

Sustainable Murchison 2040 Community Plan Regional Resource Analysis

Prepared for

Waratah-Wynyard Council, Circular Head Council, West Coast Council, King Island Council

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This Regional Resource Analysis has been prepared by Geografia. It has been informed by information from specialised consultants commissioned by Geografia. A *Natural Resources Inventory* was prepared by AK Consultants that informed Section 4 Areas of Natural and Cultural Significance and Section 5 Productive Land and Water Values. This Inventory is available separately. GTA Consultants prepared a transport review that is incorporated into Section 7 Access and Infrastructure. The report is based on datasets available up to 10 February 2016.



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Executive Summary

- This document describes the key natural, human, and economic resources in the Murchison region. The information will inform the preparation of the Murchison Sustainable Community Plan 2040.
- There are emerging economic opportunities, for example, in food and fibre production, tourism, the silver economy and lifestyle-led development. By contrast, long-term demographic trends suggest Murchison's population will continue to decline and age without impetus for change. Climate change is the major environmental challenge. In Murchison's case, the impact is expected to be significant although moderate compared with much of the rest of Australia.
- The Murchison region is endowed with good natural and cultural assets. The vast majority are conserved, internationally recognised forests and geological land formations that accommodate numerous threatened species. The heritage of the Indigenous communities is scattered throughout the region, while European heritage is concentrated into settlements and mines.
- Agriculture and mining currently provide Murchison with much of its income. Economic restructuring is likely to diversify the economy away from commodity export toward value adding, and services. As well as shifting towards services, a downturn in mining commodity demand and the State Government's efforts to reinvigorate advanced manufacturing and forestry will reshape the region's economy. In the future, agriculture and downstream industries will present greater opportunities for sustainable development and employment in most of the region. Tourism will continue to grow, particularly if the Australian dollar remains low.
- Murchison's road network is mostly adequate for passenger vehicle trips. However, expected increases in agribusiness road freight movements may raise the priority, particularly as many bridges have reached the end of their economic life. The region will need to ensure that transport initiatives receive funding priority from State and Federal government to maintain prosperity from trade and tourism. These initiatives are presented in the Framework Plan.
- Urban settlements are compact and conserve the region's valuable resources for agriculture and mineral extraction. Somerset, Wynyard and Smithton have adequate land suitable to accommodate any future residential or industrial expansion.



Summary statement

The key findings from the Resource Analysis, cover:

- Areas of cultural and natural significance;
- Land and water values;
- Land use suitability analysis; and
- Economic structure, resources and opportunities.

Overview

Murchison relies substantially on trade with the Australian mainland and Asia. The region has been buffeted by international events, such as changes in the value of the Australian dollar, and volatile commodity prices. Most settlements share the challenges of shrinking and ageing populations, low income households and outmigration.

However, new opportunities are emerging in agriculture; population servicing for new residents drawn from the rest of Australia; and tourism, with international tourists attracted by food and cellar door offerings. Infrastructure investment required in ports, roads, rail and airports is likely to generate more employment as well. With careful planning and a committed community, Murchison will be able to benefit from these opportunities.

Areas of natural and cultural significance

An inventory of the natural and cultural values of Murchison shows that West Coast and Wilderness West have a high concentration of significant natural features. These are also present (albeit in less abundance) in other areas. They include:

- **Rugged landscape of national and global significance.** These dominate West Coast, Wilderness West, and, to a lesser extent, Smithton and Waratah. These areas contain geological formations of regional, state, national and global significance and give the region its iconic landscape and imagery;
- **Large natural reserves.** Protected by law from development, these are arguably one of the region's greatest assets. Unlike the reserves, conservation areas have less protection;
- **Threatened vegetation communities.** These exist throughout the region and often not within reserves, which requires careful land use policy application. Diverse vegetation and fauna communities enhance the liveability of settlements; and
- **Freshwater ecosystems, such as wetland, water bodies and rivers, of high conservation value.** These are protected from development or require, at least, assessment to understand impacts of particular development. Furthermore, groundwater dependent ecosystems overlap with areas of geoconservation and threatened species, providing them greater environmental protection.



Murchison's cultural significance lies in both Aboriginal heritage and listed heritage sites of state, national and global significance. Approximately half the listed Aboriginal heritage sites are within the protected reserves. Future development outside reserves requires further assessment to determine the presence of Aboriginal heritage. There are 139 listed heritage sites across the region.

Productive land and water values

- Most productive, and potentially productive, agricultural land is located around the settlements along the north coast, and on King Island, off the northwest mainland;
- Production forestry and Permanent Timber Production Zones account for less than 10% of the region. These are mostly located in Circular Head Rural, and in proximity to settlements in West Coast. Significant hardwood plantations are concentrated in the Waratah area, with smaller plantations dispersed through Circular Head Rural;
- Mineral leases for metallic minerals and atomic substances account for the greatest mined land area, while 51 gravel mines have the right to operate in Murchison. Strategic Prospectivity Zones protect much of the region's land from development, particularly Crown land, in favour of future extraction;
- Aquaculture activities are concentrated along the northwest coast in Robin's Passage, Big Bay, Duck Bay, and Macquarie Harbour. Production in Macquarie is set to increase in the coming years;
- Water, mainly used to generate electricity and support agriculture, is managed in several regions by Water Districts, which control the volume of water extracted for used and taken for storage. Currently under development, the Duck Irrigation Scheme will provide 5,000ML to the Duck Irrigation district, while private schemes are under investigation, primarily for dairy and livestock operations;
- Climate change is expected to have some positive impacts on agriculture production. Rainfall on the west coast may increase, while northwest and King island will have less rainfall;
- Coastal areas are vulnerable to moderate levels of inundation and erosion. This is part of Councils' considerations in preparing and implementing planning schemes;
- Landslip hazard is known and mapped in the region;
- Acid sulfate soils, if disturbed, may be a hazard to land currently used for grazing along the north coast of Circular Head; and
- Soil salinity for King Island and Robbins Island is identified as moderate.

Land use suitability

Land suitability assessment has identified land suitable for residential and industrial development around Somerset, Wynyard, Smithton, Queenstown and Currie. Consistent with the Cradle Coast Land Use Framework, the assessment was confined to these settlements to ensure development occurs in an orderly and sustainable pattern. It is also



essential so that development does not negatively impact agricultural land, which is important for economic prosperity, scenic quality, natural quality and identity.

The assessment is relatively high level and considers proximity to employment, education, retail, recreation space, public transport, and hospitals, as well as agricultural land, threatened vegetation communities and land slip risk.

Land suitable for residential and industrial development is available in the region. Municipal level strategies will help Councils guide development. It must be noted, however, that any future development proposal should be evaluated on a site-by-site basis.

Economic structure, resources and opportunities

Economic structure

Primary production industries dominate economic activity, with mining and agriculture accounting for one third of total output for the region. A further 21% is from manufacturing, which includes meat product manufacturing, dairy product manufacturing, log saw milling and fruit and vegetable processing (Table A).

Table A Murchison, Output by Key Industry (2013-14)

Industry	Total Output (\$m)	Percentage	Pct of Tasmania
Agriculture, Forestry and Fishing	\$407	18%	6%
Mining	\$352	15%	1%
Manufacturing	\$471	21%	13%
Construction	\$229	10%	12%
Wholesale Trade	\$109	5%	4%
Total Industries	\$2,290	100%	100%

Source: *Economy Id, 2016.*

Economic resources

Table B Economic Resources

Resource	Comment
Human capital	Murchison's workforce is mostly low-skilled. Only 29% of residents had post-school tertiary qualifications at the last Census - lower than Burnie and the rest of Tasmania. Young residents are moving out of the region, predominantly for education and employment opportunities. Over time, the levels of post-school qualifications in the region may rise, particularly if younger, skilled and educated residents decide to stay.
Agriculture	Dairy and beef cattle are common throughout the region, but particularly in Circular Head and King Island. Milk and meat cattle products contribute \$158.1 million and \$73.4



Resource	Comment
	million annually to the local economy. Not surprisingly then, Murchison is a State-significant producer, supplying half of Tasmania's milk and meat cattle production. Horticulture is also a major product, with \$27.3 million in local production value, mainly in vegetables and nurseries, cut flowers and cultivated turf.
Mining	The region is abundant in mineral resources and mining is a major employer (~13% of jobs at the last Census). It also supports downstream processing, including: iron ore and silica processing in Port Latta and Wynyard, with direct exports to South East Asia; and machinery equipment design and manufacturing (Elphinestone in Wynyard).
Manufacturing	Manufacturing is linked to mining and agribusiness, with food manufacturing the most prominent activity. This includes dairy production by Fonterra at Wynyard (and Spreyton, Devonport); Murray Goulbourn at Edith Creek, and; Tasmanian Dairy Products (TDP) at Smithton. Furthermore, cheese factories are operated by Lion at Burnie and King Island. Advanced manufacturing has matured through the long history of product development for the mining sector in Tasmania. For examples, Eplinstone has operated in Burnie for more than 40 years and is adapting its product to suit a wider market domestically and overseas. Other notable manufacturing activities includes wood product manufacturing and mineral processing and the Tasmanian Department of State Growth is proactively working with business to seek new opportunities.
Tourism	Tourism is growing. Trends show that visitation is increasing, and supported by the low level of the Australian dollar, Strahan attracted over 138,000 in 2014-15; Queenstown, 128,000 and Stanley, 101,500.

Economic opportunities

There are four broad themes for economic opportunities.

1. Short-medium: restructuring of the economy: from mining to agriculture and tourism

- Diversification into new agricultural ventures and tourism, including higher value dairy and horticultural products with stable retail base and give farmers more markets into which to sell their produce. Part of this will include growth in food tourism;
- Attraction of domestic and foreign investment in agricultural land;
- Exploration of the opportunities for new markets arising from the Free Trade Agreement (FTA) with Japan;
- Examination of opportunities to exploit non-tariff barriers, such as phytosanitary restrictions;
- Mineral and energy exports to Japan as tariffs are phased out over ten years;
- Export of high valued meat and horticultural products, including stone fruit, vegetables and native Japanese products (Wasabi);
- Opportunities arising from the China FTA;
- Promote infrastructure investment in the Port of Burnie, with a view to facilitate freight shipping for the region's producers;



- Agriculture industry development including research into shrinking margins; the emerging opportunities from climate change; cooperative efforts in milk processing; a fresh producer co-op; and meat industry development;
 - Improve agriculture industry management through co-ops, better training/skills demand matching; support for seasonal workers; and for farmers, including in productivity and R&D;
 - Marketing and promotion as a quality food producing region;
 - Implementation of the Cradle Coast Destination Management Plan, focusing on new agri-tourism products (e.g. farm stays, whisky and cider cellar doors); attraction and investment in holiday homes; and development of complimentary heritage and village tourism products along the Cradle Coast touring route; to visitor dispersal from primary tourist destinations;
 - Develop and implement Tourism Employment Plans and sub region Destination Management Plans; and
 - Explore the viability of improving airport infrastructure in Burnie, King Island Strahan and Smithton airports.
- 2. Short-medium: population servicing and opportunities as a residential destination**
- Promote the region's amenity, affordable housing and rural-coastal lifestyle;
 - Expand into the seniors' housing market (retirement villages and aged care) and auxiliary ageing services (GPs, hospitals and pharmacies in Murchison);
 - Pursue programs to break generational poverty and school reforms; and
 - Promote international migration to the Murchison area.
- 3. Medium-long term: human capital development, and the 'Murchison Diaspora'**
- Improve educational outcomes in Murchison (including year 12 retention rates);
 - Provide incentives for young, educated residents with desirable skills to return;
 - Leverage from the NBN availability through a mix of technologies to attract former residents and NBN-dependent industries (e.g. the creative sectors);
 - Rethink the brain drain as the 'Murchison Diaspora': the export of 'ambassadors and champions'; and
 - Support the forestry industry and communities to capitalise on the new State laws.
- 4. Long-term strengths in climate change resilience, renewable energy and water security**
- Investigate the viability for increased production in potentially available agricultural land that may be more suitable as the climate changes (AK Consultants, 2010); and
 - Build on Murchison's wind resources (particularly in King Island and along the coast).



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1 Introduction

This report describes the key natural, human, and economic resources in the Murchison region. The information summarised here will inform the preparation of the Sustainable Murchison Community Plan 2040.

1.1 Purpose of this document

This document forms part of the Murchison Community Plan 2040 (the Plan). The other documents are the:

- Murchison Framework Plan;
- Murchison Community Vision Statement; and
- Murchison Community Study.

The **Framework Plan** is the lead document. It brings together the community's vision for the region with analysis of the region's resources, community infrastructure and social ecology.

The **Community Vision Statement** is a summary of the community's key concerns, themes and their vision. The vision was developed through a series of community engagement sessions across the region; an online survey; a school program; council workshops; and community leaders' fora. Over 2,000 responses have been incorporated into the Statement.

The **Regional Resource Analysis** (this document) analyses the region's resources (natural, heritage, economic and infrastructure) and provides an evidence base to guide development. Natural resources include land and water for production and conservation, whilst heritage and cultural assets, both Aboriginal and European, are presented. Land suitability, economic assets, and infrastructure are considered and future opportunities identified for the region's prosperity.

The **Community Study** is a consolidated evidence base that draws together analysis of the region's settlement pattern, population and household forecasts, social ecology by subregion, community infrastructure needs and suggested indicators of community wellbeing with consideration to physical, emotional and mental health.

The Framework Plan will be used by Council and the community to guide development to 2040.

About the Resource Analysis

This document provides guidance for the sustainable use of the region's land and water resources. It is based on a comprehensive analysis of productive and conservation land and



water values, economic resources, transport and access infrastructure, and the opportunities the region can tap into. Key considerations in the preparation of this Resource Analysis were:

1. **Land value and suitability**¹. There is a focus in the Plan on a spatial evaluation of the land, water and cultural values of the physical environment, landscape and setting. The analysis was undertaken in light of predicted climate change and took account of both natural and cultural/heritage values. The spatial analysis identified significant areas for:
 - Conservation of important natural and cultural values;
 - Identification of significant areas of risk and hazard;
 - High value agricultural, forestry and mining areas and freshwater resources; and
 - Optimal areas for settlement including residential and industrial areas.
2. **Economic resources and opportunities**. A spatial and economic analysis of the economy, focusing on competitive advantages, resources and potential; and
3. **Access and infrastructure**². An evaluation of the area’s transport infrastructure networks and requirements to support future settlement, population and employment.

1.2 Features of the study area

The Murchison study area comprises the entire Tasmanian west coast, north west Tasmania, and King Island, covering approximately 19,000 square kilometres, much of which is managed forest and agricultural land. As Figure 1 shows, the region is made up of eight Australian Bureau of Statistics (ABS), geographical areas (Statistical Area 2s - SA2). These have formed the spatial basis of the regional analysis. Populations for each are shown in Table 1 and Figure 2.

Table 1 Populations by SA2 (ERP ABS 2014)

Local Government Area	Statistical Area - SA2	Estimated Population
Waratah-Wynyard	Wynyard	6,276
	Somerset	4,087
	Waratah	3,940
Circular Head	Smithton	4,099
	Circular Head Rural	4,202
West Coast	West Coast	4,528
	Wilderness West	0
King Island	King Island	1,610
Total		28,742

¹ AK Consultants provided the datasets for determining environmental values and agricultural land suitability. The findings are summarised in Sections 3 and 4 and their full report is available separately.

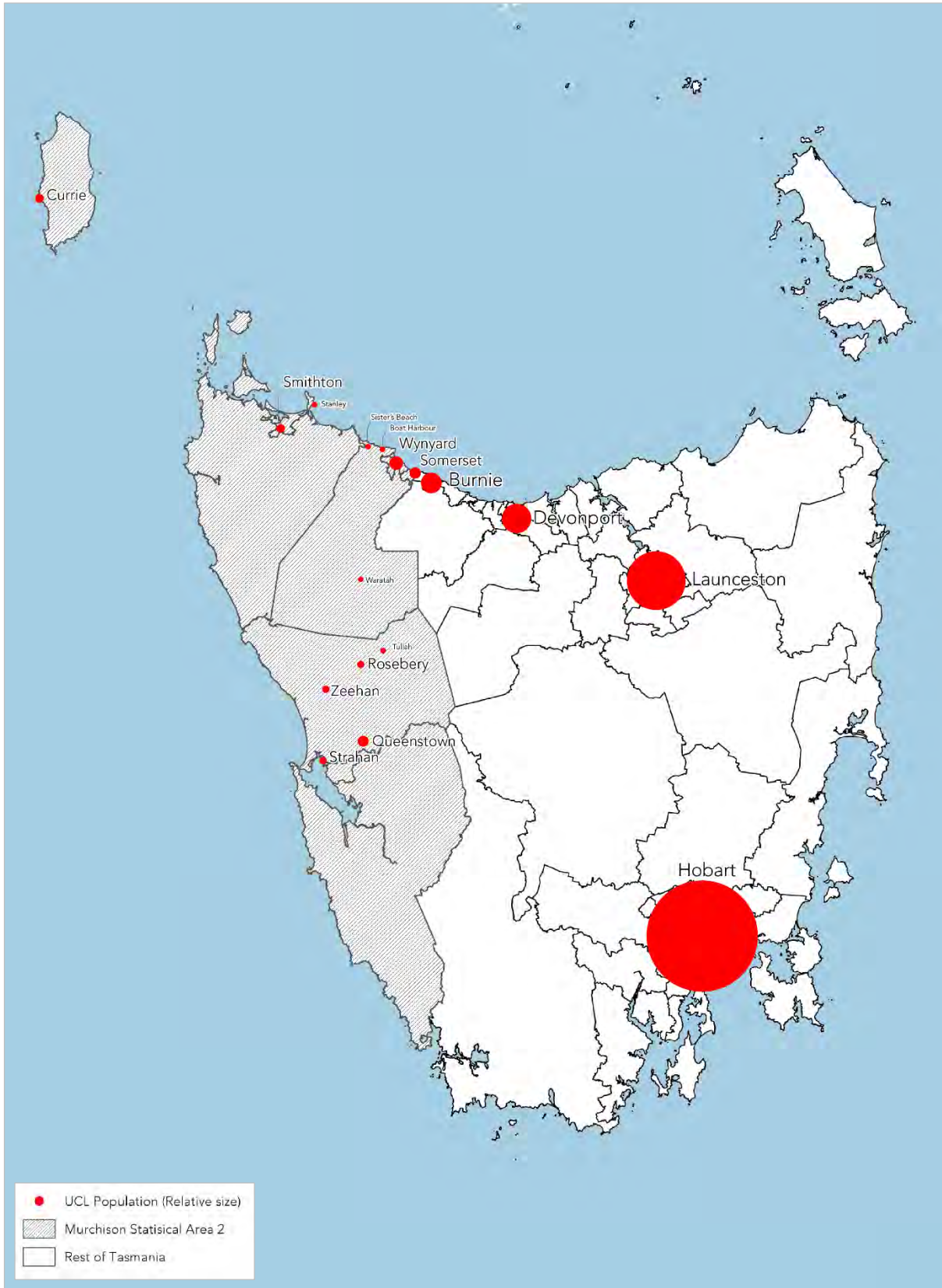
² GTA Consultants undertook an assessment of transport networks. The findings are summarised in Section 7.



Figure 1 Murchison Region and SA2 Boundaries



Figure 2 Murchison Settlements by Population



Dispersed urban centres

To analyse the distinctive settlements, the ABS geography Urban Centres or Localities (UCLs) have been used (Table 2 and Figure 3).

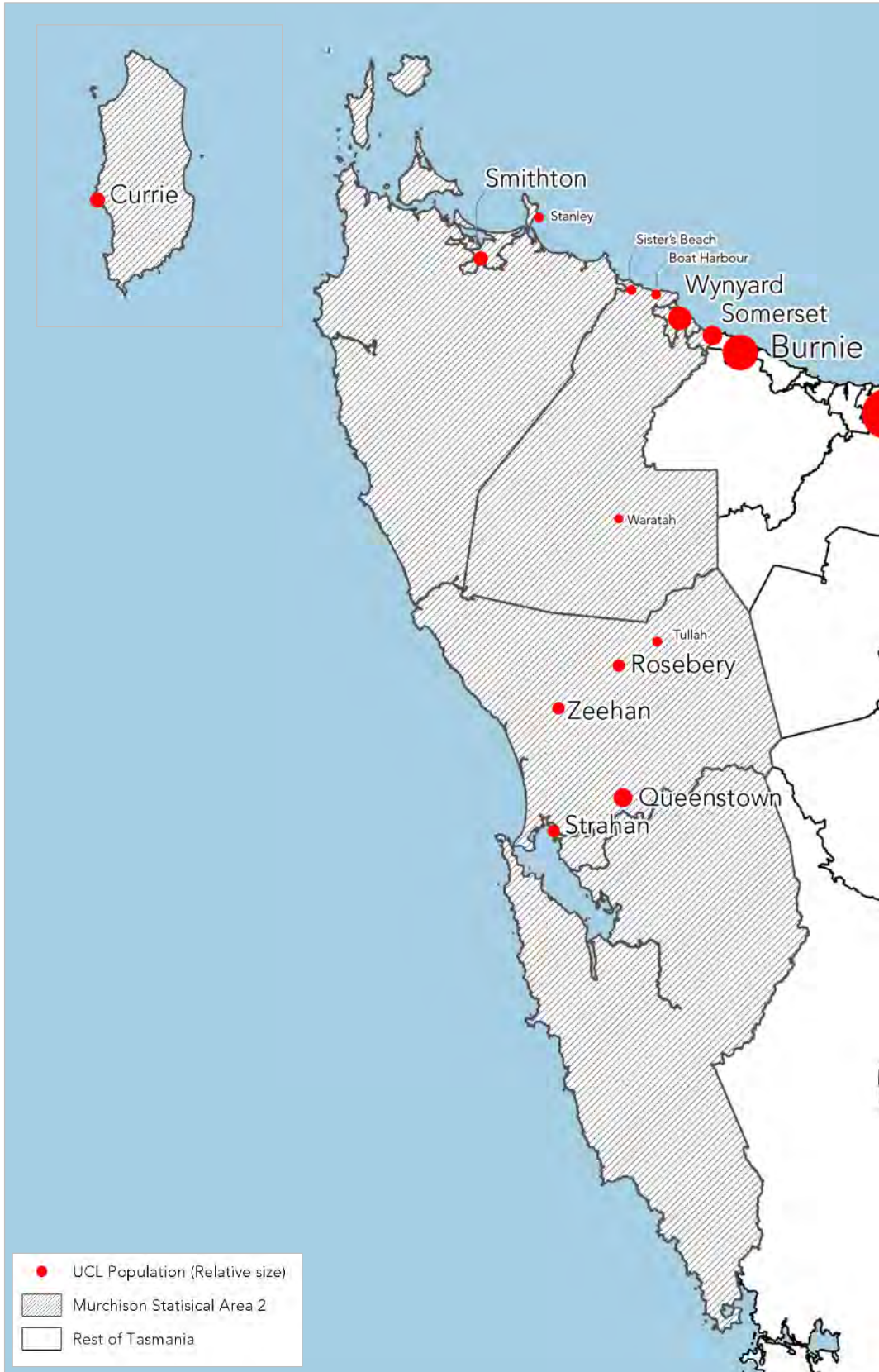
Table 2 Urban Centres

Local Government Area	Urban Centre	Population
Waratah – Wynyard	Wynyard	5,229
	Somerset	3,100
	Waratah	261
	Sister's Beach	458
Circular Head	Smithton	3,398
	Stanley	542
West Coast	Queenstown	2,009
	Rosebery	928
	Zeehan	724
	Strahan	650
	Tullah	195
King Island	Currie	704

Source: ABS, 2013



Figure 3 Dispersed Urban Centres



Burnie is the regional centre

There is no main regional centre in Murchison. Instead, Burnie (population ~20,000) plays the role as the main regional centre.

Burnie's container port is the nautical gateway for Murchison's agricultural, forestry and mining outputs. Burnie has a mature advanced manufacturing sector, in particular underground mining equipment, and other mining industry suppliers. Having grown on the back of Murchison's mining resources, manufacturing is moving beyond this to other heavy industry machinery, such as trucks and military vehicles.

Major transport connections throughout the region for road, rail, and sea converge in Burnie, whilst air travel is accessible nearby through the Burnie City Council-owned airport at Wynyard. All major Australian financial institutions have branches in the City that provide retail and agribusiness services.

Various education facilities are centralised in Burnie. The University of Tasmania, TasTAFE and Hellyer College have campuses in close proximity on Mooreville Road. The College is a major gateway to education post Year 10 for students seeking vocational education and training as well as to matriculate to university. The campus is at capacity three days a week and the University plans to move to a larger facility which can accommodate up to 2,000 students.

Marist Regional College provides the option for Year 11 and 12 students to move through the catholic school system.

The North West Regional Hospital and Smithton District Hospital have 24-hour accident and emergency facilities, where Murchison residents along the north coast can seek emergency medical treatment. The West Coast District hospital at Queenstown mainly serves West Coast residents.

Like Murchison's coastal towns, Burnie has picturesque beaches and hinterland. Consequently, tourism links between Murchison and Burnie are essential. Burnie provides restaurants, accommodation and facilities that make it a suitable base for exploring NW Tasmania.

Burnie's Community Plan, *Making Burnie 2030*, outlines six future directions:

1. An attractive place to live and work
2. An inclusive and healthy community
3. A centre for information, knowledge and learning
4. A secure, innovative and diverse economy
5. A natural and built environment that is respected and cared for
6. A region hub

The linkages between Murchison and Burnie are considered in the Framework Plan.



Sustainable future outcomes for West Coast

In 2015, more than 2,000 people were involved in the preparation of the West Coast Community Plan. It summarises their desired future vision, and strategies for the region and for specific towns (Table 3).

Table 3 West Coast Community Plan Action area and visions

Action Area	Vision Statement
Our people, Our Community	Residents & visitors feel safe, healthy and connected to their community through access to appropriate and relevant services, activities and facilities.
Our economy	We have a strong and diversified economic base and are recognised as a leading regional centre in Tasmania to live, work and visit.
Our infrastructure	We have a sustainable asset and infrastructure base to meet the lifestyle and business needs for residents, visitors and industry.
Our environment	Our natural assets are protected and enhanced for future generations through environmental leadership.
Our partnerships, Our leadership	We welcome and foster partnerships. Our Council demonstrates sound leadership, transparency and inclusive decision making processes and delivering outcomes that best meets the needs of the West Coast.

A declining, urbanising and ageing population

Since the 1980s, Murchison's total population has steadily declined from 35,236. As is common in regional Australia, the remaining population has drifted towards the larger urban settlements. Notably, Wynyard's population has grown, adding about 500 residents since 1991.

The population in Murchison is also ageing. The key dimensions to this are: 15-30 year olds leaving and 55+ year olds moving to Murchison from elsewhere in Australia. These changes are discussed in more detail in Section 2 and the Community Study.

Education across the region

Education is delivered through several channels including Child Family Centres, schools, vocational and higher education institutions.

State-funded Child Family Centres integrate services, such as preschool, healthcare, parent services, education psychology, kids' services and pre-school early years programs. They are located in Burnie and Queenstown.

The Tasmanian Department of Education's surveys show that communities are largely satisfied with schools in the region. Table 4 lists the State and non-state school system.



Table 4 Murchison Region School Campuses

School System	School level	Region				
		Waratah Wynyard	Circular Head	West Coast	King Island	Burnie
State schools	Primary	Somerset Table Cape Boat Harbour	Smithton Stanley Edith Creek Redpa Forest	Strahan Rosebery Zeehan	King Island District,	Burnie Montello Upper Burnie Romanie Park Havenview Natone Ridgely Coee
	High school / college	Wynyard	Smithton	Rosebery District Mountain Heights Queenstown	King Island District, Currie	Burnie Parklands Hellyer College
Non-State schools	Primary	St Brigid's, Seabrook Christian School	St Peters Chanel, Smithton Circular Head Christian School, Smithton*	St Joseph's, Queenstown St Joseph's, Rosebery	Ballarat Clarendon College, Grassy***	Stella Maris Catholic Leighland Christian School of Special Education
	High school / college		<i>No catholic high school</i> Circular Head Christian School, Smithton*			Marist Regional College

* Junior school – Kinder to Yr 5; Middle school – years 6, 7 and 8; Senior school – years 9, 10, 11 and 12

** To Year 10 only.

*** This is a private school campus of the College, which caters to Year 9 students that spend a term on the island with outdoor education and studies.

The schools within each local government area have developed their own attitudes toward interdependence. For example, typically, schools in Circular Head work together because of the community's belief in self-reliance. The schools collaborate to perform activities together, using the critical mass to obtain better professional outcomes through resource sharing. The State primary schools in Circular Head have formalised their collaboration by creating a Federation to promote public education, world class teachers and leaders, share expertise and foster local relevant aboriginal culture.

Local government plays an important role in supporting schools, delivering community infrastructure that is available for sport and recreation, such as football fields and swimming pools, as well as intellectual development, such as libraries and digital hubs. Local government



also diversifies student experiences through education programs, such as recycling and waste management, as well as community participation in extra-curricular activities. For example, Waratah Wynyard Council supports the Wynyard School Community Partnership to improve health outcomes to break cycles of disadvantage and teach students to develop vital life skills and stay engaged in education.

Driven by changes such as fewer apprenticeships and the increasing sophistication and complexity of the skills required for the workforce, most students need education levels beyond Year 10. Consequently, the State has implemented several initiatives to encourage students to remain in education and complete Year 12, prior to pursuing vocational or university education.

Tertiary education is offered by the University of Tasmania (UTAS) and TasTAFE. UTAS has a campus in Burnie, with future plans to expand the course offering to better meet the needs of local industries. TasTAFE also has a campus in Burnie, as well as a smaller campus in Smithton. *The Education-Driven Economic Revitalisation of Northern Tasmania* is considered a once-in-a-generation opportunity to renew the capabilities of the communities and economies of NW Tasmania. The positive changes to tertiary education are discussed in more detail in Section 6.2.

Productive forest, agricultural land and national parks

Mainland Murchison is covered by forest and vegetation suitable, in varying degrees, for agriculture. National Parks create an eastern boundary, separating it somewhat from the rest of Tasmania. The terrain is mostly hilly, susceptible to land slide, and punctuated by several mountains, including neighbouring Cradle Mountain.

Waterbodies, wetlands and extensive river systems are formed by the terrain, which has created opportunity for hydroelectricity and water storage. The area nearby the region is also notable for lakes such as Saint-Claire in the Cradle Mountain area, Gordon in the Franklin-Gordon Wild Rivers National Park, Burbury and King William.

The Tasman sea bounds the South and West coasts, and Bass Strait to the North. At the centre of the region is Macquarie Harbour, which is connected to the Tasman Sea by a small inlet at Macquarie Heads. This aquatic area is home to important aquaculture leases. Further south is Port Davey in the wilderness area of the south west.

King Island is located almost half-way between the Australian and Tasmania mainlands. It is blanketed by largely flat, productive agricultural land.

A temperate climate

The climate is generally cool to mild. In mid-summer, the average temperature on the north coast ranges from about 12 to 21C. South, around Strahan, the temperature range is similar.

In mid-winter, the average throughout the region ranges from 6 to 13C.



Murchison experiences mostly winter and spring rain. It ranges from 900mm/yr in the north (Burnie), to 1,500 mm/yr in Strahan.

It is particularly important to note that the impacts of climate change are expected to be moderate. These are discussed in detail in Section 4.

Road, rail, sea and air links

Murchison is serviced by several key roads, airports, marine ports and limited rail.

Road transport is the primary mode for freight movement. Key roads include:

- **Bass Highway** (A2) that runs along the north coast Devonport to Burnie as a national highway, then Burnie to Marawah on the west coast;
- **Murchison Highway** (A10) from Somerset to Waratah and south to Tullah, Rosebery, Zeehan, Queenstown and Strahan;
- **Waratah Road** (B23) from Waratah to Savage River; and
- **Lyell Highway** (A10) from Queenstown to Derwent Bridge and beyond.

The road network includes a system of bridges many that are close to the end of their average economic life of 70 years. Many of these bridges are not designed to carry the masses presented by the present freight task and heavy vehicle fleet. The Department of State Growth has acknowledged funding streams for remediating these assets. However, it is not yet clear if any funding will be specifically allocated to the Murchison region.

The region has airports in Wynyard, Smithton, Currie and Strahan. Operators include REX and smaller private operators.

Marine ports connect Tasmania back to Melbourne, where freight is forwarded for distribution in the Australian mainland, or onward to global markets. The port at Burnie attracts several passenger cruise ships between September and March.

The Melba Rail Line is the only active line in Murchison and used to transport mining products to the port of Burnie via Rosebery. Remnant rail track is located through the region in varying condition. The West Coast Wilderness Railway originates from Queenstown offering three different railway experience on the following routes:

1. Queenstown-Dubbil Barril-Queenstown
2. Strahan – Dubbil Barril – Strahan
3. Strahan – Queenstown – Strahan

Access and Infrastructure are discussed in more detail in Section 7.



2 Context

In the post-GFC era, Murchison faces a challenging economic landscape. However, there are emerging opportunities, for example, in food and fibre production, tourism, the silver economy and lifestyle-led development. Relatively stable, long-term demographic trends suggest Murchison's population will continue to decline and age without intervention. Climate change is the major environmental challenge. In Murchison's case, the impact is expected to be significant but moderate compared with much of the rest of Australia.

2.1 An uncertain global economic future

Since the Global Financial Crisis (GFC) in 2007/08, global economic conditions have been uncertain. As at November 2015, the Reserve Bank of Australia observed the following:

- GDP growth of Australia's major trading partners was slightly below the decade average;
- Since 2010, China has been the largest trading partner contributing to Australia's GDP growth. However, economic growth in China is slowing;
- Oil prices have fallen around 60% since 2014; and
- Commodity prices are around 50% below their peak in 2011 but still about 80% above their levels in early 2000s.

Australia largely escaped the GFC, thanks to government stimulus in both Australia and China. However, downward pressure on commodity prices will place pressure on producers. Prices for most commodities peaked in 2008, and have fluctuated since. The International Monetary Fund forecasts prices for most commodities will decline in the coming years (International Monetary Fund, 2016). Importantly:

- Mineral resource prices for coal and iron ore may fall further by 16% and 35% respectively by 2021; and
- Dairy products have performed well in recent years. However, pressure from European expansion and more challenging seasonal conditions will put producers under pressure (Dairy Australia, 2016).

On the positive side, the fall in the Australian dollar has provided exporters with relief (Figure 4). Should it remain at current levels, Murchison's exporters will benefit. However, the



cost of imports will be higher. Furthermore, the RBA notes that an appreciation in the Australian dollar caused by sustained increases in commodity prices may be associated with a modest increase in economic activity if the higher prices allow some smaller resource firms to remain in the market, which is positive for Murchison’s mining sector (RBA, 2016).

Figure 4 Australian Dollar Trade Weighted Index Exchange Rate



Source: Reserve Bank of Australia, 2016.

2.2 A region transitioning to a service-led economy

The Murchison region is experiencing an economic transition that will ultimately change the structure of the labour force. Key factors are:

- Falling commodity prices have resulted in declining production and job losses in the mining sector. Several mines have entered “care and maintenance” modes until commodity prices increase again and there is industry uncertainty for medium term prospects. Demand from China is shrinking, and although the dollar has eased, it is uncertain how long it will remain at current levels (about 0.71 USD). It is unlikely that mining will support the substantial residential population centres associated with its historic past and more than likely that mining towns such as Zeehan and Rosebery will cater largely to a transient workforce (Cradle Coast Authority, 2011).
- The forestry industry and communities have also experienced a difficult period. However, the State Government introduced new laws to rebuild the forestry industry by providing input to future direction of the industry, addressing port access, input into developing viable operating models and understanding the implications for local business and employees. There has been new investment in the sector from companies such as Forico, which owns and operates most of its value chain. State Growth is investigating opportunities for alternative products from timber other than woodchips.



- Advanced manufacturing workers impacted by the closure of Caterpillar in neighbouring Burnie have transitioned to new employment with the assistance of the Caterpillar Transition Taskforce. There are also long-term implications of job automation trends, particularly for low skill occupations. The structural change may be mitigated by innovation creating new business opportunities in export oriented food product manufacturing and defence, which has already started to occur. For instance, the majority (~85%) of skilled workers of the Caterpillar plant have transitioned to other roles.
- Agricultural producers have sound prospects. During periods where the Australian dollar was high, local processors closed due to cheaper competitors in New Zealand and Asia. However, the lower dollar may see these processors re-open. Furthermore, demand for agricultural products by Asian markets continues to grow. In support of this, the Department of State Growth (DSG) and DairyTas have updated investor guides for the North West. This growth may be more sustainable by value-adding to milk products for domestic and international markets.
- Tourism is an established industry with potential for further growth. If the dollar stays low, Regional Tourism Australia expects both domestic and international tourism to grow, including in Tasmania. The extension of cycling and walking trails along the north and west coast will support higher visitor numbers and can build up visitation to established attractions, such as the Tarkine, Cradle Coast Mountain, and Macquarie Harbour tours. Quality is set to improve with master plans for Cradle Mountain and Wynyard Waterfront, a potential \$70m investment in accommodation at Table Cape, and \$7m development in Boat Harbour. King Island's Cape Wickham golf course has stimulated greater tourism-related development on the island.
- As with much of the rest of the national economy, the major *employment* growth sectors are in population servicing industries, including health, education and administration. In addition, the impacts of the ageing population are starting to be seen as much an economic opportunity as a service demand challenge. This has given rise to the idea of the silver economy, based on health, education, financial planning and recreation markets.
- Owing to the rapid pace of structural change, workers in the region may require assistance to retrain in order to take advantage of these new opportunities.

2.3 State and regional population trends

Tasmania has been ageing and growing slowly

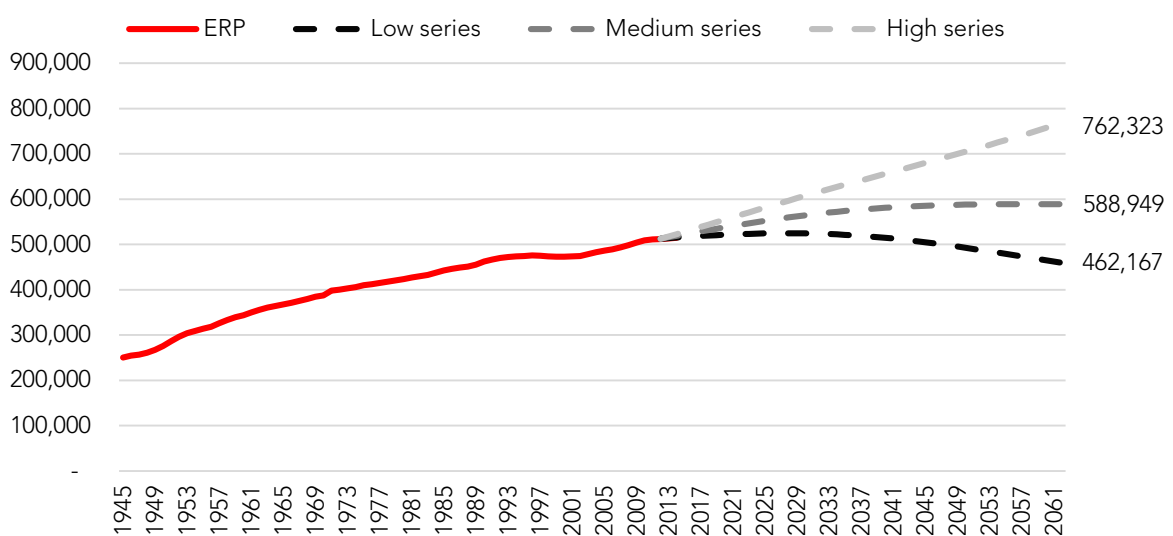
With the exception of a decline in the mid-90s, Tasmania's population has grown slowly in the post-war period (Figure 5). This is in contrast to most mainland states and has been a result of net outmigration and a lower than expected share of international inward migration.



However, the Tasmanian Treasury expects outmigration to slow, as labour market conditions in Tasmania converge with those of the mainland; and better comparative housing affordability attracts more people to Tasmania.

As Figure 5 shows, there are three scenarios for growth based on different average annual growth rate assumptions³.

Figure 5 Tasmanian Population, Actual and Scenarios



Source: ABS, 1945, 2014, Tasmanian Treasury

Murchison’s divergent population projections

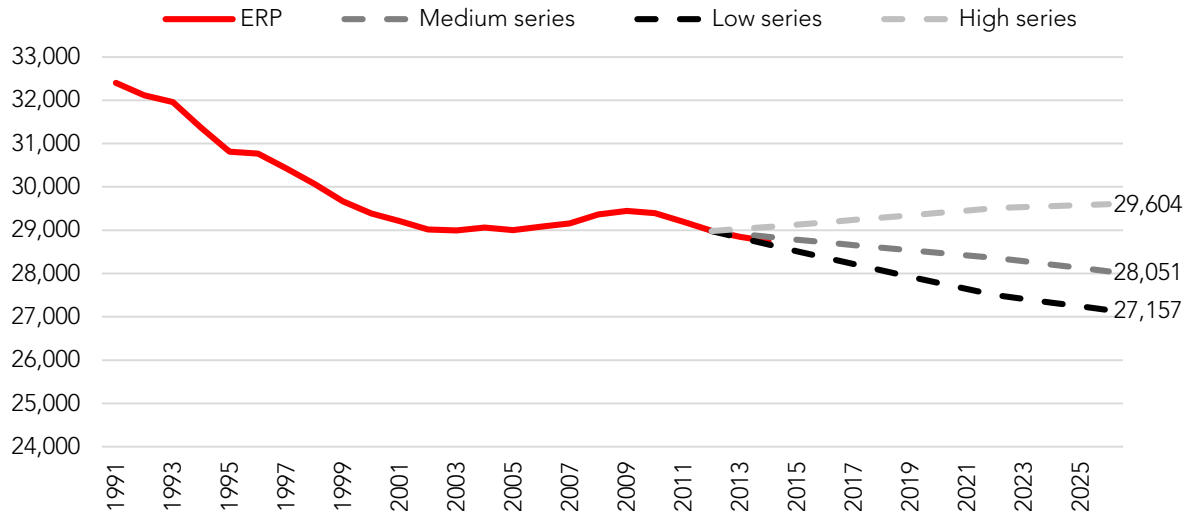
Murchison’s population has trended downwards for more than two decades, with a brief upswing in 2005-2009 (Figure 6). This was concentrated mostly in Somerset and Smithton.

In contrast to the expectations for the State, population change in Murchison is forecast to continue to decline; although some areas, such as Waratah Wynyard, are projected to grow (Figure 7). The decline in West Coast is driven largely by out-migration.

³ These are mathematical growth rate scenarios and not based on specific modelling of, for example, the effect of changing economic conditions. Given the relatively small size of Tasmania’s population and its subsequent sensitivity to economic activity, it would be more effective to prepare projections based on economic growth scenarios, for both Tasmania and smaller sub-regions such as Murchison.

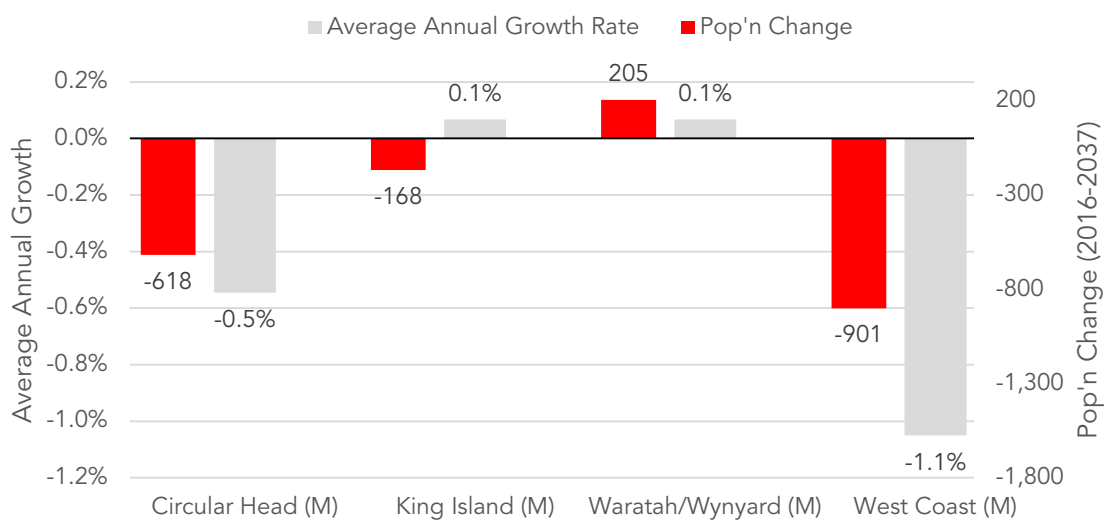


Figure 6 Murchison Population, Actual and Scenarios



Source: ABS, 2013, 2014, Tasmanian Treasury

Figure 7 Projected Population Decline (medium series to 2037)



Source: Tasmanian Treasury

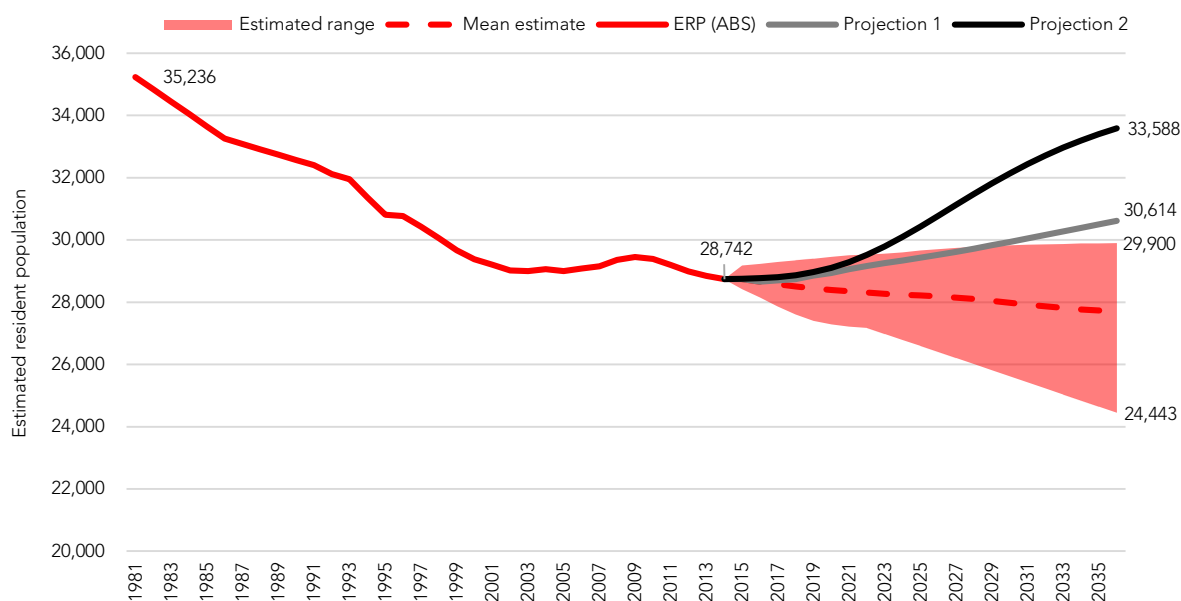
Tasmania's Population Growth Strategy has set a target for growth of 650,000 people by 2050. It identifies 50 actions in three key areas (job creation and workforce development, migration and liveability) in which the government will invest \$10 million over four years to implement, largely in job creation. (Department of State Growth, 2015).

Building on the State projections, but introducing economic drivers into the model, three potential scenarios have been prepared (Figure 8). These scenarios factor in the



Commonwealth (Department of Employment) regional employment projections, with Additional 'above expectation' employment growth derived from market intelligence provided by councils in relation to major public or private investments.

Figure 8 Population Scenarios to 2036



From Figure 8:

- The BAU scenario (red shaded area) extends forward the historical trend by assuming no major investment beyond what would be expected for a region of around 30,000;
- Projection 1, assumes the Department of Employment forecasts for the region continue, stimulating some population growth; and
- Projection 2 assumes above trend growth as major new investments are made in agribusiness and tourism.

Population is discussed in more detail in the Community Study.

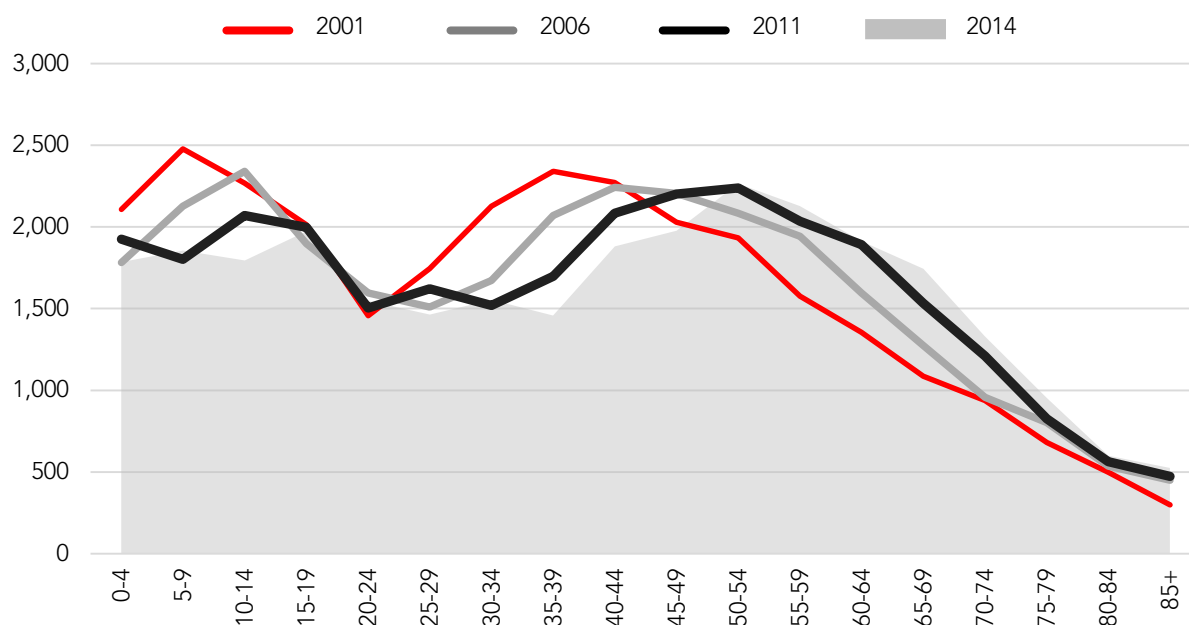
Murchison's ageing population

Since 2001, Murchison's population has continued to age rapidly (Figure 9). The number of young people aged 25-49 year olds fell consistently, while the number of people aged 50+ grew. Younger people are likely to be leaving to pursue education and employment opportunities in larger centres in Tasmania, such as Launceston and Hobart, as well as the



Australian mainland. At present, it is likely that the Murchison region is perceived as a good place to retire, rather than to seek education or work opportunities.

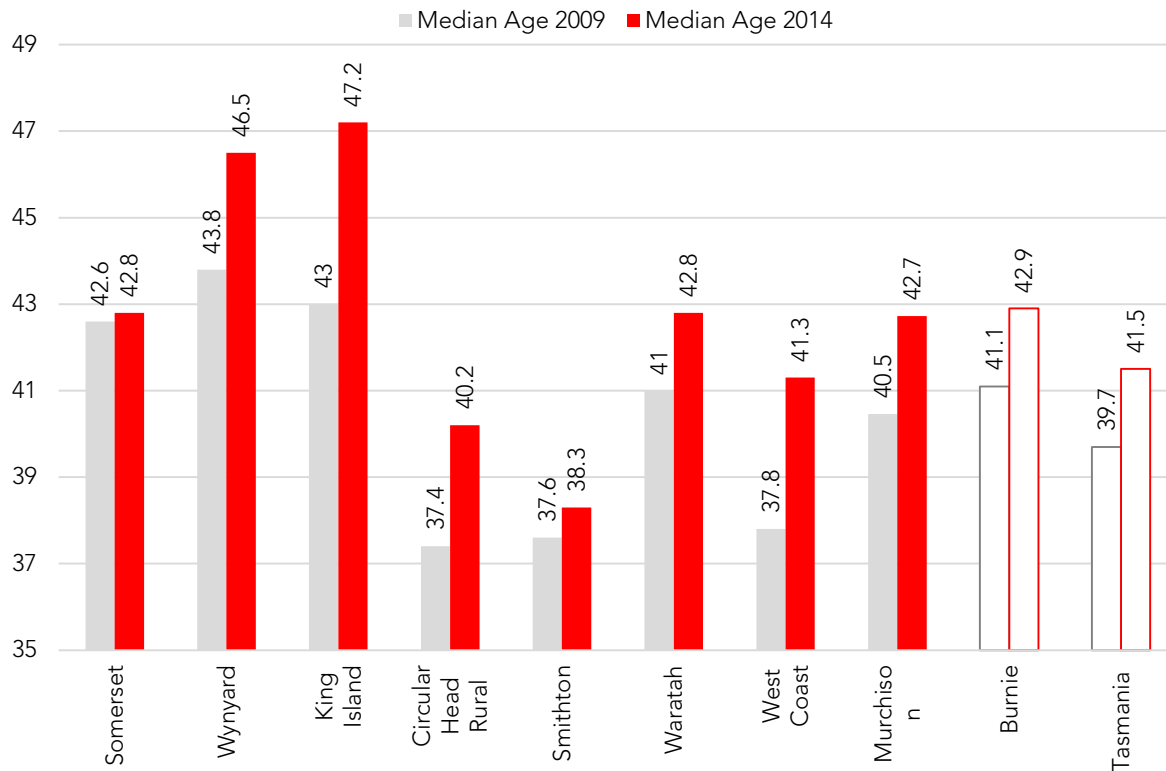
Figure 9 Population by Age, Murchison 2001-2014



The impact of migration has also affected the median age, which, from 2009 to 2014, rose for the whole region (Figure 7). Notably, King Island experienced the greatest increase and Smithton and Circular Head Rural have lower median ages than the State average (41.5 in 2014). Supporting younger new entrants to farming and proposed new courses at University of Tasmania may abate the trend somewhat, but this will also depend on new jobs and industry development in the region, which is discussed later in this analysis.



Figure 10 Median Age by SA2, 2009-2014



Source: ABS, 2014

The implication of these demographic changes are significant, specifically:

1. The loss of working age population (particularly younger workers) will shrink labour pools, putting pressure on local businesses. The replenishment of younger working age families is essential to provide the labour force and household formation rate necessary to sustain the development of the region's economy.
2. There may be pressure on older workers to stay in the workforce longer, or work full time, at a time when they would prefer to decrease their working hours or withdraw from the workforce altogether. Given the lower cost of living in Tasmania and the relatively high rates of home ownership, there is arguably even less incentive for older workers to remain in the workforce.



2.4 A significant but comparatively moderate impact from climate change

Tasmania will not be immune to climate change. In particular, climate variability is likely to be exacerbated, resulting in more frequent heat waves and extreme weather events, increasing the risk of bushfire, storm surge, flooding and coastal erosion.

In response, the Tasmanian Department of Premier and Cabinet has released a Draft Action Plan, *Embracing the climate challenge: Tasmania's draft climate change action plan 2016-2021*. (Tasmania Government, 2015). To manage and recover from the likely future effects of climate change, the Government has adopted a risk management approach to assist businesses, communities and government.

Extensive downscaled climate projections and scenarios were developed for the State by Climate Futures Tasmania (Grose et al 2010). The predictive models developed assumed two carbon emissions scenarios – a low scenario (B1) and a high scenario (A2).

Integrating the Climate Futures Tasmania projections into existing enterprise suitability mapping, the Tasmanian Government's Department of Primary Industries, Parks, Water and Environment has modelled the future impacts of climate change on various crops grown throughout the State. The department's work is based on digital soil and climate mappings validated by field sampling and monitoring. Knowledge of soil, landscape and climate preferences of specific crops were applied to predict the suitability of farming across the State.

The impacts of climate change are discussed in more detail in Section 4.

2.5 Utilities investing in infrastructure

Utility infrastructure is undergoing investment by the utility providers to ensure the community has reliable access and quality service. Their investments range from minor works for across the network through to major plant upgrades of sewer treatment plants.

Water and energy utilities are responsive to respond to changes in settlement populations and customer needs for new and enhanced services.

The National Broadband Network rollout of high speed broadband is ongoing and will continue to be funded by the Federal Government. The Murchison region, and much of Tasmania, have been the beneficiaries of the early rollout of the network, which positions them to take first mover advantage of this new technology. This is discussed in more detail in Section 6.



Energy distribution network and supply infrastructure

Energy Networks

TasNetworks is a government business enterprise (GBE) that has main responsibility to distribute energy across mainland Tasmania, including Bruny Island. Hydro Tasmania is responsible for energy transmission on King Island and Flinders Island.

TasNetworks plan, develop and maintain its high and low voltage network infrastructure to provide adaptable levels of energy to and from residential, commercial and industrial customers. It also offers a commercial service to communications providers to access TasNetworks' network where it is not feasible to erect their own poles.

Power generation in Tasmania is largely met by hydro (74%), and to a lesser extent gas turbine (12%), wind (10%) and embedded generation (4%). Major industrial customers consume more than half the energy consumed by all customers distributed by TasNetworks (54%).

The energy transmission network in mainland Murchison is considered to be sufficient to meet the forecast demands of current and future users (TasNetworks, 2015). Furthermore, TasNetworks engages with land developers and industrial customers to help them plan and manage access and augmentation so that the network provides capacity in a timely manner. Representatives from TasNetworks are available to meet with customers on the fourth Wednesday of every month to ensure that their plans remain current and respond to customer needs. Industrial connections for customers such as smelters and mines require extra engagement with TasNetworks and Hydro Tasmania.

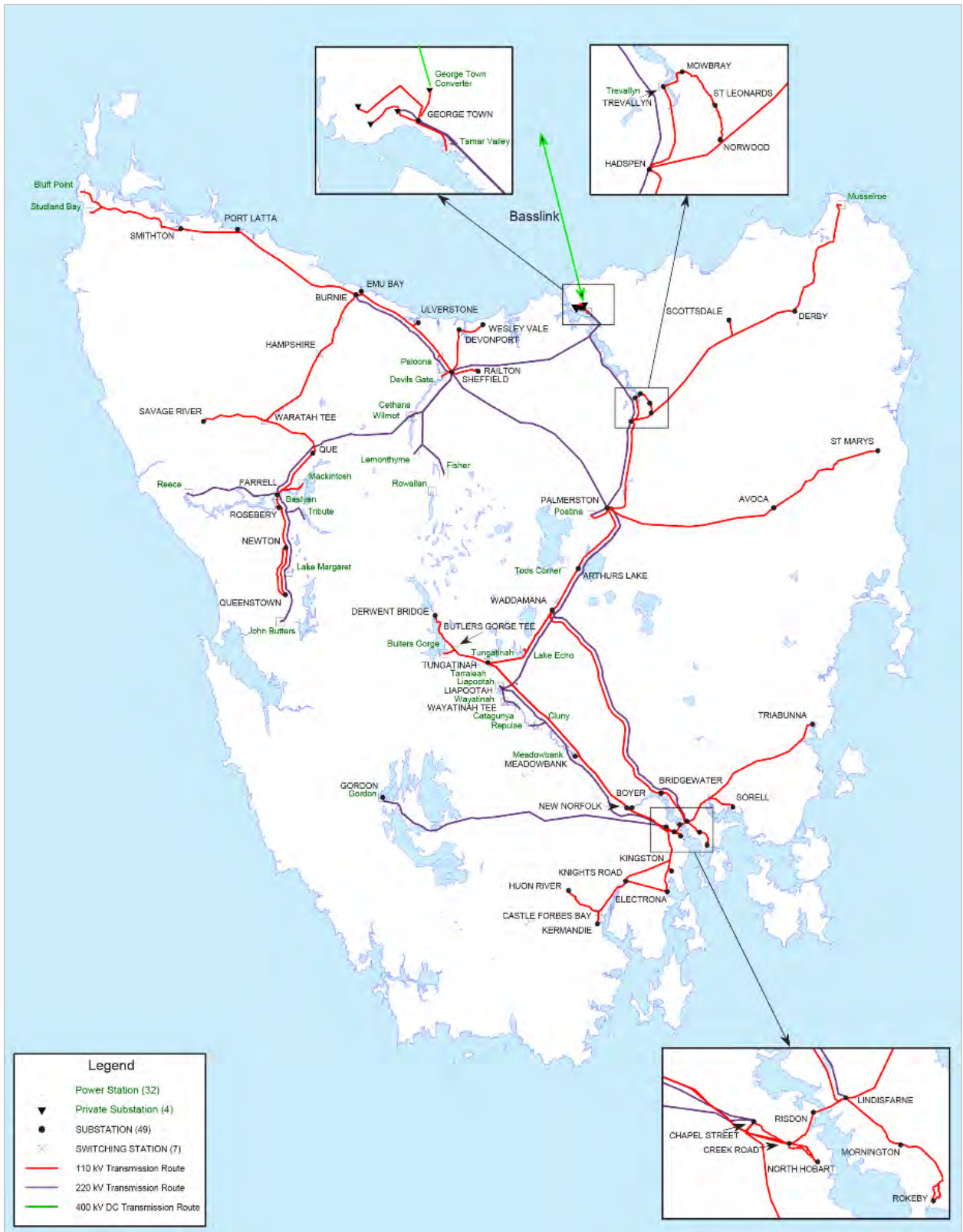
Future development of the network in the north-west is preferred within or adjacent to existing settlements to deliver infrastructure efficiently to all customers. This helps manage the infrastructure costs for land developers and customers. Industrial customers, such as food processors and mines, on the other hand, have particular needs that are reflected in their connection requirements costs.

TasNetworks has committed investment in Murchison to augment its infrastructure to meet service levels. This investment is occurring in Rosebery, Strahan, and Burnie (which supports part of Waratah-Wynyard). Performance issues and solutions are under investigation for Zeehan and Queenstown. Solutions to material constraints on the Farrell-Que-Savage River-Hampshire 110kV circuit will be proposed sometime in 2018. Projects in Farrell and Newton has been deferred indefinitely, due to reduced load from mining customers (TasNetworks, 2015).

TasNetworks is looking ahead to understand how future technology will affect energy transmission and supply. It is working on a battery trial with the Australian National University, University of Tasmania and private residential investors at Bruny Island to understand and implement battery technology in Tasmania.



Figure 11 TasNetworks Transmission Network



Source: TasNetworks Annual Planning Report 2015.



Water and sewerage infrastructure

TasWater is the local-government owned business enterprise that plans, develops and operates Tasmania's water and sewerage infrastructure network. The enterprise commenced operation on 1 July 2013, taking over assets from councils and former water and sewerage companies. The twenty-nine councils are shareholders in the enterprise and yearly endorse the business's Corporate Plan. Council shareholders receive a return on their original investment in the State's water and sewerage infrastructure.

TasWater provides key settlements with reticulated water and/or sewerage services. The business has 20 employees (full-time equivalents) operating and maintaining the water and sewerage network in the region. Most, but not all, settlements have both full service drinking water and sewerage. Water and sewerage services outside serviced land are the responsibility of land owners.

There are two environmental regulators of sewerage in Tasmania: the Environment Protection Authority (EPA) and local government. Councils are the responsible regulators for septic tanks and Level 1 sewer treatment by public and private plants that have a dry weather flow up to 100kL average per day. The EPA is responsible for the regulation of treatment plants larger than 100kL.

TasWater has allocated more than half (57% or \$188m) of its capital works budget (\$330m) to improve compliance with environment and drinking water standards, as outlined in its regulated Price and Service Plan 2015- 2018. Around \$70 million will be spent in Murchison to provide better drinking water, meet environmental compliance and to improve the safety of its dams. Some of the projects include:

Water:

1. **King Island** - An upgrade to improve the water supply to Curry and Grassy including construction of a new water treatment plant and a 28km pipeline delivering treated water to Curry. The project is underway and is expected to be completed by June 2017. Project budget \$13m.
2. **Queenstown** – Upgrade to Conglomerate Dam, Queenstown's water supply, to ensure supply and safety. The project is underway. Project budget \$4.0m.
3. **Rosebery** – Upgrades to existing water supply pipelines and pump stations in Rosebery to facilitate the move to a fully treated water supply with construction of a new state-of-the-art water treatment plant. The project is due for completion by June 2016. Project budget \$6.6m.
4. **Lake Mikany** – Dam safety upgrade to lower operating risk of the dam. Due for completion June 2017. Project budget \$7.0m.



Sewerage:

1. **Upgrading sewage treatment plants** to ensure compliance with Environmental Protection Authority requirements. This focus is likely to continue for at least ten years until all the state's sewerage assets are compliant.
2. **Rosebery** – Upgrade of interconnecting pipelines and treatment plant to state of the art system. The plant has been completed and the project is expected to be completed by June 2016. Total project cost \$10m.
3. **Wynyard** – Major plant upgrade to rationalise the Somerset sewage treatment works and achieve environmental compliance at Wynyard. Project to be completed June 2017. Project budget \$17m. In addition, the construction of a new sewer main from Fonterra directly to the TasWater sewage treatment plant, \$2.1m.

It is likely that future projects may be needed to improve sewage treatment plants in settlements such as Tullah, Zeehan and Stanley, and drinking water infrastructure in Strahan. However, these are subject to feasibility assessment and expenditure approval by the Tasmanian Economic Regulator.

Water is typically sourced from rivers, stored in reservoirs and dams, and treated at the point of entry to water network. Most of the key settlements also have sewerage infrastructure, to treat residential, commercial and industrial sewage and waste water, at local treatment plants prior to discharge to the sea or lagoons. Some industrial customers produce wastewater that requires treatment prior to discharging to TasWater's network. For example, Lion's Dairy processing plant at Smithton includes a bio-digester to transform trade waste into energy, which reduces the active components of waste and making it suitable for treatment in TasWater's plant.

The Department of Health and Human Services (DHHS) regulates drinking water and TasWater works closely with them to ensure that, where reticulated drinking water is provided, it is safe for consumption. In line with DHHS requirements and drinking water guidelines, Boiled Water Alerts or Do Not Consume alerts may be issued to customers advising them that their water is not safe. TasWater has a program to provide safe drinking water to communities where these alerts have been longstanding.

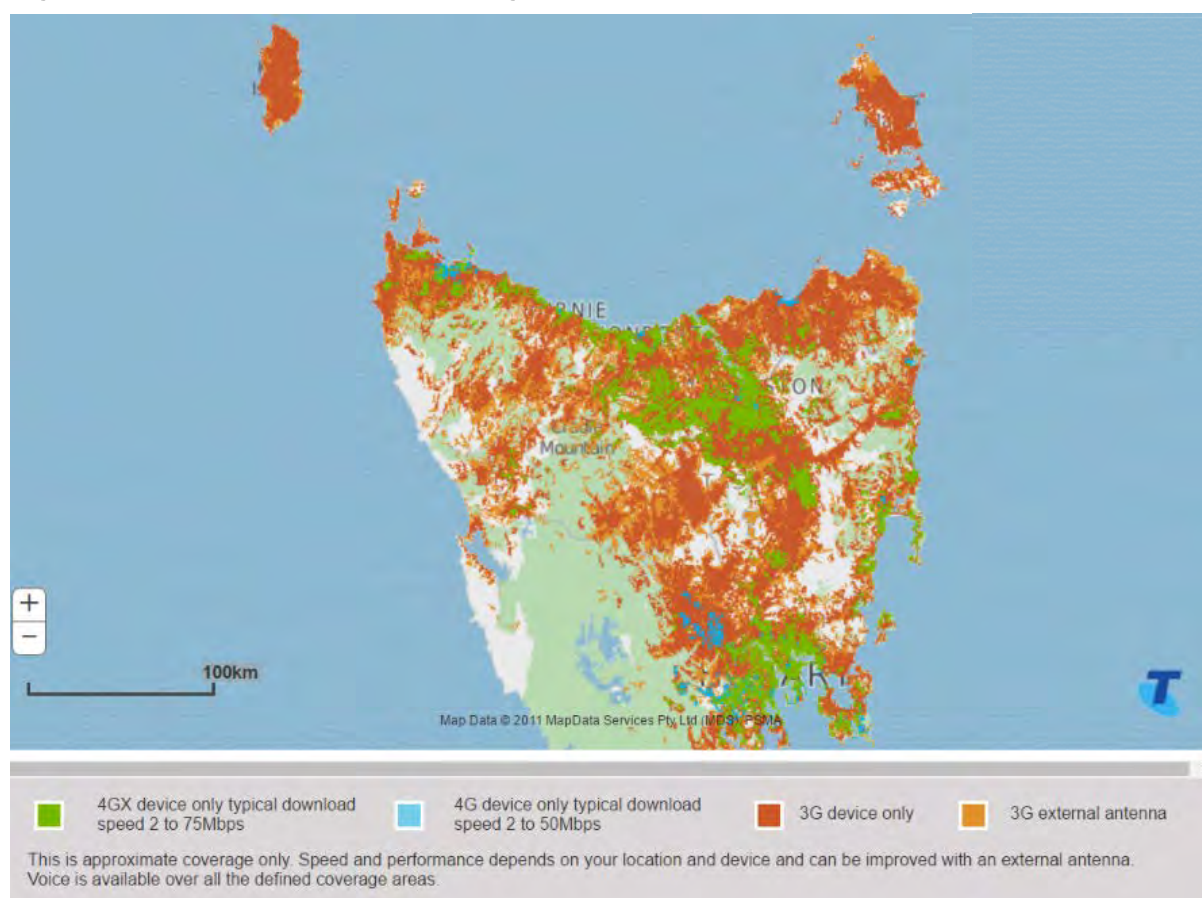
Settlements in the region are likely to have adequate water and waste water infrastructure capacity to cope with future changes in the Community Plan's horizon. This is supported by future demand modelling by TasWater, as part of its Price and Service Plan, which draws upon growth predictions from the ABS, the Tasmanian Treasury, available council studies, council land use strategies and specific discussions with councils and other stakeholders. While, the demand forecasts are reviewed every 3-5 years in the Price and Service Plan, TasWater engages with customers, developers and Councils to ensure that new infrastructure continues to meet the community's needs.



Telecommunications infrastructure

Telecommunications are serviced by a fixed line copper network and wireless mobile network. Telstra is the main provider. The mobile network covers large parts of the region where there are settlements (Figure 12). However, large areas that are forested are unlikely to receive coverage.

Figure 12 Telstra Mobile Coverage Networks



Source: <https://www.telstra.com.au/coverage-networks/our-coverage>

The National Broadband Network (NBN) will deliver High Speed Broadband (HSB) to the region by the end of 2018. Smithton has fibre to the premise, Wynyard will have fixed line services while other parts of the region will have fixed wireless. Customers will be able to choose from wholesale Internet service providers (ISP) offering a range of tiers, based on speed and volume.

West Coast and King Island will be able to access HSB through NBN's satellite SkyMuster service, which commenced operation in April 2016. Subject to election commitments, West Coast settlements of Queenstown, Rosebery and Zeehan may be connected to the HSB network by fibre. Service levels are comparable with the FTTN network. As with customers



on fixed line and fixed wireless services, the speeds achieved will depend on factors such as equipment quality, software, and network design.

There will be a delay in the time it takes to get data to and from the satellites, which means real time services, like online-gaming and virtual private networks are affected.

NBN Co is progressing with plans to provide students using a satellite service with a separate additional service for distance education that will provide them with an extra 50 GB per month of data and up to 150 GB per month for households with this service. (NBN Co Limited, April 2016).



3 Areas of Natural and Cultural Significance

The Murchison region is endowed with great natural and cultural assets. The vast majority are conserved, internationally recognised forests and geological land formations that accommodate numerous threatened species. The heritage of the Indigenous communities is scattered throughout the region, while European heritage is concentrated into settlements and mines.

This section summarises the datasets provided by AK Consultants that Geografia has used to evaluate natural and cultural values. The full report prepared by AK Consultants is available as a separate document.

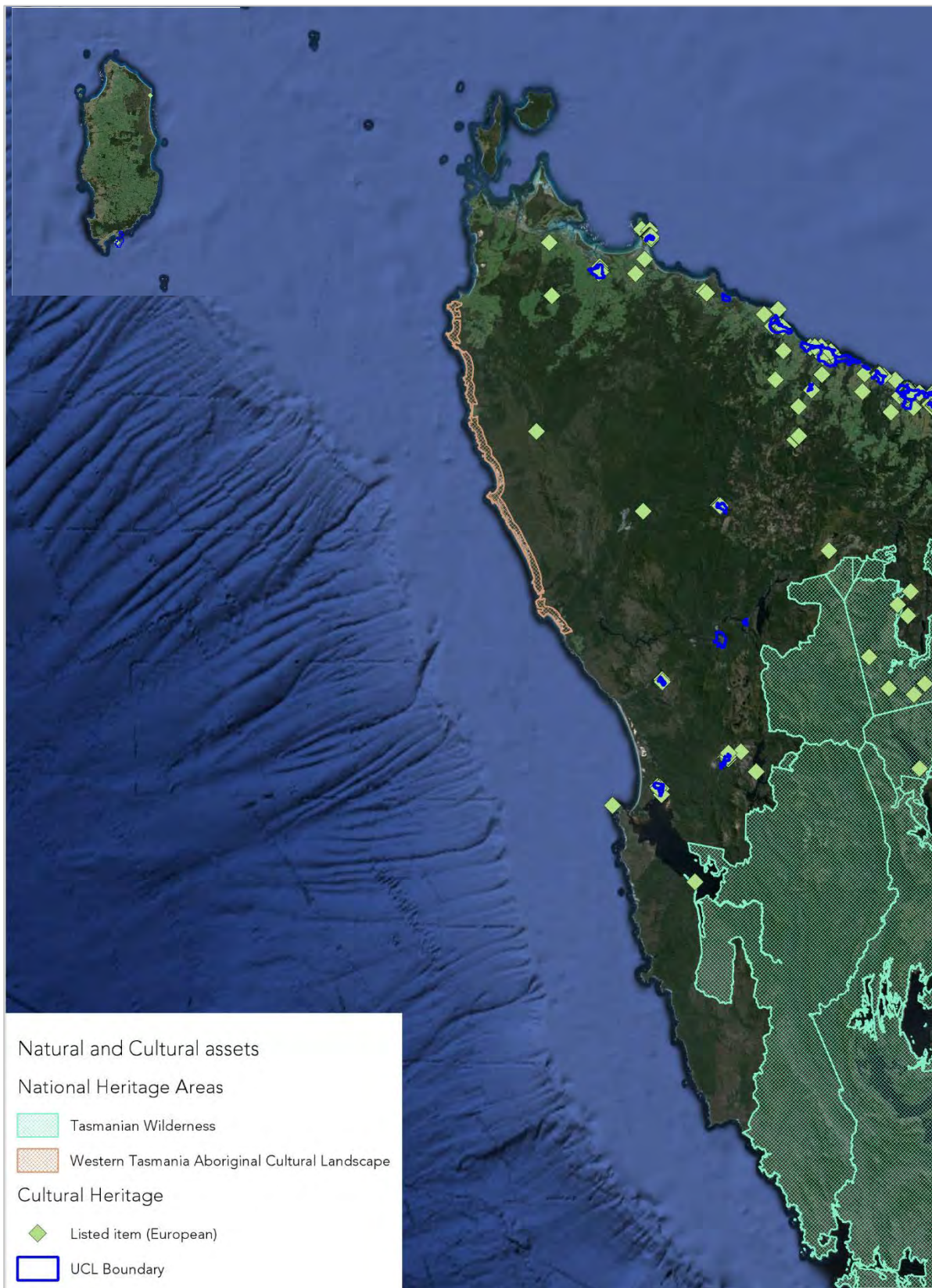
3.1 Murchison's natural and cultural assets

An inventory of the natural and cultural values of the Murchison found:

- Approximately 63% (1.179m hectares) of the region is reserved for conservation;
- There are 139 heritage listed sites (including 31% of Tasmania's Wilderness World Heritage Area);
- There is 41,651 ha of threatened vegetation communities, with 44% outside of reserves;
- There are 3,227 known Aboriginal Heritage sites, only half of which are in reserves;
- There are 429 geoconservation sites, covering 1,530,500 ha of land. 15% of this land area is outside reserves; and
- 10,280km of rivers and 52,183 ha of waterbodies and wetlands are identified as having high integrated conservation value.



Figure 13 Natural and Cultural Assets



3.2 Extensive natural significance

Reserve areas

Areas of natural significance in Murchison are reserved within 16 different land tenure classifications including marine reserves (Table 5)⁴. These are protected through various legislation including the *Nature Conservation Act 2002*, the *Crown Lands Act*, and the *Local Government Act*. Reserves within the World Heritage Area are also protected under the Commonwealth's *Environment Protection and Biodiversity Protection (EPBC) Act 1999*.

Marine reserves which adjoin the Murchison region are the Port Davey/Bathurst Harbour Marine Nature Reserve within the Southwest National Park. This area is outside of the Murchison SA2 boundaries.

The analysis illustrates the quantum of land protected from development by primary industries or settlement, however it should be noted that some reserves are informal and 'Conservation Areas' generally allow mining and some, albeit limited production forestry activities. It should also be noted that reserve status can change and permissible activities within the boundaries change as a result.

Table 5 Areas Reserved Within Murchison

LIST Land Tenure Classification	Area (ha)	% of Murchison region
Conservation area	300,500	15.7
Conservation covenant	4,543	0.24
Game reserve	205	0.01
HEC conservation area	330	0.02
Historic site	8,060	0.4
LGA conservation area	0	0
Local Government Act reserve	20.3	0
Marine reserves	0	0
National Park	503,200	26.4
Nature reserve	484	0.02
Nature recreation area	42,404	2.2
Private nature reserve	240	0.01
Private sanctuary	2,443	0.13
Public reserve	2,581	0.13

⁴ According to the LIST Land Tenure (DPIPWE, 2015) there are 29 different land tenure classifications within the Murchison region, of which 15 depict reserved land and are therefore included in this assessment. The LIST Marine Nature Reserves (DPIPWE, 2015) was used to identify Marine Reserves.



LIST Land Tenure Classification	Area (ha)	% of Murchison region
Regional reserve	290,726	15.2
State reserve	23,205	1.21
TOTAL	1,178,941	61.67

Source: LIST Land Tenure (DPIPWE 2015), LIST Marine Nature Reserved (DPIPWE 2015) cited in AK Consultants (2016)

Threatened vegetation communities

Native vegetation communities considered to be threatened are listed under Schedule 3A of the *Nature Conservation Act 2002*. State-wide digital mapping of Tasmania’s vegetation (TASVEG) depicts approximately 41,651 ha of Murchison vegetation communities as being threatened⁵ (Table 6), 18,325ha (44%) of which are not within reserves.

While clearing is restricted here, it may be permitted where the proponent can provide suitable offsets. Regulations surrounding the clearing of land in Tasmania apply to both forest vegetation and threatened non-forest vegetation communities and are controlled mainly under the *Forest Practices Act 1985* and *Forest Practices Regulation 2007* as well as local planning schemes.

Table 6 TASVEG3.0 Threatened Vegetation Communities

Threatened Vegetation Community	TASVEG 3.0 Code	Listing
Alkaline pans	MAP	<i>Nature Conservation Act 2002</i>
<i>Allocasuarina littoralis</i> forest	NAL	<i>Nature Conservation Act 2002</i>
<i>Athrotaxis cupressoides</i> / <i>Nothofagus gunnii</i> short rainforest	RPF	<i>Nature Conservation Act 2002</i>
<i>Athrotaxis cupressoides</i> open woodland	RPW	<i>Nature Conservation Act 2002</i>
<i>Athrotaxis cupressoides</i> rainforest	RPP	<i>Nature Conservation Act 2002</i>
<i>Athrotaxis selaginoides</i> / <i>Nothofagus gunnii</i> short rainforest	RKF	<i>Nature Conservation Act 2002</i>
<i>Athrotaxis selaginoides</i> rainforest	RKP	<i>Nature Conservation Act 2002</i>
<i>Athrotaxis selaginoides</i> subalpine scrub	RKS	<i>Nature Conservation Act 2002</i>
<i>Banksia marginata</i> wet scrub	SBM	<i>Nature Conservation Act 2002</i>
<i>Banksia serrata</i> woodland	NBS	<i>Nature Conservation Act 2002</i>
<i>Callitris rhomboidea</i> forest	NCR	<i>Nature Conservation Act 2002</i>
Cushion moorland	HCM	<i>Nature Conservation Act 2002</i>
<i>Eucalyptus amygdalina</i> forest and woodland on sandstone	DAS	<i>Nature Conservation Act 2002</i>

⁵ Compiled from LIST TASVEG 3.0 Codes (DPIPWE, 2013). While there is an existing LIST data layer “Threatened Vegetation Communities 2014 (TNVC 2014”), it only includes communities listed under State legislation (the *Nature Conservation Act 2002*) our analysis includes threatened vegetation communities listed under Federal legislation (the *EPBC Act 1999*).



Threatened Vegetation Community	TASVEG 3.0 Code	Listing
<i>Eucalyptus amygdalina</i> inland forest and woodland on Cainozoic deposits	DAZ	Nature Conservation Act 2002
<i>Eucalyptus brookeriana</i> wet forest	WBR	Nature Conservation Act 2002
<i>Eucalyptus globulus</i> dry forest and woodland	DGL	Nature Conservation Act 2002
<i>Eucalyptus globulus</i> King Island forest	WGK	Nature Conservation Act 2002
<i>Eucalyptus morrisbyi</i> forest and woodland	DMO	Nature Conservation Act 2002
<i>Eucalyptus ovata</i> forest and woodland	DOV	Nature Conservation Act 2002
<i>Eucalyptus ovata</i> – <i>Callitris oblonga</i> forest		EPBC Act 1999
<i>Eucalyptus risdonii</i> forest and woodland	DRI	Nature Conservation Act 2002
<i>Eucalyptus tenuiramis</i> forest and woodland on sediments	DTO	Nature Conservation Act 2002
<i>Eucalyptus viminalis</i> - <i>Eucalyptus globulus</i> coastal forest and woodland	DVC	Nature Conservation Act 2002
<i>Eucalyptus viminalis</i> Furneaux forest and woodland	DVF	Nature Conservation Act 2002
<i>Eucalyptus viminalis</i> wet forest	WVI	Nature Conservation Act 2002
Heathland on calcareous substrates	SCL	Nature Conservation Act 2002
Heathland scrub complex at Wingaroo	SCW	Nature Conservation Act 2002
Highland grassy sedgeland	MGH	Nature Conservation Act 2002
Highland <i>Poa</i> grassland	GPH	Nature Conservation Act 2002
Lowland <i>Themeda triandra</i> grassland	GTL	EPBC Act 1999
Lowland <i>Poa labillardierei</i> grassland	GPL	EPBC Act 1999
<i>Melaleuca ericifolia</i> swamp forest	NME	Nature Conservation Act 2002
<i>Melaleuca pustulata</i> scrub	SMP	Nature Conservation Act 2002
<i>Notelaea</i> – <i>Pomaderris</i> – <i>Beyeria</i> forest (now Broad-leaf scrub)	NNP (now SBR)	Nature Conservation Act 2002
Rainforest fernland	RFE	Nature Conservation Act 2002
Riparian scrub (now Eastern Riparian Scrub)	now (SRE)	Nature Conservation Act 2002
Seabird rookery complex	SRC	Nature Conservation Act 2002
<i>Sphagnum</i> peatland	MSP	Nature Conservation Act 2002
Spray zone coastal complex	SSZ	Nature Conservation Act 2002
Subalpine <i>Diplarrena latifolia</i> rushland	MDS	Nature Conservation Act 2002
Subalpine <i>Leptospermum nitidum</i> woodland	NLN	Nature Conservation Act 2002
Wetlands	AWU, AHF, AHL, ASF	Nature Conservation Act 2002

Source: TASVEG 3.0 Codes (DPIPWE, 2013) cited in AK Consultants (2016)

Geoconservation

Geological features, systems and processes of conservation significance make up the 429 listed Geoconservation sites with a total area of approximately 1,530,500 ha⁶. Listed sites

⁶ Tasmanian Geoconservation Database V7 (DPIPWE, 2010).



therefore cover 82% of Murchison. Approximately 80% of these sites, however, are already within reserve boundaries, therefore 283,760ha (15%) of Murchison contains listed sites outside of existing designated reserves.

Geoconservation values are categorised in relation to whether they are representative of features or are of outstanding significance. This level of significance is then ranked according to a scale from local significance to global significance.

Each value is also classified by its sensitivity from 1-10. This sensitivity scale reflects the values' potential to be degraded by disturbance from various land use practices⁷.

Geoconservation values are considered in Natural Values Assessments⁸ and have the potential to constrain development opportunities for primary production and settlement. Whether a particular site needs to be excluded completely from development or land clearing depends upon a multitude of factors, including the sensitivity, extent and significance of the feature which can only be assessed on a case by case basis. Consequently, this layer does not necessarily indicate areas which are unavailable for development, but need to be considered as areas subject to further investigation as there may be restrictions on clearing and earthworks for values of broader significance or higher sensitivity. Generally, these areas are protected through the application of a 'reserve' status.

In addition, this analysis does not include "Restricted" sites, which are confidential to reduce the risk of vandalism/fossicking. Within Murchison there are 14 sites listed as Restricted, 12 of which are within existing reserved areas.

Conservation of freshwater ecosystems (CFEV)

Murchison has 10,280 km of rivers and 52,183 ha of waterbodies and wetlands that have been assessed as having a high or very high integrated conservation value⁹ (Table 7).

Table 7 Wetlands, Waterbodies and Rivers of Integrated Conservation Value

CFEV Feature	Total	Area/length
Wetlands	3,165	25,827 ha
Waterbodies	244	26,356 ha
Rivers	22,621	10,280 km

Source: CFEV Waterbodies, Rivers and Wetlands datasets (DPIPWE, 2005) cited in AK Consultants (2016)

⁷ Appendix 2 of AK Consultants (2016) Murchison Natural Resource Inventory.

⁸ Guidelines for Natural Values Assessments, DPIPWE (2009)

⁹ Conservation of Freshwater Ecosystem Values (CFEV) Waterbodies, Rivers and Wetlands dataset from LIST (DPIPWE, 2005).



While there are no specific development controls relating to CFEV ratings, generally 'Very High' or 'High' values would trigger further assessment work to determine the impact of any proposed development on those values, particularly the development of water resources.

3.3 Cultural Heritage

Aboriginal heritage

An Aboriginal Heritage Search of the Aboriginal Heritage Register (conducted by Aboriginal Heritage Tasmania, February 2016), resulted in a total of 3,227 listed sites within the Murchison region. This is 26.6% of Tasmania's listed Aboriginal Heritage sites. Sites include:

- Middens (33%), with 1,170 individual sites recorded;
- Artefact scatters (31%), with 1,088 sites recorded; and
- Isolated artefacts (27%), with 967 sites recorded;
- Shelter/other (7%), with 233 sites recorded; and
- Quarries (1.6%) with 56 recorded sites¹⁰.

Approximately 52% of the listed Aboriginal Heritage Sites in Murchison are within reserves. The remaining 1,546 known Aboriginal Heritage sites are outside of reserve boundaries and vulnerable to disturbance.

Aboriginal Heritage Sites are protected under the *Aboriginal Relics Act 1975* and any future development proposed for Murchison will require more detailed assessments to ensure they remain preserved.

Listed heritage sites

Murchison also contains a range of heritage listed sites and individual dwellings, which are listed on the World Heritage List (including convict settlement sites), National, Commonwealth and Tasmanian Heritage Lists.

There are 139 listed sites across the region. It should be noted that some features are counted more than once where they spread over multiple cadastre titles. In addition, Murchison contains approximately 492,270 ha (31%) of the 1.6 million ha of Tasmanian Wilderness World Heritage Area and 18,973 ha of the Western Tasmania Aboriginal Cultural Landscape, which are both listed under the National Heritage Register.

¹⁰ These totals are more than the total amount of sites stated above due to some sites classified as multiple site types.



Listed places are protected under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). For the purpose of this project it can be assumed that the identified sites and dwellings cannot be disturbed and/or cleared for development.

Additionally, Municipal Planning Schemes may generally have their own listings for heritage streetscapes or places of heritage significance at the local level. These have not been included in this regional analysis.



4 Productive Land and Water Values

There are significant areas in Murchison currently under, and suitable for, agricultural production, particularly near the north coast and on King Island. Climate change is expected increase rainfall on the west coast and the northwest and King Island may experience a reduction in rainfall. Overall, climate change is expected to have a positive impact on production. Land fragmentation may be an issue for framers and declining mining activity may reduce expenditure on mine site maintenance, creating environmental issues.

This section summarises the datasets provided by AK Consultants that Geografia has used to evaluate productive land and water values. The full report prepared by AK Consultants is available as a separate document.

Key findings:

- Several areas of high agricultural value, including irrigated cropping regions and classes 1-3 Land Capability exist within close proximity to existing settlements, particularly Wynyard and Somerset
- With only 30,335ha of land mapped as Land Capability classes 1-3, the majority of the identified 144,949ha of land currently used for agriculture is occurring on non-prime agricultural land (Classes 4-6). This includes the majority of land used for the dairy industry.
- The majority of land outside and close to settlement, especially near the north coast, and most of King Island is considered potentially available agricultural land
- A large proportion of potentially available agricultural land is already severely fragmented with over 60% of agricultural holdings less than 40ha in area.
- Water use across the region is predominately for hydro-electricity, irrigation and mining
- Irrigation in the Murchison is significant, and the quantity of water available for irrigation will increase with the Duck Irrigation Scheme
- 5. Climate change projected to have varied impacts across the Murchison region. For some agricultural enterprises this will present new opportunities for expansion, while others may have to make significant investment to adapt to changing conditions.



4.1 Production areas

Agricultural land

As well as having large areas of land under reserve, Murchison is a highly productive agricultural region. Approximately 145,000 ha (7.6%) of its land area is currently classified as being used for agriculture¹¹ (excluding forestry, mining and aquaculture). Much of this is concentrated in the north of the mainland and King Island (Figure 14).

The key agricultural activities include horticulture, beef and cattle, dairy farming, food processing and cheese production. Most of the land available for agriculture (66%) is modified pastures for grazing, mostly for dairy farming, with dairy sheds and yards accounting for a further 24%¹². Irrigated cropping accounts for just 6% of total land area, while minor grazing, horticultural and flower activity makes up the remaining 4% (Table 8).

Table 8 Agricultural Land Use Areas (2009-10)

Agricultural Land Use	Area (ha)	Percentage of agricultural land use
Grazing native vegetation	1,070	0.70 %
Grazing modified pastures	95,362	66.00 %
Native / exotic pasture mosaic	819	0.60 %
Cropping	38	0.03 %
Land in transition	926	0.60 %
Degraded land	281	0.20 %
Grazing irrigated modified pastures	1,950	1.00 %
Irrigated cropping	8,873	6.00 %
Irrigated perennial horticulture	4	0.01 %
Irrigated perennial flowers and bulbs	85	0.06 %
Intensive horticulture	9	0.01 %
Dairy sheds and yards	35,526	24.00 %
Rural residential with agriculture	6	0.01 %
Total Agricultural Land Use	144,949	

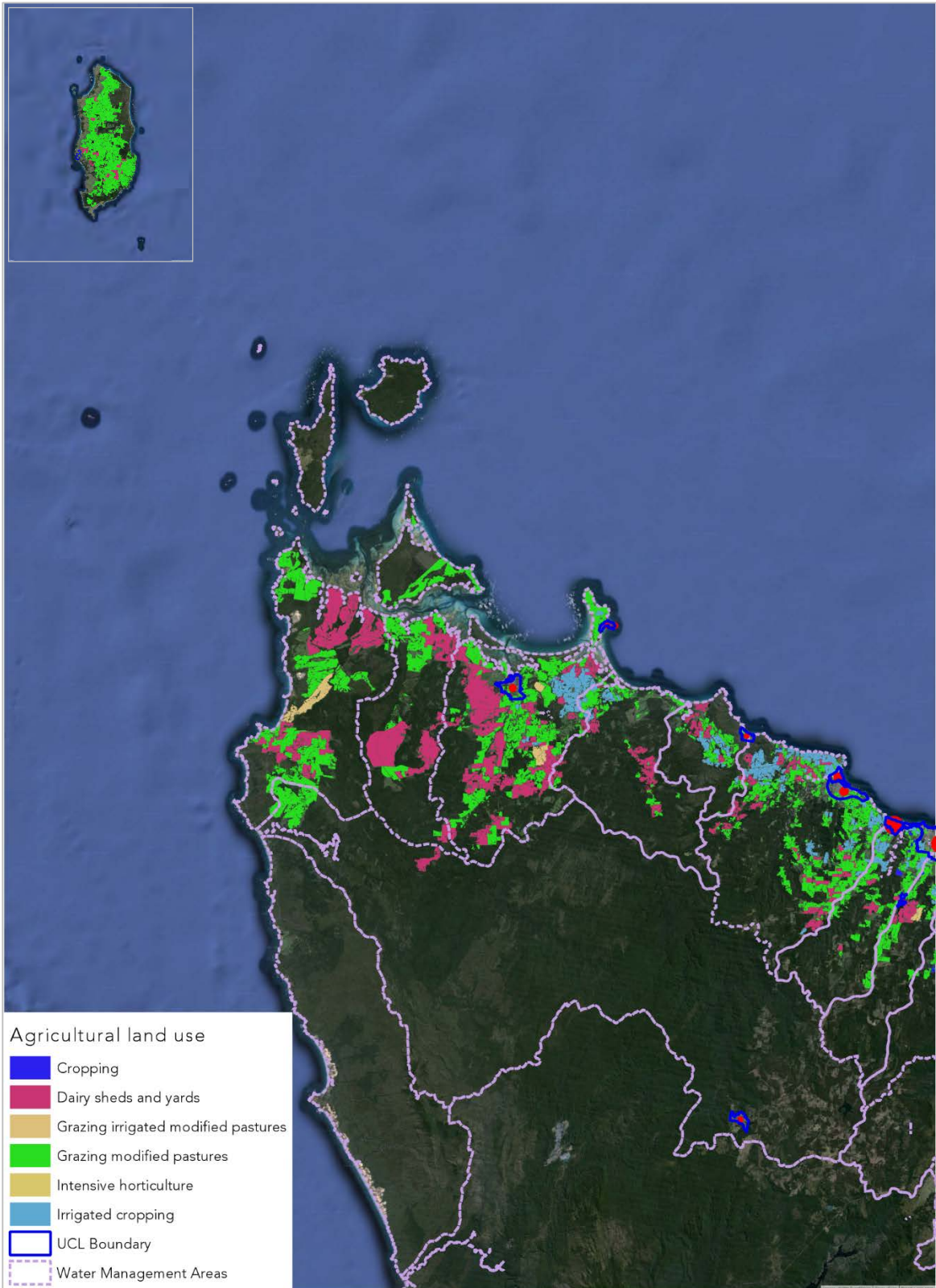
Source: Land Use 2009-2010 (DPIPWE 2012) cited in AK Consultants 2016

¹¹ According to Land Use 2009-2010 (DPIPWE 2012) mapping.

¹² This category is not a reliable indicator of total dairy regions with some dairy pasture areas potentially mapped as grazing modified and grazing irrigated also.



Figure 14 Agricultural Land Use, Mainland and King Island



Source: Land Use 2009-2010 (DPIPWE 2012), Water Management Regions (DPIPWE, 2015)Geografia, 2016



Land Capability

In terms of the capability of the land to support agricultural use, Land Capability mapping has been undertaken for 11 regions throughout the State, three of which are in Murchison: the Hunter, Circular Head and Inglis (Figure 15).

Land Capability is classed from 1-7 as defined by Grose (1999)¹³, with 1 being the most suitable for agricultural use through to 7 which is considered unsuitable. Classes 1-3 are defined as “Prime Agricultural Land” under the *Protection of Agricultural Land Policy 2009* (PAL 2009).

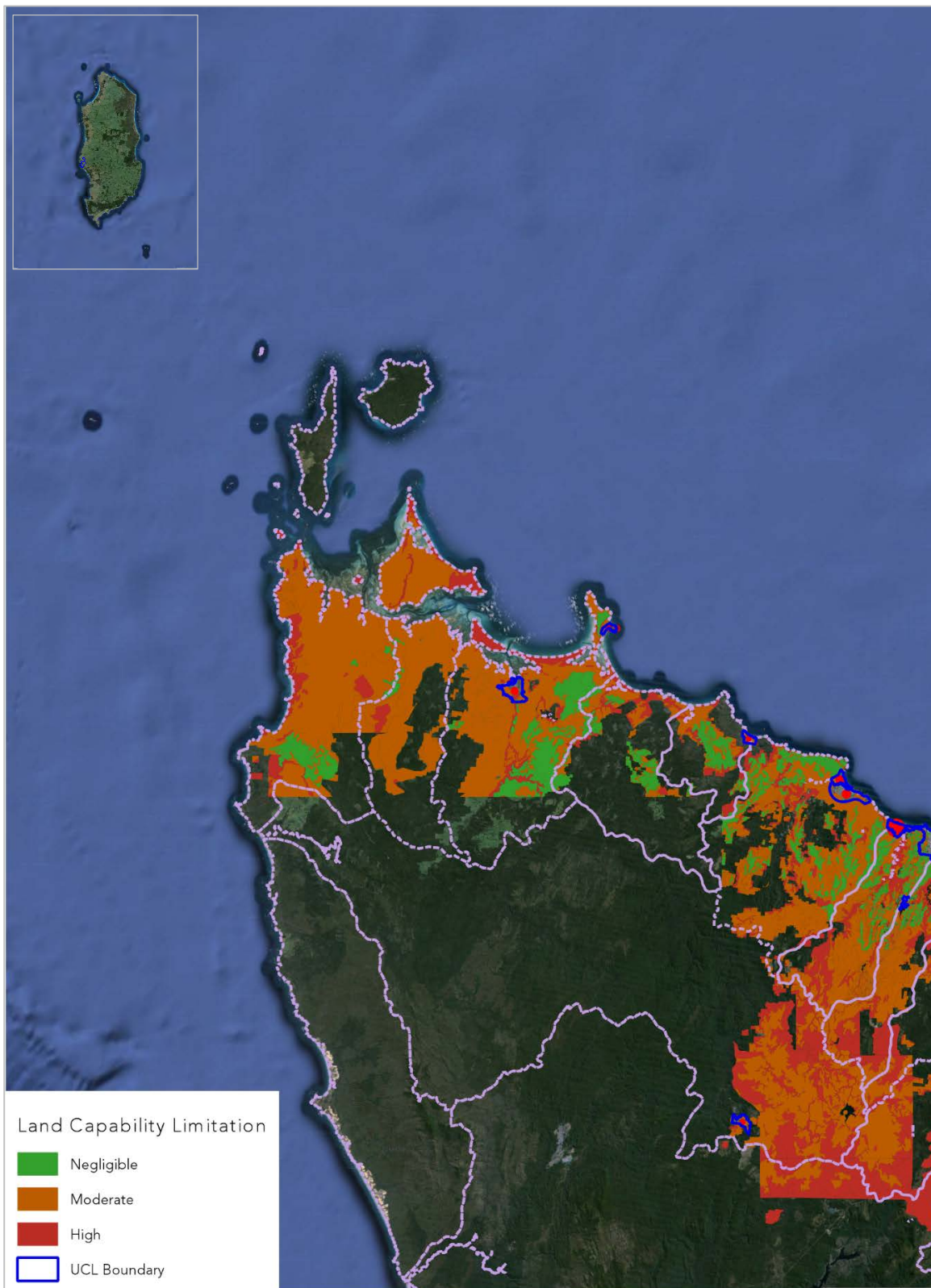
A framework for ranking Land Capability has been adapted from this (Table 7). This shows approximately 13% of the area with mapped Land Capability being suitable for intensive agricultural activities; 64% suitable for improved pastures, plantation forestry, viticulture and orchards and less intensive cropping; and 23% of limited value to agriculture.

A large proportion of the Murchison remains unmapped and it is also important to consider that, other than Land Capability, there are many other variables to consider when determining suitability for agriculture, including availability of water, size of the title, connectivity to other farming land and presence of threatened vegetation, as discussed in more detail in the following section.

¹³ *Land Capability Definitions in Appendix 3 of AK Consultants (2016), Murchison Natural Resource Inventory.*



Figure 15 Land Capability Limitations, Mainland and King Island



Source: Land Capability (DPIPWE, 2007); Water Management Regions (DPIPWE, 2015); Geografia, 2016



Table 9 Land Capability Classes

Predominant Land Capability	Limitation	Area (ha)	% of Total
Class 1-3 Land (including 3+4 & 4+3) Land suitable for intensive agricultural activities.	Negligible	30,335	13%
Class 4-5 Land Land suitable for improved pastures, plantation forestry, viticulture and orchards & less intensive cropping.	Moderate	154,197	64%
Class 6-7 Land (including 5+6, 6+5 & 6+4) At best, land marginal for grazing and plantation forestry.	High	54,637	23%

Source: AK Consultants (adapted from Grose, 1999).

Potentially Available Agricultural Land

Potentially Available Agricultural Land (PAAL, AK Consultants, 2010) is a very conservative 'first cut' of the analysis of land that may be suitable for agriculture. It is identified using the following criteria:

- Private land within the Rural Resource Zone;
- Land Capability Class 6 or better¹⁴;
- Vegetation indicating agricultural use or previously cleared land;
- Not under formal reserve; and
- Area of such land within a parcel greater than 1ha.

A summary of this analysis is provided in AK Consultants report.

There are 762,300 ha of land in the Rural Resource Zone, although only a portion of this is available for agriculture (see Table 10 and Figure 16). As discussed in the PAAL methodology¹⁷, tenure, title configuration and size and vegetative cover are important attributes defining the potential for agricultural activity. The proximity of houses and nearby non-agricultural developments can also constrain agricultural land use potential. However this has not been included in this analysis¹⁵.

¹⁴ In applying this methodology to Murchison, the Land Capability criteria was not used as the Land Capability mapping is not available for the entire study area.

¹⁵ Constraints analysis is a useful planning tool and is discussed in more detail in the full Natural Resource Inventory report prepared by AK Consultants.



Table 10 Potentially Available Agricultural Land in Murchison

Description	Area (ha)
Total area of Murchison Region	1,908,500
Total area of private parcels in the Rural Resource Zone	302,505
Total number of private parcels greater than 1ha in the Rural Resource Zone	6,252
Total area of PAAL	188,340
Number of parcels with PAAL greater than 1 ha	5,457
Number of PIDs with PAAL greater than 1 ha	3,500

Source: AK Consultants, 2016

It is common for land parcels adjoining and farmed by the same business, to be rated together and identified with a unique Property Identification Number (PID). The areas of land associated with each PID have been analysed on the basis that, in most cases, each PID represents a unique farming business.

Table 11 Area of PAAL, Parcels in Specified Size Ranges

Parcel area, ha	# of parcels	Total area, ha	% of parcels	% of area
1-8ha	1,699	6,072	31%	3%
8-40	2,451	51,671	45%	27%
40-100	1,004	62,085	18%	33%
100-400	291	48,809	5%	26%
>400	12	19,702	0.2%	11%
Total	5,457	188,340	100%	100%

Source: AK Consultants, 2016

Table 12 Area of PAAL, PIDs in Specified Size Ranges

PID area, ha	# of PIDs	Total area, ha	% of PIDs	% of area
1- 8 ha	1130	3,722	32%	2%
8-40	1212	25,357	35%	13%
40-100	761	49,269	22%	26%
100-400	369	66,013	10%	35%
>400	28	43,925	0.8%	23%
Total	3,500	188,286	100%	100%

Source: AK Consultants, 2016



Figure 16 Potentially Available Agricultural Land, Mainland and King Island

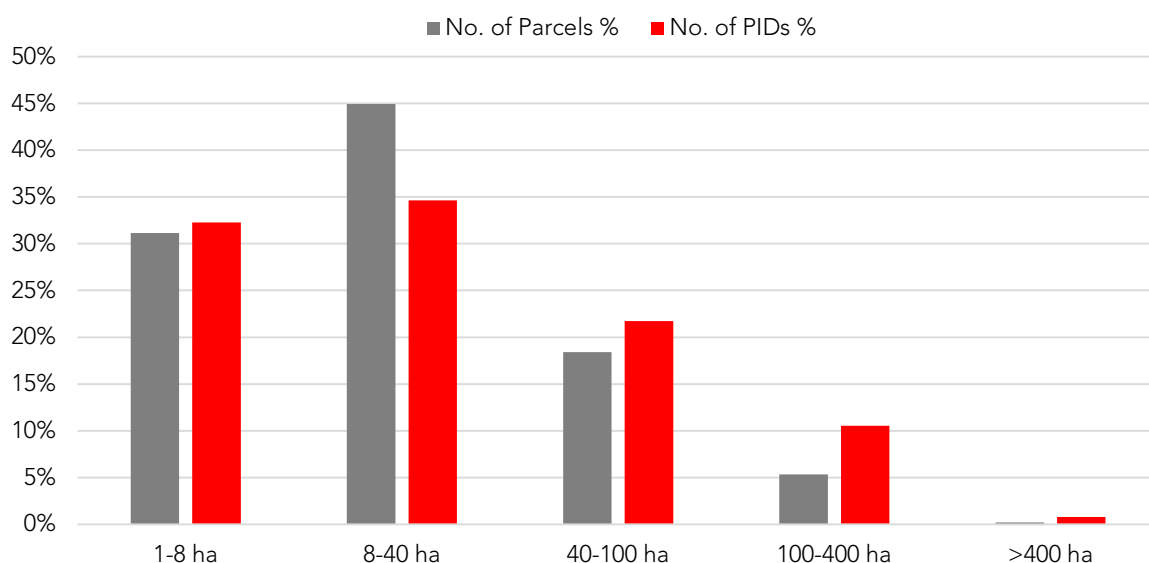


Source: Water Management Regions (DPIPWE, 2015), PAAL (AK Consultants, 2016); Geografia, 2016



Detailed analysis of the size distribution of the parcels and PIDs in the PAAL area is shown in Figure 11. The analysis shows that 76% of parcels and 67% of the holdings are less than 40 hectares in area. This suggests that some areas of the potentially available agricultural land in the Murchison region are severely fragmented. However, 37% of the land area of parcels and 56% of the land area of holdings are greater than 100 hectares.

Figure 17 Distribution of Parcel and PID Sizes



Source: AK Consultants, 2016

Mining

There are sizable mineral deposits across the region. There are around 170 leases for exploration and extraction, covering 2% of the land area, while 60% (1,140,000ha) of the region is within Strategic Prospectivity Zones. These recognise areas of high prospectivity for minerals (Figure 18). Crown land within these zones is protected under the *Mining (Strategic Prospectivity Zones) Act 1993*, designed to ensure their security for the industry.

The majority of mines are gravel mines (51 leases), however the leases of greatest area are 'all minerals' which comprise of 58.6% (17,461 ha) of the mined area in Murchison (Table 13).



Figure 18 Mining Leases, Licences and Strategic Prospectivity Zones



Source: *Mineral Resources Tasmania (2015); Water Management Regions (DPIPWE, 2015); Geografia 2016.*



Table 13 Current Granted Exploration Licences

Category	Number of Licences	Area	% of Licences	% of Area under Licence
Category 1	84	243,501	65	73
Category 3	19	30,329	15	9
Category 5	26	59412	20	18

Source: Mineral Resources Tasmania, 2015 cited in AK Consultants 2016

In addition to existing mining leases, there are a substantial number of exploration licences. These are categorised as:

- Category 1 - Metallic minerals and atomic substances;
- Category 2 - Coal, peat, lignite, oil shale and coal seam gas;
- Category 3 - Rock, stone, gravel, sand and clay used in construction, bricks and ceramics;
- Category 4 - Petroleum products except oil shale;
- Category 5 - Industrial minerals, precious stones, semi-precious stones;
- Category 6 – Any geothermal substance.

Licences for metallic minerals and atomic substances (Category 1) account for the majority (65%) of current and granted exploration licences in Murchison (Table 14). There are also a large number of licences pending approval, including some for Category 4.

Table 14 Mine Leases Granted

Mined material	Mines (#)	Area (ha)	Mines (%)	% of area mined
All minerals	15	17,461	8.9	58.6
All minerals and stone	5	4,228	3.0	14.2
Cement	1	unknown	0.6	-
Copper	1	5	0.6	0.0
Dolomite	3	132	1.8	0.4
Easement	7	868	4.1	2.9
Gold	1	510	0.6	1.7
Gravel	51	830	30.2	2.8
Iron	2	757	1.2	2.5
Lime Sand	4	33	2.4	0.1
Limestone	1	56	0.6	0.2
Magnesite	2	998	1.2	3.3



Mined material	Mines (#)	Area (ha)	Mines (%)	% of area mined
Nickel	1	400	0.6	1.3
Quartzite	1	205	0.6	0.7
Sand	8	102	4.7	0.3
Sand and gravel	10	130	5.9	0.4
Sand and stone	4	83	2.4	0.3
Shale and Specimens	1	3	0.6	0.0
Silica	4	540	2.4	1.8
Specimens	8	73	4.7	0.2
Stone	27	239	16.0	0.8
Stone and gravel	5	58	3.0	0.2
Tin	6	2,105	3.6	7.1
Zinc	1	4	0.6	0.0
Total	169	29,820		

Source: Mineral Resources of Tasmania, 2015 cited in AK Consultants 2016

Forestry

Approximately 243,412 ha (13%) of land is used for forestry (Figure 19). Land in the Permanent Timber Production Zone is reserved for forestry and prohibits development or clearing for other primary industry use; while plantations on private land may be converted to other primary uses, such as pasture.

An additional 143,067ha of Future Potential Production Forest incorporates both Crown and Hydro Electric Corporation land. This is reserved for future forestry use after the year 2020 under the *Forestry (Rebuilding the Forest Industry) Act 2014*. Prior to 2020, this land cannot be converted to production forest and, after 2020, will only be converted to Permanent Timber Production Zone land if future demand requires native forest harvesting.

Table 15 Forestry Activity and Associated Areas in Murchison

Forestry Activity	Area (ha)	% of Murchison
Permanent Timber Production Zone Land	197,147	10%
Plantation on private land	46265	2%
Total	243,412	13%
Future Potential Production Forest - Crown	139,722	7%
Future Potential Production Forest - Hydro Electric Corporation	3,345	0.2%
Total	143,067	7%

Source: LIST Land Tenure (DPIPWE, 2015) and the Land Use 2009-2010 (DPIPWE, 2012) cited in AK Consultants 2016



Figure 19 Forestry Types



Source: LIST Land Tenure (DPIPWE, 2015); Land Use 2009-2010 (DPIPWE, 2012); Water Management Regions (DPIPWE, 2015); Geografia, 2016



Aquaculture

Murchison currently has 33 marine leases totalling 1,206 ha in the waters off the coast. The majority of these leases are located in

- North west coast - Robbins Passage, Big Bay and Duck Bay; and
- West coast - Macquarie Harbour.

Fish farming expansion has been approved in Macquarie Harbour. Council and the government agencies are encouraged to work with the industry to monitor the expansion to ensure that the natural environment can support the expansion.

4.2 Water

Water resources

Rainfall across the Murchison largely varies due to the unique topography of the region. While Smithton in the north west experiences an average annual rainfall of 884mm, the west coast receives more rain with Strahan recording an average annual rainfall of 1,521mm (BOM, 2015).

Murchison has considerable water resources, with 59,153 km of watercourses and 49,209 ha of waterbodies, including natural lakes and man-made dams (LIST, 2014).

In Tasmania, water management is regulated under the *Water Management Act 1999*, and is administered by DPIPWE. Approvals are required to extract or store water through a water licencing system which regulates allocations for both direct water use (direct offtakes) and water taken into storage (storage offtakes).

Reliability of water is reflected in surety levels as outlined in Table 16. Surety levels indicate the priority of rights to take water. For example, during periods of low water availability, a cease to take for Surety 6 water will be issued before Surety 5 water is affected. Town water, fire-fighting and stock and domestic water supplies are allocated at Surety 1.



Table 16 Water Surety Levels

Surety level	Notional Reliability	Purpose
1	expected to be available at >95% reliability	stock and domestic, firefighting, town water supplies
2		requirements for environmental flows
3		commercial licenced issued to replace rights under previous water management acts
4		special licences, including electricity generation
5	expected to be available at about 80% reliability (eight years in ten)	direct or storage offtakes for irrigation and other commercial purposes
6	expected to be available at less than 80% reliability	direct or storage offtakes for irrigation and other commercial purposes
7 & 8	lower level of reliability than a Surety 6 allocation. Generally provided during flood conditions	direct or storage offtakes provided under site specific conditions, such as flood events

DPIPWE, 2016

The Department monitor and assess water availability for Surety 5 and 6 allocations using the Water Assessment Tool (WAT) which considers allocation limits, environmental flow requirements and current allocations to provide estimates of potential water availability at the local, sub catchment and catchment level. Sustainable yield must be available at all three management levels for an allocation application to be approved.

The natural water yields which are used by the WAT tool are generated from hydrological catchment models. An assessment of water availability at the scale of this strategy would be impractical due to local level complexities and the variability of the data.

Murchison includes the Water Management Regions and Catchments as described in Table 17 and illustrated in Figure 20.



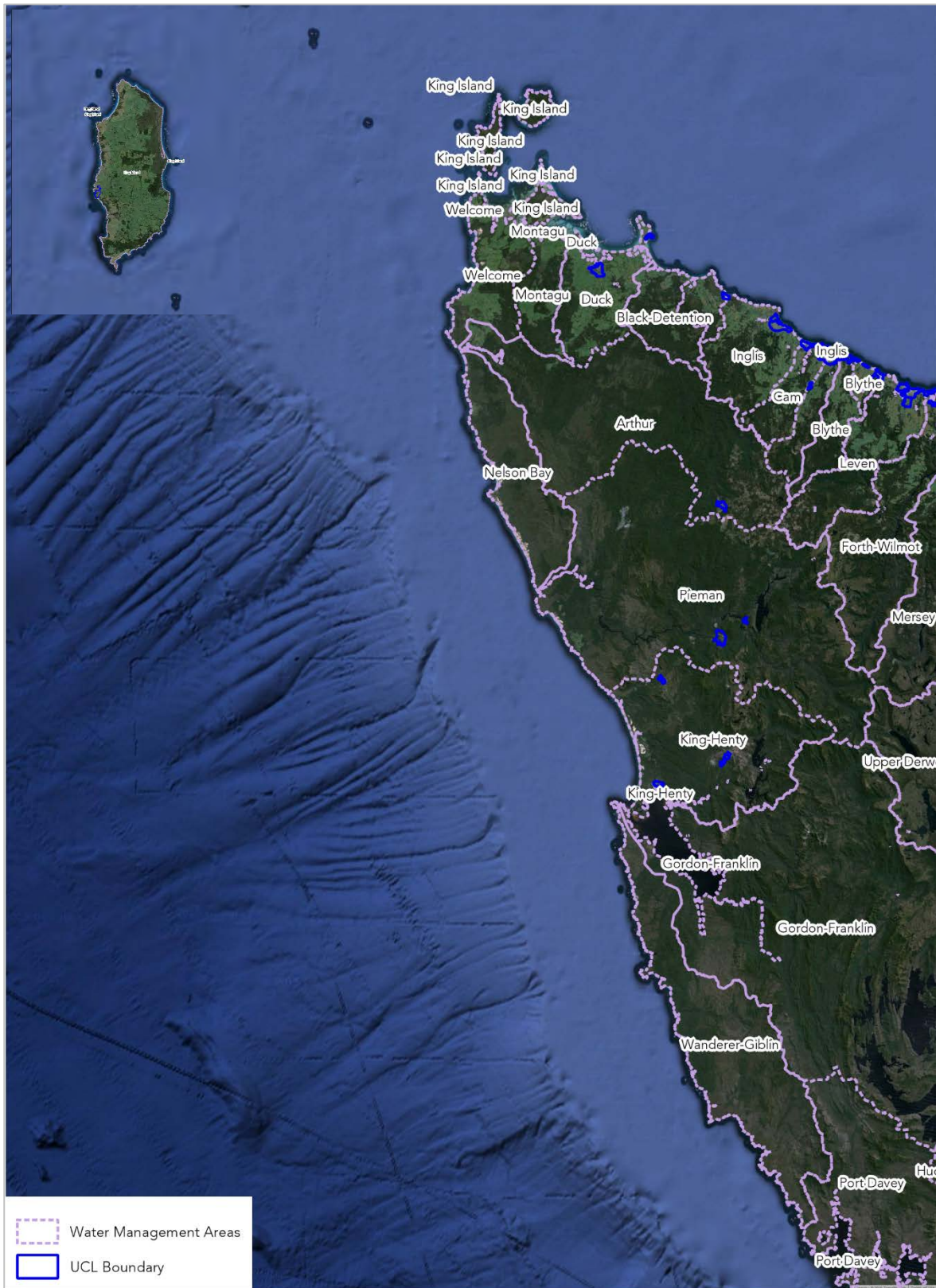
Table 17 Water Management Regions and Catchments

Region	Catchment	Area (ha)
1- Arthur Pieman	King Henty	178,971
	Nelson Bay	86,658
	Pieman	410,252*
	Arthur	243,547*
	Welcome	55,731
	King Island	134,199
	Montagu	37,027
	Duck	61,246
	Black-Detention	41,315
	Region 1	1,248,946*
2- Inglis Cam	Black-Detention	17,034
	Inglis	61,605
	Cam	7,443*
	Emu	1,874*
	Blythe	2,831*
Region 2	90,787*	
3 – Mersey Forth	Leven	13,071*
	Forth-Wilmot	4,856*
Region 3	17,926*	
7 – Derwent-South East	Upper Derwent	341
	Region 7	341
8 – Huon-Gordon	Port Davey	38,120*
	Wanderer-Giblin	176,223
	Gordon-Franklin	335,551*
	Region 8	549,894*
Total Area		1,907,894

*Total depicts area within Murchison region only, actual region and/or catchment size is larger. Source: Water Management Regions (DPIPWE, 2015) cited in AK Consultants 2016.



Figure 20 Water Catchments Areas



Source: Water Management Regions (DPIPWE, 2015); Geografia, 2016



The Water Management Act 1999 also provides for the establishment of Water Districts which give a water entity (which includes companies, Councils and Trusts formed under the Act) or a group of landholders, administrative control and responsibility for that Water District. Water Districts proclaimed under the *Water Management Act 1999* in Murchison are presented in Table 18.

Table 18 Murchison Region Water Districts

Water District	Area (ha)	
<i>Drainage Districts</i>	Egg Lagoon Drainage Area	2,333
	Togari Drainage Area	3,560
	Brittons Swamp Drainage Area	1,522
	Mowbray Swamp Drainage Are	5,256
	TOTAL	12,671
<i>Riverworks Districts</i>	Welcome River Riverworks District	24,700
	The Montagu Catchment River Improvement:	32,380
	TOTAL	57,080
<i>Water Supply Districts</i>	Togari Water District	2,422
	Brittons Swamp Water District	9,195
	TOTAL	11,617
<i>Hydro-electric Districts</i>	Kings River Hydro Electric Water District	55,630
	Lake Margaret Hydro Electric Water District	2,172
	Henty River Hydro Electric Water District	7,015
	Pieman-River Hydro Electric Water District	263,600*
	Forth-River Hydro Electric Water District	5,098*
	TOTAL	333,515

*Total depicts only the portion of the district which is within the Murchison boundaries. Source: LIST Hydrographical Areas (2014) dataset, AK Consultants, 2016.

Hydro Tasmania holds a Special Licence under the *Water Management Act 1999* that gives the Hydro-Electric Commission the right to the water in the Hydro-electric districts. Within Murchison, Hydro-electric districts comprise of 263,600ha (64%) of the Pieman Catchment and 64,817ha (36%) of the King Henty Catchment.

Water use

Current water use in Murchison is derived from the Water Information Management System (WIMS) database, a register of dams and water licences in Tasmania available from DPIPWE.



There are currently 1,289 dams in Murchison, including existing dams and approved dams with a current permit (Table 19). Most are used for irrigation, however, the dams of largest capacity are used for hydroelectricity.

Table 19 Registered Dams

Dam Purpose	Number of Dams	Dam Capacity (ML)
Aesthetic	14	47
Commercial	3	373
Domestic	2	20
Firefighting	20	224
Hydro	16	4,766,677
Industrial	2	5,483
Irrigation	1,014	26,325
Mining	11	13,082
Other	8	3,529
Recreation	5	2,562
Sediment Pond	1	1.5
Stock	154	1,074
Stock and Domestic	31	136
Waste Water	3	18
Water Supply	3	192
Total	1,289	4,819,746

Source: WIMS, 2015 cited in AK Consultants 2016

Watercourses provide water for a diverse range of uses: aesthetic, aquaculture, commercial, firefighting, irrigation, recreation, stock and domestic, and town water supplies (Table 20). However, some of this stored water is for non-consumptive use, and the number of dams is not exhaustive as older dams may not be registered.

Water licences provide a more accurate reflection of consumption, although some uses (for example stock and domestic) do not require a licence. Furthermore, some historical use for mining and other commercial activities may not be recorded accurately in the database.

Water used for commercial purposes includes mining, dairy and renewable energy industries. The large volume of direct take is 46,663 ML. This would generally be considered to be non-consumptive use, however, given the large amount of water indicated as being for the dairy industry, some of this is potentially used for irrigation purposes. Only stock and domestic, irrigation and town water are considered to be entirely consumptive use, with total consumptive volume in the order of 30,644 ML.



Table 20 Primary¹⁶ Water Allocations for Water Licences

Offtake Purpose	Number of Offtakes (storage)	Offtake amount (ML) (storage)	Number of Offtakes (direct)	Offtake amount (ML) (direct)
Aesthetic	24	84	0	0
Aquaculture	1	4	0	0
Commercial	10	7,671	18	46,663
Firefighting	25	381	0	0
Irrigation	949	26,145	338	27,351
Recreation	2	385	0	0
Stock and Domestic	191	2,035	15	76
Town water	3	2,998	81	3,217
Total	1,205	39,703	452	77,307

Source: WIMS, 2015 cited in AK Consultants 2016

Water available for irrigation is a key factor in determining the potential agricultural uses of a land parcel, particularly for intensive high value products. Water for irrigation can be in the form of winter storage in dams, or direct pumping from bores or streams.

There are two take periods for irrigation water licences: winter (1st May – 30th Nov) and summer (1st Dec – 30th April). Traditionally these periods have correlated with storage periods for winter and direct application for summer, although in drier seasons the winter take can be applied directly, particularly in spring.

At present the Department is not issuing any more summer takes until the completion of their latest review which will take into account future climate projections for the State. Several characteristics indicate the extent of limitations to water available for a parcel of land. The characteristics of minor and major limitations are:

- 1. Minor limitations:** Titles within an irrigation district, or with existing irrigation infrastructure, irrigation dams or within 500m of a *named stream*¹⁷, or direct access to an *un-named stream*, or high yielding (5-10 litres/ second) ground water bores; and
- 2. Major limitations:** Titles which are 500-1,000m from a *named stream* are considered to have some potential for access to water resources, however, the costs of delivering the water due to distance, or lift, would require a high value product to warrant the investment.

¹⁶ Where there are multiple offtakes listed for the same water quantity per water licence only the primary source is included in the tally of the volume.

¹⁷ This refers to water courses named on Tasmap 1:25 000. There is a possibility that even though there is direct access to a named stream it may not be possible to gain an allocation for the title, or it may be possible to gain a winter storage allocation and there may be no dam sites on the property. It may also be possible that an allocation from an unnamed stream is feasible. Generally named streams have a greater catchment area and are likely to provide a higher yield.



Water resources in Murchison

There are 1,287 current off-takes for irrigation purposes (both takes into storage and direct), totalling 53,496 ML (Table 21).

Approximately 74% of the allocations provide for water to be taken into storage (949 allocations for 26,145 ML); the remainder are for direct takes (27,351 ML). There are 1,014 existing or proposed irrigation dams with a total capacity of 26,325 ML.

The major water courses in Murchison used for direct summer takes for irrigation are the Arthur, Black, Calder, Cam, Detention, Duck, Flowerdale, Grassy, Inglis, Manuka, Montagu, Stitt and Waratah Rivers and tributaries.

The Duck Irrigation Scheme is currently (December, 2015) under development by Tasmanian Irrigation. The scheme proposes 5,000ML of winter water, stored in a proposed Mill Creek Dam sourced from the Duck River and Mill Creek. The scheme will provide water for the proposed Duck Irrigation District, which comprises of the communities of Montagu, Stanley, Forest, Edith Creek and Irishtown.

There are also private scheme developments under investigation, primarily for dairy and livestock operations. Generally, the streams and rivers with remaining higher yields are remote from the agricultural areas. Sourcing irrigation water cost effectively is one of the major challenges, not only for Murchison but all agricultural areas.

Ground water bores are another water resource in Murchison. There are some bores¹⁸ where the flows are suitable for irrigation, either directly or by first pumping to storage and then to irrigation systems. To date, groundwater extractions are not regulated. This means that, although it is certain groundwater is used in Murchison for irrigation, the amount of water actually used or available is unknown.

Although detailed analysis of titles with current or potential access to an irrigation water resource has not been undertaken, it is clear that irrigation in Murchison is significant, and the quantity of water available for irrigation will increase with the Duck Irrigation Scheme.

¹⁸ According to the DPIPWE Groundwater Information Access Portal (accessed December, 2015).



Table 21 Irrigation Water Resources in Murchison

Water source	Irrigation Water (ML)
Current direct take allocations ¹⁹	27,351
Current and proposed dam storage capacity (excludes expired permits)	26,325
Proposed Mill Creek Dam	5,000
Groundwater bores	Volume not available
Total current and proposed	58,676

Source: AK Consultants, 2016.

4.3 Risk and Hazard

Murchison is fortunate to be unburdened by significant threats to its natural and productive environment. Notwithstanding this there are still some risks and hazards in relation to:

- Climate Change;
- Coastal vulnerability;
- Land slip;
- Acid sulfate soils;
- Salinity; and
- Bushfire vulnerability.

Climate change

Climate Futures for Tasmania (CFT) modelling (DPAC, 2015) contains projections for three timeframes: near future (2010-2039); medium term (2040-2069); and end of century (2070-2099).

The predictive models developed assumed two carbon emissions scenarios – a low scenario (B1) and a high scenario (A2). For this study, the scenario for high global emissions, referred to as A2, was used to understand the impacts of climate change on Murchison. The A2 emissions scenario is commonly used for such studies, as emissions are currently tracking above this scenario, and therefore it best represents the changes the region is likely to experience. Table 22 summarises the analysis, with details of near future (2010-2039) changes to the Murchison region following.

¹⁹ This water is of lower reliability than water supplied through irrigation schemes due to restrictions in low rainfall periods.



Table 22 Predicted Climate Change Impacts for Murchison

	Annual Rainfall Change (mm)		Frost Risk (days)		Temperature Change (°C)		Pan Evaporation Change (mm)		Relative Humidity Change (%)	
	Min Change	Max Change	Min No. of Days	Max No. of Days	Min Change	Max Change	Min Change	Max Change	Min Change	Max Change
Near Future	-22.37	50.69	<1	140	0.5	0.6	0.55	1.35	0.17	0.36
Medium Term	-77.31	49.30	<1	112	1.22	1.5	1.87	2.3	-0.13	0.58
End of Century	-82.81	105.5	<1	79	2.2	2.6	3.63	5.78	-0.24	0.91

Source: LIST Climate Futures Tasmania (DPAC, 2015) cited in AK Consultants 2016

Annual rainfall change (2010-2039)

Within Murchison, inland areas of the northwest and King Island may experience an overall decrease in rainfall, while areas of the west coast will have an increase, particularly in the south west. While these changes will be gradual, by 2040 some inland areas are projected to experience an annual decrease of up to 22mm of rainfall.

Within the majority of areas identified as Potentially Available Agricultural Land, annual rainfall by 2040 is predicted to decrease up to 20mm. However, some parcels of agricultural land further south are predicted to experience up to 30mm more rain.

Frost risk (2010-2039)

Frost risk is a measure of the number of frost risk days predicted to occur.

A reduction in the number of frost risk days is predicted to occur across the entire region. Within the areas identified as Potentially Available Agricultural Land across the majority of the north west, the number of frost risk days is predicted to decrease from a baseline average (1961-1990) of 3-48 days/yr to 1-29 days/yr. While the areas surrounding Waratah, which presently experience approximately 50-75 days/yr, will experience up to 25 days/yr.

Temperature

Murchison is predicted to experience a mean temperature increase of between 0.5°C and 0.6°C in the near future (2010-2039) and between 2.2°C and 2.6°C by the end of the Century.

Pan evaporation

Pan evaporation is a metric used to measure the evaporation of water. The modelling used by Climate Futures takes into account the influences of radiation, wind, humidity and temperature.



Pan evaporation is predicted to increase across Murchison at up to 0.55-1.35mm in the near future (2010-2039) and 2.9-9.5mm by the end of the Century.

Relative humidity change (2010-2039)

Relative humidity is a measure of the amount of moisture in the air as a percentage of the amount the air can hold (BOM, 2015).

Humidity is predicted to increase across most of the region by up to 0.36%, with the largest increases occurring on King Island. Within the majority of areas identified as PAAL, humidity change is not predicted to increase by more than 0.24%, with the exception of King Island.

Emerging challenges and opportunities

While the scope of this strategy focuses on the data available for near future predictions (2010-2039) across the Murchison as a whole, municipality level climate projections are available from Climate Futures Tasmania for the baseline to end of the Century and are summarised in AK Consultants (2014).

The impacts of climate change will vary particularly given the topographical differences between the North West and West Coast. This is evident in seasonal rainfall projections (1961-1990 to 2071-2100), where the West Coast is likely to experience an increase in winter and spring and a decrease during summer and autumn (Grose, 2010). The remaining Murchison areas are expected to experience an increase in summer and winter and a decrease in spring.

In regard to agricultural enterprise, climate change impacts across the region (in both the near future and beyond) are likely to present new opportunities through increased land suitability for various horticultural enterprises and crops such as poppies, canola and pyrethrum with fewer frost risk days and increased temperatures.

However, enterprises with restricted optimum temperature growing ranges and reliance on winter chill hours to break dormancy, may begin to experience negative effects.

Climate change enterprise suitability mapping is one way of considering which enterprises may be more suitable in the future and is currently available for barley, poppies, potatoes, sparkling wine, table wine and wheat for two different climate scenarios, B1 and A2 (DPIPWE, 2015). Under the A2 scenario, the mapping depicts little change in suitability for barley, wheat, poppies and potatoes to the year 2050. However, there are some changes during this timeframe for table and sparkling wines, both of which are currently mapped as having very few suitable sites. By 2050, though:

- The areas of "suitable" and "marginally suitable" land for sparkling wines will decline (the largest impacts being on King Island), where areas currently mapped as "suitable" disappear altogether and the areas of "marginally suitable" land become restricted to the south of the Island only; and



- Table wine mapping shows an increase in suitability across the region with several small currently “marginally suitable” regions predicted to become “suitable” and some areas of “unsuitable” land predicted to become “marginally suitable”.

Further studies should focus on enterprises common to the Murchison region, in particular in the areas identified as Potentially Available Agricultural Land (as defined in the AK Consultants PAAL analysis) to ensure that suitable land is retained for agricultural use into the future and allow for industry to adapt to changing conditions. This should include consideration of water resources for irrigation as pan evaporation, relative humidity and rainfall will all influence the amount of irrigation water required and the amount available.

Additionally, there needs to be a focus on local scale adaptation suited to the relevant industries to enable them to not only be viable beyond 2040 but to expand. Suitable adaptation methods will vary between each industry and specific location, timeframes for implementation and at what cost. Several large scale groups within the Murchison region have already invested in adaptation measures such as protective cropping.

Understanding the challenges climate change is projected to bring to the Murchison region and the potential adaptation measures within the timeframe of this 2040 strategy will assist in ensuring current and future investment in the Murchison region is capable of adapting to conditions projected by 2040 and beyond.

Coastal vulnerability

The hazard of coastal inundation²⁰ and coastal erosion²¹ are classified into four hazard bands:

1. **Low:** The area is vulnerable to a 1% AEP²² storm event in 2100;
2. **Medium:** The area is vulnerable to a 1% AEP storm event in 2015 and a 0.8m sea level rise by 2100;
3. **High:** The area is vulnerable to the highest astronomical tide now, and to a 0.2 metre sea level rise from the mean high tide by 2050; and
4. **Non LiDAR <10m:** The extent of area vulnerable to inundation is unable to be mapped accurately due to inadequate height data. The inundation level for each hazard band and minimum floor level in the area will be found in the planning code.

²⁰ Derived from the Coastal Inundation Planning Map (DPIPWE, 2014) which is based on sea level rise and storm tide modelling by Lacey et al (2012)

²¹ Derived from the Coastal Erosion Hazard Mapping (DPIPWE, 2014) which incorporates several coastal variables including landform types to determine erosion susceptibility for the present, 2050 and 2100 (Sharples et al. 2013)

²² Annual Exceedance Probability.



Within Murchison the majority of the coastline, with the exception of the unmapped 'Non LiDAR <10m', is mapped as having a high risk of coastal inundation and coastal erosion (Table 23).

Table 23 Coastal Vulnerability Hazard Bands

Hazard	Hazard Band	Area (ha)
Coastal Inundation	Low	3,352
	Medium	3,722
	High	4,744
	Non-LiDAR <10m	34,315
Coastal Erosion	Low	2,123
	Medium	3,123
	High	3,767
	Non-Lidar<10m	22,141

Source: DPIPWE, 2014 cited in AK Consultants 2016

While there are areas of low risk, in regard to future development, land identified as having a low, medium or high hazard level will be likely be assessed under the Tasmania Planning Scheme.

Flood vulnerability

According to the relevant Interim Planning Schemes and DPIPWE flood plain mapping, there are no flood prone areas in Murchison. Apart from coastal inundation, the other flood risk to the region is from dam failure. DPIPWE have a Dam Hazards dataset which identifies river levels and land inundation in the event of a dam break, but was not available.

Landslip

Landslip hazard (DPAC, 2005) across Tasmania is categorised into four levels:

1. **Low Band** - the area has no known active landslides; however, it has been identified as being susceptible to landslide by Mineral Resources Tasmania (MRT).
2. **Medium Band** - the area has known landslide features, or is within a landslide susceptibility zone, or has legislated controls to limit disturbance of adjacent unstable areas.
3. **Medium-active Band** - the area has known, recently active landslide features.
4. **High Band** - the site is within a declared Landslip A area.



Approximately 706,813ha has landslip hazard Table 24. Although the majority of the mapped landslip areas are of low and medium hazard, in accordance with the Interim Planning Schemes, any development proposal within the landslip overlay mapping will trigger further assessment to determine development eligibility and further requirements.

Table 24 Landslip Hazard Areas

Hazard Class	Area	% of Total Landslip Area
Low	359,785	51%
Medium	346,930	49%
Medium-active	17	<1%
High	81	<1%
Total	706,813	100%

Source: Landslide Planning Map V2 - Hazard Bands (DPAC, 2005). cited in AK Consultants

Acid sulfate soils

Disturbance of acid sulfate soils can cause them to oxidise, producing sulfuric acid and causing environmental damage to land and water environments.

Acid sulfate soil probability mapping (DPIPWE, 2009) is categorised into extremely low, low and high probabilities of acid sulfate soils occurring. High probability areas have been identified for subaqueous (estuarine areas), coastal (90-20m AHD) and inland (>20m AHD) areas. High probability is considered a >70% chance of occurrence.

In total, 20,376ha has a high probability of occurrence of Acid Sulfate Soils (Table 25). Development or disturbance proposed within these areas will need to be assessed.

Table 25 Acid Sulfate Soils

Acid Sulfate Soils	Area (ha)
Subaqueous	126
Coastal	19,306
Inland	944
Total	20,376

Source: (DPIPWE, 2009) cited in AK Consultants, 2016



Salinity

Salinity mapping describes areas of no, moderate or severe salinity. Within Murchison, the only regions with mapped salinity are on Robbins and King Islands. These areas comprise of 48,189 ha, which is considered to contain land systems with ‘moderate’ salinity.

Bushfire vulnerability

Under the Bushfire Prone Areas code, any land within 100 metres of fire prone vegetation of greater than 1ha in size is considered to be within a Bushfire Prone Area. While there is existing mapping which depicts these areas, the dataset could not be attained at the time of the analysis. Bushfire Prone Areas, however, do not restrict development but require developments to meet BAL rating, firefighting, water supply and access requirements.

In considering bushfire risk for expanding settlements, under the Bushfire Code Acceptable Solutions, all building areas in new subdivisions must be within 200 metres of a through road. While an examination of potential building areas that meet this requirement is outside the scope of this analysis, it is expected that a large proportion of land suitable for development will currently not comply with these conditions, and subdivision cannot occur until further links are constructed to another through road or safe place.

The 200m requirement could justifiably be relaxed where the access was of a higher standard than minimum requirements for an escape route; that is dual lane, away from likely fire direction with clear sight lines and with surrounding grassland vegetation. Each individual subdivision would need to be assessed on the actual requirements and these conditions would apply to both private and public access.



5 Land Suitability Analysis

On the basis that urban settlements are compact and conserve the region's valuable resources for agriculture and mineral extraction, Somerset, Wynyard and Smithton have lands suitable to accommodate any future residential or industrial expansion.

A land suitability assessment was undertaken to provide a high level understanding of the optimum locations for residential and industrial development. An outline of the methodology and underlying assumptions is provided in the Appendix.

It is important to note that the land suitability scores derived from this assessment are just a guide to identifying lands that *may* be suitable for residential or industrial development. Without detailed onsite assessment, the analysis cannot be a comprehensive or categorical indication of land use suitability. Other than excluding land with Land Capability Classes 1-3 and land utilised for irrigated cropping, agricultural potential of land has not been considered. Given the importance of agriculture to the future economy, further analysis is required to determine if land should be protected for agricultural use. It has not considered *local* planning policies, Aboriginal heritage values and risks, such as coastal erosion and coastal inundation have also been excluded. Lands marked in the maps as 'Future investigation' are potential development areas affected by moderate or high risk of landslip, geoconservation, threatened vegetation communities and heritage.

5.1 Policy context – extension, but no new settlements

The Cradle Coast Land Use Framework is the primary policy tool that guides land use. It:

- Favours containment of settlements and orderly development in response to social and economic activity. This will allow the region to capitalise on lands already serviced with infrastructure, achieve higher population densities for liveable and sustainable centres, achieve the region's economic goals, and manage the risks of climate change.
- Supports some expansion beyond the settlement boundary where *there is demonstrated need and the scale, form, and sequence of the release is justified under a local settlement strategy.*
- Does not support new settlements.

These policy positions informed the selection of input values/assumptions to the assessment.



5.2 Industrial Land Use Study considerations

According to the NW Tasmanian Industrial Land Study (which included the Murchison region), there will be an oversupply of industrial land for the next fifteen years (SGS, 2015). The Study assessed four categories of industrial uses (local service, export, transport and warehousing and bulky goods) and the following key observations were made:

6. **Local service industries** require lots between 2,000 and 5,000 sqm within or close to the populations they serve. The amount and location of these lands may experience a shortfall in lots <2,000 sqm over the next 15 years. King Island and West Coast have small areas of land zoned for industrial use, so demand needs to be monitored to ensure that supply can be delivered in a timely manner.
7. **Export-oriented industries, transport and warehousing.** These industries require strategically significant locations, such as major roads and ports. This land use has the greatest oversupply but is likely to represent the bulk of demand. The study identified land in Wynyard around Burnie airport as most suitable. Other lands include the former paper mill site close to Burnie Port. However, the redevelopment of brownfield sites is less attractive than greenfield due to higher costs.
8. **Rural industries, such as food processing, support and intensive production activities,** which the study considers likely to grow over the next ten years, can be permissible in rural resource zones. Intensive production industries require proximity to ports (air and sea) and affordable power. The general industrial zone in Smithton is suitable for these types of industries, as is Wynyard.

In view of the oversupply of industrial land; the cost effectiveness of greenfield sites, rather than centrally-located brownfields; the availability of rural resource land; and the likely growth in demand for transport and warehousing, an Industrial Land Use *Strategy* is warranted. It will give business certainty; and help free-up no longer needed industrial land for other uses, such as residential or utilities. The strategy should include a review of Burnie's industrial lands to ensure that strategically significant land is available for amongst other things, primary uses - identified in TasPort's 30-year strategy - such as container import/export, forestry products, minerals, roll-on roll-off freight, and cruise ships.

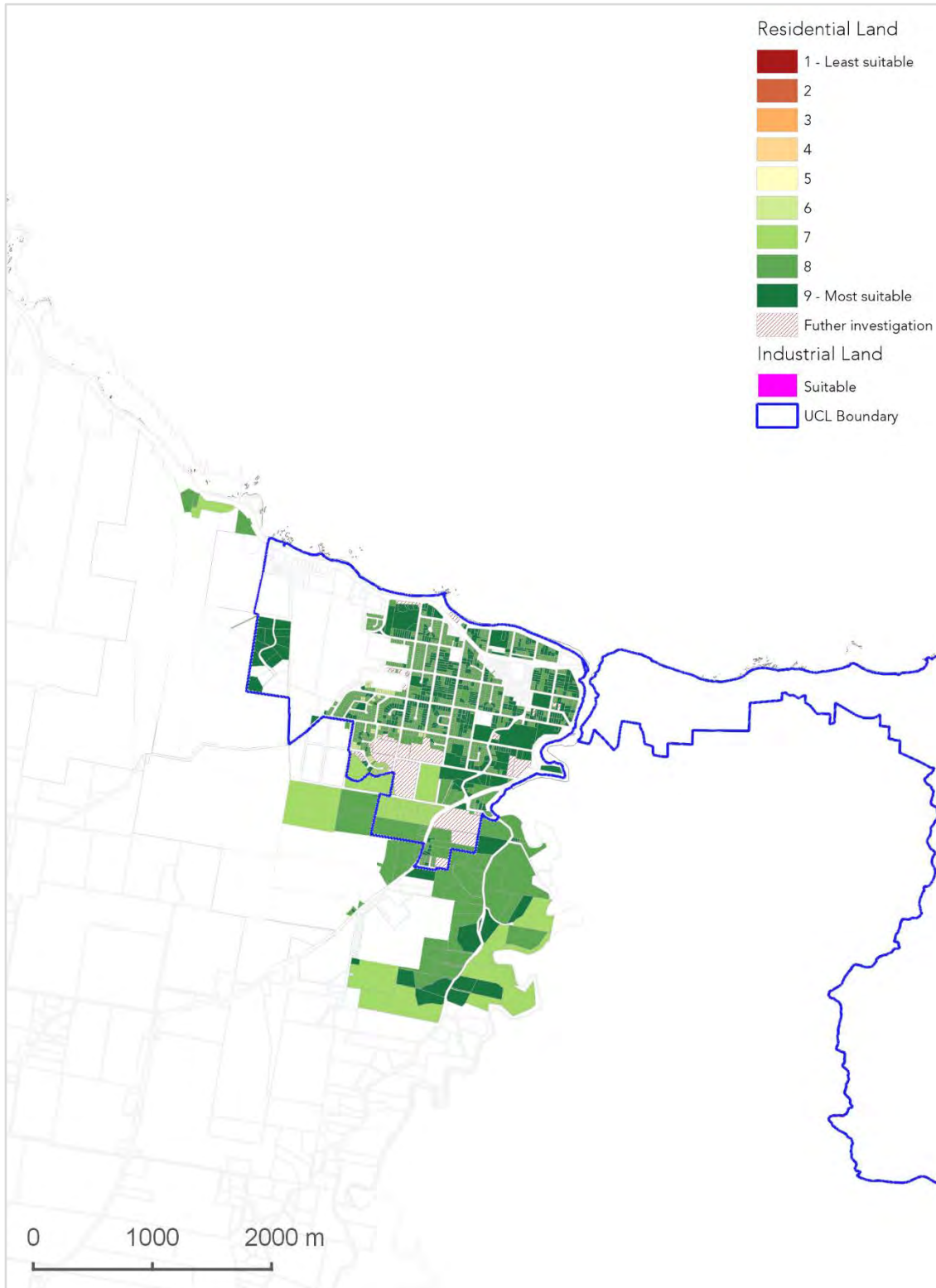
5.3 The land suitability assessment

The results of the assessment are presented in the following maps. They show that Somerset, Wynyard and Smithton, in particular, have suitable residential land, mostly due to their access to employment, retail, public transport and hospitals.

Land suitable for industrial development was assessed on the basis of proximity to major roads. It was noted that some of these lands in Somerset, Wynyard and Smithton are not presently connected to sewers, and augmentation of the sewer network would be required. These lands lie on the edge of settlements within the UCL boundary. Further assessment within each LGA is needed to confirm that the land is suitable and demand is sufficient.



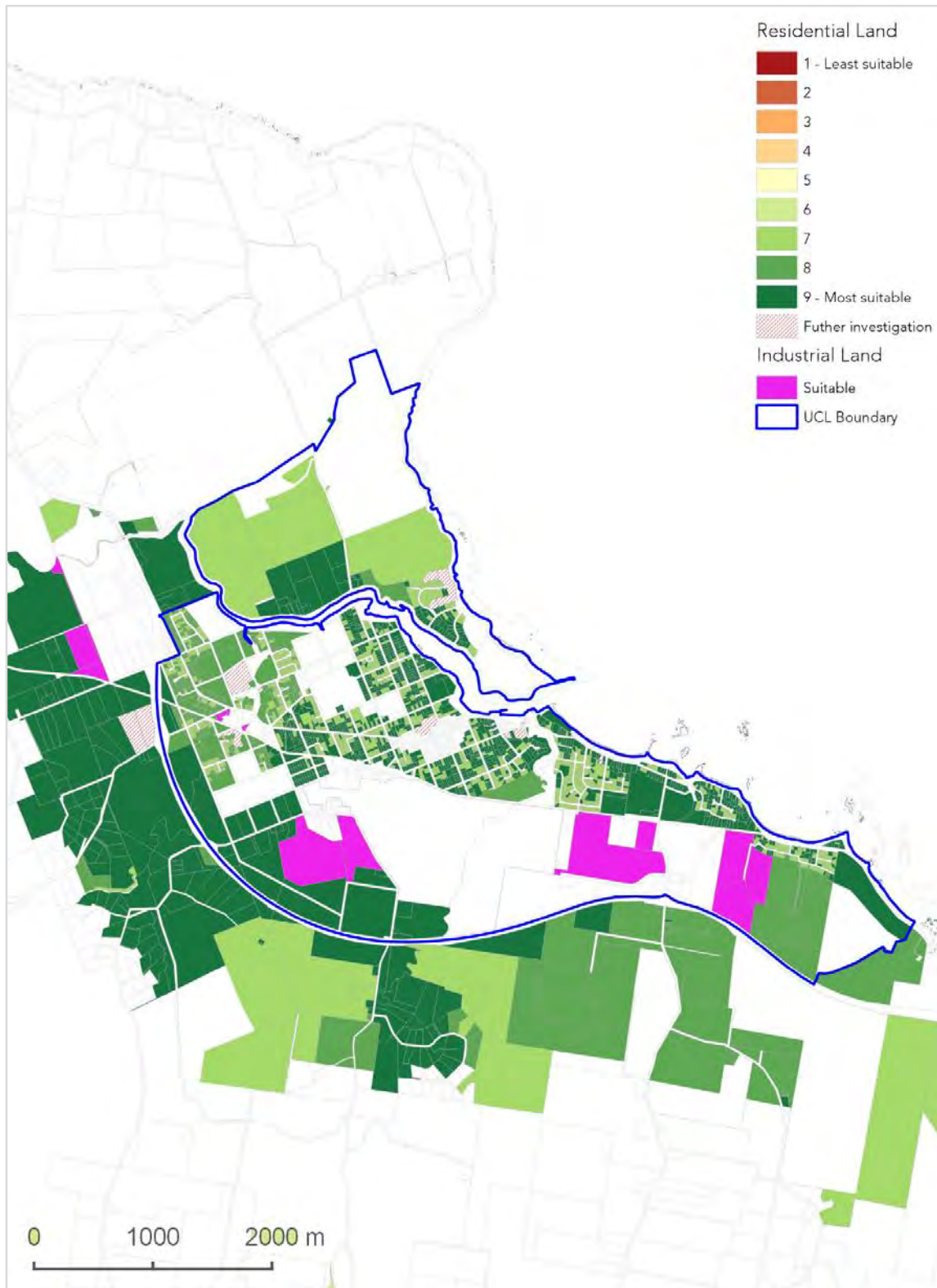
Figure 21 Land Suitability, Somerset



Further analysis is required to determine current agricultural activity and areas to be retained as buffers for agriculture to minimise the risk of constraining existing and potential agricultural use. Source: Geografia, 2016.



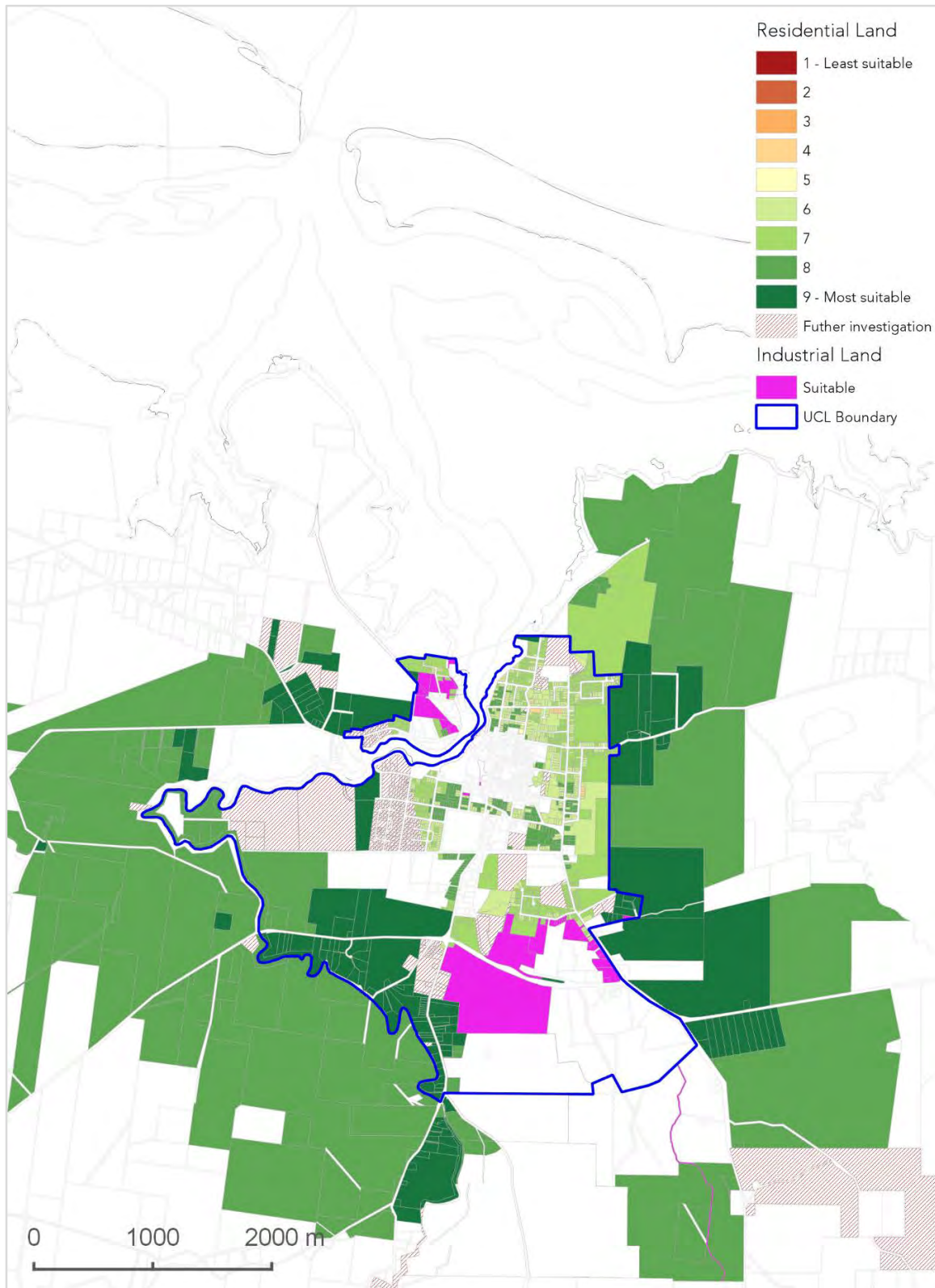
Figure 22 Land Suitability, Wynyard



Further analysis is required to determine current agricultural activity and areas to be retained as buffers for agriculture to minimise the risk of constraining existing and potential agricultural use. Source: Geografia, 2016



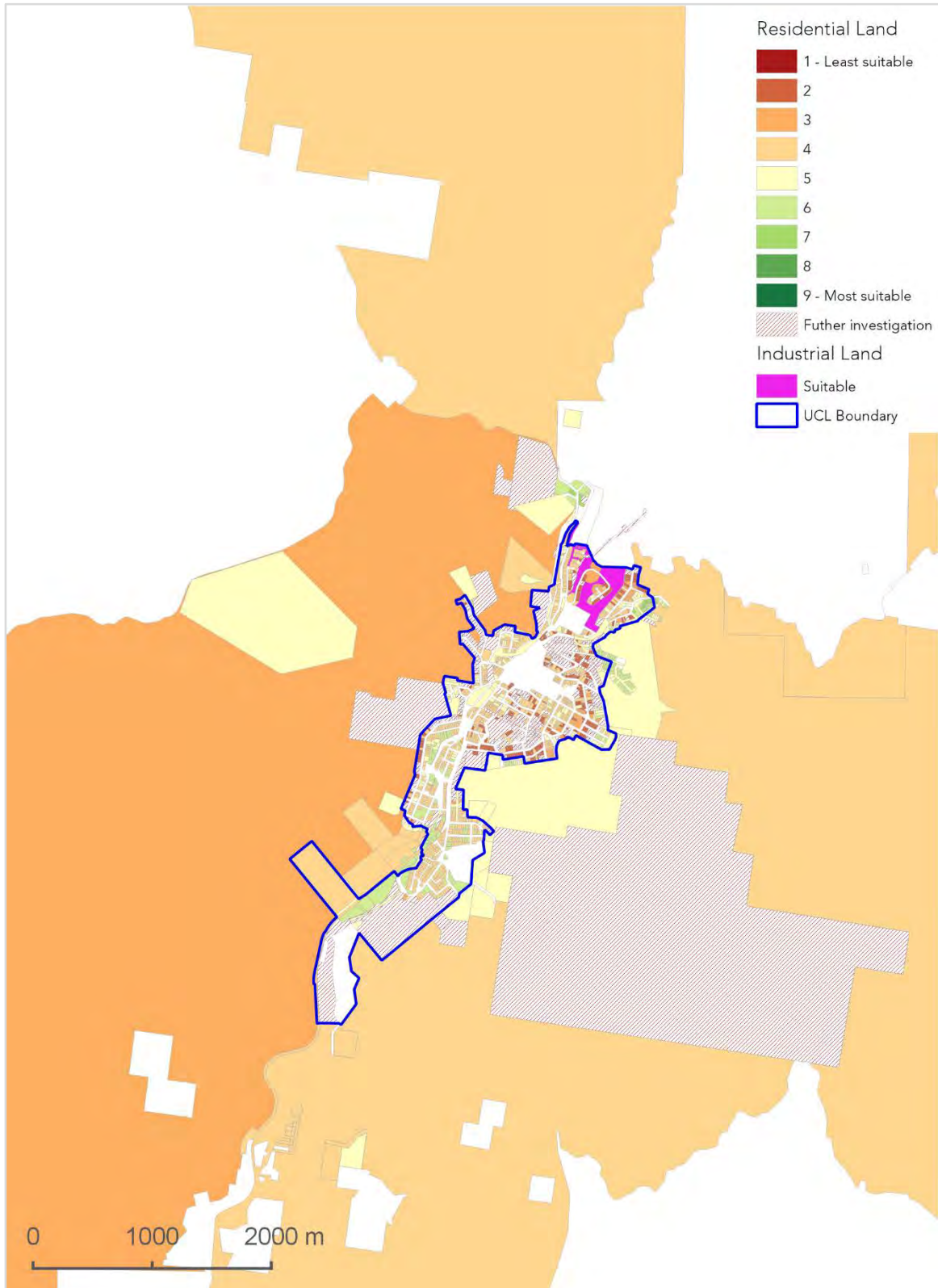
Figure 23 Land Suitability, Smithton



Further analysis is required to determine current agricultural activity and areas to be retained as buffers for agriculture to minimise the risk of constraining existing and potential agricultural use. Source: Geografia, 2016.



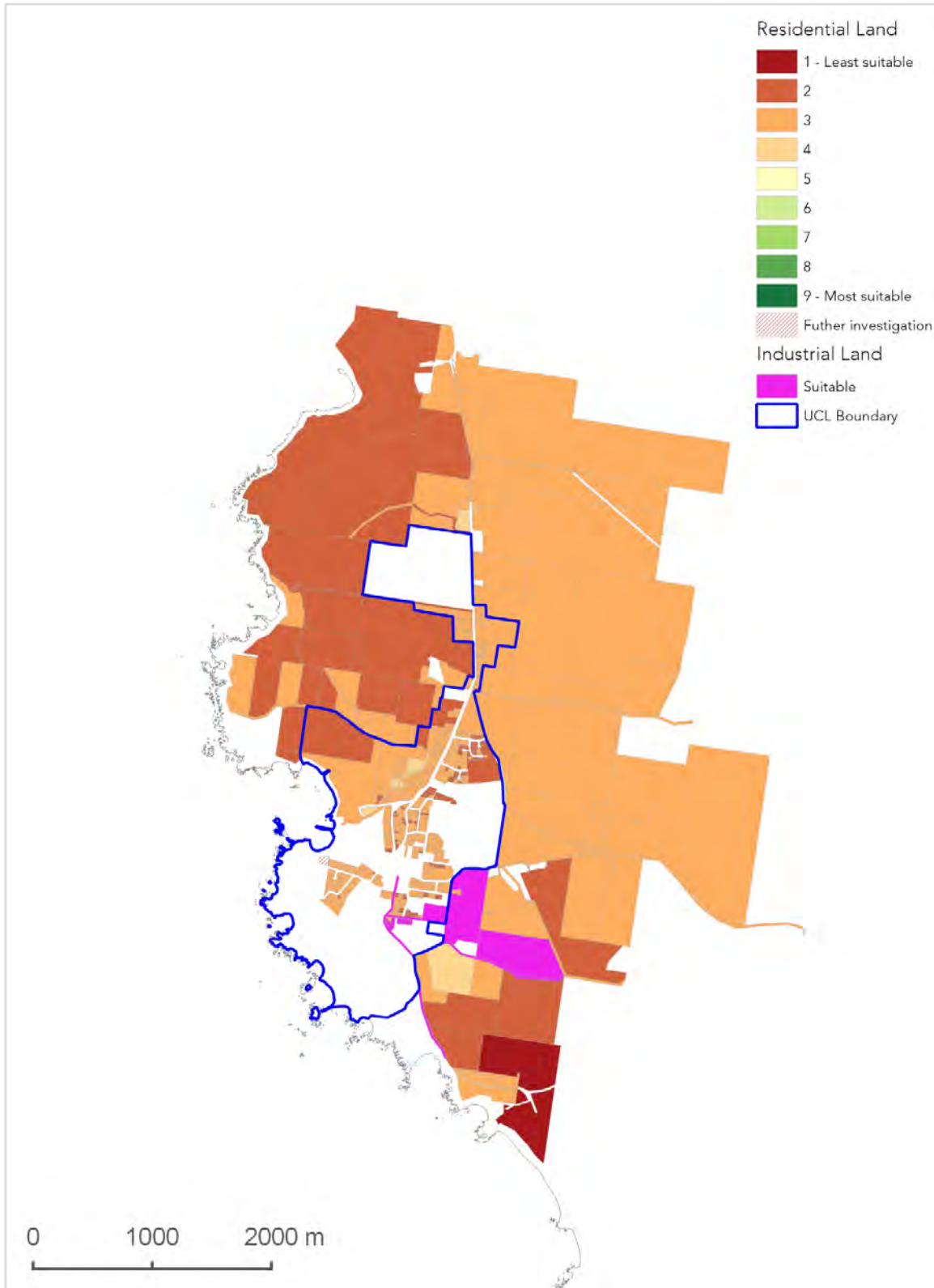
Figure 24 Land Suitability, Queenstown



Further analysis is required to determine current agricultural activity and areas to be retained as buffers for agriculture to minimise the risk of constraining existing and potential agricultural use. Source: Geografia, 2016.



Figure 25 Land Suitability, Currie



Further analysis is required to determine current agricultural activity and areas to be retained as buffers for agriculture to minimise the risk of constraining existing and potential agricultural use. Source: Geografia, 2016.



King Island

Much of the land on King Island is suitable for agriculture and productive purposes. Though the population forecasts in the Community Study suggest little growth, there is land that may be available to accommodate more residential development. The King Island Strategy 2008 identifies a large area on the west coast located immediately north of Currie, bounded by Currie, North Road and the coast, and extending up to the south of the settlement of Loorana. According to the Strategy, the area has no significant agricultural value although, should any development be proposed, further investigation would be necessary.

One issue of note is the availability of suitably zoned land for accommodation at Cape Wickham. The land is zoned Rural Resource, which permits accommodation for up to 16 guest. The growing appeal of the Cape Wickham Golf course with golf tourists may require accommodation for more than 16 guests at a time. Further investigation may be required to confirm the level of planned development and the planning requirements for it to ensure that development is timely.



6 Economic Structure, Resources and Opportunities

Agriculture and mining currently provide Murchison with much of its income. However, economic restructuring is likely to reduce this reliance. As well as shifting towards services, a downturn in mining commodity demand and the State Government's efforts to reinvigorate advanced manufacturing and forestry will reshape the region's economy. In the future, agriculture and downstream industries will present greater opportunities for sustainable development and employment. Tourism will continue to grow, particularly if the Australian dollar remains low.

6.1 Murchison's trading economy

Murchison's population is too small to be a fully self-sustaining economy and it is dependent upon trade with the Australian mainland and the rest of the world. This means it is susceptible to movements in trading costs and policy changes that alter trading conditions, such as commodity price fluctuations, free trade agreements, import tariffs, and shipping costs.

Primary production industries, such as **agriculture and mining**, are the dominant economic activities, accounting for 13% each of local jobs (ABS Census, 2011).

Manufacturing industries have been steadily declining. Nevertheless, they still account for 13% of regional jobs in meat and dairy product manufacturing, log saw milling and fruit and vegetable processing.

School education, accommodation and retail are the other notable employers (ABS, 2011).

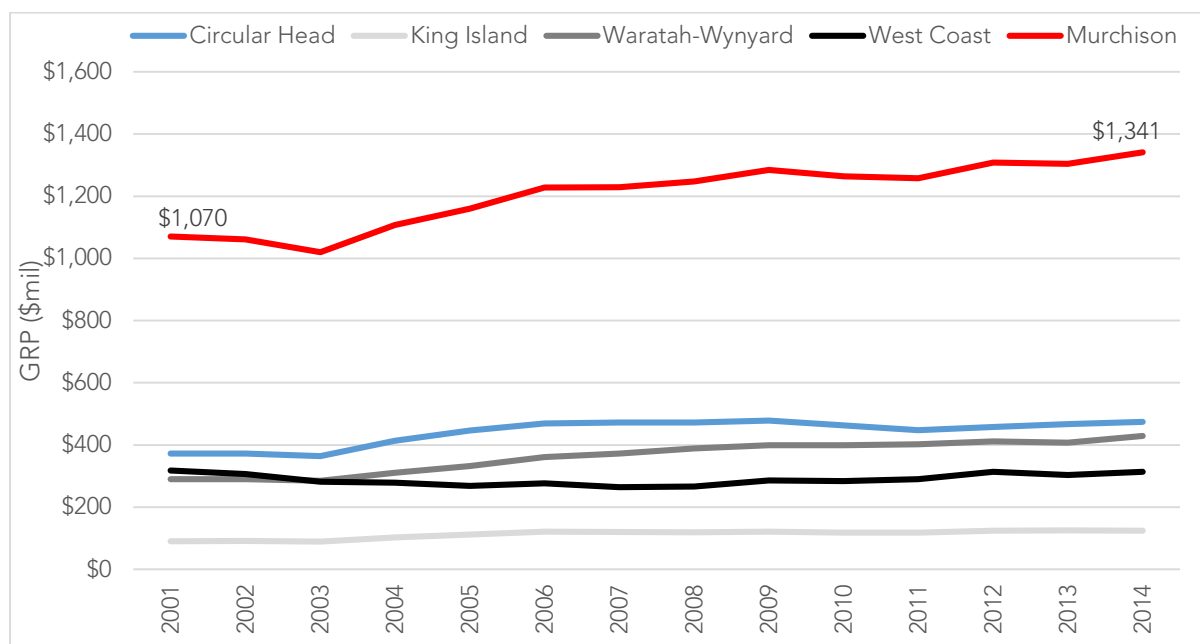
Industries by value

Over the past decade the Murchison economy has grown on average at 1.7% p.a. and is now worth \$1,341 million in Gross Regional Product (GRP) (Figure 26)²³.

²³ Economy ID, sourced March, 2016



Figure 26 Historical GRP Murchison and LGAs 2001-2014



Source: *Economy Id, 2016*

As with total employment, the value of the Murchison economy is heavily oriented to primary production, including agriculture and mining which makes up more than a third of its total output value (Table 26).

Table 26 Murchison, Output by Industry (2013-14)

Industry	Total Output (\$m)	Percentage	Pct of Tasmania
Agriculture, Forestry and Fishing	\$407	18%	6%
Mining	\$352	15%	1%
Manufacturing	\$471	21%	13%
Electricity, Gas, Water and Waste Services	\$83	4%	8%
Construction	\$229	10%	12%
Wholesale Trade	\$109	5%	4%
Retail Trade	\$70	3%	5%
Accommodation and Food Services	\$62	3%	3%
Transport, Postal and Warehousing	\$97	4%	6%
Information Media and Telecommunications	\$25	1%	4%
Financial and Insurance Services	\$37	2%	6%
Rental, Hiring and Real Estate Services	\$27	1%	2%
Professional, Scientific and Technical Services	\$28	1%	4%
Administrative and Support Services	\$29	1%	2%



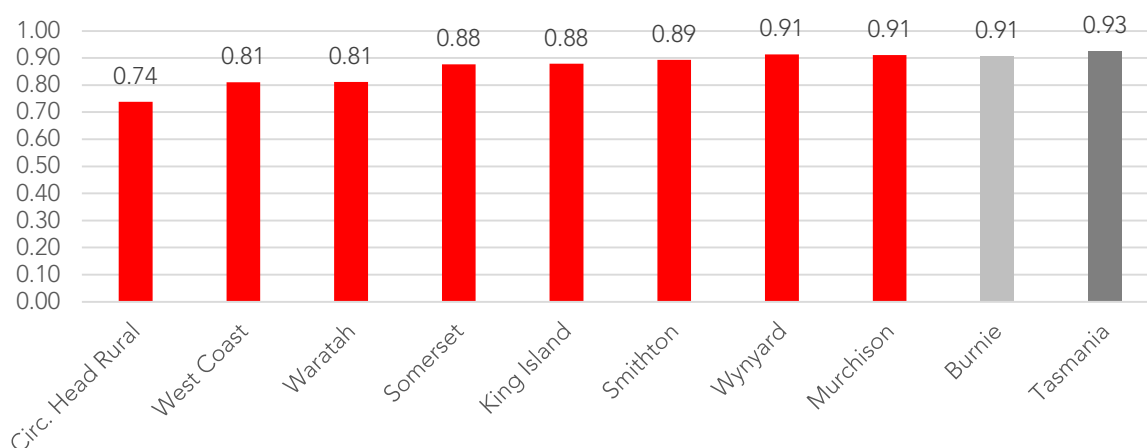
Industry	Total Output (\$m)	Percentage	Pct of Tasmania
Public Administration and Safety	\$57	2%	7%
Education and Training	\$66	3%	5%
Health Care and Social Assistance	\$96	4%	9%
Arts and Recreation Services	\$14	1%	1%
Other Services	\$31	1%	2%
Total Industries	\$2,290	100%	100%

Industry output and Gross Regional Product (GRP) represent different measure of the economy. Output relates to the sum total of expenditure and consumption by industry (excluding taxes, purchase of imported goods and transport/wholesale margins); GRP relates to the sum total value-add in the economy (e.g. profits and dividends; wages, salaries and remunerations and net taxes). Source: Economy Id, 2016.

Manufacturing also contributes 21% to local economic value, mainly in value-added agricultural and mineral processing. In comparison to the rest of the State, professional services and healthcare make lower economic contributions.

Notwithstanding this apparent industry concentration, industry diversity in Murchison is still comparable with Burnie and the rest of Tasmania (Figure 27).

Figure 27 Industry Diversity Index – Region and SA2



Industry diversity index is a measure for concentration and dependence of regional areas to industry sectors. A more diverse industrial base is correlated with higher economic resilience. The industry diversity index is measured between 0 and 100, with 0 representing no industry diversification (i.e. region is dependent on a single industry sector) and 100 representing total industry diversification. Source: ABS, 2011



Industries by businesses, employment and labour force

The employment profile of Murchison's workforce reflects its primary production base, with major employing sectors including Metal Ore Mining (with 1,013 workers or 10.4% of total employment) and Agriculture (1,053 workers or 10.7%) (Table 27).

Table 27 Top 20 Industries by Employment, 2011

Rank	Top 20 Industries by Employment Size - Murchison - ANZSIC 2011 2 Digit	2011	2006	% Change
1	Agriculture	1,053	1,193	-12%
2	Metal Ore Mining	1,013	621	63%
3	Preschool and School Education	652	603	8%
4	Food Product Manufacturing	634	694	-9%
5	Food Retailing	435	453	-4%
6	Food and Beverage Services	426	415	3%
7	Other Store-Based Retailing	379	348	9%
8	Accommodation	354	374	-5%
9	Construction Services	335	236	42%
10	Public Administration	312	313	0%
11	Residential Care Services	248	170	46%
12	Wood Product Manufacturing	232	266	-13%
13	Road Transport	214	211	1%
14	Exploration and Other Mining Support Services	201	156	29%
15	Repair and Maintenance	195	141	38%
16	Social Assistance Services	189	163	16%
17	Professional, Scientific and Technical Services (except Computer System Design and Related Services)	185	187	-1%
18	Building Construction	148	117	26%
19	Grocery, Liquor and Tobacco Product Wholesaling	142	139	2%
20	Medical and Other Health Care Services	137	158	-13%

Source: ABS, 2011

Comparative analysis of employment by industry (location quotient) emphasises Murchison's specialisation in agriculture, mining and mining related services, value-added manufacturing (wood and food producers) and tourism (through accommodation) (Table 28).



Table 28 Top 20 Sectors by Specialisation (LQ Index), 2011

Rank 1	ANZSIC 2001 2 Digit Level	Specialisation (LQ) Index	Employment
1	Metal Ore Mining	15.3	1,011
2	Exploration and Other Mining Support Services	11.6	201
3	Mining, nfd	7.4	68
4	Other Transport	4.4	33
5	Non-Metallic Mineral Mining and Quarrying	3.6	32
6	Agriculture	3.3	1,042
7	Fishing, Hunting and Trapping	2.8	70
8	Wood Product Manufacturing	2.6	213
9	Food Product Manufacturing	2.5	616
10	Machinery and Equipment Wholesaling	2.5	130
11	Petroleum and Coal Product Manufacturing	2.5	3
12	Accommodation	1.8	354
13	Commission-Based Wholesaling	1.6	14
14	Aquaculture	1.6	84
15	Non-Store Retailing and Commission-Based Buying/Selling	1.5	8
16	Fuel Retailing	1.5	57
17	Agriculture, Forestry and Fishing Support Services	1.5	35
18	Heavy and Civil Engineering Construction	1.4	120
19	Textile, Leather, Clothing and Footwear Manufacturing	1.4	41
20	Agriculture, Forestry and Fishing, nfd	1.4	5

Location Quotient (LQ) is a measure for region's industrial specialisation relative to the State's economy. The LQ is calculated by dividing the proportion of employment by industry at a regional level with the proportion of employment by industry at a State level. A higher LQ index represents a higher degree of relative specialisation. Source: ABS, 2011

Slow employment growth, but more buoyant enterprise growth

Between 1996 and 2011, employment in Murchison grew by 0.1% annually (Table 29). This was lower than Burnie (0.6% p.a.) and Tasmania (1.2%). Low growth trends are largely attributed to a decline in employment demand from the agriculture sector. This is in line with long-term State and National trends, and is largely attributable to farm consolidation; increasing use of capital-intensive technologies (that reduce labour-intense methods and agricultural labour demand); and competing labour demand from higher income industries in interstate economies (e.g. mining in WA and QLD). Slow growth in other large sectors (e.g. local mining and manufacturing industries) have also contributed to the weak annual growth.



Table 29 Industry of Employment, 1996-2011

ANZSIC 2006 Industry Code - 1 Digit	1996	2001	2006	2011	1996-2011 % change p.a.
Agriculture, forestry & fishing	1,752	1,714	1,669	1,474	-1.1%
Mining	1,051	883	751	1,002	-0.3%
Manufacturing	1,458	1,510	1,740	1,631	0.8%
Electricity, gas, water & waste services	93	90	93	104	0.7%
Construction	590	567	717	800	2.1%
Wholesale trade	493	537	454	454	-0.5%
Retail trade	1,056	1,031	1,101	1,181	0.7%
Accommodation & food services	765	783	842	880	0.9%
Transport, postal & warehousing	529	511	571	527	0.0%
Information media & telecommunications	107	105	79	62	-3.6%
Financial & insurance services	175	101	128	146	-1.2%
Rental, hiring & real estate services	158	122	95	103	-2.8%
Professional, scientific & technical services	273	223	282	291	0.4%
Administrative & support services	220	285	431	303	2.2%
Public administration & safety	471	427	587	621	1.9%
Education & training	751	783	830	897	1.2%
Health care & social assistance	939	896	949	1,038	0.7%
Arts & recreation services	67	77	59	62	-0.5%
Other services	379	402	357	414	0.6%
Inadequately described/Not Stated	593	261	338	185	-
Total - Murchison	11,920	11,308	12,073	12,175	0.1%
Total - Burnie	7,245	6,658	7,626	7,984	0.6%
Total - Tasmania	182,211	182,522	203,175	217,298	1.2%

Source: ABS, 2011

Although employment growth has been moribund, there are some signs of a resurgence in business numbers. Between 2012 and 2014, there was:

1. An increase in the number of **agriculture** and **construction** enterprises, likely a result of recent investments in irrigation infrastructure and flow-on benefits to businesses in both industries.
2. An increase in the number of **retail** enterprises.

Growth in these three sectors far exceeded State trends, particularly agriculture. Initiatives arising from the Tasmania Fruit and Vegetable Industry Task should be monitored to assist local producers. In April 2016, the Federal Government announced funding for the Tasmania Horticulture Market Growth Project, which is intended to help develop markets in Australia and overseas (Australian Government 2016). The taskforce recognised that farmers have had



greater focus on productivity and needed as assistance with market development (Tasmanian Fruit and Vegetable Industry Taskforce, 2014). By contrast, the number of manufacturing enterprises declined (by 12% compared with 3% for Tasmania (Table 30).

Table 30 Industry by Number of Business and Employment Size, 2014

ANZSIC 2006 Industry 1 Digit - Murchison	0-4 employees	5-19 employees	20+ employees	Total Businesses	'12-'14 % Change Murchison	'12-'14 % Change Tasmania
Agriculture, Forestry and Fishing	780	84	11	875	5%	-5%
Mining	10	4	3	17	100%	-19%
Manufacturing	60	17	13	90	-12%	-3%
Electricity, Gas, Water and Waste Services	0	0	0	0	Industry Exit	-15%
Construction	247	23	6	276	5%	-8%
Wholesale Trade	31	6	0	37	8%	-10%
Retail Trade	102	40	3	145	16%	-9%
Accommodation and Food Services	96	33	0	129	1%	-5%
Transport, Postal and Warehousing	105	14	9	128	0%	-2%
Information Media and Telecommunications	9	0	3	12	-25%	-3%
Financial and Insurance Services	96	3	3	102	-4%	3%
Rental, Hiring and Real Estate Services	153	6	0	159	7%	-1%
Professional, Scientific and Technical Services	64	14	0	78	-3%	-3%
Administrative and Support Services	27	3	0	30	67%	-9%
Public Administration and Safety	3	0	0	3	0%	5%
Education and Training	9	0	0	9	33%	-15%
Health Care and Social Assistance	42	6	3	51	-8%	1%
Arts and Recreation Services	9	3	3	15	60%	-6%
Other Services	70	13	0	83	8%	-8%
Unknown	29	0	0	29	-14%	3%
Total - 2014	1,942	269	57	2,268	6%	-5%

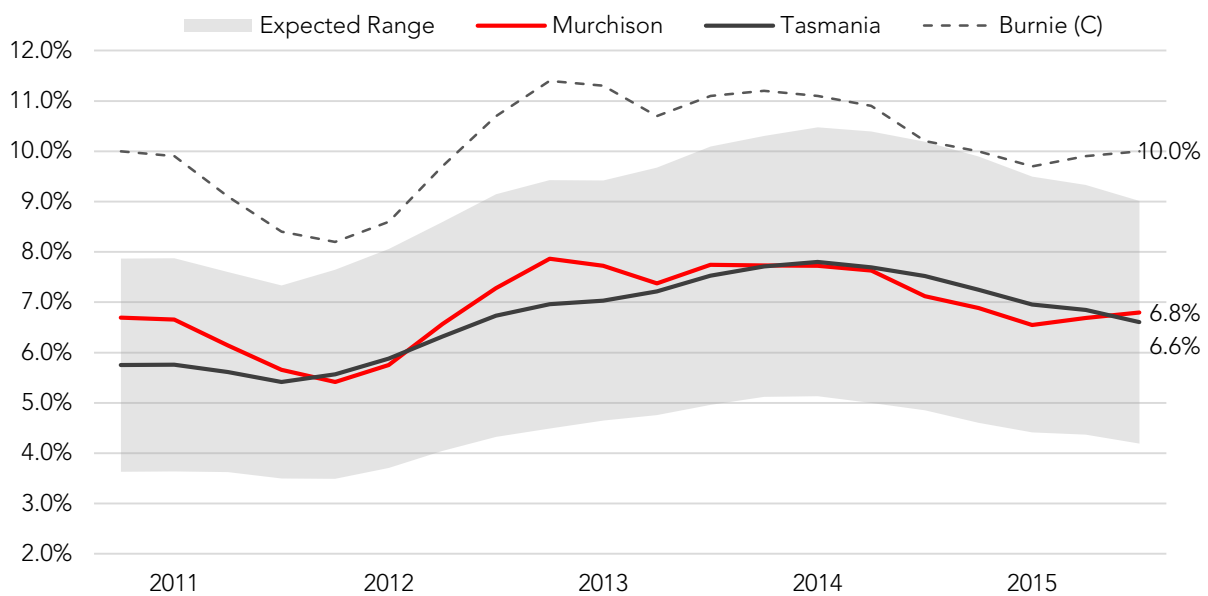
Source: ABS Business Industry Exit/Entries, 2014.



An average unemployment rate

In 2015, Murchison had an unemployment rate of 6.8%, marginally above the State average of 6.6% (Figure 28). Historically, unemployment in Murchison has been aligned with State averages. By comparison, Burnie has had a statistically significant, consistently higher unemployment rate over the same period; at 10% in 2015.

Figure 28 Murchison Unemployment Rate 2011-2015



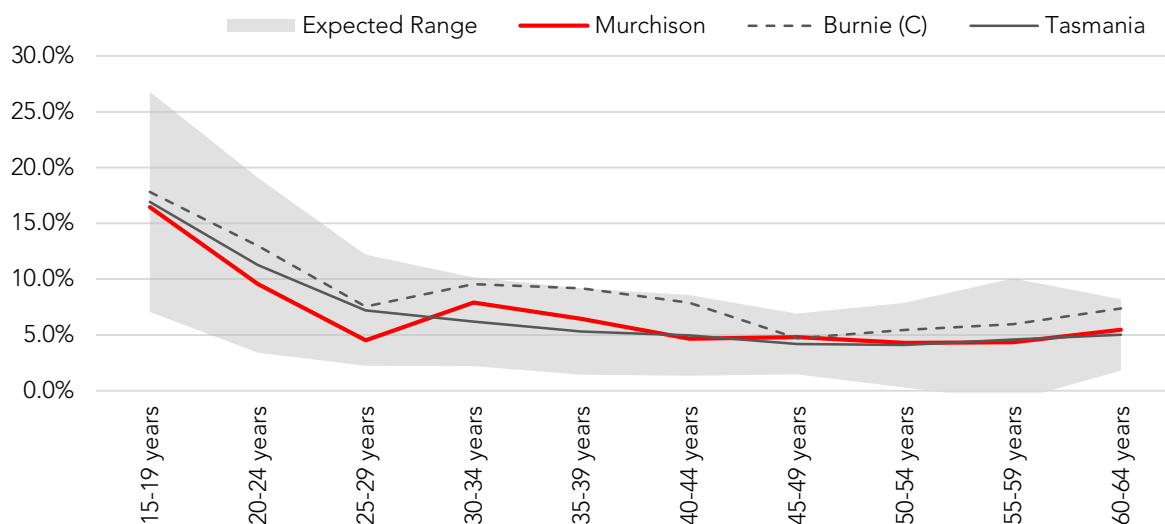
The grey band indicates the expected range for Tasmania. The chart highlights how Murchison's unemployment rate has largely followed that of the Tasmanian average, in contrast to Burnie's, which has remained statistically significantly higher. Source: *Small Area Labour Force, Department of Employment, 2016*

In fact, Murchison's unemployment profile is aligned closely to the State profile across all ages (Figure 29), with no statistically significant deviation from the State range.

Within the region, however, unemployment has ranged considerably; typically (and statistically significantly) highest in West Coast and lowest on King Island (Figure 29).

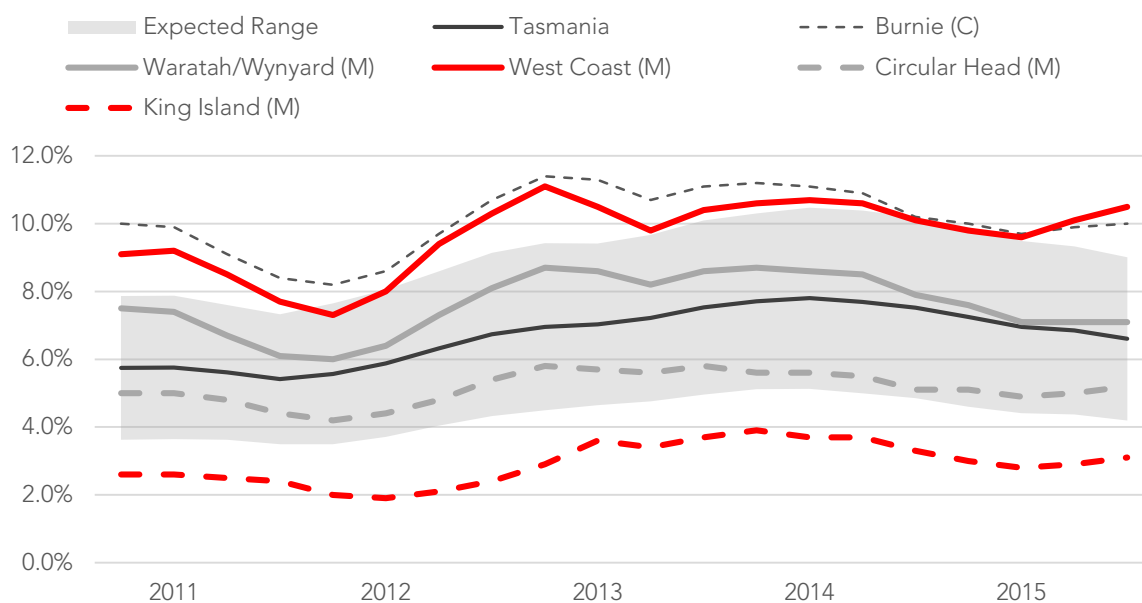


Figure 29 Murchison Unemployment Rate by Age Group, 2011-2015



Unemployment by age at a municipal level is unavailable due to unreliable estimates at the low sample size of data. Interestingly, while youth unemployment seems to be a significant issue for Tasmania and Burnie, it is less so for Murchison. This is likely due to the considerable out-migration of young residents from Murchison (with approximately two-thirds moving to other parts of Tasmania, and one-third to the rest of Australia). Source: ABS 2011.

Figure 30 Murchison LGA Unemployment Rates 2011-2015



Source: Small Area Labour Force, Department of Employment, 2016



6.2 Murchison's economic resources

Human capital

Human capital is a measure of the total stock of knowledge, creativity and attitudes of people applied to generating economic value. Its value depends on both the total number of people, and also their level of skill.

The key for creating human capital in Murchison is to continue working on raising the skill base of the resident workforce, both by attracting and retaining skilled workers, and by ensuring existing residents have the best possible access to education and training.

Transition or more brain drain

Murchison has a high proportion of low skilled workers. At the 2011 Census, only 29% of residents had a post-school tertiary qualification (Grad/Dip and Post-Grad) compared to 31% in Burnie and 41% in Tasmania. Nearly half of Murchison residents had vocational qualifications (Figure 31).

The region's low skill qualifications may be driven, in part, by the region's school educational attainment profile: only 23% of residents have completed Year 12 (Figure 32), lower than Burnie (26%) and Tasmania (35%). With lower school outcomes, residents are more likely to be induced to seek vocational qualifications.

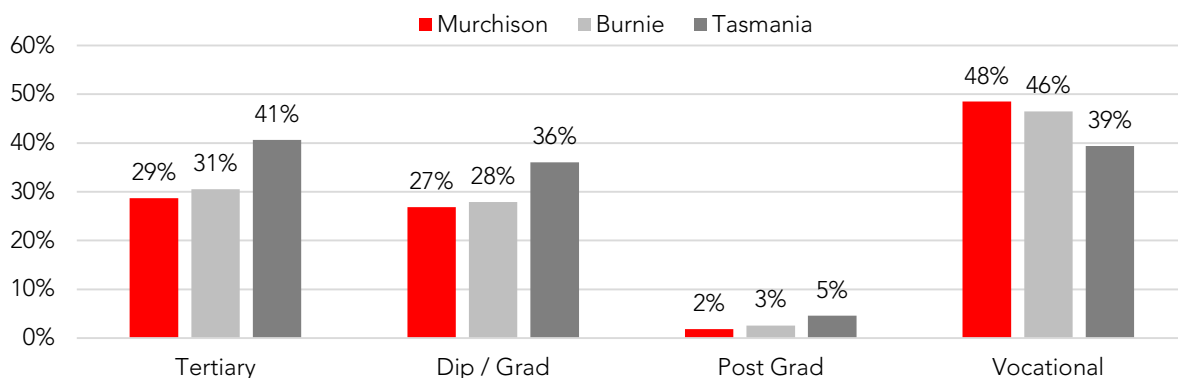
If we look at younger residents only, we see that school educational attainment levels are higher. Over time this will improve the educational profile in Murchison (to the extent that these younger residents remain in the region (Figure 33)). Nonetheless, even in this age group, the proportion with Year 12 or equivalent qualifications is still lower than for Burnie and Tasmania.

Murchison is experiencing a brain drain of young, educated residents. Detailed data suggests the majority of migrating youth are relocating to Hobart or elsewhere in Tasmania (65% of relocating youth), followed by other interstate locations (21%, mainly to Victoria and Queensland), or Burnie (14%); to seek further education or employment opportunities. Some young people with low skill levels may remain in the region to fill low skilled jobs, though experience around Australia shows that even these jobs are disappearing, due to automation or obsolescence.

The education outcomes in Murchison are similar to other rural and remote areas. Significantly, the State's education legislation allows students to leave at Year 10 provided that they can get 25 hours per week paid employment. However, this legislation is under review.

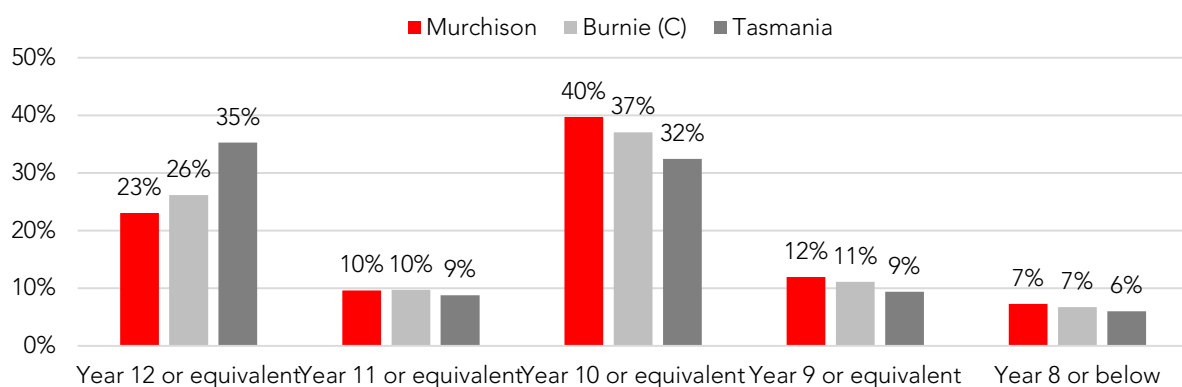


Figure 31 Post-School Qualification, 2011



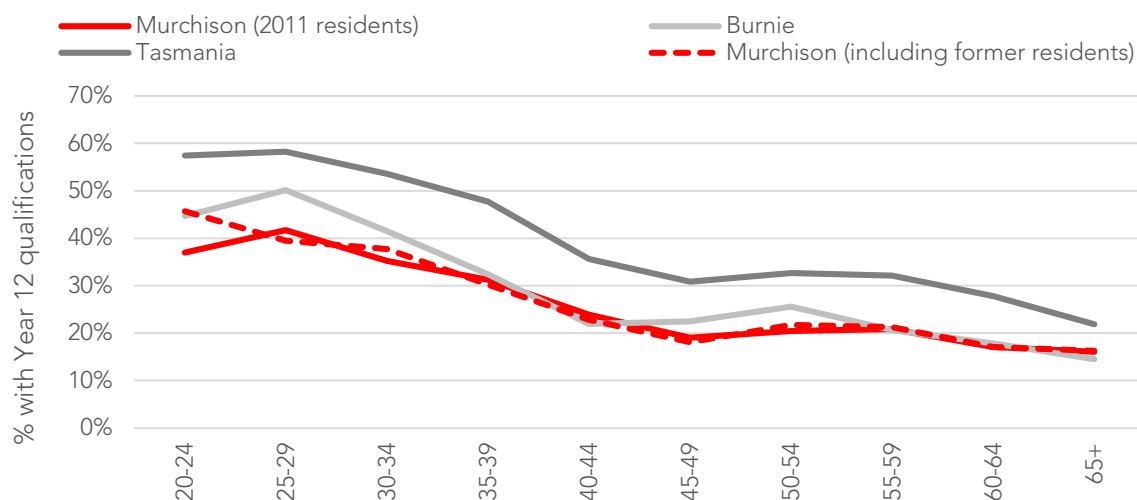
Source: ABS 2011

Figure 32 School Educational Attainment, 2011



Source: ABS 2011

Figure 33 School Educational Attainment by Age Group, 2011

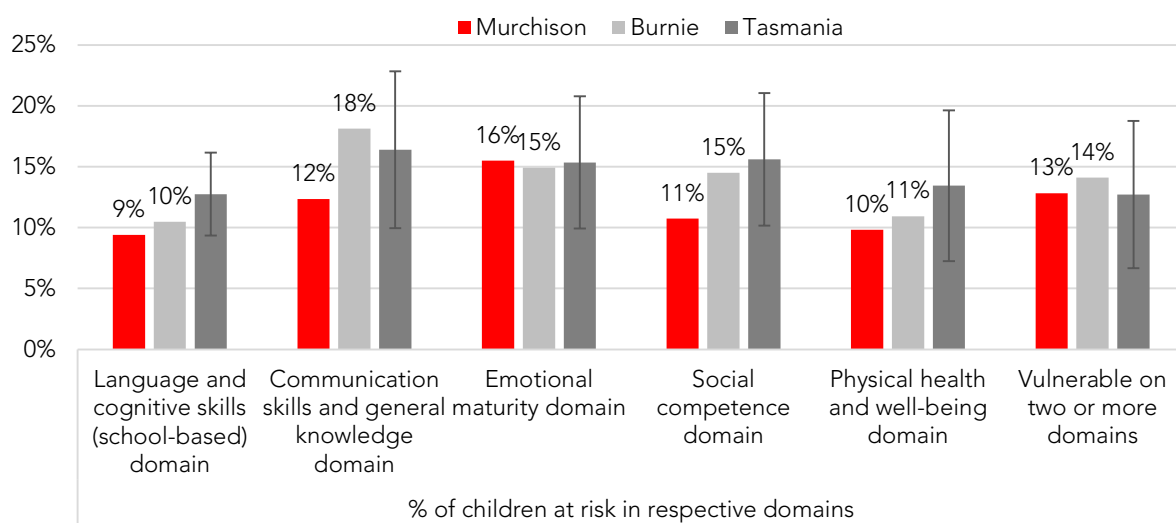


Source: ABS 2011



More positively, Murchison is achieving good early childhood outcomes in primary and secondary school. According to Early Childhood Development indicators, Murchison is on par with the State and faring better than Burnie on most indicators (Figure 34). This suggests local educational institutions are successfully supporting local human capital development.

Figure 34 Early Childhood Development Indicators - % at Risk by Type, 2012



The vertical black bars indicate the range of State values. Figures outside of this can be considered to be statistically significant deviations. Source: Australian Institute of Childhood Ranking Survey for School Age Primary and Secondary Students, 2013

Murchison residents are less likely to experience persistent inter-generational poverty. This is indicated by a significantly lower proportion of families with one or more unemployed parents; known to be an important indicator (Figure 35). However, the level of welfare payments, reduced mobility of welfare recipients, and decline of key industries in areas will lower economic industry diversity, such as West Coast and Circular Head may distort this.



Figure 35 Proportion of Families by Family Type and Unemployment Type



Source, ABS, 2011

Overall, in comparison to Burnie, these indicators suggest that household profiles and educational institutions are supporting reasonable development outcomes. While these bode well for the region’s human capital potential, this is being somewhat offset by a brain drain of young and educated residents (which is mostly due to their demand for higher skill job opportunities). Unless these trends are mitigated or skilled in-migration is increased, Murchison will struggle to increase the size and scope of its skilled workforce.

Education transition for students, parents and teachers

Educational attainment levels are increasing around Australia and unskilled jobs are rapidly diminishing in number. In response, the Tasmanian Government has committed to a long term policy action and strategies to encourage and inspire students to complete Years 11 and 12 before pursuing vocational or tertiary education and plan their education from an early age.

Schools in remote areas will be able to offer a wider variety of subjects to students, including vocational education and training (VET) subjects or Tasmanian Certificate of Education (TCE) subjects. For example, Smithton High school student can access agricultural training or mechanic/automotive training, while digital classrooms with video conferencing facilities allow TCE students to participate in classes in Hellyer College in Burnie.

The strategy has been successful. Previously, students in Smithton who left home to attend Hellyer College often dropped out due to the travel or being away from home. They are now able to use the video conferencing option and complete their studies. This has resulted in a 50% increase in enrolments through Year 11 and 12. At Mountain Heights High school,



hospitality training is offered, which provides future workforce for local tourism operators and helps retain young people in the area.

The Government's initiatives also encourage students and parents to be proactive to direct students' education. "My Education" and "ME Online" are tools to help them create a transition plan to tailor the education to meet the requirements of their desired career.

Finally, teacher retention is acknowledged as a critical issue in rural and remote areas. Teacher retention is difficult in West Coast and King Island, compared to Circular Head and Waratah Wynyard, and the current Industrial Award for teachers may unintentionally contribute to the issue by encouraging teachers to leave at the end of a three year appointment. It is recognised that policy intervention is needed to address this issue.

Tertiary education to transform Northern Tasmania

Tertiary education in the north-west of Tasmania will be reformed to provide courses that meet the needs of local employers and provide students with pathways that match their career aspirations.

The Education-Driven Economic Revitalisation of Northern Tasmania is considered a once-in-a-generation opportunity to renew the capabilities of the communities and economies of north-west Tasmania. The partnership proposal by the University of Tasmania has brought together other project funding partners (the Tasmanian Government and Burnie City Council), to commit capital to the revitalisation of education. Their combined public investment of \$40 million will provide modern facilities at West Park in Burnie; investment in the Tasmanian Institute of Agriculture; closer integration and collaboration with TasTAFE; and support for start-up enterprises.

New programs will target under-qualified school leavers, mature age students, career changers and high-achievers returning to study to upskill for promotion. Additionally, international students will be welcomed to participate in English language programs to meet academic requirements prior to participating in courses.

Other strategies to attract potential students to university studies include targeted recruitment programs to Year 9 and 10 students in preparation for their subject selections in Years 11 and 12, and the introduction of parent / first in family strategies.

The annual ongoing contribution from the campus activities to deliver degree and associate degree programs once it reaches full capacity over a ten-year timeframe includes:

1. 2,000 new students, including over 150 international students
2. 40 new full-time academic staff and support staff
3. \$6m in new salaries for university personnel
4. \$66m in additional economic output to the economy (2015 dollars)
5. 28 additional indirect jobs created in the economy



6. \$3m in direct spending by interstate and overseas students

The new Associate Degree programs that support local industries will include:

1. Applied Science (Agriscience/Food, Food Technology, Aquaculture)
2. Applied Business (Logistics, Tourism and Hospitality, Lean, AgriBusiness)
3. Allied Health (Community/ Human Services, Case Worker, Aged Care)
4. Design and Technology (Disruptive Technologies, Innovation, Design Thinking).

The first round of courses is expected to begin in 2017 and full early program delivery from 2018.

Specialised training opportunities may also exist in aviation. The region has a number of small airports with low volumes of air traffic and variable weather conditions that make the region suitable for pilot training. Together with the university or TasTAFE training courses could be developed that would allow non-native English speaking pilots to complete the requirements for their pilot training in English speaking countries.

Attracting and retaining skilled and professional workers, such as teachers, farm managers and white collar professionals is difficult in regional Australia. It can be mitigated through higher salaries, better conditions and other incentives, much of which is beyond the capacity of Councils to influence, or the SMEs that make up part of Murchison's economy, to fund. The good news is that while Murchison can sometimes find it difficult to attract staff, quality of life can make that task a little easier.

Notwithstanding the local quality of life, retaining skilled staff is always going to be a challenge. Because it is a smaller labour market, as people climb the career ladder they are often compelled to relocate to larger centres. Also, the spouses can struggle to find local work, putting pressure on the decision to leave.

The quality and reputation of primary and secondary schooling, and the pathways to further education and employment, are important consideration in professionals' when deciding to relocate their families. Future investment in the tertiary sector, increasing availability of online courses, and the rollout of the NBN may reduce potential or perceived barriers to relocate to the region.

A strong, growing agriculture sector with a relatively young workforce

While employment in the agricultural sector has seen long-term decline, the industry remains significant in terms of both jobs and value. The region's temperate climate, fertile

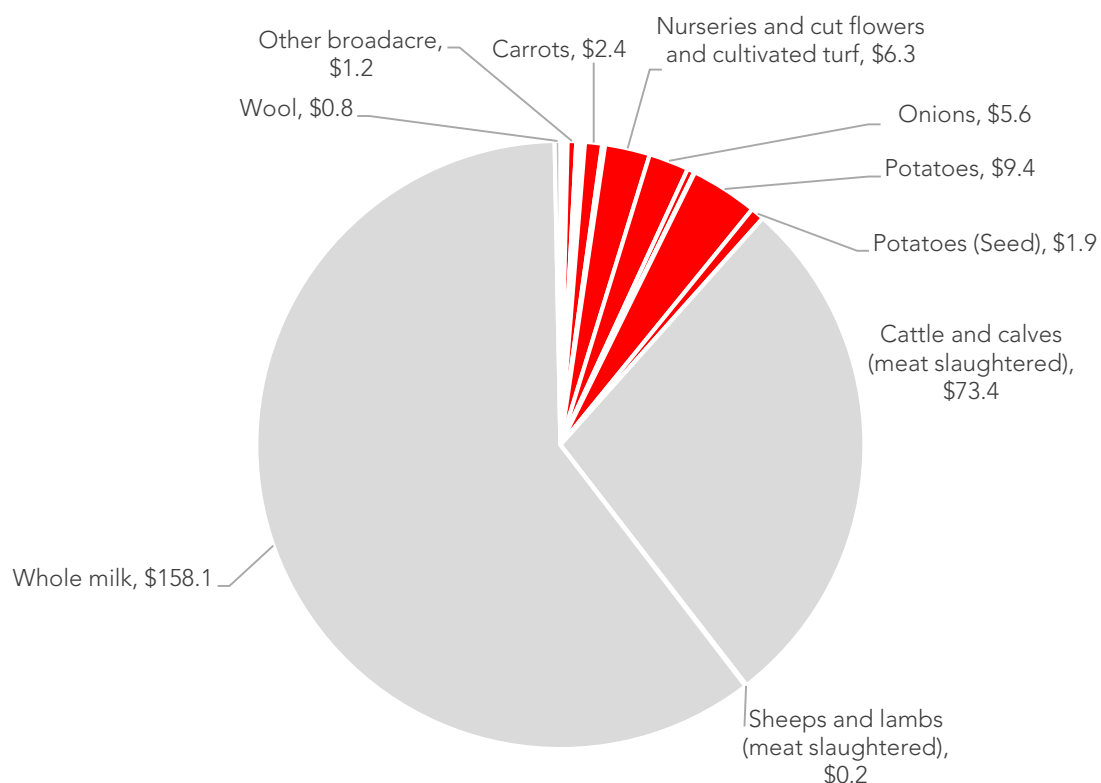


soils and reliable rainfall has support a low-cost pasture-based dairy and cattle sector, and prominent horticultural sector.

Dairy and beef cattle are concentrated in Circular Head and King Island. Milk and meat cattle products respectively contribute \$158.1 million and \$73.4 million annually to the local economy (Figure 36). In fact, Murchison is a State-significant producer, supplying half of Tasmania’s milk and meat cattle (Table 31).

Horticulture is also a major product, with \$27.3 million in local production value, mainly in vegetables and nurseries, cut flowers and cultivated turf. Recent and planned investments in irrigation are expected to lift productive capacity of these sectors (particularly milk and horticulture), increasing value, diversity and State-significance in the short-to-medium term.

Figure 36 Value of Agricultural Commodities Murchison, 2010-11 (\$m)



Source: ABS 2010-11 Agricultural Census



Table 31 Top 10 Agri-Products by State Contribution, Murchison, 2010-11 (\$m)

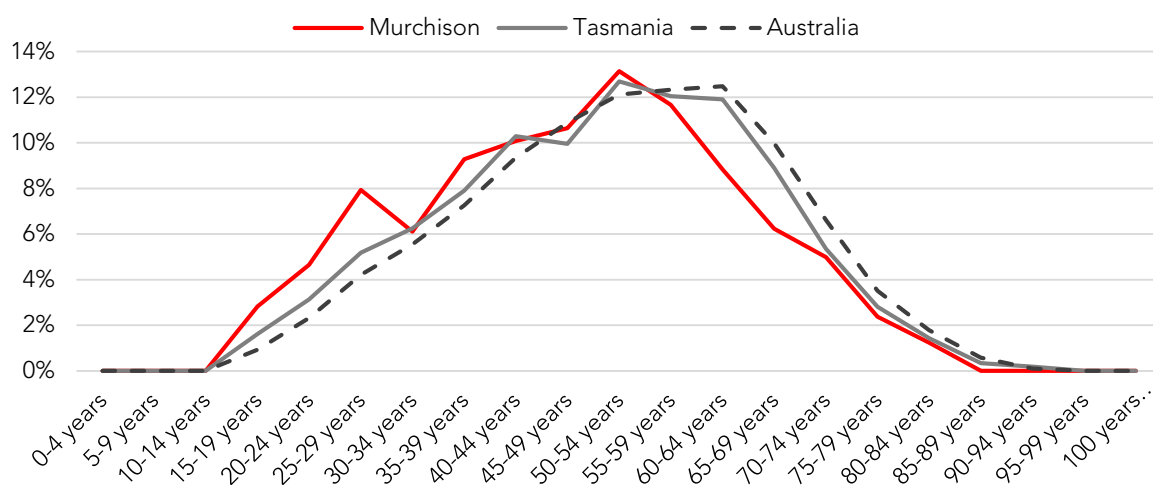
Rank	Commodity	Murchison	Tasmania	% State Contribution
1	Whole milk	\$158.1	\$311.4	51%
2	Cattle and calves (meat slaughtered)	\$73.4	\$176.8	42%
3	Nurseries and cut flowers and cultivated turf	\$6.3	\$17.9	35%
4	Cauliflowers	\$0.4	\$2.1	19%
5	Other vegetables	\$1.0	\$6.3	16%
6	Onions	\$5.6	\$37.1	15%
7	Potatoes (Seed)	\$1.9	\$15.5	12%
8	Carrots	\$2.4	\$20.4	12%
9	Potatoes	\$9.4	\$88.4	11%
10	Wheat	\$0.4	\$7.5	5%
Total Agricultural Products		\$274.4	\$1,129.5	24%

Source: ABS 2010-11 Agricultural Census

Another often overlooked advantage is Murchison’s relatively young agricultural workforce: the median age of farmers and farm managers is 49, compared to 51 for Tasmania and 53 for Australia.

Figure 37 shows that, compared to Tasmania and Australia, Murchison has a higher proportion of 20-29 year olds in the agriculture sector, and a lower proportion of 55+ year olds. This is likely to be both a source of longevity and innovation for the sector (as young workers are more likely to adopt new technologies and engage in riskier investments).

Figure 37 Proportion of Farmers & Farm Managers by Age Group, 2011



Source: ABS, 2011



Seasonal workers, such as foreigners on working holiday visas, are moderately skilled and may provide an important source of efficient labour during harvest seasons. Such workers' wages currently receive local tax treatment, i.e. they are eligible for the tax free threshold, which makes working in Australia attractive to them and cost efficient for farmers. Measures that affect these workers' wages should be monitored to ensure that this labour source is not adversely affected.

Forestry

Murchison's forestry industry has followed State and National trends, undergoing long-term decline as the industry continues to face difficult conditions for operations. The historically high AUD, competition from Asian woodchip and hardwood markets, and a strong shift in demand to plantation resources has made both Murchison's (and Tasmania's) industry less competitive in the global market.

While regulatory changes following the 2014 Forestry Bill²⁴ may see modest short-term benefits to the industry, long term prospects for the industry remains highly uncertain simply because of the global competitiveness.

Supporting new and existing enterprises in forestry may also create further employment opportunities and strengthen the sector to compete internationally. New entrant to the Tasmanian market, Forico, is owned by New Forest and illustrates a new model for the industry. New Forest is a fund manager with \$2.5b invested in 500,000 hectares of forests, rural and conservation investments. It manages all aspects of the supply chain locally – from nursery through to chip export and the local industry may be able to leverage their expertise and capital.

Mining

Murchison and, in fact, most of Tasmania's west coast, is one of the most heavily mineralised regions in Australia (Table 32). It supports a large and diverse mining sector that includes iron ore, copper, zinc and other precious metals extraction.

At the 2011 Census, the mining sector was a major employer. It also supported the development of downstream mineral processing industries, including:

- Iron ore and silica processing in Port Latta and Wynyard, with direct exports to South East Asia; and
- Machinery equipment design and manufacturing (Caterpillar in Burnie and Haulmax in Wynyard).

The industry also has significant flow-on benefits to the non-mining sector. In particular, mineral export activity supports the viability of the Port of Burnie and its shipping services.

²⁴ Also known as the 2014 Rebuilding the Forest Industry Bill.



This provides reliable access for other sectors (including manufacturing and agriculture) to export to the rest of Australia and international markets.

Table 32 Major Mineral Commodities and Mines in Murchison, 2013-14

Commodity	Location	Lifespan	Production Quantities	Gross Production value* (m)
Iron Ore	Savage River	Continue operation to 2030, with potential to further extend the mine's life through other deposits.	6.41 million tonnes of crushed ore	\$7.8
Zinc, lead, gold, silver and copper	Rosebery	n/a	893,181 tonnes (mainly zinc)	\$1,741
Tin, copper	Renison Bell, Mt Bischoff	n/a	7-8,000 tonnes of tin	\$173
Gold	Henty Gold Mine	Currently under care and maintenance	247,230 tonnes of ore, including 38,067 ounce of gold	\$53 (excl ore)
Copper, gold, silver	Mount Lyell mine	Copper Mines of Tasmania (CMT) in care and maintenance**	-	NA

* Estimated by Geografia from global commodity prices at June 2013

** has since entered care and maintenance mode

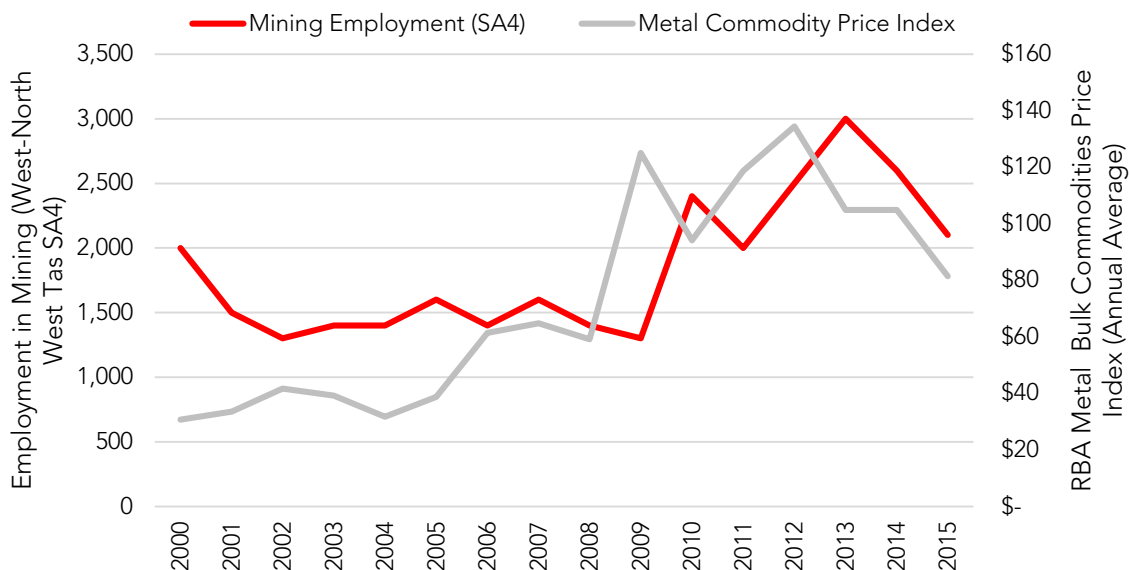
Source: The Mining and Mineral Processing Industry in Tasmania, 2014

Despite good resources, the industry's employment trends and operational viability are susceptible to global mineral prices and consequently, subject to boom-bust cycles. This has translated into volatile employment trends across the larger region (Figure 38).

Though the Murchison level data depicts growth in industry employment between 2000 and 2011, it is unlikely that these growth trends have continued through to 2016, following global price declines and regional employment declines in mining.



Figure 38 Regional Mining Employment in WNW Tasmania and Metal Price Index



Source: ABS Labour Force (2015) and Reserve Bank of Australia (RBA) Bulk Commodity Price Index, 2015

Manufacturing value adding to resource extraction

Manufacturing is primarily linked to Murchison’s commodity endowments through value-adding processing. Food manufacturing is the most prominent sector, employing 634 people in 2011. The region is home to a number of major dairy processors, including Fonterra at Wynyard, Murray Goulbourn at Edith Creek and Tasmanian Dairy Products (TDP) at Smithton. Cheese factories are operated by Lion at Burnie and King Island.

Wood product manufacturing is also a major employer (232 persons), along with mineral processing and mining-related equipment manufacturing (in total, mining-related manufacturing²⁵ employs 315 persons). In the next five years, hardwood plantations will be available for harvesting. Value adding to this timber stock represents potential opportunity. Some mills in Tasmania have already moved into value adding.

For instance, Forestry Tasmania has developed a new product, Hardlam, a veneer to laminate timber that would have otherwise gone to waste. Ta Ann, a Malaysian owned plywood manufacturer in Smithton, recently opened a mill - with support from a Federal Government grant - to produce premium plywood that will compete with imports (which account for 70% of the market in Australia).

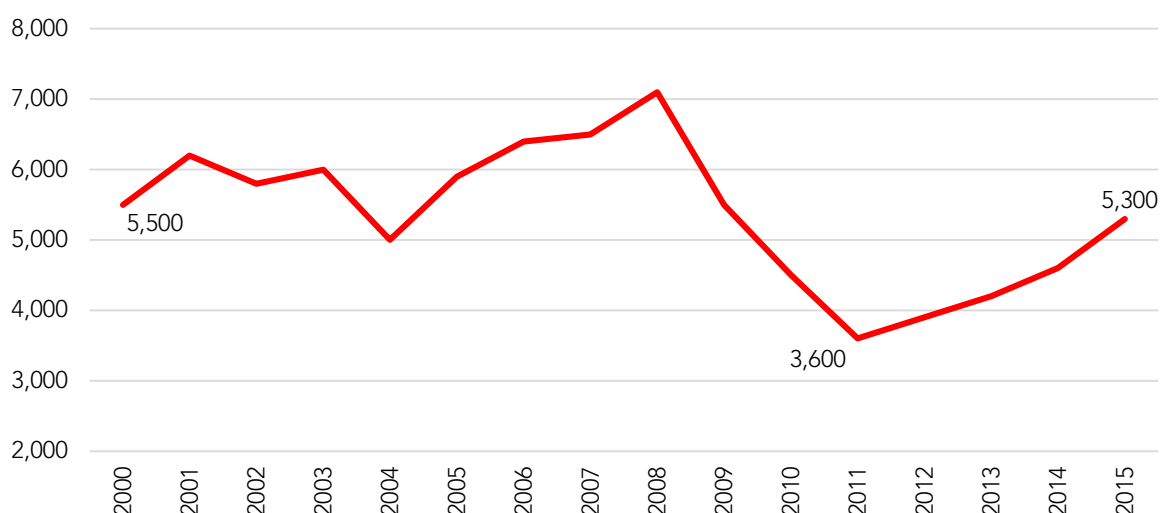
From 2001 to 2011, manufacturing employment declined very slightly from 1,340 to 1,315 (Figure 39). This was largely due to a decline in wood product and machinery equipment

²⁵ This includes: machinery and equipment, primary metal and metal products, fabricated metal products, transport equipment and basic chemical and chemical product.



manufacturing. Since then, though, it has experienced a resurgence due to investment in, and expansion of, the food processing sector, particularly dairy and horticultural packaging and processing (Table 33).

Figure 39 Regional Manufacturing Employment in WNW Tasmania, 2000-2015



Source: ABS Labour Force, 2015

Table 33 Major Agri-Manufacturing Investments in Murchison and Burnie

Manufacturing Company	Product	Recent or Planned Investments
Lion (formerly National Foods)	Dairy products in Burnie and King Island	Recent and planned investment of \$150 million in expansion in Burnie (2014) and King Island plant (2017)
Tasmania Dairy Products	Dairy products in Smithton	\$80 million investment in milk-powder plant in Circular Head and \$14 million upgrade to Edith Creek plant equipment for Asian market exports positioning
McCain	Potatoes	\$2-3 million investment in additional potato storage
Greenham	Meat products	Recent investments in upgrades to production capacities of abattoir plants
Fonterra	Dairy products in Wynyard	\$18.6 million in upgrade of its cheese plant in 2010-2013

Source: Dairy Sector Summary 2014, Department of State Growth Tasmania and consultations with Council.

Finally, aquaculture in Macquarie Harbour is projected to double by 2030. This is expected to create 45 new jobs in thin fishing but, more interestingly, 120 jobs in processing.



Rebounding tourism

Tourism is obviously important to the region. In the 2011 Census, 354 persons were employed in accommodation (a simple proxy for part of the tourism sector). In fact, Murchison has a State-level specialisation in this industry.

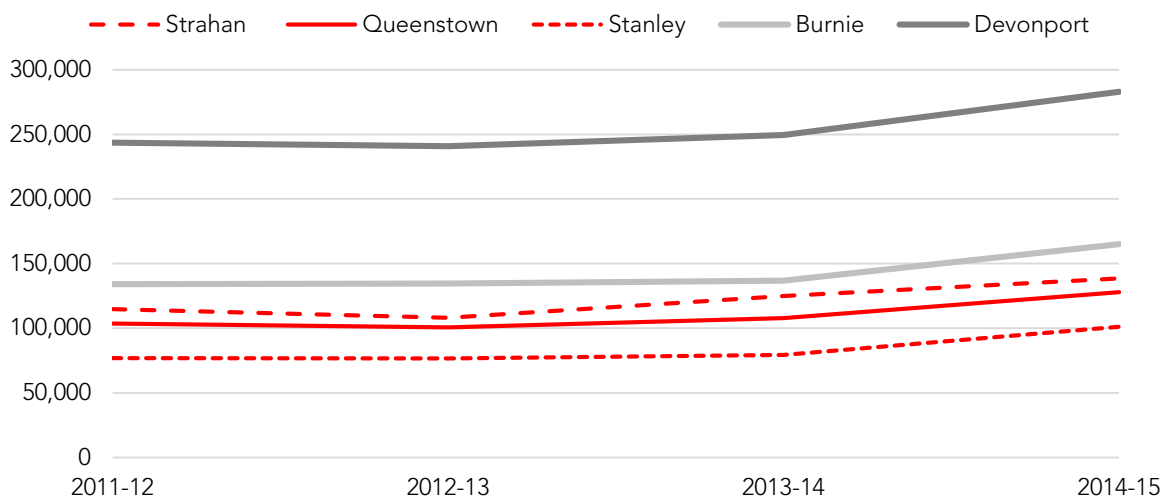
As a destination, Murchison is secondary to Burnie (165,092 visitors) and Devonport (282,871 visitors). The region's strengths lie in landscape amenity, food products and history with:

- Agri-tourism and food on King Island and in Circular Head;
- Coastal and heritage activity in Stanley, Boat Harbour, Strahan and Queenstown;
- Nature-based, adventure tourism in Tarkine and Tullah, complimented by nearby Cradle Mountain-Lake St Clair; and
- Golf tourism. Since the opening of Cape Wickham on King Island in October 2015, fly-in packages are available to the island, which can also take in Barnbogle on the Tasmanian mainland. These can include meals and accommodation.

Tourism investments that are planned or under consideration by public and private investors include a hotel in Boat Harbour, accommodation at Cape Wickham, Cradle Mountain facility and accommodation upgrade, and several pathway and bike trail experiences. These, and other tourism projects, are discussed in more detail in the Framework Plan.

According to the TasSurvey, visitation increased from 2011-12 (Figure 40).

Figure 40 Overnight and Daytrip Visitations, 2011-2015



Source: TasSurvey Overnight and Daytrip tourism data, 2016



In 2014-15, Strahan attracted the highest number of visitors to Murchison with over 138,000 visitors. This is followed by Queenstown (128,000) and Stanley (101,250) (Table 34).

Table 34 Tourism Visitation by Sub-Region, 2014-15

	Region	Overnight Visitors	Daytrip Visitors	Total Visitors*
Murchison	Zeehan	4,776	36,071	88,392
	Strahan	111,476	19,301	138,462
	Queenstown	28,794	53,567	127,914
	Tullah	7,009	19,070	69,999
	Rosebery	6,508	24,468	78,785
	Corinna	4,429	7,046	26,477
	Other West Coast	13,908	11,166	37,614
	Wynyard	22,032	41,172	95,676
	Stanley	40,641	46,925	101,249
	Smithton	18,704	25,885	60,576
	Arthur River	3,805	17,305	31,098
	Other North West	41,802	15,640	77,643
	Burnie	47,604	70,381	165,092
	Devonport	73,051	102,347	282,871

*Total visitors including tourists passing through. Tourism visitation estimates for King Island are unavailable.
Source: TasSurvey Overnight and Daytrip tourism data, 2016

Golf tourism is a niche area of opportunity that the region could continue to explore. Domestic players' visitation to Northern Tasmania rose steadily from 2005 to 2014, ranked the fourth most visited in Australia in 2014, attracting more than 80% of visitors from other States. Nationally, in 2013, the number of trips increased to 78,000, as has the spend per night (\$182), but the average length of stay has slightly decreased to 3.7 nights.

Golf visitors to Australia from the UK and New Zealand dominate the inbound market, while visitation from Chinese players grew by 73%. The average spend from the top five international visitor markets ranges from \$3,268 (Other Europeans) to \$13,468 (China).

The opening of Cape Wickham golf course represents an opportunity. It will need to be supported by investments in infrastructure, such as upgrade to the airport, and accommodation and associated facilities for players and staff.

Cradle Coast Authority has a number of initiatives underway to support tourism, including:

- A reinvigorated Cradle Mountain. A new Master Plan proposes a better visitor experience within the World Heritage site. The gateway to the experience is a "wilderness" village connected by an 8km gondola to a new sub-terrestrial visitor



facility at Dove Lake. The project includes a mix of public (\$60m) and private (\$100m) investment, including additional accommodation. With the number of tourists likely to increase to 100,000 annually, the estimated direct economic benefit could be in the order \$23 - \$29 million annually;

- A Tourism Employment Plan toolkit to help tourism operators and industry stakeholders to guide workforce development; and
- Destination Management Plans are being prepared for each council.

Baby Boomers and the silver economy

The silver economy relates to economic activity serving those over 50 and the Baby Boomer generation (now all over 50) are a unique economic opportunity. They are:

- The most educated and wealthiest ever generation to reach retirement age (ABS, 2011a);
- The first ever generation of older consumers accustomed to living in domestic comfort (unlike the frugal pre or post-war generations before them); and
- Keen to travel to avoid cold winter months, or to stimulate intellectual and cultural interest (72% of Baby boomers claim that they would rather spend their money enjoying retirement, than leave it to their children (APIA, 2011)).

Care services

- The Productivity Commission estimates that the number of people in high and low care residential aged care is likely to increase by 78% by 2024-25 and over 200% by 2044-45. In regions with a higher concentration of older people and a positive net migration of older age groups, the increases may be much larger.
- If our ageing population is less a problem, and more an untapped opportunity, then it is critical to improve the health and quality of life for older people by focusing on initiatives that promote good health and prevent disease. As well as improving people's quality of life, it also helps to control the rise in medical and long term care costs.
- Research shows that, although older Tasmanians are going to become wealthier, they are still conservative when it comes to spending. They prioritise health care and essential services over spending on recreation or other services.
- When people move in later life, it is not usually by choice, but because there is no other alternative that provides the necessary levels of care and services.
- Therefore, healthcare is a key economic sector which will see improved job opportunities in the medium to long term.



Consumer services

Consumer sectors most likely to benefit from the silver economy are tourism, education, recreation, culture and arts, and retail.

Yet despite the extensive body of research and analysis on these and other silver economy opportunities, older people are still little understood as a set of consumer subgroups. Businesses have failed to connect with older people or recognise their diversity and most local governments to date still focus on 'service provision for the elderly' and efforts to attract and retain younger residents.

New markets can emerge if they are specifically targeted to older consumers. Tourism is one sector which understands the older consumer better than other sectors. Tourism operators know that tourism 'intensity' is highest among older people and that they respond best to niche products and marketing. Most notably, because they are serious consumers, baby boomers require two things above all else, choice and control.

Extending education and employment

Baby boomers understand the risks of sudden early retirement to their mental health, and may choose to work beyond traditional retirement age, perhaps part-time and self-employed if the job's purpose is no longer to maximise income, but rather a life-extending strategy.

Our tendency to think of older people as technologically inept and vulnerable is increasingly outdated especially as the Baby Boomers, who are far more tech savvy, enter retirement age.

Both of these factors mean that older people now make up a valuable part of regional human capital. Any reforms that improve labour participation rates and encourage innovation and technology to improve productivity can help to minimise the impact of ageing on economic growth.



7 Access and Infrastructure

Murchison's road network is mostly adequate for passenger vehicle trips. However, expected increases in road freight arising from agriculture and aquaculture movements may raise the priority of network improvements, particularly as many bridges have reached the end of their economic life. The region will need to ensure that transport initiatives receive funding focus from the State and Federal governments.

The evaluation of the transport networks and services and planned projects is based on publicly available data and background documents provided by councils in May 2016²⁶.

7.1 Summary of key policy directions

DSG has released its 10-year plan for State road infrastructure investment across 6 streams: sustainable maintenance; network safety upgrades; freight efficiency; peak commuter demand; visitor infrastructure; and active transport. Four of these are locally relevant:

1. Sustainable maintenance – To sustainably deliver expected customer levels of service, road and bridge infrastructure must be maintained and replaced at an optimum rate otherwise maintenance costs rise and average asset condition, safety and functionality is reduced.
2. Network Safety Upgrades – In accordance with the Tasmanian Road Safety Strategy: *undertake a road width and shoulder widening program by 2025 that will improve the safety of key rural roads. Improve the safety of identified junctions as warranted by crash statistics.*
3. Freight efficiency – Murchison Highway alignment and width improvements
4. Active Transport – general infrastructure improvements noting that the plan does not outline specific projects within the study area.

Councils have a role to play in the provision of transport infrastructure and services, such as:

- Promoting integrated transport and land use patterns through development and in application of planning scheme(s) (*Transport Integration Act, 2010*);
- Construction and maintenance of non-State roads, footpaths and cycle networks;
- Providing community transport that provides access to council services;
- Working with other transport authorities to improve the overall network; and

²⁶ This evaluation was undertaken by GTA Consultants.



- Advocating on behalf of residents/businesses for State funding and prioritisation of transport infrastructure projects for local benefits.

There is National, State and local policy support for improving access to non-car transport options. Greater transport choice can enhance access to employment or recreation; and improve equity. It can also contribute to social inclusiveness, particularly for the transport disadvantaged, who are present in numbers in Murchison.

7.2 Overall private modal use

Census data shows that:

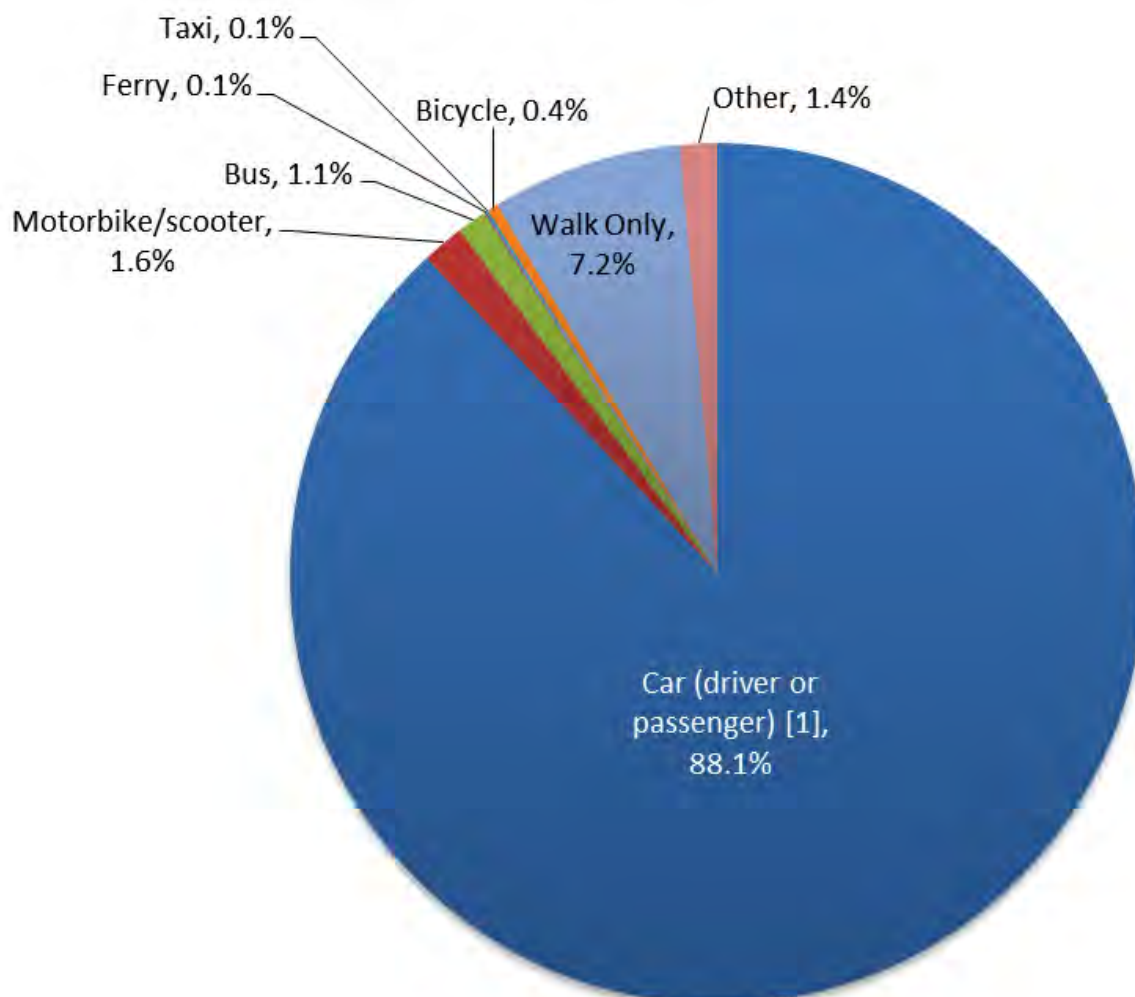
- The majority of work trips rely on access to a private car, with 88% of travel to work either being as car driver or passenger;
- Nonetheless, a relatively high proportion walked to work (7.2%). By extension, this indicates that walking may be a feasible mode of travel for trips to access local goods and services within urban settlements;
- Public bus trips account for a small proportion of overall employment related travel, with 1.1% residents' work trips being by bus; and
- Bicycle trips for work purposes accounted for 0.4% of residents (Figure 41).

The Cradle Coast Regional Land Use Planning Framework suggests that the personal mobility of the population is high, however 8% of households have no vehicle. Given the lack of availability and quality of car-alternate transport, households with no access to a car face a significant challenge in meeting their daily travel needs.

In summary Murchison is heavily car dependent for the vast majority of trips and given the forecast population estimates, topography and population density, it is unlikely that the dependence on private vehicles will change.



Figure 41 Murchison Residents' Method of Travel to Work



[1] Includes truck

7.3 Walking and cycling

Investment in pedestrian networks is generally focused on improving amenity in retail and commercial settings. In comparison with the road network, the level of connectivity afforded between trip generators and attractors is limited. For instance, connections between residential areas and town centres are not typically continuous. In the future, with a potential increase in town tourism, investment in pedestrian streetscapes is warranted.

There are several walking trails in the region. The majority are operated and managed by the Tasmania Parks and Wildlife service. Popular multi-day walk opportunities for serious hikers include the Overland Track/Cradle Mountain and the Walls of Jerusalem National Park. There are also day walking opportunities (Figure 42).



Table 35 Walking Trails near the Murchison Region

Map Reference (Figure 42)	Name of Walking Trail
33.	Calcified Forest (King Is.)
34.	The Nut
35.	Fern Glade
36.	Leven Canyon
18.	Lake St Clair
19.	Mt Rufus
20.	Shadow Lake Circuit
21.	Echo Point
22.	Franklin River Nature Trail
23.	Donaghys Hill
24.	Nelson Falls
25.	Kelly Basin
26.	Hogarth Falls
27.	Montezuma Falls
28.	Huon Pine Walk
29.	Dove Lake Circuit
30.	Enchanted Walk
31.	Crater Lake Circuit
32.	Cradle Mountain Summit

The cycling environment in most urban centres is a mixed traffic environment, with little or no dedicated facilities. Mixed traffic environments are suitable where traffic speeds and volumes are low, such as in Murchison's town centres. However, higher speed arterial and collector roads between residential settlements and adjoining town centres may be unsuitable for cycling, precluding, a significant cross section of the community from considering cycling for transport and/or recreation. Cycling upgrades should be pursued by each council to further enhance the attractiveness of cycling as a mode of travel.

Active networks such as walking and cycling trails can promote visitation and capitalise on the regions natural tourism assets. Disused rail may present further opportunities for generating tourism interest over the longer term. TasRail has agreed to lease a portion of the rail corridor between Wynyard and Burnie to the Council for the north coast pathway.



Figure 42 Map of Walking Trails near the Murchison Region



Source: Parks and Wildlife Service Tasmania



Planned cycling and walking projects

State Government

DSG's Infrastructure Investment Plan identifies \$5million in spending on general cycling infrastructure. There may be opportunities for directing a component of this funding to Murchison for projects such as the Northwest Coastal Pathway Plan. Other investment identified in the Plan may also benefit pedestrians and/or cyclists, however they would be indirect. This includes part of State road maintenance investment, as well as \$0.5million for the Roads for Our Future strategic corridor and network planning projects. Councils should be working collaboratively with DSG to ensure the region is included within the strategic corridor and network planning projects.

Regional projects

There is currently very little detailed longer term planning for local walking or cycling networks. The exceptions are the **Northwest Coastal Pathway Plan** and the **West Coast Mountain Bike Project**.

Northwest Coastal Pathway Plan

This project provides guidance for delivery of a 110km trail joining communities of Northwest Tasmania. The project rationale is to improve access to walking and cycling routes along the linear settlements of the coast; achieving various benefits including:

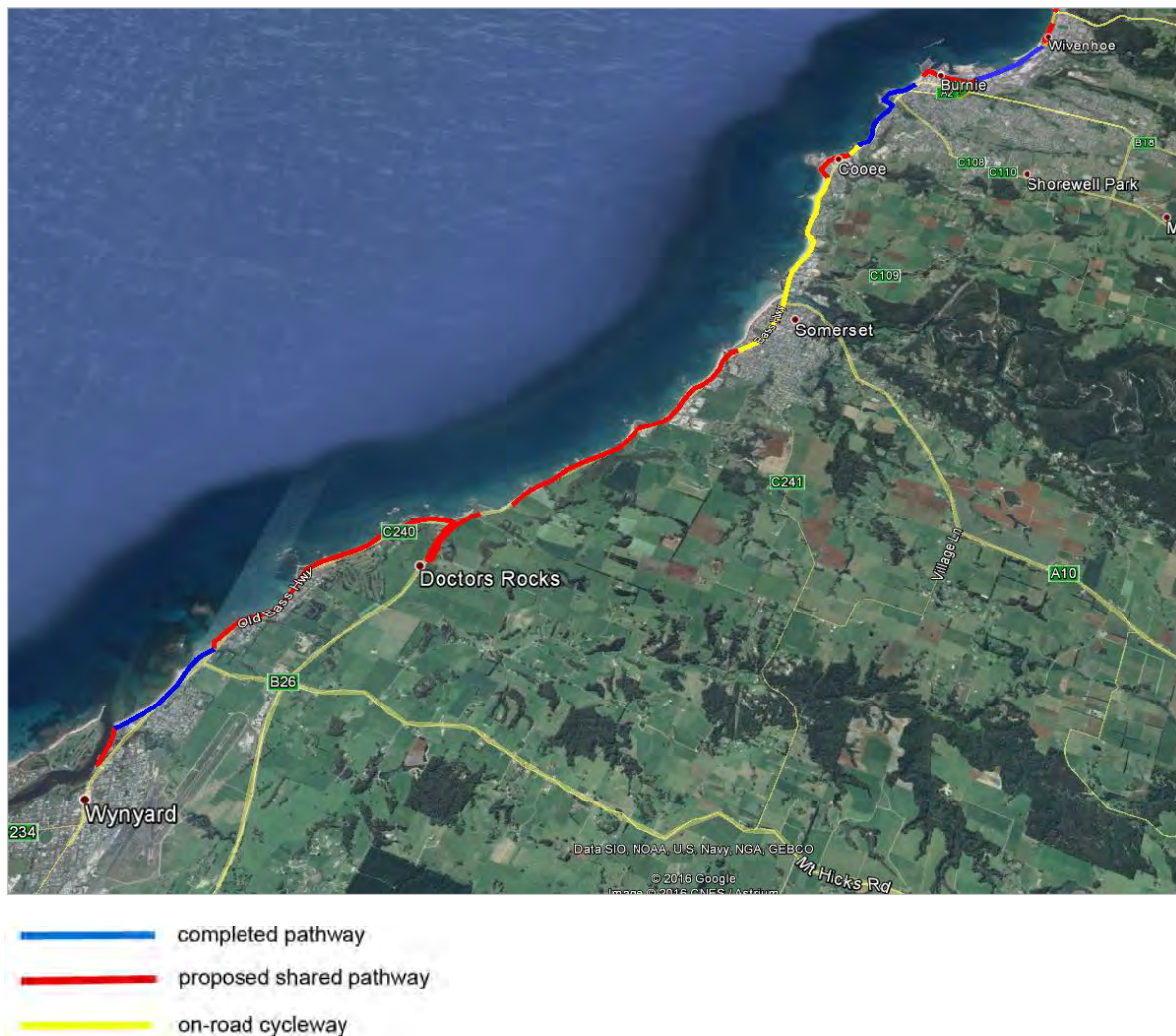
1. A more active and healthy community;
2. Environmental outcomes associated with increased use of more sustainable transport modes; and
- Tourism and regional economic benefits.

Implementation is the responsibility of participant councils. The State Government has provided in-principle support for the path generally along the disused railway between Cooe and Wynyard. Capital works estimates by Burnie City Council are for a total cost of \$2.46million, with the project potentially being completed in 3 stages to 2020.

Implementation is the responsibility of participant councils, and as identified in Figure 43, some sections remain unfunded and incomplete.



Figure 43 Northwest Coastal Pathway Plan - Implementation



Source: Bicycle Network, January 2014

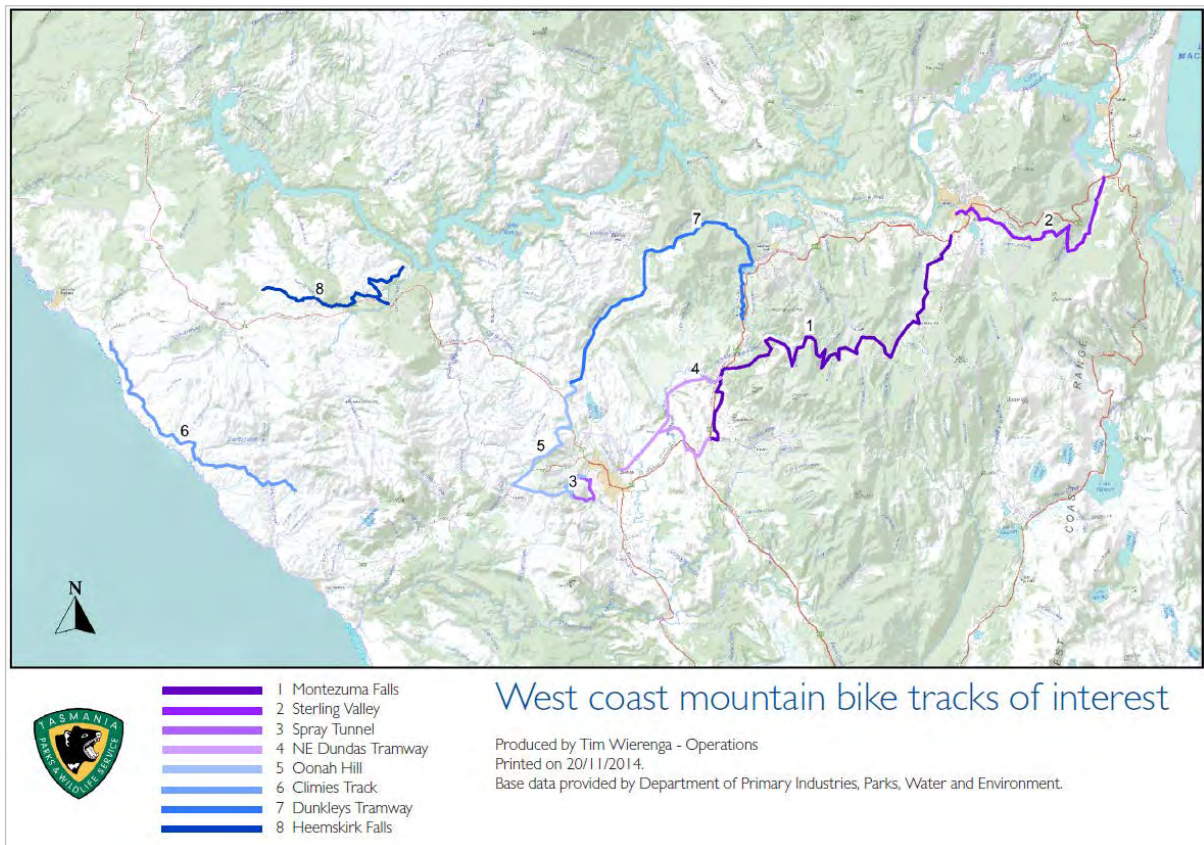
West Coast Mountain Bike Project

The **West Coast Mountain Bike Project** proposes a network of upgraded and new trails over two stages of delivery, using disused mining and forestry rail corridors. The State Government allocated \$1.2million in 2014 towards the project to promote mountain biking tourism and diversify the economy.

The focal point for the suite of projects is Zeehan, and is being project managed by Tasmanian Parks and Wildlife Service (PWS). Current funding only extends to Stage 1, inclusive of components 1, 2, 3, 4 and 6. Feasibility for subsequent stages is yet to be tested (Figure 44).



Figure 44 West Coast Mountain Bike Project (includes Stage 1 and Stage 2)



Source: West Coast Mountain Bike Project – Bike Trails, Department of State Growth

Municipal projects

In addition to the Northwest Coastal Pathway Plan, Waratah Wynyard approved the upgrade to the pedestrian pathway and environs along the Wynyard foreshore,

West Coast Council are developing a comprehensive Asset Management framework to deal with a backlog of infrastructure deficits, including a footpath remediation and extension program.

Network planning

The **Principal Urban Cycling Network (PUCN)** is a network of high priority cycling corridors identified by DSG through stakeholder consultation in 2011. It provides a framework to support cycling for transport and access to areas of higher urban density. It is also a 'bicycle infrastructure planning tool' to guide investment in the planning and development of the future bicycle network:

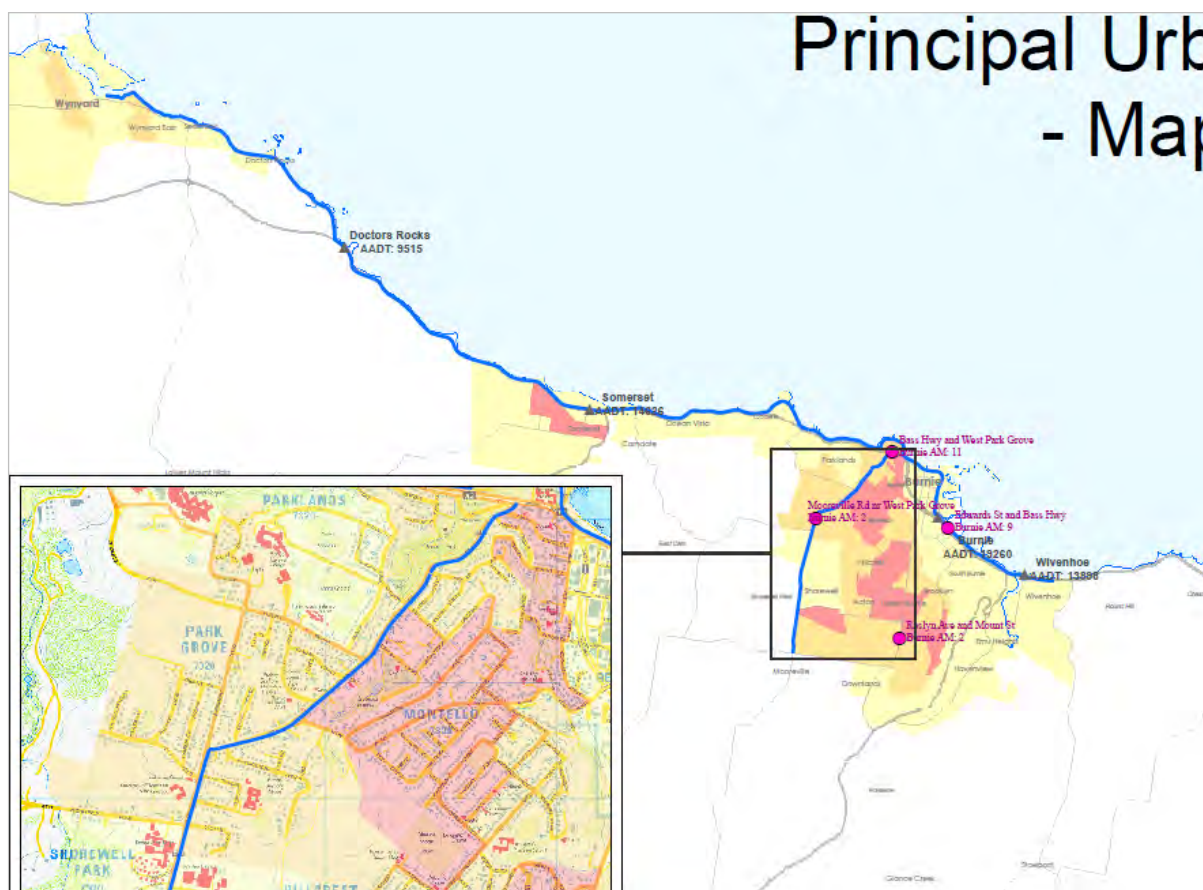
1. Where a State Government new major road projects on a PUCN route, provision will be made for cycling;



2. Where the State Government undertakes road upgrades or improvements on PUCN routes, provision will be made for cycling if the upgrade involves road widening, lane duplication and lane widening only; and
3. The Department of Infrastructure, Energy and Resources must consider opportunities for cycling initiatives when leading non-road projects. Where a project is on, or links to, PUCN routes, features to enable cycling should be included as part of the design.

Sections of the PUCN relevant to Murchison are reproduced in Figure 45. The network is relatively coarse (i.e. generally does not respond to local catchments) and no network exists with the exception of the connection to the southeast from Wynyard toward Burnie.

Figure 45 Principal Urban Cycling Network – Burnie and Devonport



Source: Principal Urban Cycling Network, State Growth 2012

In regional areas, the **Regional Arterial Cycling Network** provides those links that connect to and radiate from the PUCN routes. The North West Coastal Pathway Plan constitutes the Regional Arterial Cycling Network in Murchison. The Cradle Coast Authority is responsible

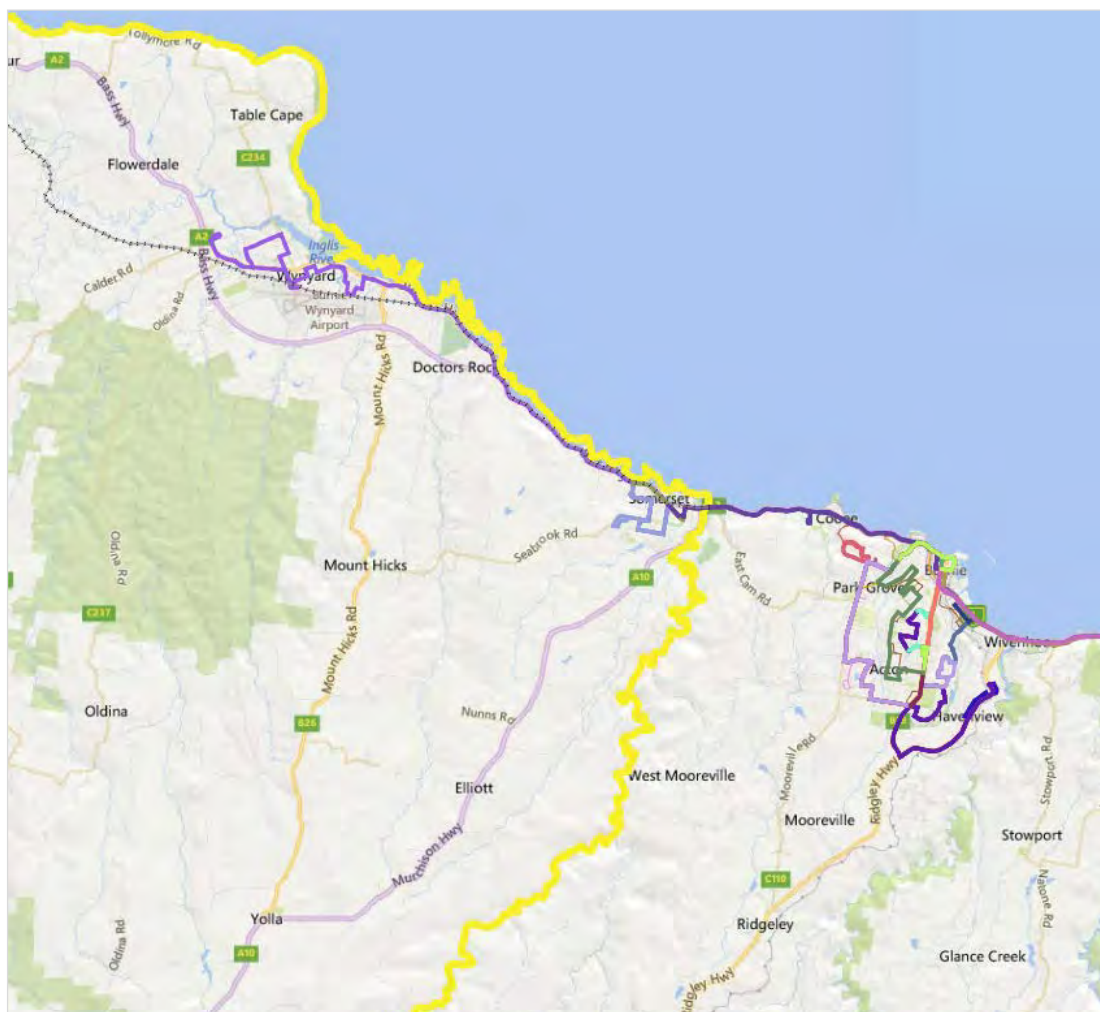


for defining a more fine-grained cycling network for urban catchments. Provision for legible and safe cycling networks in urban and peri urban areas is important to support and encourage cycling.

7.4 Public transport networks

Urban public transport options are limited, and generally only include the Burnie bus services (Figure 46). Services have a low frequency and provide a limited service span, particularly on weekends and evenings. The community ranked adequate and accessible public transport as an outcome statement for the Murchison Sustainable Community Plan. A refreshed plan for fare structure, service frequency, coverage and other variables that encourages greater ridership could be developed by providers and the community through flexibility, collaboration and trialling different options.

Figure 46 Urban Public Transport Coverage via Burnie



Source: Bing, Metro Tasmania (Trial Route operated by TassieLink not shown)



Services also operate east to Ulverstone, and a connecting bus is also available connecting through to Devonport. A number of school bus routes also exist, although low population densities generally limit the viability of public transport services in this region of Tasmania.

The West Coast Community Plan seeks to improve public transport accessibility around the region, and to meet the requirements of the Disability Discrimination Act (DDA). In many regional areas, accessibility to public transport is poor, with limited connecting footpaths and poor access for people with mobility impairments. There are opportunities to enhance accessibility with bus stop upgrades in key areas to meet DDA compliance.

Tassielink is also currently operating a Queenstown – Burnie service (Route 747) A one-year trial commenced on 12 April 2016, linking Queenstown, Rosebery and Tullah to Burnie. An analysis of the trial will take place in January-March 2017 to evaluate future feasibility. The route operates with one service in each direction and is limited to Tuesdays and Fridays; as such this would only be a realistic travel option for those with a high level of personal flexibility in their travel needs or those visiting other centres on an occasional basis. Trials such as Tassielink's are to be encouraged.

There are also some community transport service options, including that provided by Community Transport Services Australia (CSTS), which is joint funded by the Commonwealth and Tasmanian Government.

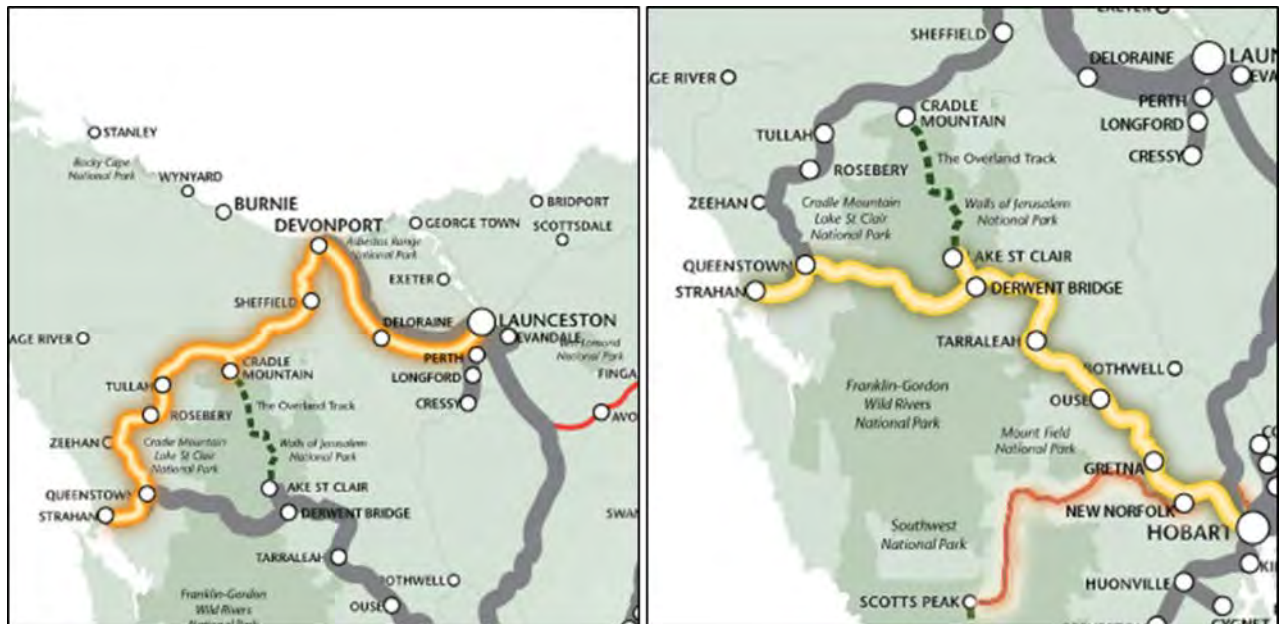
Coach services are provided by a small number of private bus operators aimed primarily at servicing tourism regions. Bus operator **Tassielink Transit** operates two relevant coach services within the area, including:

1. The 'Launceston - West Coast (including Cradle Mountain)' service, which connects Strahan and Launceston via Queenstown, Zeehan, Tullah, Sheffield and Devonport (Figure 47). Services are seasonal and vary from approximately two to four services per week in each direction.
2. The 'Hobart - West Coast (incl Lake St Clair)' service which connects Strahan and Hobart via Queenstown, Lake St Clair (Overland Track), Derwent Bridge, Tarraleah, Ouse, Fretha and New Norfolk.

Redline also offer a regional coach service to and from the region, including stops at Smithton, Stanley, Wynyard and Burnie. Services connect to both Hobart and Launceston via Burnie and Devonport. On weekdays, Services are sparse, with two outbound services in the morning and one inbound service arriving in the early afternoon.



Figure 47 Tassielink Coach Service Coverage



Source Taslink website accessed February 2016:

In summary, the existing coach network provides a limited degree of flexibility for accessing the region. Similar to urban passenger transport, there is insufficient tourism density to service much of the region. Further, at the end destination, visitors are likely to require a car to meet every day needs. Community transport options for those who cannot drive may become increasingly important as the population ages.

Planned public transport projects

At the time of this analysis, there was no information available about proposals to expand services or coverage of the public transport network in the region. Services are already subsidised, and the low density of customers means any expansions using traditional models are unlikely to be viable. There may be opportunities to explore alternative low-cost models, which are more sympathetic to the regional context.

The Tasmanian Government and Cradle Coast Authority have planned a \$200k investment in developing a Commuter Network Plan to support industry and communities in regional areas to enable viable and sustainable commuter service for workers. The lead agency is DEDTA.



7.5 Road network

Road hierarchy

Figure 48 illustrates the State road hierarchy. Aside from this network, all roads are managed and maintained by councils.

Figure 48 Tasmanian State Road Hierarchy



Source: State Growth 2013.



Higher order roads connect Wynyard to Hobart (via Burnie, Devonport and Launceston), with a trip time of approximately four hours. The alternate route via Zeehan and Queenstown uses lower order roads with a trip time of almost six hours (via Burnie, Zeehan and Queenstown). The connections to smaller local townships are via lower order roads, which, given the size of population centres, is considered adequate.

Strategies for settlement patterns adopt a 'stable' (i.e. low growth on existing vacant zoned land) or 'contained' approach (i.e. intensification or limited expansion from existing, retaining compact urban form). Existing land use planning proposes no new discrete settlements. On this basis, private car transport capacity issues are unlikely over the study timeframe.

'Safe and efficient road networks' ranked highly amongst the outcome statements from the community consultation process. Low population densities and the infrastructure funding can be a challenge for maintaining a road network to an adequate standard for Murchison councils and they should continue to advocate for funding to maintain and upgrade the network.

Road access for tourism and recreation

Tourism continues to be a source of growth in Tasmania and the road network is important for ensuring visitors face acceptable travel times and suitable amenity for general vehicles (e.g. gravel roads may be a deterrent for some visitors, particularly if using hire cars). There are opportunities for the transport network to be upgraded to ensure appropriate levels of accessibility to key tourism destinations.

The Arthur Pieman Conservation Area is one area which is relatively inaccessible. The area offers 130km of gravel and sealed roads for exploring this remote area of the west coast. Further areas are accessible by four-wheel drive only, using designated recreational vehicle tracks. The site is also valued for its Aboriginal heritage and as an archaeological region. In 2014, a federal court case mandated that several previously available four-wheel drive tracks were to remain closed.

This is a prime example where road access planning for tourism and recreation must be balanced against the heritage and natural conservation values of the region. Indeed, a significant appeal of the remote area is for activities such as four-wheel driving and road upgrades would, in fact, be counterproductive.

Ride sharing

Ride sharing services, such as Uber, are operating across various Australian states with differing degrees of legal authority. The Taxi and Hire Vehicle Industries and Amendment Bill 2016 was moved to amend the *Hire Vehicle Industries Act 2008*, including to legitimise Uber in Tasmania. This may stimulate ride-sharing services in Murchison, although it is more suited to larger urban centres.

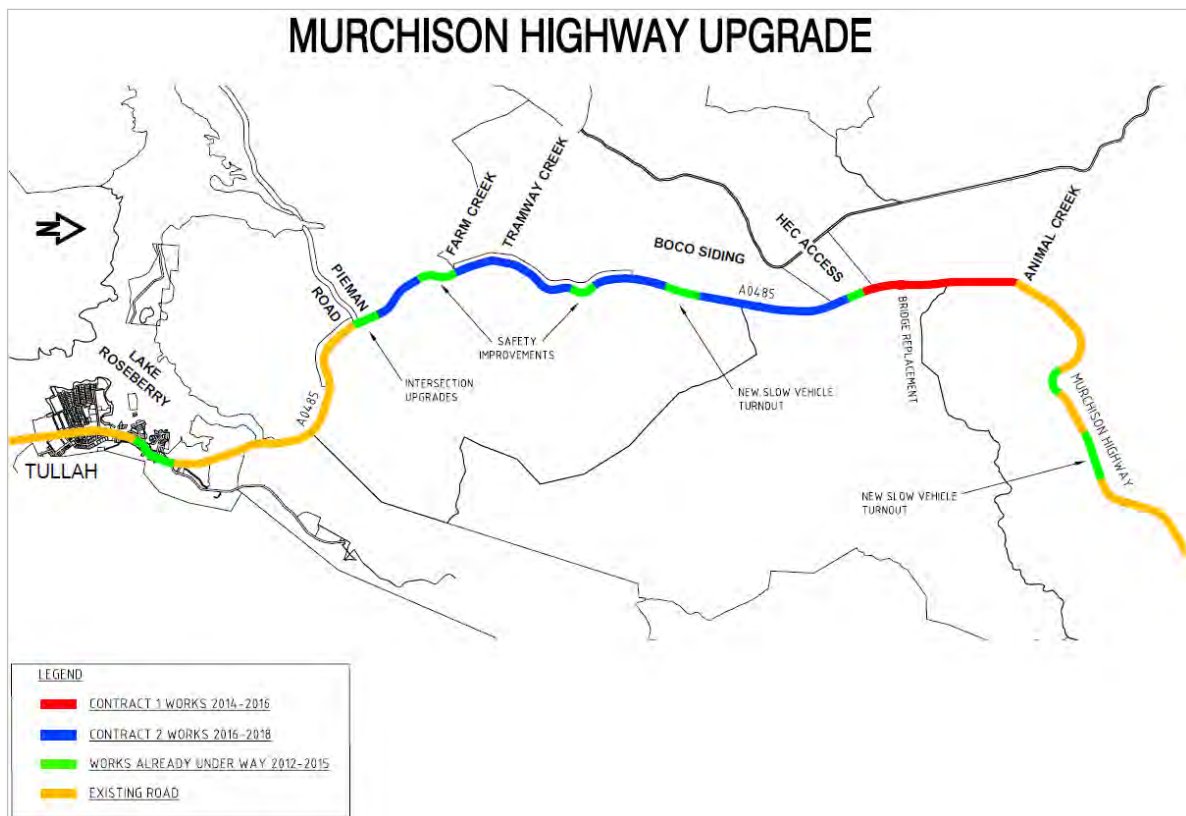


Planned projects

At this time, the following road projects are identified for the region:

1. The Murchison Highway upgrade east of Tullah as a High Productivity Vehicle Route, at varying stages of completion (Figure 49). The works include, targeted widening of narrower sections of road, improved sight distances, horizontal and vertical curve improvements, shoulder sealing and pavement strengthening, safety barriers upgrades and one bridge replacement.
2. Wynyard Bass Highway Junction Upgrades (unfunded).
3. Upgrade of Bass Highway west of Wynyard (unfunded).
4. Cam River/Cootee Bass Highway upgrades (election commitment).

Figure 49 Murchison Highway Upgrade Project Map



Select municipal projects

Waratah Wynyard has identified the following projects:

- Wynwyrd Waterfront Masterplan – includes streetscape improvements of some \$300,000, a boardwalk and other pathway and urban design works;



- Safety improvements to the Bass Highway at Reservoir Drive, Deep Creek Road, Oldina Road, Calder Road and Inglis Street (proposed joint Council/Department of State Growth project);
- Potential upgrades to Table Cape Road required if a proposed tourism development proceeds; and
- Potential duplication of the Cam River Bridge to reduce traffic congestion and improve security of access.

West Coast Council have identified a shortfall of in the order of \$350,000 per annum in depreciation allocations across the 200km of roads within their municipality. The Council has set it as a high priority to seek a one-off capital injection from the State or Federal governments (to be matched by Council).

Burnie City Council has prepared a draft road network strategy, which is subject to community consultation and final Council approval. The document identifies:

- The State Road Network – integrated planning with Department of State Growth;
- Freight – support for Burnie Port and Rail Hub;
- Active Travel – develop a cycle strategy, secure funding for the coastal pathway;
- Public Transport – enhance facilities and services; and
- Road safety – audit key local roads.

Circular Head has identified a number of projects for sealing of roads, such as Marcus River Road (23km between Woolnorth to Marrawah) and the Western Explorer, which will benefit agriculture and tourist traffic.

7.6 Freight and supply chains

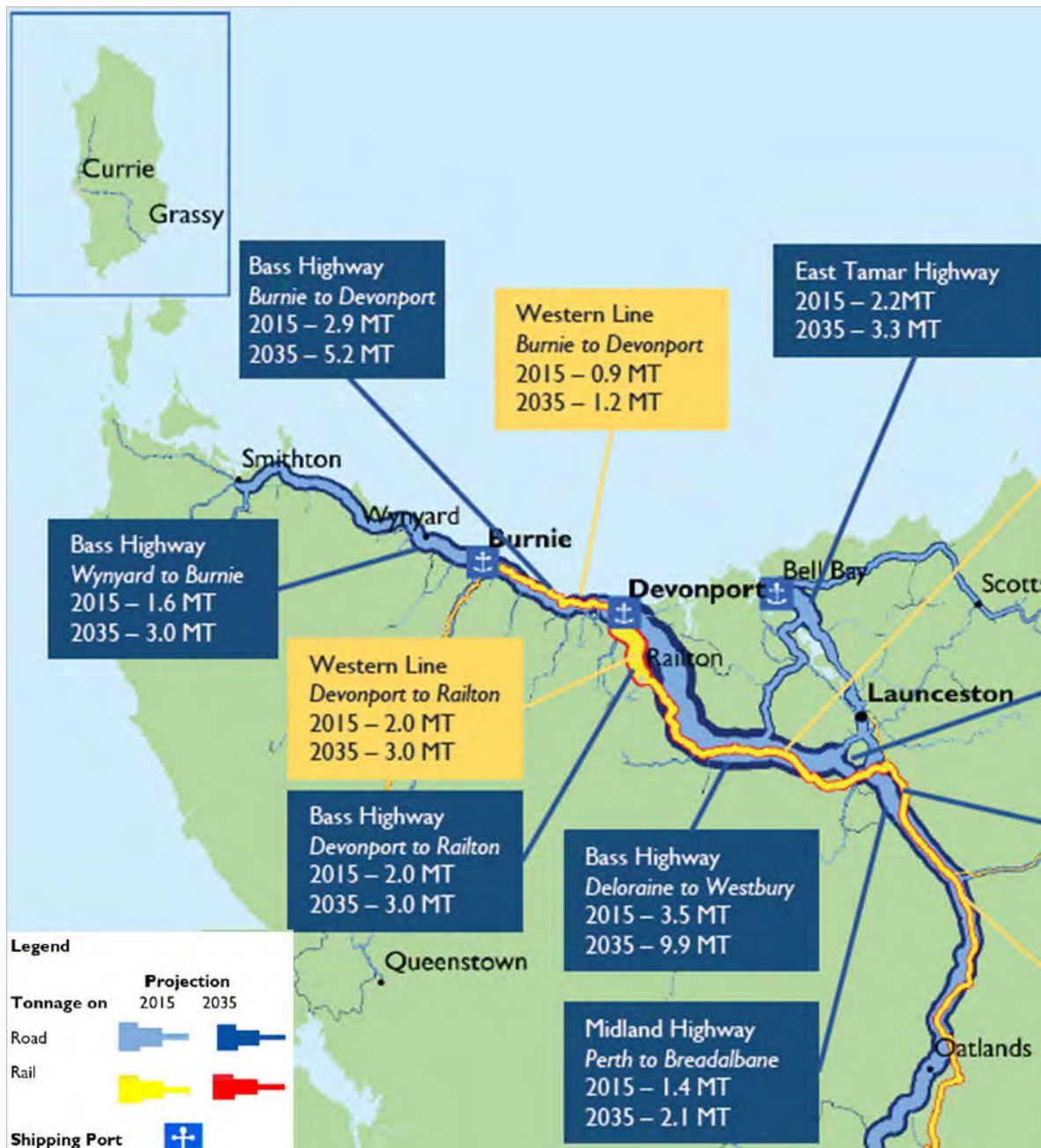
Road freight

The Bass Highway (A2), west of Burnie, is the preferred freight route, carrying approximately 1.6MT per annum. This route carries a mix of heavy freight and passenger vehicles, with both local and inter-regional trip types. Projections indicate the land freight task will grow to 3.0MT by 2035, mostly due to agricultural sector output growth. The percentage of freight vehicles on local roads should be monitored to ensure amenity is not unduly affected.

The growing road freight task is likely to increase the need for sections of road widening to permit safe overtaking areas or the duplication of sections of key freight routes such as the Bass Highway (Figure 50). Councils should continue to advocate for the identified upgrade of the Bass Highway west of Burnie to support the projected increase in freight loading.



Figure 50 Existing and Projected Freight Task



Source: Draft Tasmanian Integrated Freight Strategy 2015, Department of State Growth

The Tasmanian Freight Equalisation Scheme (TFES) provides crucial support to key industries and is worth approximately \$200 million per annum (including passenger subsidies). The TFES provides Tasmanian Exporters affordable access to mainland markets.

The Local Government Association Tasmania (LGAT) have lobbied for an investment in a Hobart-Burnie freight corridor. This plan aims to address changes in future freight routes; cater for additional demand; and improve the efficiency of the route. The topology of the



region presents a challenge for delivering road infrastructure, and a number of High Productivity Vehicle (HPV) routes (Figure 51) are either marginal or non-compliant. This is a concern for both freight efficiency and road safety. The priorities for addressing non-compliant routes are not known at this stage.

Figure 51 Higher Productivity Vehicle Routes

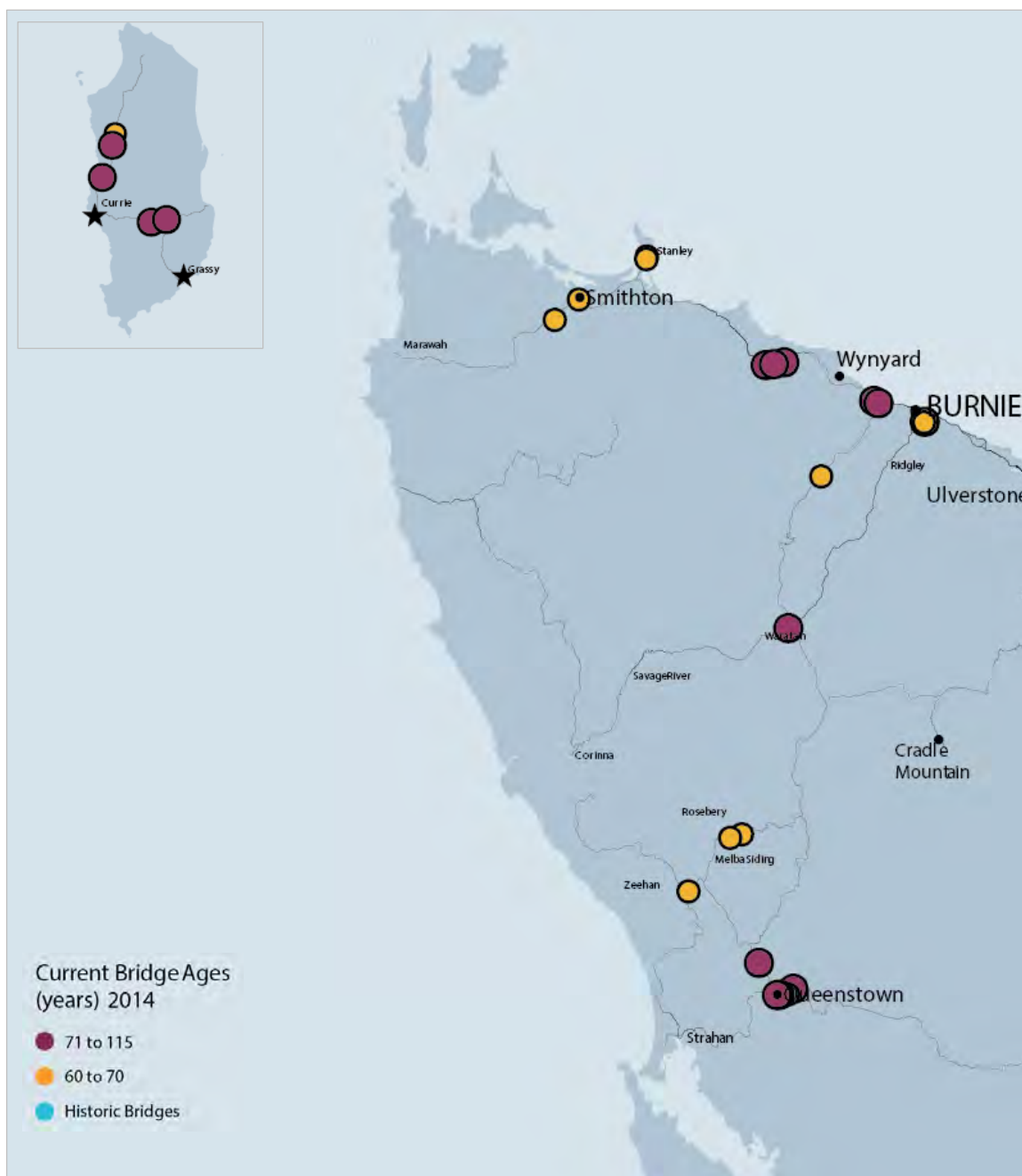


Source: Draft Tasmanian Integrated Freight Strategy 2015, Department of State Growth



A number of road bridges in the study area are over 70 years old (Figure 52) . Bridges of this age have been found to have an average economic life of about 70 years (State of Our Roads, 2014). DSG acknowledges this in their Infrastructure Investment Plan; noting that ‘the replacement of bridges will increasingly need to be prioritised based on strategic considerations.’

Figure 52 Bridge Age



Source: State of Our Roads (2014)



A key theme from the Industrial Land Study North West Tasmania (SGS, 2015) was that new agribusiness could be well accommodated on industrial land, subject to having proper availability of road access and proximity to an airport (amongst other things). In addition, local service industries are proposed to be accommodated on locally significant industrial sites subject to good access to arterial roads. Transport and warehousing industries naturally gravitate toward locations near major transport corridors. As such, the level of road access plays a role in site selection and land capability for some types of industry. Future transport projects should acknowledge these effects, and plan for them accordingly.

The Strahan aquaculture operators have formed the Macquarie Harbour Aquaculture Group (MHAG), with a view to expanding the industry. Noting that aquaculture relies on road based transport projects, there may be a need to improve road access to Strahan. At present a HPV route does not provide a direct link to Hobart. Insufficient public investment in access roads to support new agricultural or mining operations may deter private investment.

Planned road freight projects

The Western Tasmania Industry Infrastructure Study (SKM, 2012) identifies a list of priority transport projects to support economic development. A subsequent study, the Western Tasmania Export Corridor Plan (in progress) will clearly identify and prioritise supply chain improvements to benefit mining and other economic activities.

Smaller agriculture or mining ventures, viewed in isolation, may not provide a sufficient catalyst for upgrading road or rail freight service routes. However, if the projects are grouped and transparency is provided amongst an investor group, then economies of scale may enhance the feasibility of successful transport infrastructure investment.

Circular Head Council and independent consultant, Arnold Consulting, have identified a major upgrade to 17.5km of the Bass Highway west of Wynyard as a major priority. The project, estimated to cost approx. \$87m requires State and Federal development and funding. This section of road carries more than 1 million tonnes annually, with an estimated value of \$1 billion per year. The upgrade would bypass the most dangerous sections of the highway and the main coastal villages of Hellyer, Edgcumbe, Crayfish Creek, Cowrie Point and Peggs Creek. Reclassification of the highway to a national highway would provide regular funding program to maintain the road, however the strict classification framework requires that a national highway link two capital cities or States, whereas a reclassification as a State road may be more achievable. A detailed assessment of the highway, with backing by Burnie, Waratah-Wynyard and Circular Head councils, is warranted to ensure sustainable future funding for improvements and maintenance for this economical significant road to the region's supply chain.



Rail freight

There is one active freight rail line in the region – the Melba rail line; used for transporting mining products. The rail line connects the Melba Flats siding to the Port of Burnie. The efficiency of this supply chain suffers from weight restrictions; ineffective mine to rail connections (i.e. HPV routes); and lack of mineral stockpile planning or larger bulk carriers.

Some of the aforementioned factors limiting supply chain efficiency are private sector driven. Other factors, such as weight restrictions on rail, could be addressed by public infrastructure works.

Mine closures along this freight line may lessen viability over the long term of ongoing operation due to higher costs per unit of production.

Planned rail projects

The Tasmanian Freight Rail Revitalisation Programme is funding upgrades to the Melba and Western rail line with \$119.6m over four years. This project supports the operational efficiency of TasRail and its ability to improve rail freight network performance.

The Department of Infrastructure, Energy and Resources (DIER) HPV route review and strategy (2011) identified non-compliant sections of road network servicing Melba Flats siding. However, the proposed ameliorative measures consisted of operational fixes targeted at managing existing risks. Priorities, timeframes and funding for any future upgrades are not currently known.

Shipping and ports

There are four key ports within the study area. Tasport's planning to 2043 includes retention of a multi-port system, retaining specialised ports with minimal new or consolidated infrastructure. This includes the 'Major Port' at Burnie, 'Community Port' at Stanley, Strahan and Currie, and 'Cargo port' at Grassy. There is also a private port at Port Latta.

The preferred approach going forward is to specialise, standardise and rationalise Tasmania's ports. A port master plan is being prepared for Burnie and is expected to be completed in June 2016. Burnie is expected to remain as the key port in Tasmania. In recent times there has been an uplift in forestry operations at the Port of Burnie and, in the future (if the market dictates it) it is expected that some container operations from Devonport will be operated from Burnie.

In addition to the main ports there are community (non-commercial) and cargo ports:

- Grassy (King Island) – goods and services, livestock export, other industry, recreation, fishing;
- Currie (King Island) – fishing and recreation;
- Stanley – Livestock import, fishing, recreation; and



- Strahan – fishing, recreation, tourism.

Funding has been provided by Tasports and the government to complete remediation works at the smaller/community ports and a new ramp has been provided at Stanley and works are planned to reposition a fuelling facility to improve safety.

High functioning well maintained port are critical to industry and provide a crucial connection for King Island. Given this, councils should advocate for, and support upgrades of, both the major port at Burnie and changes at community ports.

A major constraint to freight costs is that international freight is required to use domestic transshipment across Bass Strait to Melbourne before shipping internationally, reducing the cost efficiency of export trade and access to global markets.

Reports suggest that Tasmanian producers are affected by higher costs of shipping across the Bass Strait in comparison to equivalent mainland shipping distances (even after the Tasmanian Freight Equalisation Subsidy is applied).

As outlined in the draft Tasmanian Freight Strategy there is some uncertainty regarding the future of shipping services to King Island. In late 2016, a new vessel to replace the existing SeaRoad shipping vessel will be too large to dock at King Island. No market-based solutions have presented as of yet, however the State Government is working with interested parties to secure a long term solution. This issue presents a large risk to those dependent on shipping and is crucial to local producers. Some local councils have made the provision of international shipping services a priority.

West Coast Council has identified its objective to ensure ongoing provision of international shipping service to and from Tasmania. This would support the productivity of producers in the region. It is noted that there is the potential for an upgrade to the Port of Burnie to secure direct international shipping, subject to shipping law reforms as discussed below.

Planned port projects

In November 2015, DP World announced they had entered into an agreement with TasPorts to upgrade the Port of Burnie to handle international container freight. The upgrades are dependent on the passing of the Commonwealth's *Coastal Shipping Act 2015*. This legislation will allow international shipping operators to carry domestic freight between Australian ports. If they proceed, the works are expected to provide a considerable reduction to the cost of shipping.

Freight studies have identified that the Port of Burnie currently has insufficient depth for direct international freight, and as such any international port upgrade will require dredging of new channels.



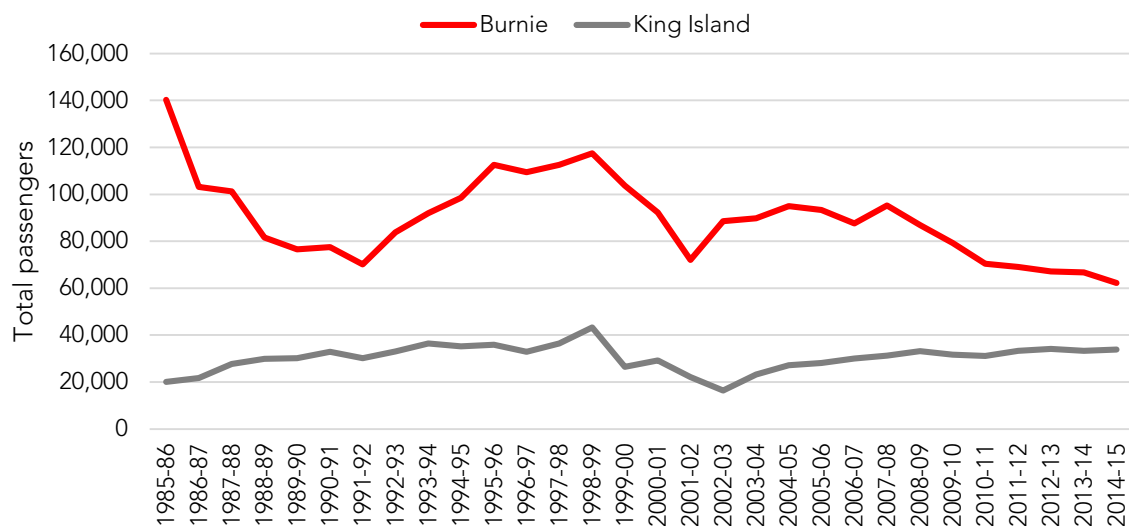
The Port of Burnie upgrade is supported by components of the draft Tasmanian Freight Strategy. This suggests opportunities for rationalisation of multiple ports to take advantage of economies of scale achieved by consolidation.

The extent of any rationalisation of ports remains unclear, and details are likely to emerge in coming years. A target start date of January 2017 for the Port of Burnie Upgrade has been nominated by DP World. Any port rationalisation could change land freight patterns and requirements for the region.

7.7 Airports

Figure 52 shows the total domestic passenger movements through Burnie and King Island Airports. By way of comparison, Launceston Airport carried 2.1 million passenger movements in 2014/15; far exceeding the combined 96,000 passenger movements per annum for Burnie and King Island combined.

Figure 53 Airport Passenger Numbers 1986-2015



Source: BITRE, 2016

The Bureau of Infrastructure Transport and Regional Economics statistics indicates that:

- Total passenger numbers through King Island Airport doubled from a low of 16,000 in 2002-03 to 33,800 passengers in 2014-15; and
- Burnie Airport has not experienced similar growth, and passenger movements are at historical lows. It is, though, an important community and economic asset.



The availability of regular and affordable flights ranked as a top outcome as part of the community consultation. Low demand, an absence of competition, and the commercial realities of operating small airports mean that achieving fares comparable to other mainland destinations will remain a challenge.

Smithton Airport has recently been sold to a private operator, and predominately supports higher value freight, along with a pilot training school and some light aircraft passenger movements.

King Island Airport is owned by the Council and currently Sharp Airlines, King Island Airlines and Regional Express fly there. Privately owned planes are also able to use the Airport. Annual licences can be purchased by regular local users of King Island Airport. Whilst similar to historic levels observed in the mid 1990's, the King Island Strategy Plan 2008 recommends a review of airport infrastructure if it is to support double the resident population to maintain acceptable service levels for the Airports functions.

Ongoing growth of King Island passenger arrivals may generate the need to expand or better manage airport assets, as well upgrade access, parking and community transport/taxi services. The increase in golf tourism since the opening of Cape Wickham has seen more arrival by plane, increasing the urgency for investigations and action to accommodate more arrivals.

Improvements to Burnie Airport should be sought to ensure competitiveness and secure continued services.

Strahan Airport (owned by West Coast Council) is not serviced by regular commercial flights and is generally only used for charter flights. West Coast Council have flagged the upgrading of the airport as a high priority. This will require a business case, ideally focusing on its potential for both tourists and freight. Any business case will aim to better understand the airports strengths and ability to operate as a gateway to the region, including the estimate of costs for required upgrades (pending).

It is understood that West Coast Council are seeking a joint contribution from Federal and State Government, for the business case study. This could support the potential for direct flights via Melbourne and Adelaide. However, it has been reported that improvements would be needed to support larger planes (including a wider, longer runway). A regional airport at Strahan would be subject to identifying and working with partner operators willing to run regular services in the region (West Coast Council, 2015).

Planned airport projects

Smithton Airport was recently sold to a private operator and there are plans for upgrades to the Airport to allow a higher number of flights any time of day or night. This includes plans to upgrade the passenger terminal, build more hangars and lease out more space for tenants.



8 Challenges & Opportunities

The challenges and opportunities constitute four broad themes over different time periods. The themes are: restructuring the economy; population servicing; the Murchison diaspora; and climate change resilience, renewable energy and water security.

The four themes for Murchison:

1. *Short-medium: restructuring of the economy: from mining to agriculture, tourism and advanced manufacturing*

1. **Value-added processing and commodity port trading are likely to experience moderate flow-on effects in the short to medium term.** The recent slow-down in China and falling dairy and mineral commodity prices will put downward pressure on Murchison's industry production and employment. Consequently, the region must look to restructure the economy.
2. **Agriculture and mining will continue to play a role in the local economy,** with mining and mineral processing continuing as significant (though no longer the primary) employers. In addition, mineral exports make the Port of Burnie viable, allowing other sectors to affordably export.
3. **Diversification into new agricultural ventures and tourism.** Following the Circular Head Irrigation Scheme, land-use is likely to transition from lower valued cattle production to dairy and horticulture. The recent drop in milk prices highlights the need to value add to this and raise domestic consumption of dairy. Part of this will include growth in food tourism.
4. **Advanced manufacturing expansion into new markets.** Building on the success and strength of local advanced manufacturing enterprises to support existing markets, such as mining, but more importantly to diversify and expand into new markets, such as defence products and services.
5. **Attraction of domestic and foreign investment in agricultural land.** There is opportunity to attract investment in value-added agri-processing services (e.g. fruit and vegetable packaging, milk and cheese). This has already occurred, with the irrigation infrastructure instilling business confidence and attracting large industry players into Murchison (e.g. Murray Goulburn).
6. **Exploration of the opportunities for new markets arising from the Free Trade Agreements (FTAs) with Japan.** The FTA will eliminate tariffs on:
 - Casein, lactose, albumen and milk-based proteins;
 - Barley for feed; and
 - Horticulture, such as fruits, vegetables, nuts and juice.



Japan offers very limited opportunities for dairy as the industry is heavily regulated, and agreements have effectively excluded dairy products.

7. **Exploration of opportunities to exploit non-tariff barriers, such as phytosanitary restrictions.** For example, Tasmania has a competitive advantage over the rest of Australia in exporting apples to Japan, which prohibits exports from other Australian States. Advantages may also exist in current or potential horticultural exports with other nations.
8. **In the medium term, mineral and energy exports to Japan may be an opportunity,** as tariffs will be phased out over ten years.
9. **Export of high valued meat and horticultural products.** This includes vegetables and native Japanese products (Wasabi), which are suitable to the area.
10. **Explore opportunities arising from the China FTA,** including:
 - Export of high valued meat and milk-processed products to China, as tariff reductions are phased in between 2019 and 2024;
 - Tariff reductions on pork, hides and skins, horticulture and seafood will be eliminated by 1 January 2019; and
 - Tariffs on barley and sorghum were eliminated on 20 December 2015.
11. **Promoting infrastructure investment in the Port of Burnie,** with a view to facilitate freight shipping for the region's producers. This will support growth into export-oriented agriculture products and will require work to finalise the infrastructure solution for Grassy Port to accommodate new vessels.
12. **Value adding to forestry products,** such as recent products Hardlam, a veneer to laminate timber that would have otherwise gone to waste.
13. **Agriculture industry development:**
 - Identify and develop product differentiation opportunities in domestic and international markets for whole milk and value-added products;
 - Commission research to investigate downward pressure by retailers and increased production costs of growers;
 - Attract growers through climate change comparative advantage in horticulture and dairy;
 - Investigate the opportunity for fresh producers to form a co-op, purchase freight and improve the supply chain (RDA, 2012); and
 - Develop the meat industry along the same lines as the dairy industry, by establishing an industry development plan, production targets and improvements to farming practices to increase productivity.



14. Improve agriculture industry management:

- Ensure co-ops of growers and farmers have sufficient management skills, including technical, marketing, logistics and negotiation skills to deal with their major customers in the supply chain;
- Improve links between education and agriculture and industry to better match skills supply and demand;
- Support seasonal workers with better accommodation, facilities and workplace relations laws that balance the needs of workers and growers; and
- Support farmers to embrace poppy production (production practice, land management planning, sharing information between growers and processors, R&D in plant material and production techniques).

15. **Branding, marketing and promotion as a quality food producing region**, which is important to increase the demand and value for product in emerging Asian markets and domestically. The process has started and further development has potential to realise more benefits for Murchison, not just the well-established King Island brand through place-based labelling recognising the region as a source of quality food. Similarly, branding investment would benefit the red meat industry to support price premiums and buffer against price volatility.

16. **The Austrade/Tourism Tasmania and State Growth Tourism Employment Plan**. These plans are being prepared with the assistance of the Cradle Coast Authority. They will address skill shortages, retaining quality staff, increasing productivity and more effectively aligning training to industry needs.

17. **Continue to develop and implement sub region Destination Management Plans**. The Plans, which identify the tourism opportunities and enhancements to support them, can reference each other to cross sell complimentary experiences. King Island's DMP is complete, and the process was regarded favourably.

18. **Tourism has seen a resurgence with the fall in the AUD**. Implementation of the Cradle Coast Destination Management Plan will help to leverage from this and there is an opportunity for Murchison to continue this through:

- New agri-tourism products (e.g. farmstays, whisky and cider cellar doors);
- Attraction and investment in holiday homes; and
- Development of complimentary heritage and village tourism products along the Cradle Coast touring route; to visitor dispersal from primary tourist destinations; and

19. **Exploring the viability of improving airport infrastructure** in Burnie, King Island and Strahan.



2. *Short-medium: population servicing and opportunities as a residential destination*

20. **Promote the region's amenity, affordable housing and rural-coastal lifestyle.** There are opportunities, particularly to drive growth in the 'silver economy'.
21. **Expand into the seniors housing market** (retirement villages and aged care) and auxiliary ageing services (GPs, hospitals and pharmacies in Murchison).
22. **Pursue programs to break generational poverty and school reforms** at a local and targeted level.
23. **Promote international migration to Murchison** (a State Department of Growth policy).

3. *Medium-long term: human capital development, brain drain and the 'Murchison Diaspora'*

24. **Improve educational outcomes in Murchison** (including year 12 retention rates) to meet expected demand in agricultural, tourism and ageing services. Support students to use new tools to identify career pathways to employment in local industries by staying in Year 11 and 12 and pursue tertiary education in either new courses offered by UTAS or other courses through TasTAFE.
25. **NBN availability in Murchison.** This may attract former residents and NBN-dependent industries (e.g. the creative sectors).
26. **Rethink the brain drain as the 'Murchison Diaspora'.** Rather than viewing the out-migration of young, skilled residents as a loss, they can be seen as ambassadors and champions of the region. New courses offered by UTAS will help to retain some young people by giving them education relevant to local industries. Moreover, better local amenity may attract some back, whether as professionals or retirees.
27. **Support the forestry industry and communities to capitalise on the new State laws to expand the forestry industry.** This would include providing input to the future direction of the industry; addressing port access; providing input into developing viable operating models; and understanding the implications for local business and employees.

4. *Long-term strengths in climate change resilience, renewable energy and water security*

28. **Investigate the viability for increased production in potentially available agricultural land that may be more suitable as the climate changes.** Climate change is likely to have a largely positive impact on the region, increasing the favourability of growing conditions through reliable rainfall and increasing temperatures suitable for horticultural crops.
29. **Murchison's wind resources** (particularly in King Island and along the west coast). In the long term, there is likely to be opportunities to expand wind



power electricity generation, and to position Murchison as a net national exporter of clean, renewable energy.



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11 Appendix

11.1 Overview of methodology

The Resource Analysis was prepared as follows:

1. Define the study area and appropriate smaller areas within the study area for closer analysis.
2. Identify and assemble data to describe the study area, as well as adjoining areas for some datasets, such as transport and community assets.
3. Analyse the data for the defined areas for:
 - i. Land and water values
 - ii. Natural and cultural values
 - iii. Economic resources and opportunities
 - iv. Access and infrastructure
4. Assemble data to provide the macro context for the analysis. This included national accounts data on consumption, investment, GDP and public expenditure, unemployment rates, population trends and spatial data on land use, zoning, infrastructure provision and environmental features.
5. Undertake a spatial and economic analysis of the major trends that are having, or will have a bearing on Murchison's future, including climate change, Australia's terms of trade, as well as global, national and state economic restructuring.
6. An analysis of economic and labour force census data from 1996 to 2011 to identify emerging trends
7. An inventory of natural resources of the region, performed as a desktop analysis of GIS datasets sourced from various Tasmania government bodies

The hinterland of Murchison was considered in the land suitability analysis, taking in the town of Burnie - the nearest major regional centre – with schools, retail, medical services, etc.

11.2 Land suitability assessment

The potential suitability of land for residential and industrial development was based on a multi criteria assessment (Table 36).



Table 36 Composite Weights for Residential Development

Input Layers	Composite Output Layers	Composite Weighting for Infill Development	Composite Weighting for Greenfield Development
Drive Time to CBD Drive Time to Port Drive Time to Industry	Composite Employment Access	12%	18%
Euclidean Distance to University Euclidean Distance to TAFE Euclidean Distance to High School Euclidean Distance to Primary Schools	Composite Education Access	7%	8%
Euclidean Distance to CBD Euclidean Distance to District Retail Euclidean Distance to Neighbourhood Centre Euclidean Distance to Neighbourhood Store	Composite Retail Access	20%	15%
Euclidean Distance to Regional Active Space Euclidean Distance to Local Active Space Euclidean Distance to Neighbourhood Parks Euclidean Distance to Foreshore Reserves	Composite Recreation Amenity	11%	9%
Euclidean Distance to Bus Routes Euclidean Distance to Bus Stops	Composite Public Transport Access	8%	6%
Euclidean Distance to Major Road Euclidean Distance to Sewerage	Composite Infrastructure Access	8%	8%
Drive Time to General Hospital Drive Time to Regional Hospital Drive Time to Private Hospital	Composite Hospital Access	11%	9%
Euclidean Distance Buffer from General Industry Euclidean Distance Buffer from Industry	Composite Land Use Conflict	4%	3%
Vertical Distance Above Hydro-graphic Lines Vertical Distance Above Hydro-graphic Areas Horizontal Distance Above Hydro-graphic Lines Horizontal Distance Above Hydro-graphic Areas	Composite Riparian Protection	15%	11%
Direct Sunlight (22 June) Slope Percentage	Composite Construction Suitability	4%	3%
Threatened vegetation present	Conservation	Further investigation	Further investigation
Greenfield Land Parcel Size	Opportunity for Master Planning	n.a.	10%
Minimum lot size 800 sqm	Lot Densification Capacity	Off 0%/On 10%	n.a.
Land highly capable for agriculture (excludes categories 1-3) / PAAL data where land capability data not available	Land Capability dataset / PAAL dataset	NA	5% deduction



Input Layers	Composite Output Layers	Composite Weighting for Infill Development	Composite Weighting for Greenfield Development
Landslide	Landslip dataset	Limit to 0% to 10% slope, or further investigation	Limit to 0% to 10% slope, or further investigation

Land suitable for residential development factored in the distances to key urban amenities and urban infrastructure. Two categories of land have been developed for the assessment: 1) infill development in the area within the urban centre/locality (UCL), and; 2) Greenfield development constrained to lots, all, or part, within 1 km of the UCL.

Several settlements (of both categories) are adjoined by lands mapped as highly suitable for agricultural purposes (Land Capability Classes 1- 3). These lands have been excluded from the spatial analysis. Reasonably capable agricultural lands (Land Capability Classes 4 -6), also within 1km of the settlements and capable of supporting agricultural activities, have not been excluded. Instead, their suitability scores were reduced to demonstrate that such lands have agricultural value. Any future conversion of these lands from their current use will need further assessment and ground truthing.

The criteria for industrial land was all other land zones within 1km of a highway or arterial road, contiguous with existing industrial land and within 1km of the UCL.

