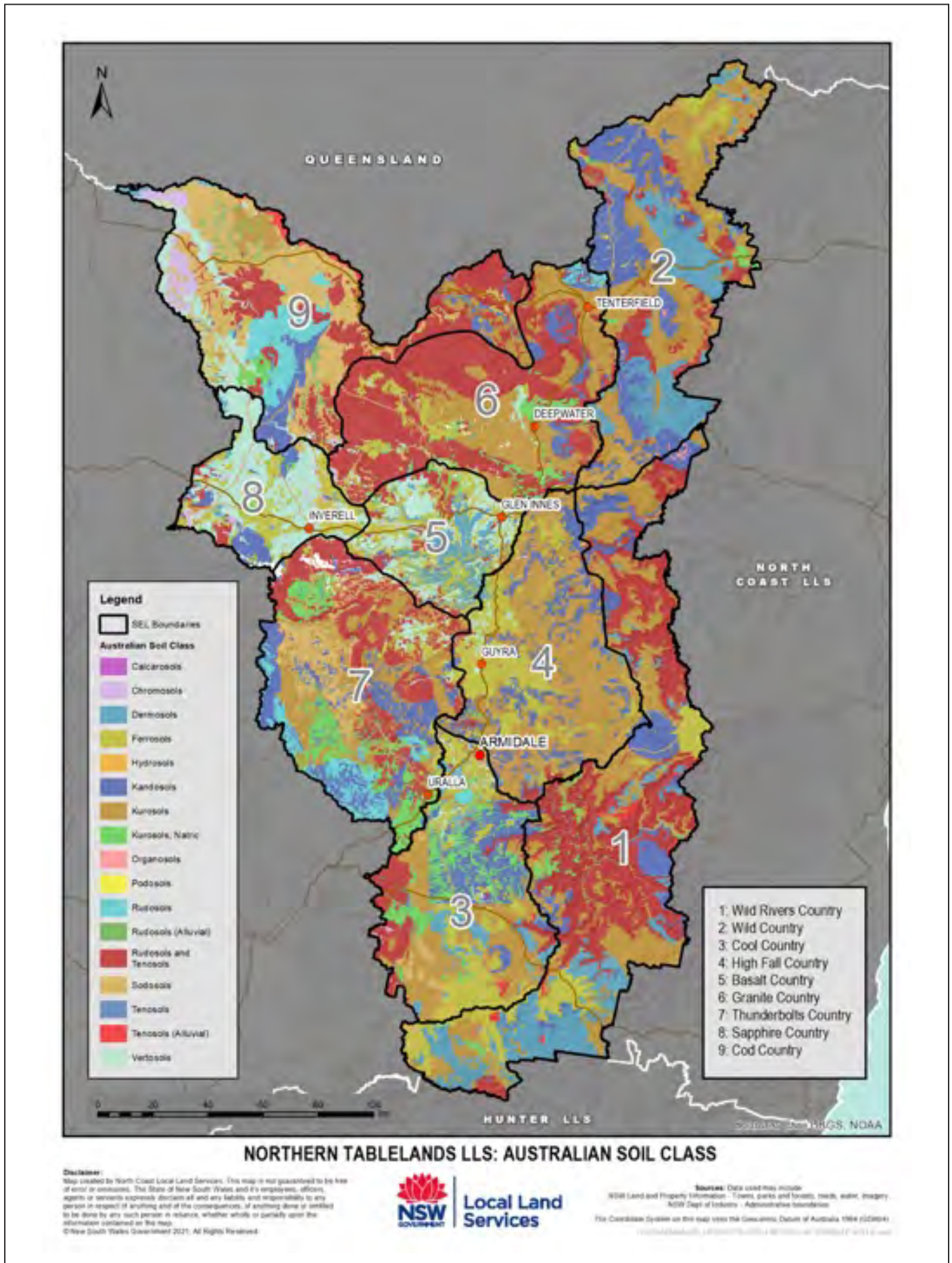


FIGURE 11: DISTRIBUTION OF SOIL FERTILITY

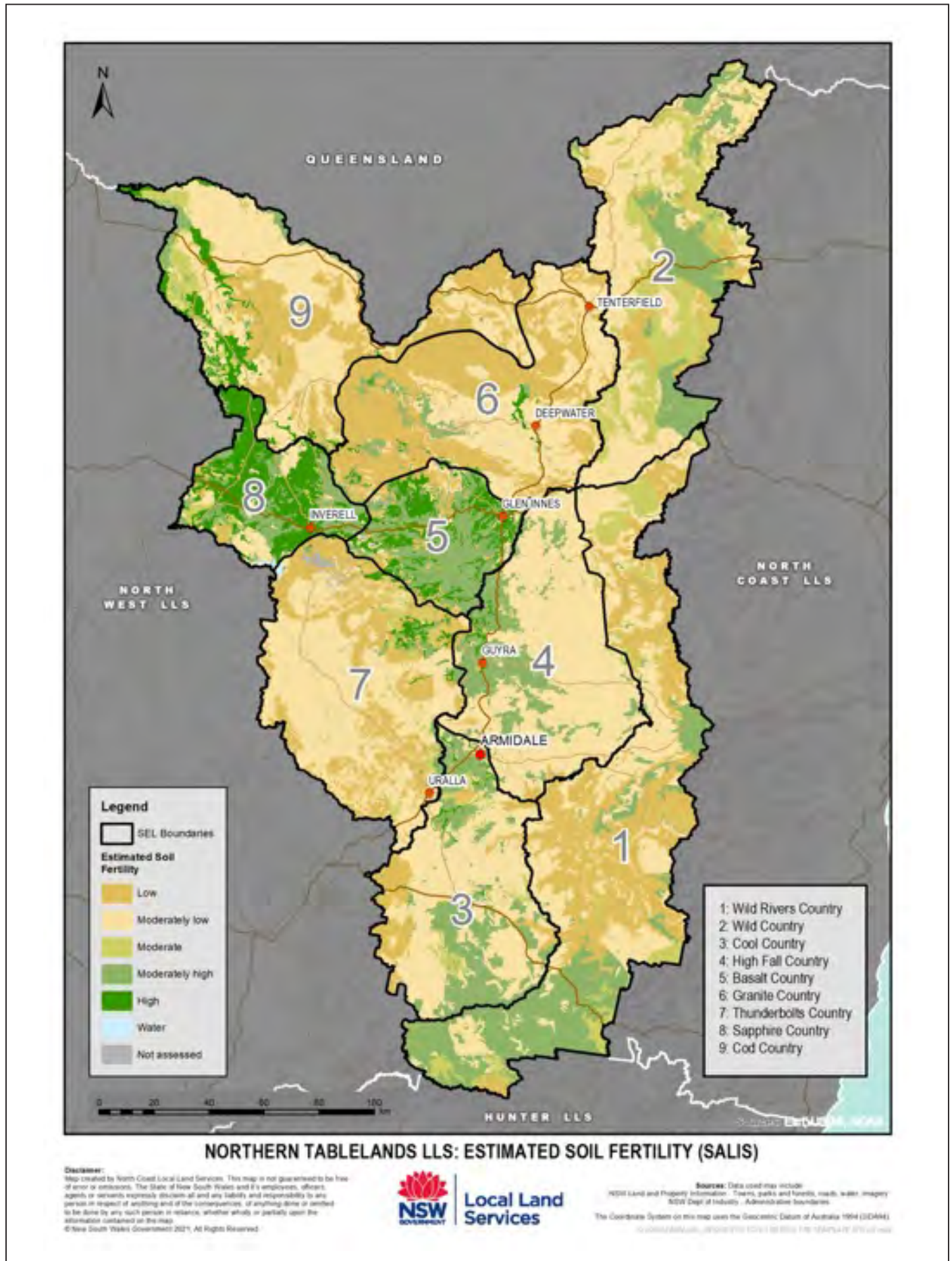
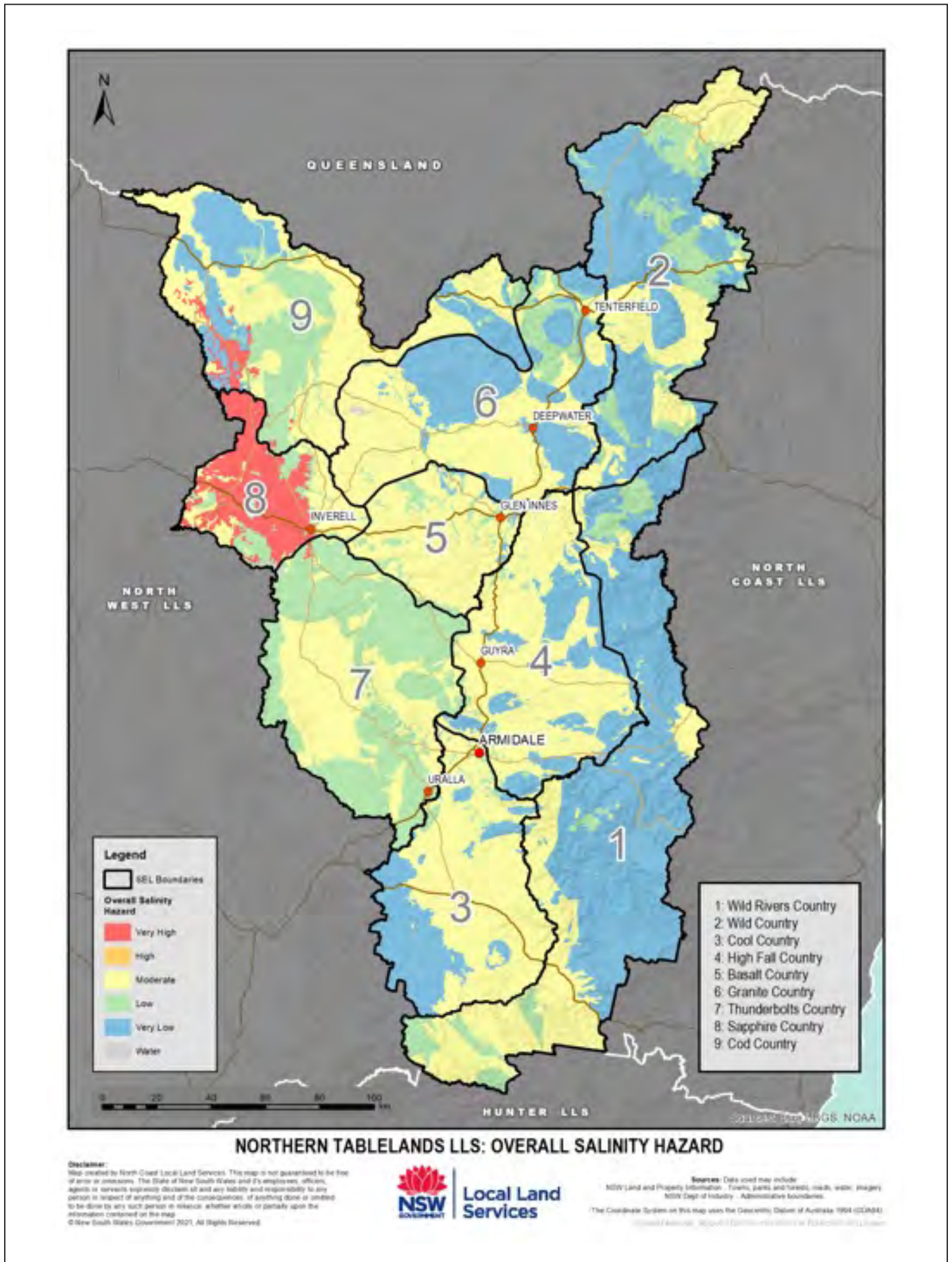


FIGURE 12: DISTRIBUTION OF SOIL SALINITY HAZARD





## 6.4 People And Communities

The Northern Tablelands region is home to 72,000 people focussed on the major towns of Armidale, Glen Innes, Guyra, Inverell, Tenterfield, Uralla and Walcha, as well as numerous small villages. Armidale is the largest town in the Northern Tablelands and supports a number of industries and infrastructure of importance to the region including the University of New England, New England TAFE, Armidale Airport and Armidale hospital.

The region is supported by a significant agricultural industry, which primarily consists of grazing for beef, sheep and wool production. Diversification of the agricultural industry is increasing, with cropping industries, fruit production, horticulture, dairy and wine production also occurring.

### 6.4.1 INDIGENOUS PEOPLE AND KNOWLEDGE

The Northern Tablelands region includes the Aboriginal nations of Kamilaroi, Anaiwan, Ngoorabul, Kwiambal, Banbai, Thungutti, Bundjalung and Gumbaynggirr, and the various tribes and language groups within these nations (NSW LLS, 2021c).

Northern Tableland LLS partners with Indigenous people of the region in the management of natural resources and works closely with ARAG to guide and support Northern Tablelands Local Land Services (NTLLS) program delivery and provide strategic advice as a Local Community Advisory Group to the NTLLS Local Board.

### 6.4.2 LANDHOLDERS

Agricultural land holdings cover approximately 1.8 million hectares (or around 45 per cent) of all land with the Northern Tablelands region. Landholders are therefore a critical component of NRM within the Northern Tablelands as they own and manage a large proportion of the land within the region.

Landholders not only rely on the health and productivity of landscapes for agriculture, but also influence the condition of natural resource values through land management practices on their private land. LLS actively encourages and facilitates the involvement of landholders in NRM practices, and there is substantial opportunity for greater involvement and engagement.

### 6.4.3 DELIVERY PARTNERS

LLS works with a range of delivery partners who play key roles in supporting and enabling LLS to deliver effective NRM programs in the Northern Tablelands. Delivery partners include farmers and land managers, industry groups, Aboriginal communities, Landcare partnerships, local community members and volunteers, Federal, State and Local government bodies, and research and education institutions.

**TABLE 4: KEY DELIVERY PARTNERS TO IMPLEMENT NRM WITHIN THE NORTHERN TABLELANDS LLS**

TYPES OF DELIVERY PARTNERS	ROLES
Farmers and land managers	Roles include implementing NRM, facilitating and engaging with experimentation to improve techniques, sharing local knowledge. Practice change champions are particularly valuable as a resource to encourage uptake of NRM activities on private land and working with regional public/conservation land managers.
Industry groups	Roles include offering facilities, expertise and extension services, coordinating stakeholders to share information and promote NRM. Examples of industry groups are NRM Regions, Meat and Livestock Australia, Birdlife Australia, Australian Wool Innovation Limited, Mulloon Institute, Cooperative Research Centres, Universities, CSIRO, and NSW Landcare.
Aboriginal communities	Contributing to Traditional Ecological Knowledge to improve NRM practices, engaging with NRM through active caring for Country
Landcare partnerships	Delivery of Landcare activities in partnership with NTLLS, ranging from collaborative project delivery and playing a critical role in community consultation, engagement and extension activities.
Local community members and volunteers	Roles include implementing NRM on the ground (e.g. through working bees) and sharing local knowledge (e.g. through citizen science programs). Examples of key community groups include Landcare groups and the Country Women's Association
Federal government bodies	Roles include providing strategic guidance and governance structures to coordinate NRM, and providing funding to support a range of NRM programs including research as well as on-the-ground projects. The Department of Agriculture, Water and Environment is a key federal body in this space
State government bodies	Roles include providing strategic guidance and governance structures to coordinate NRM, and providing funding to support a range of NRM programs including research as well as on-the-ground projects. There are multiple NSW Government departments who play key roles in NRM, including the Department of Planning, Industry and Environment, Department of Primary Industries and WaterNSW
Local government bodies	Sharing local knowledge and implementing NRM on the ground. Local government bodies are particularly important as on-ground weed management partners
Research and education institutions	Undertaking research to inform and improve NRM practices, sharing information. A key research and education institution within the Northern Tablelands region is UNE

## 6.5 Agricultural Systems

Agriculture is the main economic industry and land use on the Northern Tablelands. The Northern Tablelands region is renowned for its livestock production as well as cropping, small pockets of viticulture and horticulture. The increased productivity and sustainability of our industries occurs through practice change at the local and farm level. These changes result in improved management strategies, practices, decision making, innovation and adoption of new technologies.

Consultation associated with the development of this Strategy indicated that landholders wish to see ongoing collaboration with industry partners, be open to new ideas (like regenerative agriculture), and ensure information is underpinned by reliable research and science. Another suggestion was to support leading farmers to demonstrate and model best-practice to others in the region as an effective way of spreading knowledge.

### 6.5.1 CLIMATE CHANGE RESILIENCE

The impacts of climate change are already being felt by the agricultural sector with events such as drought becoming more frequent and extreme. Adapting to climate change will help make farming more productive and profitable, better protect Australia's land and water, and strengthen rural communities.

Higher temperatures and changes in seasonal rainfall patterns are affecting the profitability of Australian farms. Analysis by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) found changes in seasonal conditions have reduced annual average farm profits by 23% or around \$29,200 per farm over the past 20 years, with larger reductions projected to 2050 in the absence of adaptation. These same climate conditions have also made farm incomes more variable and doubled the risk of years with very low farm returns (Australian Government 2021).

Agriculture is significantly affected by climatic business disruptors such as drought, fire, flood and the introduction of an exotic animal, plant pest or disease. Business disruption is an event that interferes or alters a system or environment that leads to a significant change in regular business.

However, other sudden events such as market loss or significant change in the economic value of products, or trade disruption can also have a major influence. Northern Tablelands LLS' Agriculture Services play an important role assisting landholders prepare, manage and recover from major climate change disruptions (NSW LLS 2021d).

Northern Tablelands LLS' assistance will support the agricultural industry's stated strategic focus, including ensuring beef producer confidence in having the information tools, technologies and resources to support climate change adaptation and preparedness (Australian Beef 2021), meeting the challenge of a changing climate, and mitigating greenhouse gas (GHG) emissions (Australian Sheep 2021), and helping woolgrowers meet consumer expectations or wool having impeccable environmental credentials (Wool 2022).

### 6.5.2 PRACTICE CHANGE

It is vital for producers to ensure productivity gains are sustainable and do not degrade natural assets. Through direct action and investment, Local Land Services provides extension, advisory and capacity building services to producers.

Our services support producers to adopt improved management practices and strategies that result in increased on-farm productivity and sustainability, enhanced on-farm natural assets, improved production processes, and animal wellbeing to better meet customer and market requirements. These outcomes will not only increase on-farm productivity but also contribute to industries meeting sustainability targets (NSW LLS 2021d).

In addition to specific industry targets, the Australian Agricultural Sustainability Framework will continue to drive the practice change initiatives being delivered (AASF 2021). Specifically:

- help to bolster the Australian agricultural 'brand' by demonstrating the industry's commitment to ongoing stewardship, while proactively identifying emerging challenges (e.g. regulatory, business, market, or social licence);
- assist farmers to continuously improve on farm management practices; and
- enable consistent understanding of intent through clear language and descriptors (i.e., in domestic and global markets, in government policy, and in industry programs).

Northern Tablelands LLS is participating in an LLS Statewide initiative Measuring What Matters Project to support practice change implementation. This project seeks to understand the impact of our practice change delivery on landholders' adoption of best-practice land and livestock management systems, how we can best influence landholder practice, and how we can best meet landholder needs. Understanding the impact of our services is a core priority for partners, investors, stakeholders, staff and customers.

The project will involve the surveying, baselining and tracking of changes in landholder behaviour and practice over time (i.e. longitudinal study over many years). In addition to this longitudinal study, Northern Tablelands LLS will continue to undertake monitoring of practice change implementation following capacity building initiative over shorter timeframes (3, 6 and 12 months) to help inform annual MERI processes and future initiative design and implementation.

The delivery of practice change initiatives is underpinned by LLS' Advisory services – Strategic principles (NSW LLS 2017). These strategic principles ensure that Northern Tablelands LLS advisory services will:

1. Focus on delivering industry and public benefits, including areas of market failure.
2. Be fit for purpose.
3. Facilitate and enable improved practices.
4. Engage extension specialists to complement technical specialists and researchers from a range of organisations.
5. Be evidence based and outcomes focused.
6. Act as an 'information broker' between primary producers, land managers, researchers, government agencies, Rural Development Corporations, private research providers and markets.
7. Maximise impact through collaboration and partnerships.
8. Use a blend of initiatives that range from 'local' to state-wide activities.
9. Engage with producer led groups to optimise effectiveness of Local Land Services Advisory Services, acknowledging that such groups need to be primary producer or land manager driven.
10. Adopt best practice approaches in service provision that use a full range of platforms.
11. Create detailed primary production and landholder demographics to drive decision making, service delivery and focus effort where there is a genuine need for publicly funded advisory services.



### 6.5.3 EMERGING MARKETS - DEMANDS AND OPPORTUNITIES

Through our regional staff network, Northern Tablelands LLS is in a unique position as an NRM delivery region to provide analysis, guidance and input into research, and the development of programs that drive solutions to key industry scale issues. We will build partnerships with government and industry organisations and contribute to improving outcomes for industry.

Our Agriculture Services staff have expert skills in developing and delivering extension, advisory and capacity building programs that provide producers with the understanding and skills to implement practice change and adopt new technologies. These skills combined with an ongoing focus on extension and incentive partnerships with industry and research institutions (NSW LLS 2021c).

We will continue to grow our partnerships with government, industry and private organisations to help drive the adoption of new technologies, techniques, and innovation strategies that support landholders to adapt to significant changes in climate and market demands for providence and sustainable production (NSW LLS 2021d).

In addition to supporting climate change adaptation and meeting market demands associated with agriculture, there are a range emerging market and technology opportunities that landholders in the region have told us they want to know more about. Feedback also indicated that landholders are more likely to adopt new opportunities, or respond to market demands, where financial considerations are met and where leading farmers (or champions) demonstrate and model best-practice to others in the region (NSW LLS 2021c). Northern Tablelands LLS will support this approach to facilitate a greater awareness of emerging market demands and opportunities.

Opportunities and market demands identified within agricultural industry strategies are wide and varied. Specific examples for the Northern Tablelands region include business income diversification opportunities associated with carbon and biodiversity stewardship markets; regenerative agriculture methods and technologies; human health associated with food and fibre production and consumption, animal welfare social licence considerations, maintaining export market access through satisfying demands for providence and sustainability.

## 7 Socio-ecological landscapes

Socio-ecological landscapes (SELs) are a useful tool in NRM. They recognise that people and their livelihoods depend on the health and productivity of the natural resources that make up the landscape, and that the way they live on the land can strongly influence this health and productivity.

SELs have previously been defined by the Northern Tablelands LLS to assist with implementation of services at a strategic scale for the region. The definition of a SEL varies and is somewhat dependent on the inputs used to develop them. Generally, a SEL is defined as a geographical area of a broader region:

- Where there is a unique relationship between a community of people and the resources and services provided by ecosystems
- And where the ecosystem dynamics are influenced, to varying degrees, by people's activities (Chapin, Folke et al., 2009; NSW CAM, 2013).

SELs are developed using ecological, biophysical, economic and social (including cultural and political) data which is analysed to identify unique patterns in how these varying characteristics integrate and depend upon on another (NSW CAM, 2013).

SELs were first introduced and defined for parts of the Northern Tablelands region as part of the *Border Rivers-Gwydir 2013–2023 Catchment Action Plan* which covered an area larger than the current Northern Tablelands LLS boundary. When LLS became operational in 2014, Northern Tablelands LLS engaged Spatial Solutions Experts to revise (reorganise and redefine) the SEL boundaries to conform with the Northern Tablelands LLS administrative boundary. This process involved detailed spatial analysis of multiple biophysical, economic and social data sets, as well as consultation with LLS staff. Details of the original SEL process and subsequent revisions are provided in the NT LLS NRM Plan Evidence Plan that supports this document.



The SEL revision defined nine SELs for the Northern Tablelands region (see the Figures in Section 6 for maps showing the SEL locations), which have been consistently used across Northern Tablelands LLS' planning documents (NSW LLS, 2014). Updated spatial information has been used when developing this NRM Plan as the original SEL data was collated in 2014. The following sections provide an overview of the SELs including their defining features and values.

### 7.1 WILD RIVERS COUNTRY (SEL 1)

SEL 1 (Wild Rivers Country) is located along the eastern fall of the Great Dividing Range, covering the mid to lower eastern and southern tip of the Northern Tablelands region (Figure 13). The SEL has a large proportion of conservation land (50.5 per cent) and some areas of productive agricultural land. The western boundary of the SEL extends through the high-altitude eastern escarpment which includes Gibraltar Range, Guy Fawkes and Cathedral Rocks National Parks.

Compared to the other SELs, it has the lowest population, with no major towns, and the highest extent of native vegetation. It also includes reserves which comprise the Gondwana Rainforests of Australia World Heritage Area (NSW LLS, 2014). These reserves cover 16.5 per cent of the SEL and are:

- Werrikimbee National Park
- Mount Seaview Nature Reserve
- Parts of Oxley Wild Rivers National Park

The large extent of native vegetation provides habitat which supports many threatened species, including:

- Grey Falcon (*Falco hypoleucos*)  
– Endangered (NSW) and Vulnerable (Commonwealth)
- Hastings River Mouse (*Pseudomys oralis*)  
– Endangered (NSW and Commonwealth)
- Parma Wallaby (*Macropus parma*) – Vulnerable (NSW)
- Rufous Scrub-bird (*Atrichornis rufescens*)  
– Vulnerable (NSW) and Endangered (Commonwealth)
- Scrub Turpentine (*Rhodamnia rubescens*)  
– Critically endangered (NSW and Commonwealth)

A high number of endemic and/or reliant species have also been recorded in the SEL, particularly within and around Cathedral Rock National Park which contains one of the three known populations of Montane Green Five-corners (*Styphelia perileuca*) which is listed as vulnerable (NSW and Commonwealth) (NSW OEH, 2020e). Soft Grevillea (*Grevillea mollis*) and Floyd's Zieria (*Zieria floydii*), both listed as endangered (NSW and Commonwealth), are known to only occur in two National parks in Australia (NSW OEH, 2018c, 2020f). One of these, the Gibraltar Range National Park, predominantly occurs in SEL 1. In NSW, *Cucumis althaeoides* and Gorge Rice-flower (*Pimelea cremnophila*), both critically endangered, are only known to occur within Oxley Wild Rivers National Park within SEL 1. The population of both species in the National Park are very low, consisting of less than 100 individuals (NSW OEH, 2019b, 2020c). Other endemic and /or reliant species known to occur in SEL 1 include:

- Dungowan Starbush (*Asterolasia beckersii*)  
– Critically endangered (NSW and Commonwealth)
- Gibraltar Grevillea (*Grevillea rhizomatosa*)  
– Vulnerable (NSW and Commonwealth)
- Guthrie's Grevillea (*Grevillea guthrieana*)  
– Endangered (NSW and Commonwealth)

Agricultural activities are less extensive than most other SELs and mostly consist of cattle grazing. Two small towns, Nowendoc and Ebor, are present in the SEL and parts the Local Government Areas (LGA's) of Walcha, Armidale Regional and Glen Innes Severn fall within the SEL.

Given the large extent of native vegetation (89 per cent of the SEL) which provides habitat to a number of threatened species and communities, as well as the World Heritage Area, a key priority for this SEL is ensuring an appropriate balance of land use within the landscape and encouraging beneficial land practices which help increase connectivity.

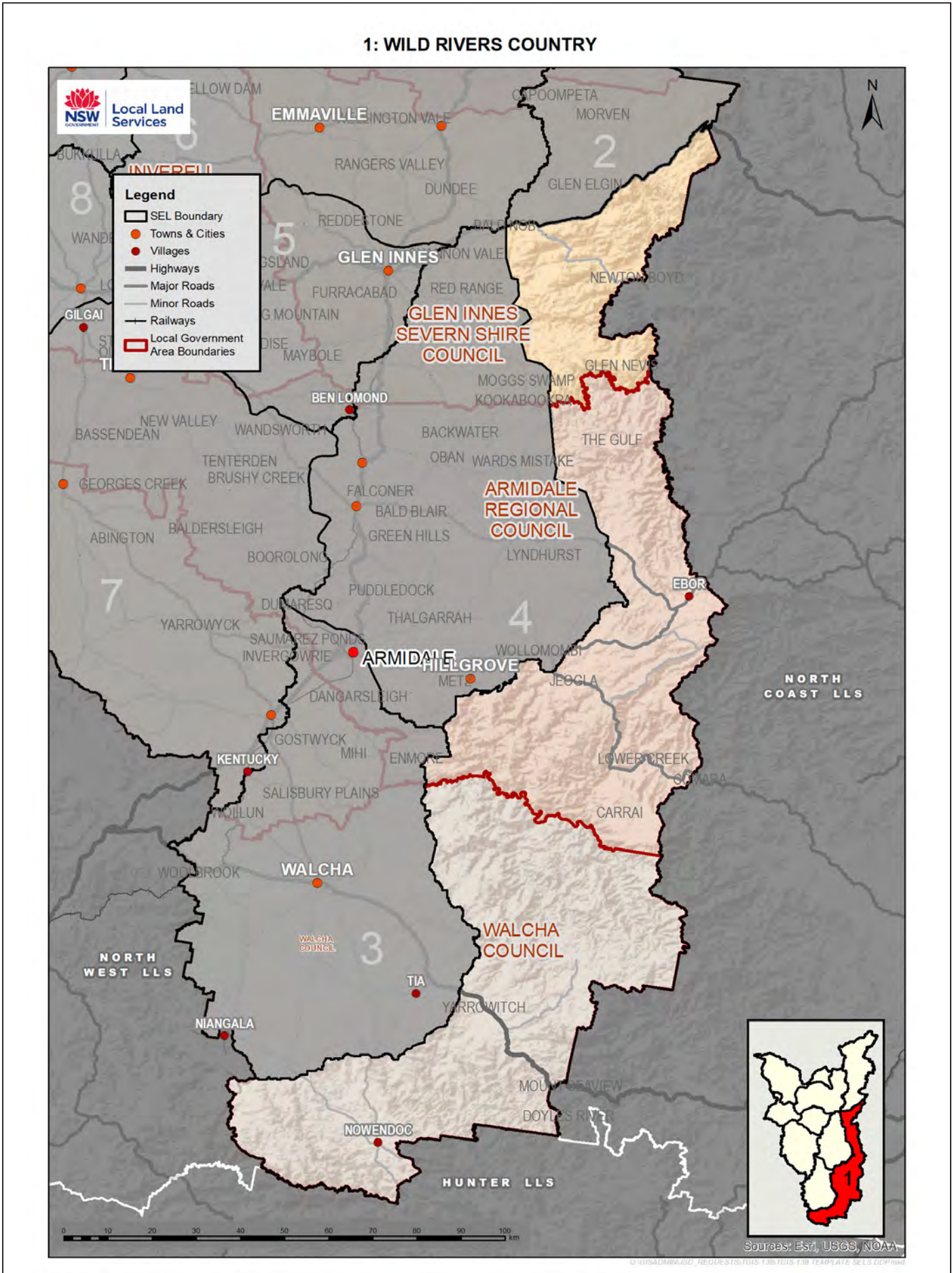
Table 5 below provides an overview of SEL 1 including the relevant NRM Plan themes and values.

**TABLE 5: SEL 1 DEFINING FEATURES AND ASSETS**

FEATURE	SEL OVERVIEW
Size	742,927 ha
Proportion of NT Region	18.8%
Population	582
Major towns	None present (small towns: Nowendoc and Ebor)
Major land uses (% of SEL area)	Conservation (50.5%) and grazing (19.9%)
NRM THEMES AND VALUES	
Terrestrial biodiversity	Native vegetation extent: 657,964 ha (89%) Protected areas: 375,263 ha (50.5%) World Heritage Area: 122,933 ha (16.5%) TSRs: 3,843 ha (0.5%) Number of different threatened species recorded: 111 Number of different endemic and/or reliant species recorded: 27
Soils	Fertility: Generally low to moderately low with areas of higher fertility Salinity hazard: Mostly very low salinity hazard
Water	Total stream length: 1,668 km Upland wetlands: 2 wetlands (15.5 ha)
People and communities	Strategic agricultural land: 10,482 ha (1.4%) Grazing: 147,591 ha (19.9%) Cropping: 3,528 ha (0.5%) Forestry: 92,452 ha (12.4%) Percentage of landholdings without PICs*: 18% Aboriginal heritage sites: 269

\*Indicator of the number of properties within SEL that are not running livestock or non-compliant

FIGURE 13: WILD RIVERS COUNTRY





Along with SEL 1, SEL 2 also supports a high number of endemic and/or species that are reliant on the SEL. This includes:

- Crescent-leaved Homoranthus (*Homoranthus lunatus*), listed as vulnerable (NSW and Commonwealth) and is restricted to the New England Tablelands, with known populations in Bald Rock and Boonoo Boonoo National Parks (NSW OEH, 2018b)
- Gibraltar Grevillea (*Grevillea rhizomatosa*) – Vulnerable (NSW and Commonwealth)
- Mountain Frog (*Philoria kundagungan*) – Endangered (NSW and Commonwealth)

Soil fertility in the SEL ranges from low to moderately high and supports a range of agricultural activities, including cattle grazing and areas of fruit and vegetable production. Timber production also occurs within the SEL (NSW LLS, 2014).

The towns of Urbenville, Legume and Woodenbong occur in the north of the SEL and the town of Drake occurs on the eastern side. Glen Innes Severn and Tenterfield Local Government Areas fall within the SEL. The SEL consists of a mosaic of agricultural land and native vegetation and therefore requires an appropriate balance of land use within the landscape. Maintaining and improving connectivity and native vegetation extent through improved management practices is therefore a priority for the SEL (NSW LLS, 2014).

Table 6 provides an overview of SEL 2 including the relevant NRM Plan themes and values.

## 7.2 WILD COUNTRY (SEL 2)

SEL 2 (Wild Country) extends from the northern tip of SEL 1 along the north-eastern side of the Northern Tablelands (Figure 14). The SEL consists of steep terrain along the eastern fall of the Great Dividing Range which limits agricultural activity. The area comprises both highly productive agricultural land and large areas protected for conservation, including the following reserves which comprise the Gondwana Rainforests of Australia World Heritage Area (covering 5.5 per cent of the SEL area) (NSW LLS, 2014):

- Washpool National Park
- Gibraltar Range National Park
- Captains Creek Nature Reserve

Native vegetation covers 83 per cent of the SEL and provides habitat to many threatened species including:

- Black-striped Wallaby (*Macropus dorsalisz*) – Endangered (NSW)
- Coxen’s Fig-Parrot (*Cyclopsitta diophthalma coxeni*) – Critically endangered (NSW) and Endangered (Commonwealth)
- Fleay’s Barred Frog (*Mixophyes fleayi*) – Endangered (NSW and Commonwealth)
- Hastings River Mouse (*Pseudomys oralis*) – Endangered (NSW and Commonwealth)
- *Lenwebbia sp. Main Range* - Critically endangered (NSW)
- Scrub Turpentine (*Rhodamnia rubescens*) – Critically endangered (NSW and Commonwealth)
- Stuttering Frog (*Mixophyes balbus*) – Endangered (NSW) and Vulnerable (Commonwealth)



**TABLE 6: SEL 2 DEFINING FEATURES AND ASSETS**

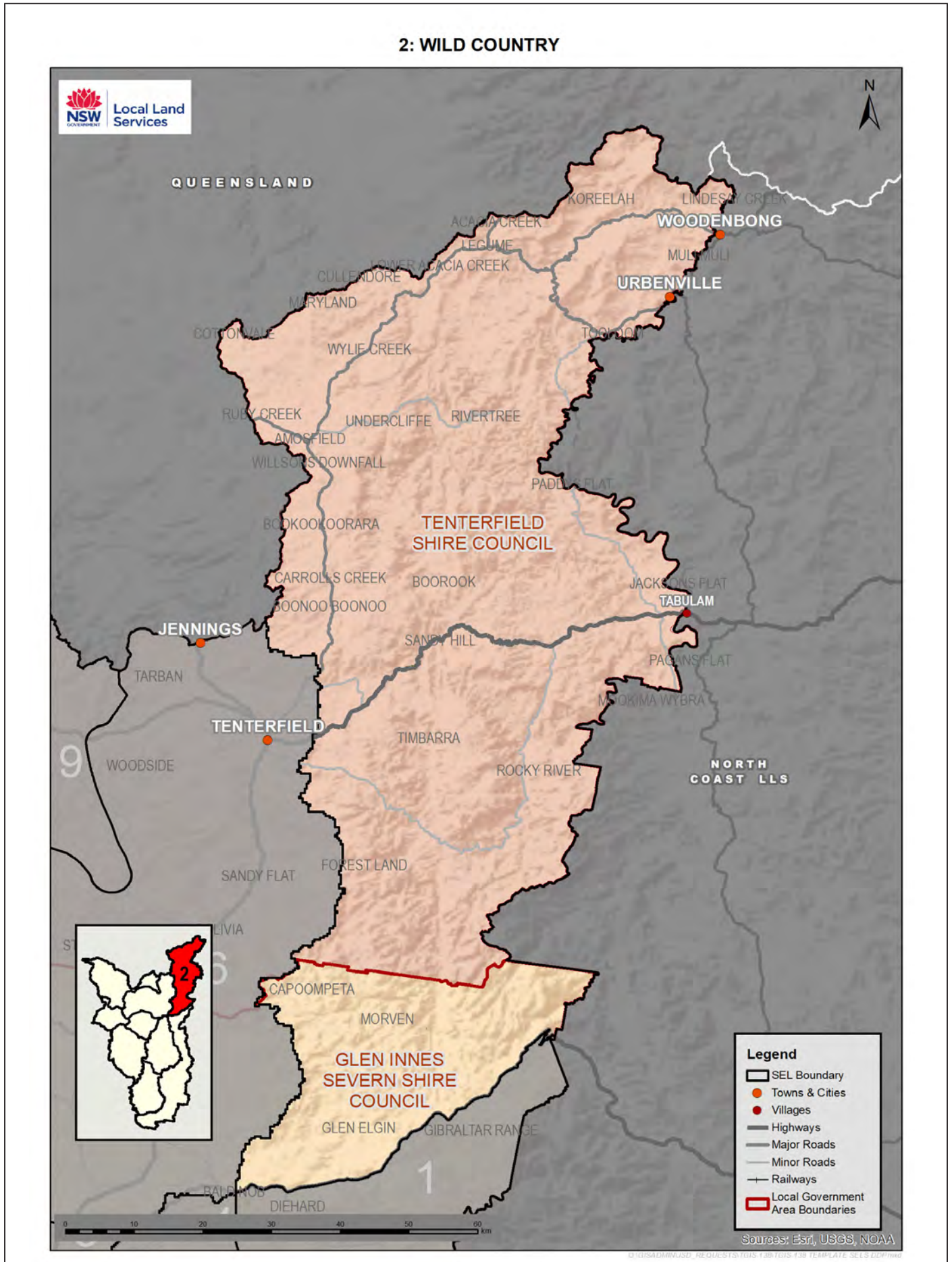
FEATURE	SEL OVERVIEW
Size	526,773 ha
Proportion of NT Region	13.3%
Population	2,797
Major towns	None present (small towns: Urbenville, Legume, Woodenbong and Drake)
Major land uses (% of SEL area)	Grazing (35.3%) and conservation (21.9%)
NRM THEMES AND VALUES	
Terrestrial biodiversity	Native vegetation extent: 438,028 ha (83%) Protected areas: 115,320 ha (21.9%) World Heritage Area: 28,835 ha (5.5%) TSRs: 4,236 ha (0.8%) Number of different threatened species recorded: 126 Number of different endemic and/or reliant species recorded: 22
Soils	Fertility: generally moderately low to moderately high Salinity hazard: Generally very low to moderate salinity hazard
Water	Total stream length: 1,073 km Upland wetlands: none present
People and communities	Strategic agricultural land: 1,278 ha (0.2%) Grazing: 18,5913 ha (35.3%) Cropping: 2,752 ha (0.5%) Forestry: 82,729 ha (15.7%) Percentage of landholdings without PICs*: 39% Aboriginal heritage sites: 86

\*Indicator of the number of properties within SEL that are not running livestock or non-compliant





FIGURE 14: WILD COUNTRY



### 7.3 COOL COUNTRY (SEL 3)

SEL 3 (Cool Country) is located in the lower north-west of the Northern Tablelands, bordered by SEL 1 in the east (Figure 15). The area has a high altitude which results in a localised climate of cold winters and mild summers (NSW LLS, 2014).

The SEL contains two major population centres, Armidale and Walcha, which are supported by several economic drivers. Agriculture is the dominant land use in the SEL, mostly consisting of beef and sheep grazing, as well as dairy industries. The SEL also supports a number of light industries, UNE, New England TAFE and boarding schools. Walcha is a significant supplier of native hardwoods and softwoods. The SEL has a high population, high employment rate and significant infrastructure including:

- The region's main airport (Armidale Airport)
- The region's main hospital (Armidale Hospital)
- A number of health services

This makes the SEL one of the most socio-economically developed in the Northern Tablelands region (NSW LLS, 2014).

Native vegetation is not extensive throughout the SEL (37 per cent). However, a number of threatened, endemic and/or reliant species are known to occur within the SEL. Bluegrass (*Dichanthium setosum*) is listed as vulnerable (NSW and

Commonwealth) and commonly occurs in moderately to highly disturbed grassy woodlands, grasslands and pastures. In the Armidale region of SEL 3, it commonly occurs on privately owned land (NSW OEH, 2019a).

Narrow-leaved *Bertya* (*Bertya ingramii*), which is listed as endangered (NSW and Commonwealth), and Gorge Hakea (*Hakea fraseri*), listed as vulnerable (NSW and Commonwealth), are only known to occur within and surrounding the Oxley Wild Rivers National Park within SEL 3 (NSW OEH, 2018e, 2020b).

Bell's Turtle (*Myuchelys bellii*) occurs within aquatic and riparian habitat in SEL 3. This species is endemic to the upper reaches of the Namoi, Gwydir and Border Rivers systems within NSW (a smaller, disjunct population also occurs in QLD) and most of the priority management sites under the NSW Saving our Species (SoS) program are within the Northern Tablelands region, including Armidale and Walcha (NSW OEH, 2018g, 2021b).

There is significant potential to increase native vegetation extent across SEL 3 through rehabilitation and improved land management practices. Given the high levels of livestock and other agriculture industries, biosecurity incidents pose a significant threat to the SEL and therefore weed and pest management is also a priority (NSW LLS, 2014).

Table 7 provides an overview of SEL 3 including the relevant NRM Plan themes and values.

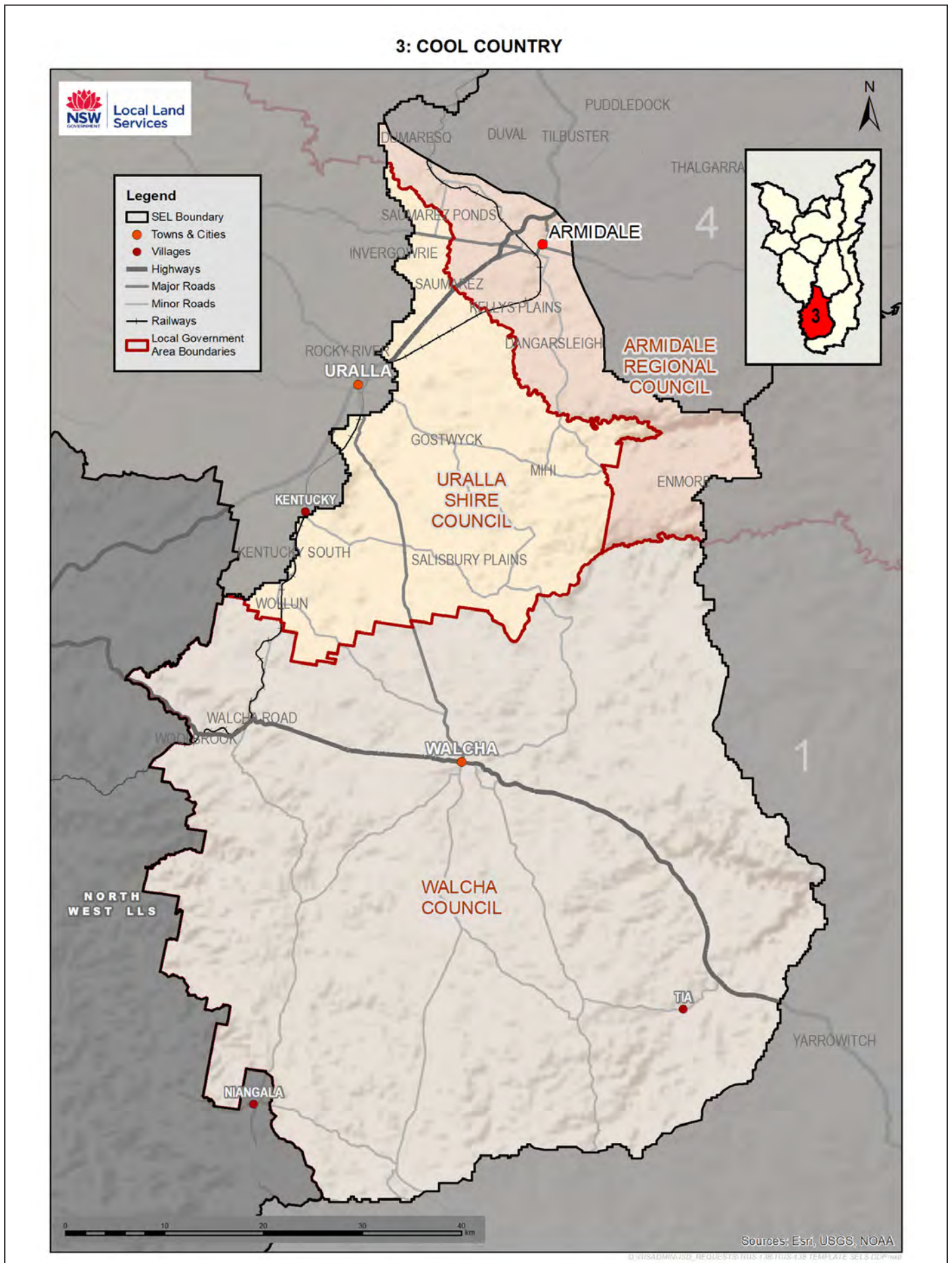
TABLE 7: SEL 3 DEFINING FEATURES AND ASSETS

FEATURE	SEL OVERVIEW
Size	382,924 ha
Proportion of NT Region	9.7%
Population	23,372
Major towns	Armidale and Walcha
Major land uses (% of SEL area)	Grazing (84.2%)
NRM THEMES AND VALUES	
Terrestrial biodiversity	Native vegetation extent: 143,543 ha (37%) Protected areas: 9,653 ha (2.5%) World Heritage Area: 7,813 ha (2.0%) TSRs: 2,488 ha (0.6%) Number of different threatened species recorded: 57 Number of different endemic and/or reliant species recorded: 13
Soils	Fertility: generally moderately low to moderately high Salinity hazard: Generally very low to moderate salinity hazard
Water	Total stream length: 717 km Upland wetlands: 16 wetlands (221 ha)
People and communities	Strategic agricultural land: 33,639 ha (8.8%) Grazing: 322,433 ha (84.2%) Cropping: 21,511 ha (5.6%) Forestry: 5,324 ha (1.4%) Percentage of landholdings without PICs*: 12% Aboriginal heritage sites: 175



\*Indicator of the number of properties within SEL that are not running livestock or non-compliant

FIGURE 15: COOL COUNTRY



## 7.4 HIGH FALL COUNTRY (SEL 4)

SEL 4 (High Fall Country) is located in the centre of the Northern Tablelands region, lying on the eastern side of the Great Dividing Range (which forms the western boundary of the SEL) (Figure 16). The main population centre is Guyra in the west, along with the towns of Wollomombi and Hillgrove on the southern boundary. The SEL has a high altitude and experiences a cold winter, with regular frosts and occasional snow, and mild summers. SEL 4 contains some land with high soil fertility as a result of areas of tertiary volcanic basaltic rocks. The fertile soils, paired with high rainfalls, supports a significant agricultural industry which is mostly comprised of grazing (beef, lamb and merino wool). The area also supports summer cropping of potatoes and intensive tomato growing (due to the abundant water supply and frequent sunshine) (NSW LLS, 2014).

Additionally, the economy is supported by the annual Lamb and Potato Festival in Guyra, as well Landcare networks (Southern New England Landcare [SNEL] and Glen Innes Resource Advisory Committee [GLENRAC]) and community organisations (Lions and Rotary). There are high levels of employment, and the community benefits from its proximity to Armidale (NSW LLS, 2014).

The SEL has the highest proportion of upland wetlands, both in terms number (30 wetlands) and area (1,378 ha). Some of the wetlands also comprise a Ramsar site, Little Llangothlin Lagoon, which is around 255 ha in size and contains four wetland types including a permanent freshwater lake of 105 ha. The site supports a number of threatened and priority species and ecological communities, with the lake providing an important drought refuge for waterbirds (Cibilic & White, 2011).

The waterways and wetlands of the SEL are surrounded by mostly cleared grazing land with patches of native vegetation. This provides significant opportunities for restoration and improvement of native vegetation (NSW LLS, 2014). SEL 4 consists of mostly cleared grazing land, with a lesser extent of native vegetation. Similar to SEL 3, Bluegrass regularly occurs on disturbed land in SEL 4 (NSW OEH, 2019a). Small Snake Orchid (*Diuris pedunculata*) an endangered species (NSW and Commonwealth) and Backwater Grevillea (*Grevillea scortechinii subsp. sarmentosa*), listed as Vulnerable in NSW, are both considered to be restricted to the New England Tablelands, with a number of records occurring near Guyra (NSW OEH, 2018f, 2020a).

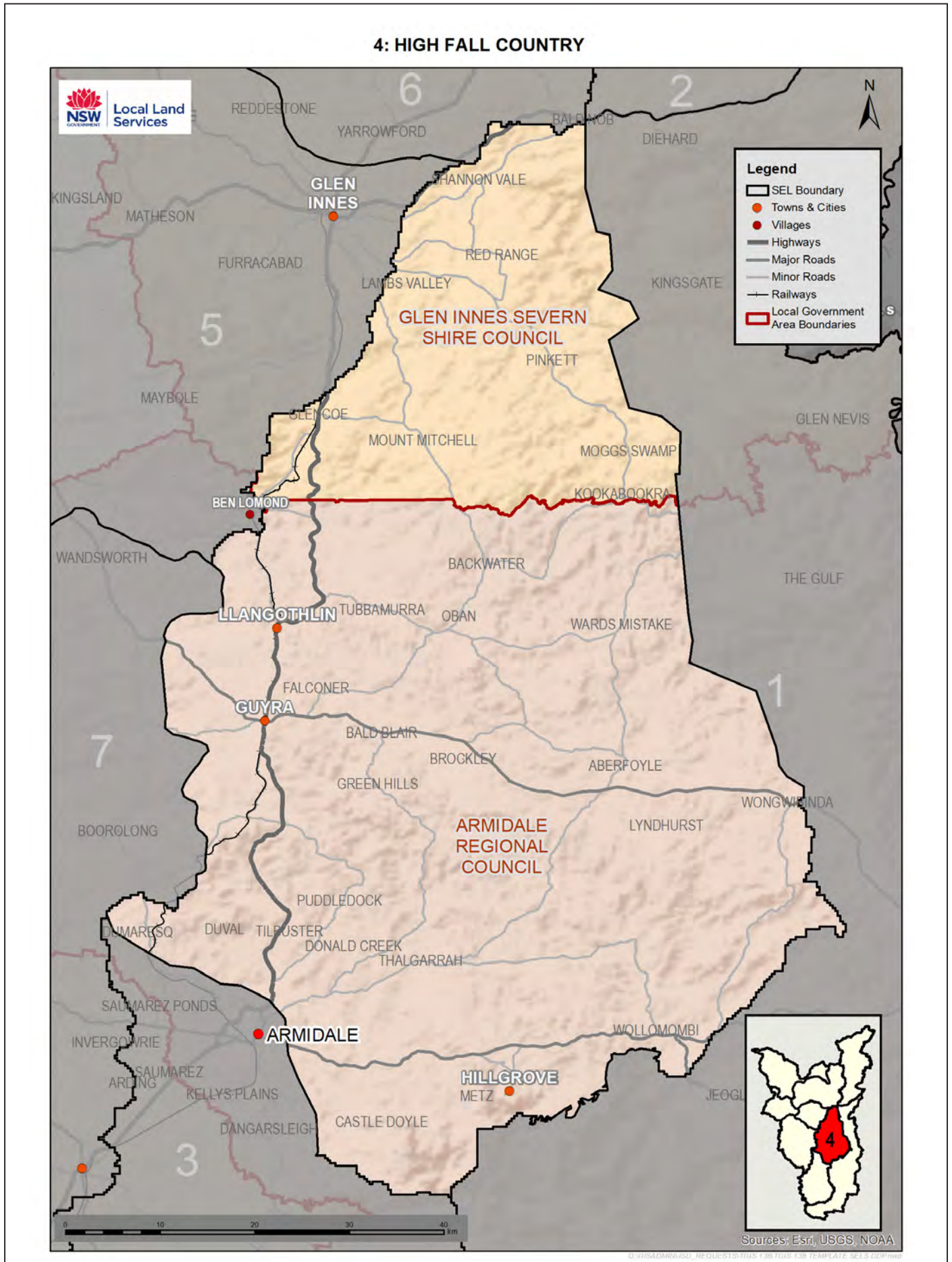
Table 8 provides an overview of SEL 4 including the relevant NRM Plan themes and values.

**TABLE 8: SEL 4 DEFINING FEATURES AND ASSETS**

FEATURE	SEL OVERVIEW
Size	417,377 ha
Proportion of NT Region	10.6%
Population	6,970
Major towns	Guyra
Major land uses (% of SEL area)	Grazing (83.3%)
NRM THEMES AND VALUES	
Terrestrial biodiversity	Native vegetation extent: 188,967 ha (45%) Protected areas: 7,725 ha (1.9%) World Heritage Area: 1,835 ha (0.4%) TSRs: 4,357 ha (1.0%) Number of different threatened species recorded: 75 Number of different endemic and/or reliant species recorded: 20
Soils	Fertility: Mostly moderately low with areas of higher fertility Salinity hazard: Generally very low to moderate salinity hazard
Water	Total stream length: 655 km Upland wetlands: 30 wetlands (1,3773 ha) RAMSAR wetlands: 254 ha (0.06%)
People and communities	Strategic agricultural land: 10,485 ha (2.5%) Grazing: 347,783 ha (83.3%) Cropping: 15,124 ha (3.6%) Forestry: 1,381 ha (0.3%) Percentage of landholdings without PICs*: 9% Aboriginal heritage sites: 218

\*Indicator of the number of properties within SEL that are not running livestock or non-compliant

FIGURE 16: HIGH FALL COUNTRY



## 7.5 BASALT COUNTRY (SEL 5)

SEL 5 (Basalt Country) is located in the centre of the Northern Tablelands region and land use is dominated by agricultural practices (Figure 17). Agriculture mostly comprises of grazing (89.3 per cent) for beef, lamb and wool production, as well as some cropping in summer (7.7 per cent). Along with SEL 4, this SEL is also located on volcanic basaltic rocks, resulting in moderately high to high fertility soils (NSW LLS, 2014).

The major town of Glen Innes is located in the east and has a strong agricultural focus. Two Landcare networks operate in this area - GLENRAC and Gwydir and Macintyre Resources Management Committee (GWYMAC). Based on the proportion of landholders with property identification code (PICs), Landowners in the area are considered to be highly compliant with the National Livestock Identification System (NLIS), compared to other SELs. Along with agriculture, the economy is supported by a small amount of sapphire mining (NSW LLS, 2014).

SEL 5 has a similar level of native vegetation extent to SEL 3 and 4, and very little of the vegetation is protected in conservation estate. Given the large areas of degraded vegetation used for grazing, the SEL has a low number of threatened species; however, Bluegrass regularly occurs in the SEL (NSW LLS, 2014; NSW OEH, 2019a). A high number of records for Blackbutt Candlebark (*Eucalyptus rubida subsp. barbigerorum*), listed as Vulnerable (NSW and Commonwealth), also occur in the SEL. This species is restricted to scattered populations in the Northern Tablelands region, generally on private land (NSW OEH, 2018a).

The SEL contains over 240 km of waterways which provide water for stock and support aquatic ecosystems, including habitat for the Bell's turtle. Improving riparian vegetation extent and quality is a priority for the SEL to help maintain adequate water quality. The SEL also has a high salinity risk which poses a significant threat to agriculture. Increasing native vegetation extent for habitat connectivity and shade for stock is another key focus for improvement (NSW LLS, 2014).

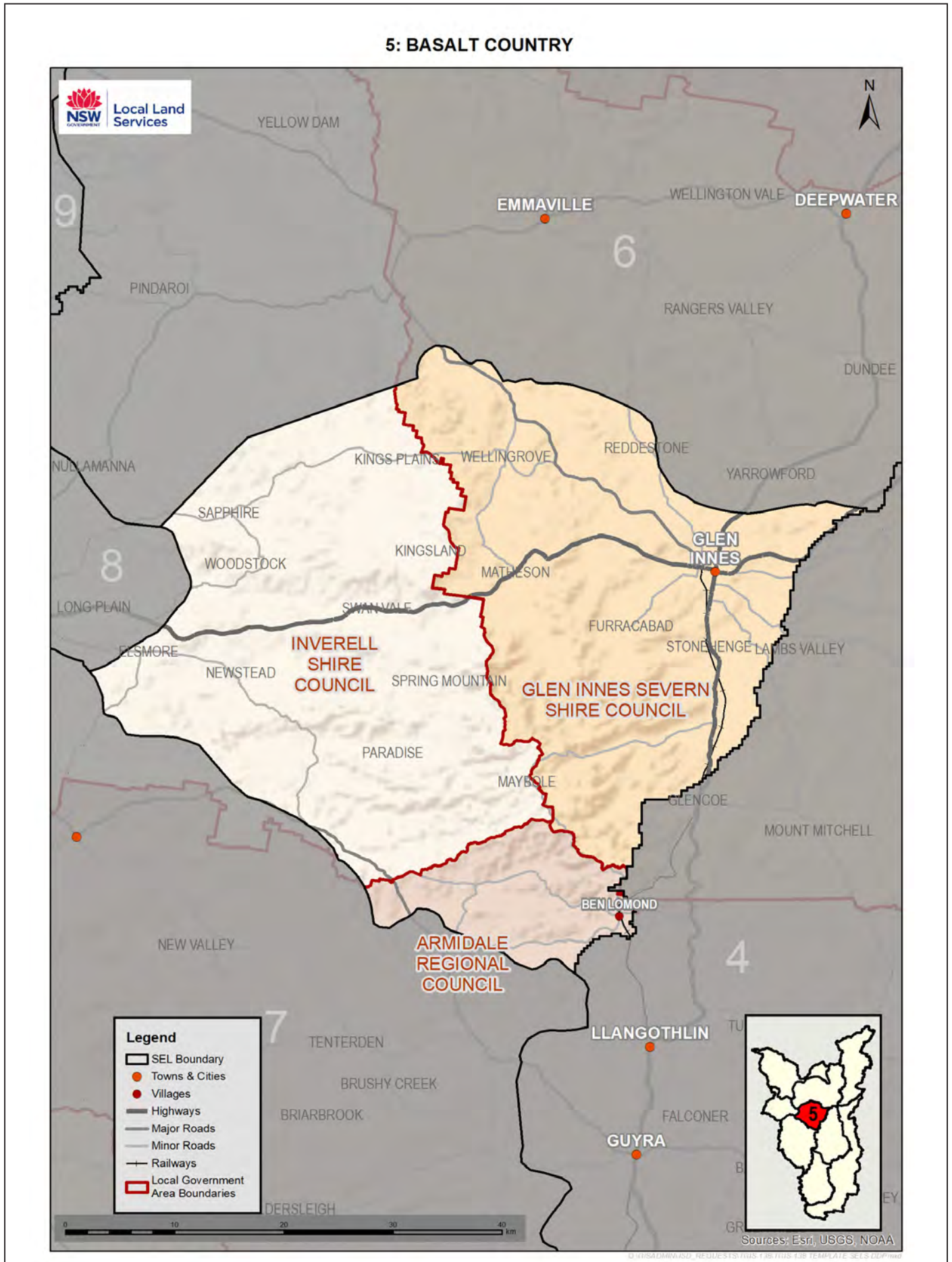
Table 9 provides an overview of SEL 5 including the relevant NRM Plan themes and values.

**TABLE 9: SEL 5 DEFINING FEATURES AND ASSETS**

FEATURE	SEL OVERVIEW
Size	195,671 ha
Proportion of NT Region	5.0%
Population	7,322
Major towns	Glen Innes
Major land uses (% of SEL area)	Grazing (89.3%)
NRM THEMES AND VALUES	
Terrestrial biodiversity	Native vegetation extent: 82,089 ha (42%) Protected areas: 501 ha (0.3%) TSRs: 2,800 ha (1.4%) Number of different threatened species recorded: 41 Number of different endemic and/or reliant species recorded: 9
Soils	Fertility: Generally moderately high to high Salinity hazard: Mostly moderate salinity hazard
Water	Total stream length: 662 km Upland wetlands: 9 wetlands (182 ha)
People and communities	Strategic agricultural land: 46,374 ha (23.7%) Grazing: 174,694 ha (89.3%) Cropping: 15,096 (7.7%) Forestry: 53 ha (0.03%) Percentage of landholdings without PICs*: 8% Aboriginal heritage sites: 75

\*Indicator of the number of properties within SEL that are not running livestock or non-compliant  
Indicator of the number of properties within SEL that are not running livestock

FIGURE 17: BASALT COUNTRY



## 7.6 GRANITE COUNTRY (SEL 6)

SEL 6 (Granite Country), located in the north of the Northern Tablelands region, consists of predominantly granite-based soils which are less fertile than some other SELs located further south (Figure 18). Land use primarily consists of grazing (80.4 per cent) for beef, lamb and wool production, as well as some limited areas of cropping. Compared to other SELs in the region, more than a quarter of landholding do not run stock or are non-compliant. (NSW LLS, 2014).

Native vegetation covers large proportions of the SEL (68 per cent), some of which is protected (12 per cent). The native vegetation provides habitat for a number of threatened species including the Regent Honeyeater (*Anthochaera phrygia*), listed as critically endangered (NSW and Commonwealth) and the Turquoise Parrot (*Neophema pulchella*) listed as vulnerable (NSW).

Conservation areas include:

- Bald Rock, Kings Plains, Butterleaf and Capoompeta National Parks
- Torrington and Currys Gap State Conservation Areas
- Severn, Bolivia Hill, Donnybrook and Bluff River Nature Reserves.

A number of these conservation areas contain unique granite rock formations providing aesthetic and environmental value to the area, including key habitat for species that are threatened, endemic or reliant on the SEL which prefer rocky habitat or granite-based soils (NSW LLS, 2014; NSW NPWS, 2003). These species include:

- Corben's Long-eared Bat (*Nyctophilus corbeni*) - Vulnerable (NSW and Commonwealth)
- Eastern Cave Bat (*Vespadelus troughtoni*) - Vulnerable (NSW)
- Border Thick-tailed Gecko (*Uvidicolus sphyrurus*) - Vulnerable (NSW and Commonwealth)

- Bolivia Wattle (*Acacia pycnostachya*) - Vulnerable (NSW and Commonwealth)
- MacNutt's Wattle (*Acacia macnuttiana*) - Vulnerable (NSW and Commonwealth)
- Velvet Wattle (*Acacia pubifolia*) - Endangered (NSW) and Vulnerable (Commonwealth)
- Granite Boronia (*Boronia granitica*) - Vulnerable (NSW) and Endangered (Commonwealth)
- Rodd's Star Hair (*Astrotricha roddii*) - Endangered (NSW and Commonwealth)
- Tenterfield Mint-bush (*Prostanthera staurophylla*) - Endangered (NSW) and Critically endangered (Commonwealth)

Wallangarra White Gum (*Eucalyptus scoparia*), listed as endangered in NSW and vulnerable at the Commonwealth level, is restricted to three locations in NSW. All of these locations occur near Tenterfield, including Bald Rock National Park (NSW OEH, 2019c).

There is a large extent of TSRs compared to some other SELs, which provides connecting vegetation corridors throughout the SEL. Around 1,500 km of waterways and one upland wetland occur in the SEL, providing habitat for the endemic Bell's turtle. A large proportion of the waterways have been identified as a priority for restoration. Increasing the extent of native vegetation would be beneficial to both the environment and landowners in the region, providing shade for stock and improving water quality (NSW LLS, 2014).

Tenterfield in the north-east and Deepwater in the east are the main towns of the SEL, both of which occur adjacent to waterways (Tenterfield Creek and Deepwater River). Emmaville, a smaller town, is located roughly in the centre of the SEL (NSW LLS, 2014).

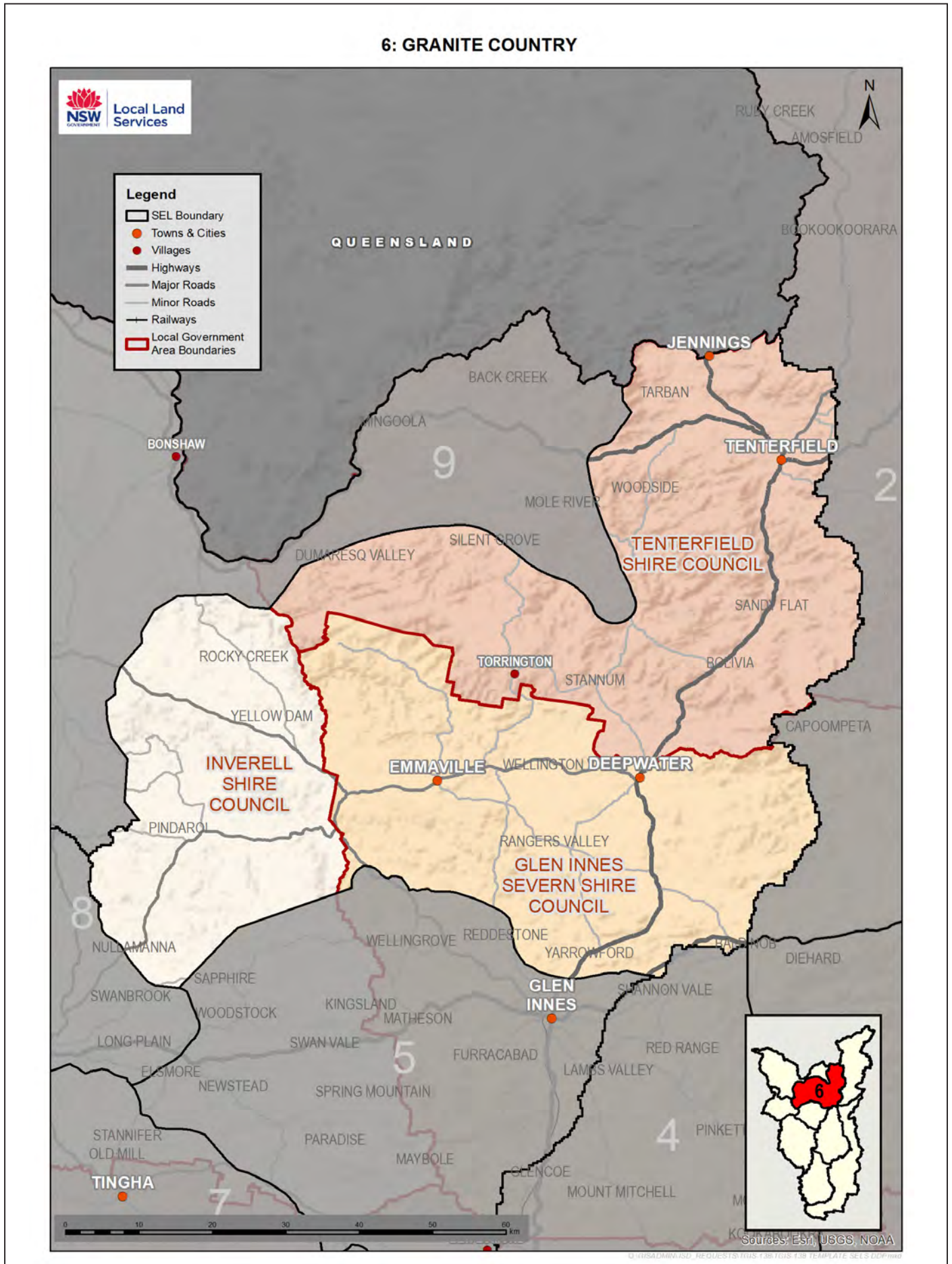
Table 10 provides an overview of SEL 6 including the relevant NRM Plan themes and values.

TABLE 10: SEL 6 DEFINING FEATURES AND ASSETS

FEATURE	SEL OVERVIEW	
Size	486,616 ha	
Proportion of NT Region	12.3%	
Population	6,395	
Major towns	Tenterfield and Deepwater	
Major land uses (% of SEL area)	Grazing (80.4%)	
NRM THEMES AND VALUES		
Terrestrial biodiversity	Native vegetation extent: 330,381 ha (68%) Protected areas: 59,248 ha (12.2%) TSRs: 6,488 ha (1.3%)	Number of different threatened species recorded: 91 Number of different endemic and/or reliant species recorded: 32
Soils	Fertility: generally low to moderately low	Salinity hazard: Generally very low to moderate salinity hazard
Water	Total stream length: 1,498 km	Upland wetlands: 1 wetland (1.3 ha)
People and communities	Strategic agricultural land: 25,564 ha (5.2%) Grazing: 391,055 ha (80.4%) Cropping: 4,723 ha (1.0%)	Forestry: 5,250 ha (1.1%) Percentage of landholdings without PICs*: 26% Aboriginal heritage sites: 225



FIGURE 18: GRANITE COUNTRY



\*Indicator of the number of properties within SEL that are not running livestock or non-compliant

## 7.7 THUNDERBOLTS COUNTRY (SEL 7)

SEL 7 (Thunderbolts Country) is located on the central, western border of the Northern Tablelands region (Figure 19). A number of rural communities occur in the SEL including the major towns of Uralla, Bundarra and Tingha which are supported by agriculture. Land use primarily consists of grazing for beef, lamb and wool (92.2 per cent). The soils are derived of granitic, trap rock and basalt (NSW LLS, 2014).

The Thunderbolt Country SEL is characterised by high vegetative cover, of which 57 per cent is native vegetation. Only a small proportion of the native vegetation is protected, with most occurring as scattered patches throughout the agricultural landscape. There are also 1,602 km of waterways and six upland wetlands in the SEL which are of high cultural significance to the local Aboriginal people (NSW LLS, 2014). The native vegetation, waterways and wetlands support a number of threatened species including Bell's Turtle, Regent Honeyeater and the Swift Parrot (*Lathamus discolor*).

Granite Homoranthus (*Homoranthus prolixus*), listed as vulnerable (NSW and Commonwealth), is known to primarily occur in scattered patches in SEL 7, while Inverell Cycad (*Macrozamia humilis*), listed as endangered (NSW), is restricted to one population in SEL 7, south of Inverell (NSW OEH, 2018d, 2021a).

Restoration and maintenance of the waterways is a priority for the region, providing benefits to both agriculture and native ecosystems. Improving soil condition and groundcover is also important, especially given the high level of salinity risk (NSW LLS, 2014).

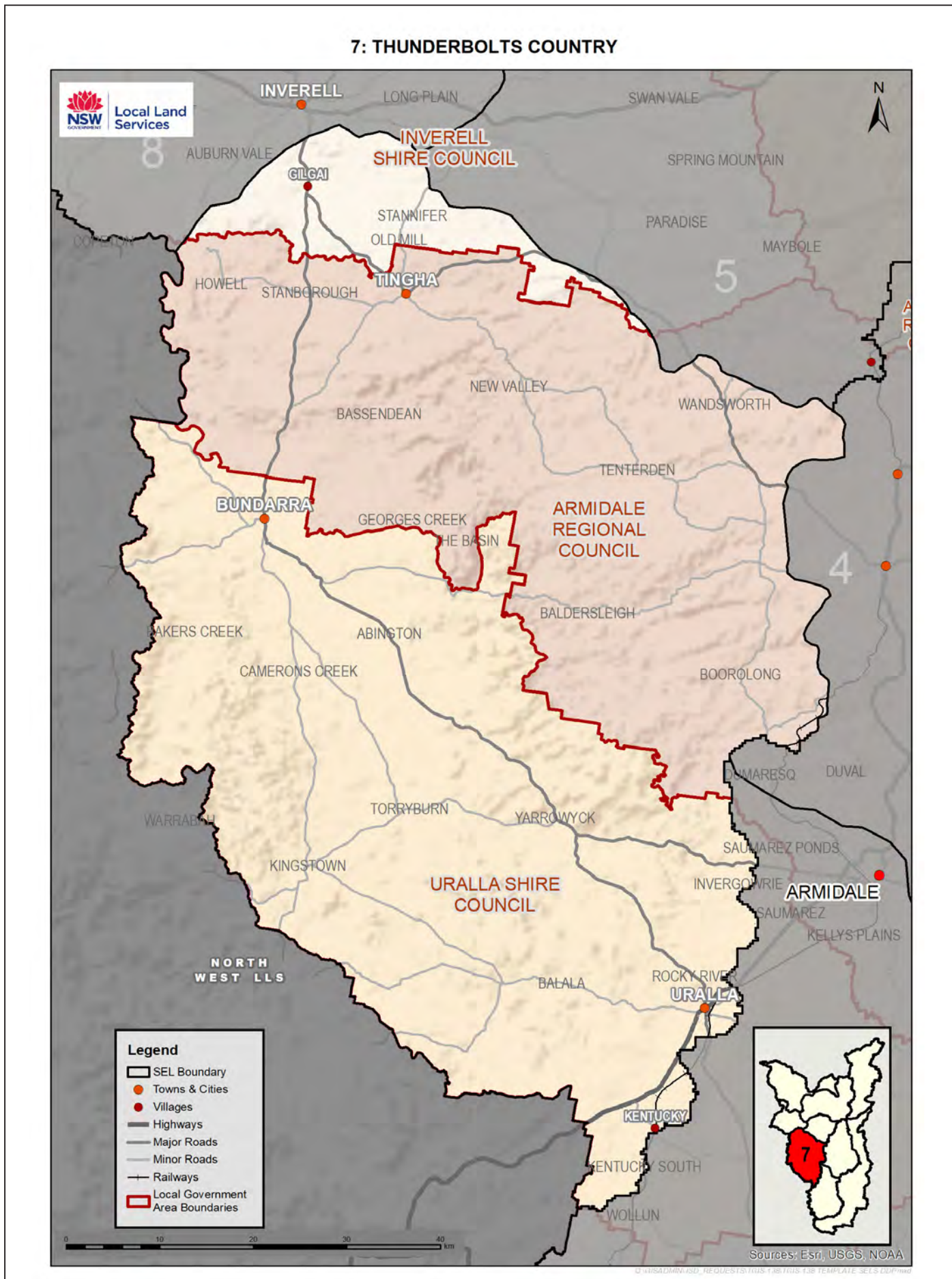
Table 11 provides an overview of SEL 7 including the relevant NRM Plan themes and values.

**TABLE 11: SEL 7 DEFINING FEATURES AND ASSETS**

FEATURE	SEL OVERVIEW
Size	485,278 ha
Proportion of NT Region	12.3%
Population	7,968
Major towns	Uralla, Bundarra and Tingha
Major land uses (% of SEL area)	Grazing (92.2%)
NRM THEMES AND VALUES	
Terrestrial biodiversity	Native vegetation extent: 275,967 ha (57%) Protected areas: 13,280 ha (2.7%) TSRs: 5,232 ha (1.1%) Number of different threatened species recorded: 55 Number of different endemic and/or reliant species recorded: 17
Soils	Fertility: generally low to moderately low Salinity hazard: Generally low to moderate salinity hazard
Water	Total stream length: 1,602 km Upland wetlands: 6 wetlands (70.2 ha)
People and communities	Strategic agricultural land: 14,159 ha (2.9%) Grazing: 447,473 ha (92.2%) Cropping: 14,330 ha (3.0%) Forestry: 2,952 ha (0.6%) Percentage of landholdings without PICs*: 13% Aboriginal heritage sites: 165

\*Indicator of the number of properties within SEL that are not running livestock or non-compliant

FIGURE 19: UNDERBOLT'S COUNTRY



## 7.8 SAPPHIRE COUNTRY (SEL 8)

SEL 8 (Sapphire Country), located on the north-west border of the Northern Tablelands region, has a mixed agricultural landscape with fertile soils resulting from the tertiary volcanic basaltic rocks (Figure 20). Compared with other SELs, the topography is less steep, mostly consisting of undulating hills. Agricultural industries include grazing (beef, lamb and wool), cereal cropping in winter and other summer cropping (NSW LLS, 2014).

There are two main towns in the SEL, Inverell and Delungra, which have a strong agricultural focus. There are also a number of cultural heritage values including old sapphire mining sites and long-established homesteads (NSW LLS, 2014).

The SEL has the lowest proportion of native vegetation compared to other SELs (28 per cent), of which only a small proportion is protected (0.2 per cent conservation area). Improving native vegetation extent through regeneration and restoration, along with improved vegetation management, is therefore a priority for the SEL (NSW LLS, 2014).

Given the low level of native vegetation, the SEL also has the lowest number of recorded threatened species that are endemic or reliant on the area compared to any other SEL. However, Hawkweed (*Picris evae*), listed as vulnerable (NSW and Commonwealth), has been recorded in the Inverell area. This annual plant is rare, with very few recordings across its restricted distribution (NSW OEH, 2020d).

Table 12 provides an overview of SEL 8 including the relevant NRM Plan themes and values.

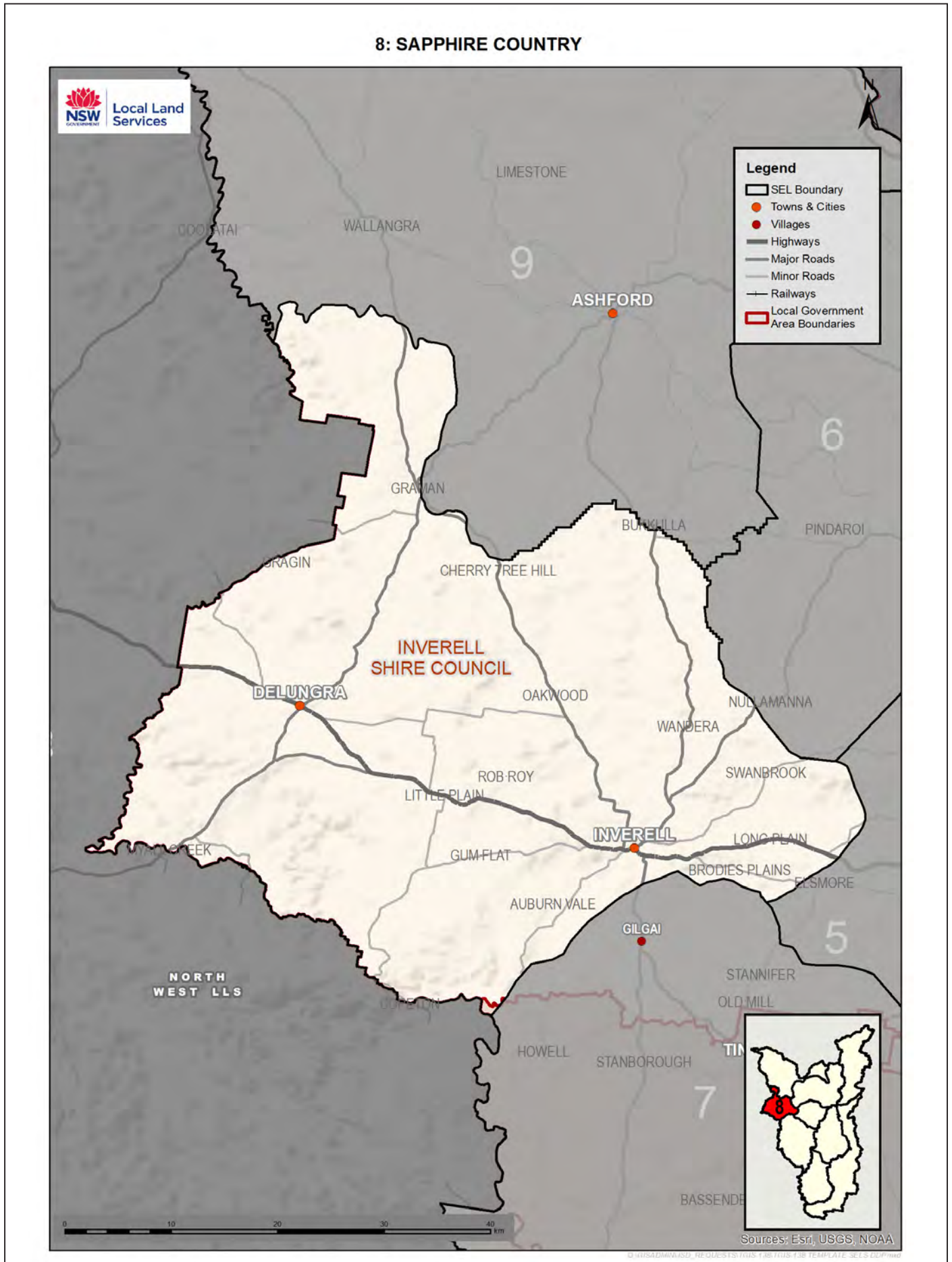


**TABLE 12: SEL 8 DEFINING FEATURES AND ASSETS**

FEATURE	SEL OVERVIEW
Size	199,284 ha
Proportion of NT Region	5.0%
Population	12,311
Major towns	Inverell and Delungra
Major land uses (% of SEL area)	Grazing (60.8%) and cropping (35.1%)
NRM THEMES AND VALUES	
Terrestrial biodiversity	Native vegetation extent: 55,712 ha (28%) Protected areas: 367 ha (0.2%) TSRs: 4,238 ha (2.1%) Number of different threatened species recorded: 34 Number of different endemic and/or reliant species recorded: 7
Soils	Fertility: generally moderately high to high Salinity hazard: Mostly very high salinity hazard, with some areas of moderate and low salinity hazard
Water	Total stream length: 596 km Upland wetlands: none present
People and communities	Strategic agricultural land: 17,137 ha (8.6%) Grazing: 121,134 ha (60.8%) Cropping: 69,870 ha (35.1%) Forestry: 1,429 ha (0.7%) Percentage of landholdings without PICs*: 9% Aboriginal heritage sites: 59

\*Indicator of the number of properties within SEL that are not running livestock or non-compliant

FIGURE 20: SAPPHIRE COUNTRY



## 7.9 COD COUNTRY (SEL 9)

SEL 9 (Cod Country) is located in the north-west corner of the region, with a small portion of the SEL extending across the northern border (Figure 21). The Dumaresq River flows along the northern boundary of the SEL and forms the border between New South Wales and Queensland, while the Macintyre River flows along the western boundary. Although there are no upland wetlands present, a number of other wetlands and lagoons do occur, including Bebo and Bebo West Lagoons, Glenhurst Lagoon, Oak Park Lagoon, and Coomooroo Billabong. These water systems provide key values to both ecosystems and the local community (social and cultural assets) (NSW LLS, 2014).

The SEL consists of a diverse geology including granite and ancient sedimentary rocks which results in generally low to moderate soil fertility (NSW LLS, 2014). The granite gorges and rocky outcrops, particularly within Kwiambal National Park (NSW NPWS, 2003, 2021), provide habitat for a number of threatened bats, including:

- Corben's Long-eared Bat (*Nyctophilus corbeni*)  
– Vulnerable (NSW and Commonwealth)
- Eastern Cave Bat (*Vespadelus troughtoni*)  
– Vulnerable (NSW)
- Little Pied Bat (*Chalinolobus picatus*)  
– Vulnerable (NSW)
- Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*)  
– Vulnerable (NSW) Other notable threatened species that occur within SEL 9 include:
- Ooline (*Cadellia pentastylis*)  
– Vulnerable (NSW and Commonwealth)
- Black-striped Wallaby (*Macropus dorsalis*)  
– Endangered (NSW)

The dominant land use is grazing (80.1 per cent) along with small areas of cropping.. 62 per cent of the SEL consists of native vegetation, a large proportion of which is located in rugged terrain with limited access. Conservation accounts for almost 10 per cent of the land use, including Kwiambal and Dthinna Dthinnawan National Parks (NSW LLS, 2014).

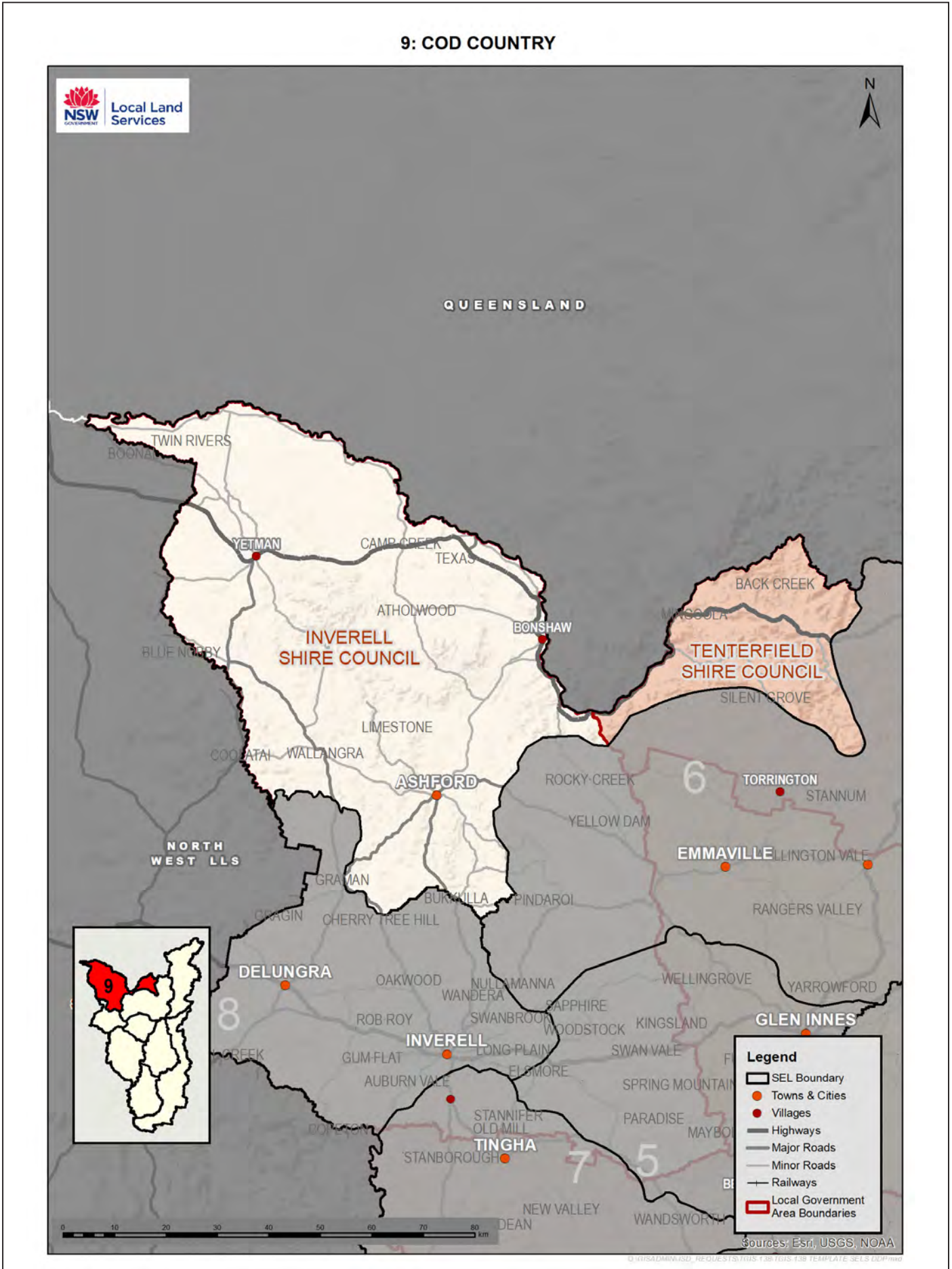
Table 13 provides an overview of SEL 9 including the relevant NRM Plan themes and values.

**TABLE 13: SEL 9 DEFINING FEATURES AND ASSETS**

FEATURE	SEL OVERVIEW
Size	512,675 ha
Proportion of NT Region	13.0%
Population	1,229
Major towns	Ashford and Bonshaw
Major land uses (% of SEL area)	Grazing (80.1%)
NRM THEMES AND VALUES	
Terrestrial biodiversity	Native vegetation extent: 318,318 ha (62%) Protected areas: 46,719 ha (9.1%) TSRs: 14,302 ha (2.8%) Number of different threatened species recorded: 78 Number of different endemic and/or reliant species recorded: 19
Soils	Fertility: generally low to moderately low Salinity hazard: Generally low to moderate salinity hazard
Water	Total stream length: 1,352 km Upland wetlands: none present
People and communities	Strategic agricultural land: 29,908 ha (5.8%) Grazing: 410,716 ha (80.1%) Cropping: 34,921 ha (6.8%) Forestry: 11,114 ha (2.2%) Percentage of landholdings without PICs*: 14% Aboriginal heritage sites: 341

\*Indicator of the number of properties within SEL that are not running livestock or non-compliant

FIGURE 21: COD COUNTRY



## 8 Priority threats

For the purposes of this NRM Plan, a priority threat is identified as:

*A process, issue or factor operating in the region which is known to contribute to the decline of a natural resource value*

Table 14 provides the list of priority threats operating in the Northern Tablelands region. These priority threats are currently interfering with the health and resilience of the region's landscapes and provide an important focus for the goals, targets and actions established under this NRM Plan.

Further detail on each priority threat is provided in the NRM Evidence Plan.

**TABLE 14: PRIORITY THREATS TO NATURAL RESOURCE VALUES OF THE NORTHERN TABLELANDS REGION**

PRIORITY THREAT	THREATENING PROCESSES TO SPECIFIC NRM THEME			
	Terrestrial biodiversity	Water	Soil	People and communities & Agricultural systems
Pest animals	<ul style="list-style-type: none"> <li>• Predation</li> <li>• Decreased habitat value</li> <li>• Herbivory</li> <li>• Displacement</li> <li>• Competition</li> </ul>	<ul style="list-style-type: none"> <li>• Disturbance</li> <li>• Predation of aquatic and riparian species</li> <li>• Displacement</li> <li>• Competition</li> </ul>	<ul style="list-style-type: none"> <li>• Direct disturbance</li> <li>• Increased herbivory</li> <li>• Impacts to vegetation resulting in decreased groundcover</li> </ul>	<ul style="list-style-type: none"> <li>• Stock predation</li> <li>• Increased grazing pressure</li> <li>• Land degradation</li> <li>• Impacts to culturally valuable environmental features or sites</li> <li>• Impacts to amenity</li> </ul>
Weeds	<ul style="list-style-type: none"> <li>• Competition with other flora</li> <li>• Decreased habitat value</li> </ul>	<ul style="list-style-type: none"> <li>• Competition with aquatic and riparian flora</li> <li>• Decreased habitat value</li> <li>• Impacts to water balance and flow characteristics</li> </ul>	<ul style="list-style-type: none"> <li>• Impacts to vegetation resulting in decreased groundcover</li> <li>• Decreased soil fertility and land capability</li> </ul>	<ul style="list-style-type: none"> <li>• Competition with favoured pasture species</li> <li>• Poisoning of stock</li> <li>• Decreasing crop yields and crop purity)</li> <li>• Impacts to culturally valuable environmental features or sites</li> <li>• Impacts to amenity</li> </ul>
Climate change	<ul style="list-style-type: none"> <li>• Increased risk of native vegetation dieback</li> <li>• Increased competition from invasive species</li> <li>• Increased risk of stochastic threats such as bushfires and severe storms</li> <li>• Increased risk of reduction in species diversity and abundance</li> </ul>	<ul style="list-style-type: none"> <li>• Increased risk of severe droughts and floods</li> <li>• Increased evaporation associated with higher temperatures</li> <li>• Decreased water quality</li> </ul>	<ul style="list-style-type: none"> <li>• Impacts to groundcover retention</li> <li>• Elevated temperatures which can alter the chemical reactions within soil and subsequently influence the soil's formation and fertility processes</li> <li>• Increased soil erosion due to changes in rainfall patterns</li> </ul>	<ul style="list-style-type: none"> <li>• Increased risk of severe droughts, fires, storm and flood events</li> <li>• Reduced productivity and resilience of the landscape</li> </ul>
Vegetation clearance and fragmentation	<ul style="list-style-type: none"> <li>• Reduced native vegetation abundance and diversity</li> <li>• Decreased habitat value</li> <li>• Decreased connectivity across the landscape</li> </ul>	<ul style="list-style-type: none"> <li>• Changes to the water cycle including evaporation, transpiration, soil moisture content and runoff volumes</li> <li>• Impacts to water balance and flow characteristics</li> </ul>	<ul style="list-style-type: none"> <li>• Decreased soil fertility and land capability</li> <li>• Direct disturbance</li> <li>• Increased risk of erosion</li> <li>• Increased risk of dryland salinity</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced productivity and resilience of the landscape</li> <li>• Impacts to amenity</li> </ul>





THREATENING PROCESSES TO SPECIFIC NRM THEME				
PRIORITY THREAT	Terrestrial biodiversity	Water	Soil	People and communities & Agricultural systems
Lack of vegetation and recruitment and dieback	<ul style="list-style-type: none"> <li>Reduced native vegetation abundance and diversity</li> <li>Decreased habitat value</li> </ul>	<ul style="list-style-type: none"> <li>Changes to the water cycle including transpiration, soil drainage and runoff volumes</li> </ul>	<ul style="list-style-type: none"> <li>Decreased transpiration by deep-rooted species</li> <li>Increased risk of dryland salinity</li> </ul>	<ul style="list-style-type: none"> <li>Reduced productivity and resilience of the landscape</li> <li>Impacts to amenity</li> </ul>
LANDSCAPE DEGRADATION				
Soil degradation	<ul style="list-style-type: none"> <li>Decreased health and recruitment of native vegetation</li> </ul>	<ul style="list-style-type: none"> <li>Impacts to water balance and flow characteristics</li> <li>Decreased water quality</li> </ul>	<ul style="list-style-type: none"> <li>Decreased soil fertility and land capability</li> </ul>	<ul style="list-style-type: none"> <li>Reduced productivity and resilience of the landscape</li> </ul>
Altered runoff processes	<ul style="list-style-type: none"> <li>Decreased habitat value</li> </ul>	<ul style="list-style-type: none"> <li>Increased pollution</li> <li>Altered flow regimes</li> <li>Altered nutrient flow and eutrophication</li> </ul>	<ul style="list-style-type: none"> <li>Increased erosion</li> <li>Decreased soil water retention</li> </ul>	<ul style="list-style-type: none"> <li>Decreased water quality</li> <li>Reduced soil productivity</li> </ul>
Salinity and deep drainage	<ul style="list-style-type: none"> <li>Reduced native vegetation abundance and diversity</li> <li>Decreased habitat value</li> </ul>	<ul style="list-style-type: none"> <li>Increased risk of aquifer contamination</li> </ul>	<ul style="list-style-type: none"> <li>Decreased soil fertility and land capability</li> </ul>	<ul style="list-style-type: none"> <li>Reduced productivity and resilience of the landscape</li> </ul>
Waterway degradation through stock access, grazing and trampling	<ul style="list-style-type: none"> <li>Direct damage to vegetation and habitat values</li> <li>Decreased recruitment of native vegetation in riparian zones</li> </ul>	<ul style="list-style-type: none"> <li>Increased sedimentation and pollution</li> <li>Increased nitrification and eutrophication</li> <li>Decreased habitat value</li> </ul>	<ul style="list-style-type: none"> <li>Soil compaction</li> <li>Increased erosion</li> <li>Increase evaporation through pugging</li> <li>Nutrient enrichment</li> </ul>	<ul style="list-style-type: none"> <li>Increased pollution, algae and disease</li> <li>Decreased water quality</li> </ul>

# Part 3: Goals, Targets and Actions

## 9 Goals, targets and actions for the region

The goals, targets and actions for the Northern Tablelands region are provided below in Table 15, Table 16, and Table 17. The SELs that are a priority for each action are also identified.

Implementation of the actions is described in Part 4, and the approach to monitoring the goals, targets and actions (including performance measures for each target) is set out in Section 10.4.2.

### 9.1 TERRESTRIAL BIODIVERSITY

**TABLE 15: GOALS, TARGETS AND ACTIONS FOR TERRESTRIAL BIODIVERSITY**

GOAL 1. TERRESTRIAL BIODIVERSITY IS HEALTHY, RESILIENT AND CONNECTED		
Target 1. Our customers are improving and restoring native vegetation (enhancing habitat quality, connectivity and biodiversity)		
Action 1.	Support rehabilitation and native seeding/planting to increase the extent of native vegetation across the landscape	Priority SELs: All
Action 2.	Support landowners to apply market-based mechanisms (e.g. carbon and biodiversity) to realise an economic return from protecting and managing biodiversity	Priority SELs: All
Action 3.	Target restoration and regeneration of native vegetation community types that are most at threat	Priority SELs: All
Target 2. Our customers are engaged in best practice weed, pest and disease management, reducing the impact of invasive species and diseases on environmental values		
Action 4.	Undertake terrestrial weed and pest management	Priority SELs: All
Action 5.	Manage threats to World Heritage areas and other conservation areas from weeds and vertebrate pests on adjoining private land	Priority SELs: 1 - 4
Target 3. There have been targeted investments in terrestrial threatened or priority species		
Action 6.	Deliver programs that address the priority threats to the terrestrial threatened or priority species that contribute to the region's biodiversity values	Priority SELs: All
Target 4. Landscape connectivity that provides resilience in a changing climate is improved		
Action 7.	Undertake management actions to improve consolidation and habitat condition within priority landscape corridors	Priority SELs: All

## 9.2 WATER

TABLE 16: GOALS, TARGETS AND ACTIONS FOR WATER

GOAL 2. AQUATIC ECOSYSTEMS ARE HEALTHY, DIVERSE AND RESILIENT		
Target 5. Our customers are rehabilitating waterways and their riparian zones in high priority catchment areas		
Action 8.	Undertake targeted in-stream and riparian protection, revegetation/restoration in priority waterways to increase quality and connectivity of habitat	Priority SELs: All
Action 9.	Undertake riparian and aquatic weed and pest management in priority waterways	Priority SELs: All
Target 6. There is an increase in the number of wetlands which are managed to protect their condition		
Action 10.	Increase awareness of upland wetlands and their importance	Priority SELs: 1, 3-7
Action 11.	Undertake targeted programs to improve upland wetlands and their catchments, including wetlands located on private properties	Priority SELs: 1, 3-7
Target 7. There have been targeted investments in aquatic threatened or priority species		
Action 12.	Deliver programs that address the priority threats to the aquatic threatened or priority species that contribute to the region's aquatic ecosystem values	Priority SELs: All

## 9.3 SOIL

TABLE 17: GOALS, TARGETS AND ACTIONS FOR SOIL

GOAL 3. SOILS ARE RESILIENT, HEALTHY AND PRODUCTIVE		
Target 8. There is an increase in the number of land managers adopting practices that improve and maintain soil health		
Action 13.	Encourage landowners to adopt best practice ground/vegetative cover management that improve and maintain soil health	Priority SELs: All



## 9.4 PEOPLE AND COMMUNITIES

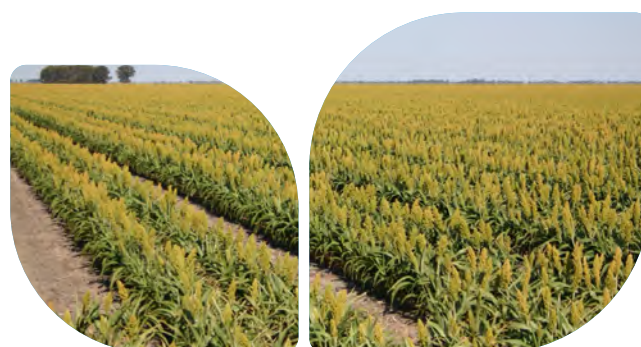
TABLE 18: GOALS, TARGETS AND ACTIONS FOR PEOPLE AND COMMUNITIES

GOAL 4. COMMUNITIES ARE COLLABORATIVE, INFORMED, ENGAGED AND ADAPTIVE		
Target 9. There is an increased number of opportunities for Aboriginal people and other land managers to promote, showcase and share traditional and contemporary land management knowledge and practices, including cultural fire practices, while ensuring the protection of cultural rights and knowledge		
Action 14.	Work with Aboriginal land managers to identify cultural heritage impacted by climate change and options for protection and better management	Priority SELs: All
Action 15.	Broker partnerships between Green Teams/ Aboriginal Land Management Teams and other parties (e.g. councils) to improve access to equipment, infrastructure, machinery, and provide project management capacity building where possible	Priority SELs: N/A
Action 16.	Support upskilling of Aboriginal workforce in Traditional Owner organisations and Local Aboriginal Land Councils in NRM, through scholarships and training assistance	Priority SELs: N/A
Target 10. Our customers increasingly adopt sustainable natural resource management practices		
Action 17.	Support and increase visibility of champions and credible local leaders already adopting NRM, through active support of land manager networks and groups, such as Landcare and communities of practice	Priority SELs: All
Action 18.	Provide whole-property planning and advisory services that integrate NRM into day-to-day farm operations	Priority SELs: All
Action 19.	Engage landowners to adopt best practice approaches to sustainable natural resource management	Priority SELs: All
Target 11. Our investors and partners are increasingly confident in Local Land Services		
Target 12. Our enabling functions such as partnership brokering and collaboration are highly valued, and are supporting the delivery of Environmental Programs		
Action 20.	Build staff capacity to deliver new focus areas in NRM services (e.g. environmental markets, climate change advice, customer-centred design, collaboration & facilitation)	Priority SELs: N/A
Action 21.	Maintain, develop and foster formal collaboration arrangements for priority partnerships	Priority SELs: N/A
Action 22.	Monitor partner and investor satisfaction, benchmarking current performance as service provider of choice	Priority SELs: N/A

## 9.5 AGRICULTURAL SYSTEMS

TABLE 19: GOALS, TARGETS AND ACTIONS FOR AGRICULTURAL SYSTEMS

GOAL 5. TO INCREASE ON-FARM PRODUCTIVITY, SUSTAINABILITY AND RESILIENCE TO CLIMATE VARIABILITY AND ENHANCING THE CONDITION OF NATURAL ASSETS		
Target 13. Increase farm productivity and sustainability, enhance natural assets, and improve production processes		
Action 23.	Producers increase their productivity and sustainability through improved land management strategies and production processes	Priority SELs: All
Action 24.	Producers increase their productivity and sustainability through enhancing the condition of on farm natural assets	Priority SELs: All
Action 25.	Producers enhance production processes aligning to customer and market expectations	Priority SELs: All
Target 14. Producers and businesses are better prepared for climate variability and better manage and recover from major business disruptor events		
Action 26.	Producers are better prepared to manage risks associated with climate variability and major disruptor events.	Priority SELs: All
Action 27.	Producers are supported when responding to major events including drought, fire and flood.	Priority SELs: All
Action 28.	Producers have the capacity and support to quickly recover from major events and take advantage of potential opportunities.	Priority SELs: All
Target 15. Build strategic partnerships that drive solutions to industry scale issues and deliver services that lead to the adoption of innovation		
Action 29.	Develop strategic partnerships and contribute to solutions for key industry scale issues.	Priority SELs: N/A
Action 30.	Build partnerships with key research and development organisations to deliver services that increase innovation and adoption.	Priority SELs: N/A
Action 22.	Monitor partner and investor satisfaction, benchmarking current performance as service provider of choice	Priority SELs: N/A



# Part 4: Implementing the NRM Plan

## 10 Plan design and implementation

This NRM Plan has been designed around an implementation and MERI (monitoring, evaluation, reporting and improvement) framework that aims to ensure that:

- The five-year goals, targets and actions are based on a robust program logic approach
- Annual projects are identified and focused on the key priorities for that year
- Implementation is adaptive over the life of the NRM Plan

Figure 1 shows the steps in this framework. They are described below and include:

- Design of this NRM Plan
- Identification and annual prioritisation of projects
- Implementation of annual projects
- The steps in the MERI program



FIGURE 13: COMPONENTS IN THE IMPLEMENTATION AND MERI FRAMEWORK

## 10.1 DESIGN OF THIS NRM PLAN

As outlined in **Part 1** and presented in **Part 3**, this NRM Plan is designed around goals, targets and actions that aim to address the priority threats to the natural resource values of the Northern Tablelands.

A program logic approach has been applied to the design of the NRM Plan. This approach aims to provide a strong framework for the implementation of NRM services which:

- Identifies the natural resource values that are important to the region and identifies the priority threats to these values
- Defines the strategic direction for NRM services in the Northern Tablelands LLS region through the goals and targets relating to these values
- Shows a clear line of sight between the actions that need to be undertaken to deliver the goals and targets over the five years

The goals, targets and actions will be delivered through a range of projects. Projects will be specific, clearly defined and structured activities which are funded and undertaken each year to implement the NRM Plan's actions. Projects will take various forms and may vary from grant programs, individual on-ground projects, education campaigns, or research projects.

A project logic approach will be applied to the design of each project. This approach will ensure that:

- Projects are clearly linked to the delivery of actions, targets and goals
- MERI for individual projects fits within the broader MERI program for the NRM Plan

To best deliver on the goals, targets and actions identified in this NRM Plan, a process of annual prioritisation for specific projects will be critical.

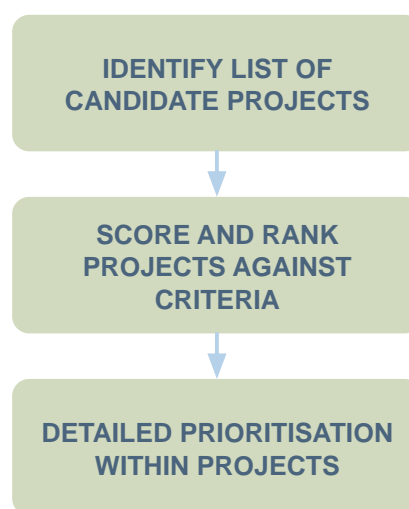
Annual prioritisation will allow LLS to take a flexible and adaptive approach to identify the specific projects to be undertaken. It provides the opportunity to:

- Adapt projects and the delivery of actions based on environmental variation affecting the region such as drought, bushfires, or emerging landscape threats
- Incorporate new science that relates to the delivery of NRM outcomes
- Consider the findings of the MERI program and how well the NRM Plan is performing

**Address the variability in annual funding where projects can be scaled up or down depending on the amount of money available in a particular year**

## 10.2 ANNUAL IDENTIFICATION AND PRIORITISATION OF PROJECTS

A three-step process will be used to identify and prioritise projects each year (see Figure 23).



**FIGURE 23: THREE STEP PROCESS TO IDENTIFY AND PRIORITISE PROJECTS EACH YEAR**

### 10.2.1 IDENTIFY LIST OF CANDIDATE PROJECTS

The first step will be to identify a list of candidate projects. This will be based on:

- A review of the key planning, policy, and environmental drivers
- A review of the previous years' projects through the MERI program
- Spatial prioritisation for relevant projects

A list of candidate projects will be developed and refined throughout this process.

The following pages provide examples of priority projects delivered with Australian Government support. These examples also provide an insight into how Northern Tablelands LLS designs, implements and improves delivery in conjunction with strategic partners and regional knowledge holders.

## NLP2 PROJECT STEERING COMMITTEE



In February 2018 a MOU was established between Northern Tablelands Local Land Services (LLS) and the four Landcare Networks within the region to formalise collaboration between the five organisations with regards to the National Landcare Program (NLP).

As a result of this successful collaboration, a number of NLP projects received funding and the Northern Tablelands LLS & Landcare Consortium Project Steering Committee was formed with the inaugural meeting held in December 2018. The Steering Committee continues to meet on a quarterly basis with the Terms of Reference for the Steering Committee reviewed annually in June of each year as some projects were completed and new projects that received funding were welcomed at the table.

It is the intention of the group to continue to collaborate into the future and remain adaptable within the Federal and State investor preferences.

## UPLAND WETLANDS (INCLUDES RAMSAR)

The Upland Wetlands project which is funded through the Regional Land Partnership (RLP) Program Round 2 has contributed to achieving two RLP outcomes: Outcome 1 the ecological character of Ramsar sites is maintained or improved, and Outcome 4 the outcomes of EPBC Act listed Threatened Ecological Communities is improved.

In addition to the outcomes delivered, the collaborative nature of the 'Ramsar Project' at Little Llangothlin Nature Reserve has been one of the highlights, drawing together six partners to participate: Northern Tablelands LLS, GLENRAC Landcare, University of New England, National Parks & Wildlife Service, Banbai Aboriginal Rangers and volunteer community members.) to deliver valuable monitoring information to guide future actions at the Ramsar site.

The opportunity exists to maintain a heightened level of community interest in New England Upland Wetlands and Ramsar sites on the back of unprecedented drought followed by wet seasonal conditions. Monitoring information provided by the research scientists to date has indicated that there is a knowledge gap regarding the characteristics of these dynamic ecosystems and although we have made progress regarding upland wetlands/lagoons, more work is required.



*Prof John Hunter  
conducting flora survey -  
John Ryall Lagoon March*





## BELL'S TURTLES



*David Waugh - Bells Turtle hatchlings being released.*



This Bell's Turtle rewilding project supported by Australian Government's Bushfire Recovery funding supported Regional Land Partnership Program Outcome 5: the condition of soil, biodiversity and vegetation are improved. The project has enhanced the recruitment of hatchlings of Bell's Turtle (*Myuchelys bellii*) into wild populations. This unique and endangered species is endemic to the Northern Tablelands region, and is restricted to upland streams in the Namoi, Gwydir and Border Rivers catchments of the Murray Darling Basin.

The project brings together a diverse consortium of land managers, turtle ecologists, postgraduate research students, detection dog handlers, and Local Land Services staff.

During the 2021-22 breeding season, the project team successfully boosted wild populations by protecting nesting areas with fox-exclusion fencing, by protecting individual nests with wire mesh, and by artificially incubating eggs harvested from wild-caught female turtles and releasing the hatchlings. A conservative estimate of at least 576 hatchlings emerged from within protected nesting areas. A further 365 hatchlings were successfully released following laboratory incubation of eggs collected from gravid female turtles in partnership with the University of New England.

The Bell's Turtle project is now at a point where we know what on-ground actions are effective for protecting nests from fox predation, and we have successfully raised awareness and gained momentum in training and recruiting land managers to participate in nest protection activities. Our research partners at the University of New England have developed cost effective methods and invested in infrastructure for producing large numbers of head-started hatchlings for release into the wild. The project has enormous potential, not just for the Bell's Turtle, but more broadly for riparian dependent species and expertise in rewilding threatened species and communities in the region.

## COOL COUNTRY KOALAS

The Cool Country Koala program was funded by the Australian Government's Bushfire Recovery funding in 2021/2022. Through successful collaboration with landholders, researchers and Landcare networks, the project has contributed to Regional Land Partnership Program Outcome 2: the trajectory of species targeted under the Threatened Species Strategy, and other EPBC Act priority species, is improved.

The team have been encouraged by the numbers of private landholders that applied to revegetate their farms - more than we were able to fund through this program. Indicating enormous potential to grow this project beyond 2022. Through this project two Northern Tablelands LLS managed Travelling Stock Reserves have changed from production utilisation to being managed for Koala conservation, supported by specific conservation management plans. The project also delivered more than 40 hectares of habitat revegetation on public and private land.

The project team has successfully engaged with a wide range of stakeholders as part of this project, including, but not limited to; the Saving our Species Northern Tablelands Koala Partnership Advisory Committee; National Parks and Wildlife Service; University of Sunshine Coast; Landcare groups; landholders; Local Government; and, Local Aboriginal Land Councils.

The project team sees great potential to build on this momentum, addressing in particular:

1. The high rates of chlamydial disease in the Armidale Koala population
2. Building carer, vet and community skills around Koalas in Inverell and Tenterfield to support the Koala populations and community buy-in into those genetically unique populations
3. Look towards preserving habitat in, and revegetating areas around Inverell, as this is the greatest threat to the Inverell's Koala population

The project has resulted in a noticeable increase in community buy-in into Koalas in Armidale, Inverell and Tenterfield. Capitalising on this momentum would lead to broader gains for EPBC Act listed species and communities, beyond just Koalas.



## Gondwana Shield World Heritage

The Gondwana Shield Project funded under the National Landcare Program Phase 2 Regional Land Partnerships has achieved significant reduction in threats to world heritage properties in the Northern Tablelands region.

The project has been containing, reducing the spread, eradicating where possible and protecting the Gondwana Shield World Heritage Area from the threat of invasive weed species.

One of many highlights of this project are the successful partnerships and engagement formed with the Local Control authority, Landcare, adjacent landholders and National Parks and Wildlife Service to complete control of invasive grasses across multiple land tenures in the target area.

Working together we have been able to reduce the infestation of invasive grasses along a 45km stretch of the Gwydir highway both within the national park and west of the national park.



## Farm Dams - Improving Resilience

Decisions that deliver drought resilience is a project of Northern Tablelands Local Land Services funded under the Future Drought Fund Program, Natural Resource Management – Landscape completed in June 2022. The project supported farmers to make decisions and adopt risk management practices that improve their sustainability and resilience.

A key aspect of this project was the establishment of farm dam demonstration sites to showcase the benefits of protecting farm dam water quality and quantity, and engage with a range of research partners to implement current scientific research findings. Partnerships were established with research institutions (UNE, CSIRO), industry groups (Ebor Beef, Landcare) and farmers to demonstrate and quantify the benefits of practice change that promote drought resilience.

The farm dam demonstrations showcased a range of best management practises that address water quality and quantity, boosting livestock health, drought preparedness and providing benefits to wildlife including frogs, migratory birds and invertebrates necessary to maintain natural capital and provide ecosystems services. The Farm Dam demonstration sites were delivered through small landholder incentives with a number of these projects added to UNE farm dam biodiversity research.

Information about the project was provided to regional farmers through newsletters, flyers, landcare and industry groups, webinar/field days, radio interviews and face to face advisory visits. Thirty-eight applications for improved farm dam management for livestock and biodiversity were received from landholders across the Northern Tablelands Region. Seventeen farms received incentives for onground projects. The successful projects included landholders who manage 13,598 hectares, with over 2700 cattle and 2025 sheep.

## Extension through pasture walks

Managing Grazing Land in the Northern Tablelands for profitable, productive and sustainable farms has been funded under the

National Landcare Program Phase 2 Regional Land Partnerships and aims to increase awareness and adoption of land management practises that improve and protect the condition of soils, biodiversity and vegetation in the Northern Tablelands.

The project delivers



Landholders adjoining the highway and the national park have completed invasive grass control on their properties, which total over 5000ha to date. We have been able to value add to this project, by coordinating further invasive grass control on Travelling Stock Reserves in the area. National Parks have contributed additional resources to complete invasive grass control within the national park. The project has seen the total eradication of Mexican Water Lilly from the project area.

This project shows how multiple agencies and private landholders can work together to protect valuable assets such as Gondwana Shield World Heritage Areas from invasive species. Further opportunities to build on this work, supporting partnerships and implementing action across multiple land tenure will ensure continued protection of our unique World Heritage areas for future generations.



The support from the Australian Government facilitated the timely delivery of information and demonstrations about how decisions on farm in response to changing climatic conditions can build more sustainable and resilient systems. This project has seen strong interest and support by farmers, industry, landcare and research organisations and provides evidence that there is opportunity for further resourcing of improved farm dam management for improved biodiversity, climate resilience and farm productivity.



an extension program covering a great range of topics for soil, pasture, native vegetation and ground cover. A very success element of this project are the Northern Tablelands pasture walks which have increased landholders awareness of the importance of managing natural resources on their holdings, including options for practises that improve the condition of soils, the vegetation and population compositions and overall biodiversity.

The extension activity builds farmers knowledge about management practices they can adopt to ensure grazing and stock management encourages and supports the long-term sustainability of our natural resources.

The pasture walks are practical, hands on events that provide all landholders the tools, knowledge and confidence to improve their skills in plant identification for both native and introduced, desirable and undesirable plant species in their locality. Participants are provided the opportunity to see many species in situ at particular times during the year, where they can touch, view and hear about key points of identification.

During the 2021-2022 financial year Northern Tablelands Local Land Services held four pasture walks with over 70 landholders attending who manage in excess of 50,000ha of grazing land. As a result of attending the events more than 95% of landholders reported that they had increased their knowledge and understanding of the topics covered.

The deliver method supports peer to peer learning, where discussions of experiences, networking and contacts with experts enables further knowledge and awareness. This project supports information, resources and access to professionals in agronomy and native vegetation for farming communities in regional and remote areas which is vital to enable land management practises that enhance natural resources and assist the production and long term sustainability of enterprises and farms.

## A REVIEW OF THE KEY PLANNING, POLICY, AND ENVIRONMENTAL DRIVERS

The key planning, policy and environmental drivers set the context for the delivery of NRM projects against the goals, targets and actions of the NRM Plan. The drivers will be reviewed and considered each year in relation to the following questions:

- What are the priorities set out in the NRM Plan (goals, targets, actions)?
- What is the current NRM policy context? Has it changed? For example:
  - NSW Government priorities (e.g. new NRM programs)
  - Australian Government priorities (e.g. RLP outcomes, new threatened species)
- What is the environmental context? For example:
  - Bushfire
  - Drought
  - Emerging landscape threats
- What are the priorities of the community and delivery partners? Have they changed?

## A REVIEW OF THE PREVIOUS YEARS' PROJECTS THROUGH THE MERI PROGRAM

The results of the MERI program will be used to review the previous years' projects. This will be done using the evaluation questions set out in Section 10.4.3 below.

## SPATIAL PRIORITISATION FOR RELEVANT PROJECTS

Spatial prioritisation is a useful tool for certain types of actions and projects. It can help to identify the locations that would most benefit from particular projects. For example, the best locations to focus native vegetation restoration efforts to maximise the protection of climate change corridors.

Spatial prioritisation will be applied each year to those actions and projects that:

- Can be spatially expressed
- Have data readily available to undertake the analysis and inform decision making
- Will significantly benefit from a spatial approach to target areas within the Northern Tablelands (as opposed to projects that could be beneficially undertaken anywhere in the region)

## 10.2.2 SCORE AND RANK PROJECTS AGAINST CRITERIA

Once the list of candidate projects has been identified, the second step in the process will be to score and rank projects against a set of criteria. The purpose of this step will be to provide a clear priority for projects to be funded in that year.

The criteria for assessing projects will be developed as part of implementation and potentially adapted over the life of the NRM Plan. They will address issues such as:

- How well does the project address a key planning, policy, or environmental driver?
- What is the predicted influence of the project on the achievement of a target?
- Does the project provide multiple benefits across themes?
- Does the project build on previous NRM activities in the region?
- Does the project provide benefits to a key asset/s?

## 10.2.3 DETAILED PRIORITISATION WITHIN PROJECTS

For some types of projects, there will be a need to undertake a further prioritisation step where decisions need to be made around allocating resources within a project.

For example, if a decision has been made to undertake a project which involves a grant program to facilitate native vegetation restoration on private properties, further prioritisation may be required to select the properties that will receive the funding.

The process for within-project prioritisation will be developed as part of implementation and potentially adapted over the life of the NRM Plan. The process will follow steps and considerations such as:

- Best available engagement process to enable landholders to engage in projects – e.g. expression of interest (EOI) process, a call for tenders for partnership community engagement and extension activities, etc.
- LLS staff to work with landholders who have submitted an EOI, or partner tenders. This will include steps such as a site visit, analysis of the proposed financials for the project, and preparation of a site map
- Assessment of each landholder proposal by an LLS assessment panel that will include considerations such as:
  - Value for money – considering ratios of public/private benefit
  - Environmental benefit
  - Risks
  - Local landscape value
  - Enduring value

## 10.3 IMPLEMENTATION OF ANNUAL PROJECTS

LLS will facilitate the implementation of funded projects with the assistance of delivery partners. Projects will be funded based on the results of the annual prioritisation process and the level of available funding.

As part of this annual implementation, a rapid six-month review of how projects are tracking will be undertaken. This review will consider:

- Performance against the project's objectives and anticipated outcomes
- Any risks and challenges associated with project delivery
- Opportunities and priorities for funding projects over the final six months of the year

## 10.4 STEPS IN THE MERI PROGRAM

A critical component of successful implementation is the NRM Plan's MERI framework. This section describes:

- What is MERI and why it is necessary
- Each component of the NRM Plan's MERI framework

### 10.4.1 WHAT IS MERI AND WHY IT IS NECESSARY

MERI provides the system for understanding how well the NRM Plan is performing, communicating that to investors and stakeholders, and adapting implementation as needed. It can be considered as (Australian Government, 2009):

*"a continuous cycle of participation and communication rather than as a single evaluation event. MERI promotes learning and adaptive management in response to progressive monitoring and evaluation which enables improvement in program design and achievement of desired outcomes"*

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*"a continuous cycle of participation and communication rather than as a single evaluation event. MERI promotes learning and adaptive management in response to progressive monitoring and evaluation which enables improvement in program design and achievement of desired outcomes"*

MERI is essential for ensuring implementation of the NRM Plan is:

- Effective: MERI enables improvements in implementation to better achieve the goals and targets of the NRM Plan
- Transparent and accountable: MERI enables investors and stakeholders to understand how efficiently and effectively the NRM Plan is being implemented, and whether the NRM Plan's goals and targets are being achieved

The purpose of the NRM Plan's MERI program is to assist LLS to:

- Provide transparency in the implementation of the NRM Plan
- Understand how well the NRM Plan is performing. That includes determining whether the:
  - Goals and targets are being achieved
  - Actions and projects being implemented to achieve the NRM Plan's goals and targets are efficient and effective
- Enable new information over the life of the NRM Plan to be integrated into implementation
- Adaptively improve the implementation of the NRM Plan where necessary to ensure the goals and targets are achieved

The MERI program for the NRM Plan is consistent with the principles of the Australian Government's NRM MERI Framework (Australian Government, 2009). This includes assessing multiple lines of quantitative and qualitative evidence, and establishing and fostering constructive partnerships to assist with both implementation and MERI.

MERI will be undertaken at two levels:

- At a whole of Plan level that will consider how well the NRM Plan is performing. This will relate to the overall program logic that has been used to design the NRM Plan
- At the individual project level to consider how well individual projects have performed. This will relate to the logic used to design each project

### 10.4.2 MONITORING

Monitoring will be to collect information and data about implementation of the NRM Plan. Monitoring will involve:

- Collecting, accessing and analysing data to understand performance against the NRM Plan's goals and targets
- Tracking implementation of individual projects and actions

Table 18 sets out the performance measures for each target and the monitoring data that will be used. Data will be sourced from a combination of:

- Publicly available datasets
- Project data which relates to information collected about individual projects implemented under the NRM Plan
- Specific monitoring projects undertaken as part of implementing the NRM Plan. For example, surveys of landholders about various aspects of the NRM Plan

Performance measures (or metrics) for individual projects will also be developed as part of project design and monitored as part of project implementation.

TABLE 19: PERFORMANCE MEASURES AND MONITORING DATA FOR EACH TARGET

TARGET	PERFORMANCE MEASURE	MONITORING DATASET/S
TERRESTRIAL BIODIVERSITY		
<b>Target 1.</b> Our customers are improving and restoring native vegetation (enhancing habitat quality, connectivity and biodiversity)	Area of native vegetation enhanced, rehabilitated or protected	<ul style="list-style-type: none"> <li>Project data</li> </ul>
<b>Target 2.</b> Our customers are engaged in best practice weed, pest and disease management, reducing the impact of invasive species and diseases on environmental values	Percent of landholders engaged in best practice invasive species management	<ul style="list-style-type: none"> <li>Project data</li> </ul>
<b>Target 3.</b> There have been targeted investments in terrestrial threatened or priority species	Number of projects undertaken for terrestrial threatened or priority species	<ul style="list-style-type: none"> <li>Project data</li> </ul>
TARGET		
<b>Target 4.</b> Landscape connectivity that provides resilience in a changing climate is improved	Area of native vegetation enhanced, rehabilitated or protected within climate change corridors	<ul style="list-style-type: none"> <li>Project data</li> <li>Climate Change Corridors (Dry Habitat) for North East NSW (NSW OEH, 2011a)</li> <li>Climate Change Corridors (Moist Habitat) for North East NSW (NSW DECCW, 2010)</li> <li>Climate Change Corridors for Nandewar and New England Tablelands (NSW OEH, 2011b)</li> </ul>
TARGET		
WATER		
<b>Target 5.</b> Our customers are rehabilitating waterways and their riparian zones in high priority catchment areas	Stream length enhanced, rehabilitated or protected	<ul style="list-style-type: none"> <li>Project data</li> </ul>
<b>Target 6.</b> There is an increase in the number of wetlands which are managed to protect their condition	Number of wetlands which are managed to protect condition	<ul style="list-style-type: none"> <li>Project data</li> </ul>
<b>Target 7.</b> There have been targeted investments in aquatic threatened or priority species	Number of projects undertaken for aquatic threatened or priority species	<ul style="list-style-type: none"> <li>Project data</li> </ul>
SOIL		
<b>Target 8.</b> There is an increase in the number of land managers adopting practices that improve and maintain soil health	Percent of landholders engaged in best practice soil health management	<ul style="list-style-type: none"> <li>Project data</li> <li>Surveys of landholders</li> </ul>



TARGET	PERFORMANCE MEASURE	MONITORING DATASET/S
PEOPLE AND COMMUNITIES		
<b>Target 9.</b> There is an increased number of opportunities for Aboriginal people and other land managers to promote, showcase and share traditional and contemporary land management knowledge and practices, including cultural fire practices, while ensuring the protection of cultural rights and knowledge	Measured by area of improved practices	<ul style="list-style-type: none"> <li>Project data</li> </ul>
<b>Target 10.</b> Our customers increasingly adopt sustainable natural resource management practices	Area of improved practices	<ul style="list-style-type: none"> <li>Project data</li> </ul>
<b>Target 11.</b> Our investors and partners are increasingly confident in Local Land Services	Increased revenue for NRM services	<ul style="list-style-type: none"> <li>Annual funding</li> </ul>
	Increased investor and partner satisfaction	<ul style="list-style-type: none"> <li>Investor and partner surveys</li> </ul>
<b>Target 12.</b> Our enabling functions such as partnership brokering and collaboration are highly valued, and are supporting the delivery of the state outcome	Increases in the proportion of NRM funds allocated to collaboration and engagement activities	<ul style="list-style-type: none"> <li>Project data</li> </ul>
AGRICULTURAL SYSTEMS		
Target 13. Increase farm productivity and sustainability, enhance natural assets, and improve production processes	<p>Measured by area of improved agricultural production</p> <p>Percentage of farms implementing improved practice change</p>	<ul style="list-style-type: none"> <li>Project data</li> </ul>
Target 14. Producers and businesses are better prepared for climate variability and better manage and recover from major business disruptor events	Measured by area of improved agricultural production	<ul style="list-style-type: none"> <li>Project data</li> <li>Measuring What Matters practice change longitudinal study data</li> </ul>
Target 15. Build strategic partnerships that drive solutions to industry scale issues and deliver services that lead to the adoption of innovation	Increases in the proportion of NRM funds allocated to collaboration and engagement activities	<ul style="list-style-type: none"> <li>Project data</li> <li>Number of formal partnerships with industry and research partners</li> </ul>

### 10.4.3 EVALUATION

Annual evaluation will be undertaken to assess the impact, effectiveness, and efficiency of the NRM Plan. Using the information and data from the monitoring step, the following evaluation questions (consistent with the Australian Government's NRM MERI Framework) will be considered:

- Impact:
  - What is the progress in achieving the NRM Plan's goals and targets?
  - Are any goals and targets not being achieved?
- Effectiveness:
  - Which actions or projects are effective?
  - Which actions or projects are not effective and should be amended?
  - Which actions or projects should be prioritised for the upcoming year?
- Efficiency:
  - What could be done differently to improve implementation and thereby maximise impact?
  - Where is the greatest value for money?

In addition to the annual evaluations, an evaluation at the end of the life of the NRM Plan will be undertaken. The end of Plan evaluation will consider the questions relating to impact, effectiveness and efficiency, as well as the following questions relating to appropriateness and legacy:

- Appropriateness:
  - How well did implementation of the NRM Plan meet the needs of investors and stakeholders?
  - To what extent was the NRM Plan compliant with best practice approaches to NRM?
- Legacy:
  - Will the NRM Plan's impacts continue over time and after the NRM Plan ceases?
  - How should the legacy be managed and by whom?

### 10.4.4 REPORTING

Reporting will be undertaken at two levels:

- Annual reporting to present the results of the monitoring and evaluation steps. These reports will address the questions around the outcomes and outputs of the NRM Plan, as well as the relevant financial information. Annual reports will be made available to the public and presented to key stakeholder groups
- Project level reporting where these are required by investors. For example, to address the Australian Government's MERI reporting requirements

### 10.4.5 IMPROVEMENT (ADAPTIVE MANAGEMENT)

The final step in the MERI program will be improvement (or adaptive management). Based on the findings of the evaluation step, LLS will consider if improvements should be made to the following:

- Actions to achieve the goals and targets
- The types of projects undertaken under each action
- Any aspect of implementation that would lead to improved results

Where improvements are made, the NRM Plan and any implementation documentation will be updated accordingly.

### 10.4.6 MEASURING WHAT MATTERS PROJECT

Local Land Services' Measuring What Matters Project aims to answer a fundamental question: What influence does Local Land Services have in landholders' adoption of best-practice land and livestock management systems?

This project seeks to understand the impact of Local Land Services services, how we can best influence landholder practice, and how we can best meet landholder needs. Understanding the impact of our services is a core priority for partners, investors, stakeholders, staff and customers. It is anticipated the study will go for at least 4-5 years. However, it is being established as a 'long-term study' - all going well (there is good value coming out of the study) it will go for decades. The longer the study goes for the richer the data will become.

The project will involve the surveying, baselining and tracking of changes in landholder behaviour and practice over time. All 11 regions are taking part in the pilot and will use the Qualtrics survey platform to gather data from landholders about their practice change intentions and progress.





## 11 SUPPORTING IMPLEMENTATION

There are three key components supporting implementation under this NRM Plan. They include:

- Funding
- Governance arrangements
- Successful collaboration and partnerships

Each of these components are described below.

### 11.1 FUNDING

Funding for the NRM Plan will come from a variety of sources. These will primarily be the NSW and Australian Governments through NRM related programs. Funding may also be provided from other sources such as NRM focused organisations, participants in NRM related market-based schemes (e.g. carbon and biodiversity), and philanthropists.

The NRM Plan recognises that funding may be variable from year to year. It has been designed to ensure projects are as cost effective as possible to deliver the greatest benefit. The annual prioritisation process (see Section 10.2) incorporates cost effectiveness and value for money into the consideration of projects.

The NRM Plan is also designed to be strategic and scalable. Where greater funding becomes available, LLS will quickly be able to decide which projects should be funded and why.

In addition to direct funding, implementation of most projects will involve significant in-kind contributions from landholders and other delivery partners. These contributions will help maximise the benefits from the funding available each year.

### 11.2 GOVERNANCE

Robust governance is a critical component of the work of LLS across NSW. The purpose of good governance in relation to implementation of the NRM Plan is to:

- Support an organisational environment and implementation approach that provides the greatest chance that the NRM Plan's goals and targets will be achieved
- Give confidence to investors and the community that actions implemented under the NRM Plan are cost effective, transparent, accountable, and will deliver the best possible outcomes

Northern Tablelands LLS operates in accordance with the state-wide *Performance Standard for Local Land Services* (NRC, 2015). The purpose of the standard is to establish the organisational principles and expectations for LLS to deliver quality outcomes for investors, ratepayers, customers and communities. A key part of that standard relates to governance and addresses critical issues such as financial accountability.

Day-to-day implementation of the NRM Plan will be facilitated by the Land Services Team within Northern Tablelands LLS. This comprises the Environment and Sustainable Agriculture teams who will share responsibility for various aspects of

implementation. The Land Services Team will be supported by the Northern Tablelands LLS Board who will be responsible for key decisions and review in relation to implementation of the NRM Plan.

Existing governance arrangements will be used to engage with stakeholders and delivery partners. For example, the ARAG provides a formal platform for feedback and advice in relation to a range of issues including NRM. These governance arrangements will help ensure that implementation of the NRM Plan is informed and supported by stakeholder input in an ongoing way.

### 11.3 COLLABORATION

Successful implementation of the NRM Plan is dependent on collaboration and partnerships with stakeholders across the region. This is a strong focus for LLS and is emphasised in the state-wide NRM and Agricultural Service Frameworks (NSW LLS, 2021a & 2021d)

LLS works with a range of delivery partners who play key roles in supporting and enabling the delivery of effective NRM programs in the Northern Tablelands. Delivery partners include farmers and land managers, industry groups, Aboriginal communities, local community members and volunteers, Federal, State and Local government bodies, and research and education institutions.

Northern Tablelands LLS adopts a collaborative governance model to coordinate and facilitate collaboration among partners and stakeholders in the delivery of its services (NSW LLS, 2021b). The aims of this approach are to:

- Achieve consensus to create lasting solutions across sectors
- Achieve genuine commitment. By working across sectors people with a stake in an issue will be involved in authentic ways and all those involved will have a role to play in multi-stakeholder projects
- Increase capacity to achieve results
- Innovate through the application of diverse knowledge and expertise
- Better coordinate investment across the region and borders, leading to multiple outcomes
- Establish greater understanding and trust

The model provides structure to cooperatively:

- Clarify respective roles and responsibilities
- Jointly invest in activities which have mutually beneficial outcomes
- Coordinate where, when, and how projects will be implemented
- Agree on common guidelines for methods and procedures in planning and operating
- Agree on expectations

### 11.3.1 CSIRO MER PILOT NETWORK

Northern Tablelands LLS is participating in two State and National collaborative initiatives that will directly support the delivery of this strategy. The first is participation in Australia's first national Monitoring, Evaluation and Research (MER) pilot network to investigate the management of weeds and the recovery of ecosystems after fire.

The MER network pilots are a new approach to learn about ecological management effectiveness. Through collaboration among policy-makers, practitioners and researchers, these networks will embed nationally integrated research infrastructure (small, well-designed experimental monitoring plots) within local ecological restoration programs. Each network can be designed to address targeted ecological management questions at national scales, as well as enabling predictions and facilitating improved outcomes. The networks will help practitioners to learn from their actions and make cost-effective decisions to better protect the environment using robust scientific methods.

The project is being led by the MER network team based at the CSIRO and the Terrestrial Environmental Research Network (TERN). Together with Regional Land Partnerships program (RLP) Service Providers, researchers, the Department of Agriculture, Water and Environment and other stakeholders the MER Network team are working to co-design and co-implement the network.

The remaining Statewide collaborative initiatives are the LLS' Measuring What Matters practice change longitudinal study and Service Delivery Strategy.



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