ACIL ALLEN CONSULTING

REPORT TO
GREATER WHITSUNDAY ALLIANCE AND THE CRC FOR DEVELOPING NORTHERN AUSTRALIA

17 JANUARY 2020

REGIONAL AGRIBUSINESS SUPPLY CHAINS

MACKAY ISAAC WHITSUNDAY

FINAL REPORT

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Greater Whitsunday Alliance (GW3)

North Queensland Bulk Ports

Regional Development Australia

Bowen Gumlu Growers Association

Queensland Department of Agriculture and Fisheries

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CONTENTS

FIGURES

TABLES

CONTENTS

ACRONYMS

ABARES	Australian Bureau of Agriculture and Resource Economics and Science
ABS	Australian Bureau of Statistics
ADA	Aquaculture Development Area
ASIC	Australian Securities and Investment Commission
CQ	Central Queensland
DAF	Department of Agriculture and Fisheries (Queensland)
GW3	Greater Whitsunday Alliance
GVP	Gross Value of Production
ha	Hectares
LGA	Local Government Area (also known as Statistical Area Level 4)
Million tonnes	Mt
MIW	Mackay Isaac Whitsunday
ROLO	Roll On Roll Off
SWOT	Strengths Weaknesses Opportunities and Threats Analysis
t	Tonnes
VHT	Vapour Heat Treatment

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EXECUTIVE SUMMARY

The Greater Whitsunday Alliance (GW3) engaged ACIL Allen Consulting (ACIL Allen) to identify and detail data for supply chains in agriculture, fisheries, aquaculture, horticulture and associated waste streams. This research aims to inform future decision making and investment in the Mackay Isaac Whitsunday region with respect to development and export opportunities for agriculture. Supply chain capacity and constraints are provided for the region's major commodities by value and volume.

- Sugar cane
- Beef cattle
- Horticulture (fruit and vegetables)[1]
- Fish and seafood (wild catch and aquaculture)
- Broadacre crops[2]

Beef cattle and sugar cane are the largest commodities by both value and volume. They account for 72 per cent of the region's agricultural production. Each commodity moves differently through the system, which creates a degree of complexity in coordinating supply chains in the region.

The region's key strengths are its:

- Solid and diverse base, resulting from a relatively stable climate and good natural resources, making the region capable of producing a variety of different products. This is strengthened by existing and underutilised assets, improving road infrastructure, existence of rail and port access.
- Capacity for growth both within existing commodities as well as for potential in new and related areas.
- Location, between the far North and Southern Queensland making it a key node in the broader supply chain. Many products travel through the region en route to market, making the opportunity to collaborate across neighbouring regions a possibility that can lead to increased scale and scope.

It is these strengths that provide most opportunity for the region.

Collaboration is the key to developing continuity of supply and scale, the two pillars for export opportunity. This collaboration can be within sectors as well as across sectors, and within the region as well as across regions.

The region is well placed to focus on growing its existing and mature markets (beef cattle and sugar) while developing market access in new areas by considering new products and markets (e.g. better use of waste streams) as well as growing high-value opportunities such as horticultural products, fish and seafood.

[1] Horticulture often includes nuts, flowers and nursery products. In this study we focus solely on fruits and vegetables.
[2] Broadacre crops include wheat, sorghum, oats, barley, maize, rice, cotton lint, triticale, pulses and oilseeds.

STRATEGY
REPORT

Background and summary

Eight per cent of Queensland's agriculture is produced in the Mackay Isaac Whitsunday region, with agriculture, forestry and fishing the 6th largest industry in that region. Other major industries include mining and services such as tourism (accommodation and food services), retail, health care and social assistance and education and training.[3]

The region produces a diverse range of agricultural commodities. Gross value of production (GVP), however, is dominated by cattle, sugar cane, and tomatoes, which account for 78 per cent of the value of region's total agricultural production. Other key commodities by value and volume include other horticulture (fruit and vegetables), broadacre cropping, and fish and seafood (wild catch and aquaculture).

Transport infrastructure is critical to agricultural production and distribution. Ports, airports, roads and rail provide the network for the dispersion of inputs and consolidation of outputs to market. High average rainfall and flooding increases road maintenance and safety issues for both road and rail.

The *Regional Transport Plan: Mackay Isaac Whitsunday Region (2018)* will shape the region's transport system over the next 15 years. Many road projects are currently being undertaken, or have funding to be undertaken, within the next few years. This will add significant benefits to the agribusiness supply chain.

Agricultural freight is predominantly moved via road, and regardless of improvements several last mile access issues remain. There is considerable room for rail infrastructure upgrades.

Mackay Port and Mackay airport have plenty of capacity with indications that the Port currently has just a 25 per cent berth utilisation.[4] Mackay airport reports approximately 100 tonnes of underbelly freight storage per day.[5]

Agricultural and seasonal labour is an issue across Australia and Mackay Isaac Whitsunday is no different. There is potential to harness the region's attractiveness and proximity to the coast.

Mining, as the other major employer in the region, creates constraints on labour supply and is generally likely to be higher paid than agricultural work. Mining, however, tends to be rather boom and bust whereas agricultural is seasonal but potentially more stable in the longer term. Capital is also considered a general constraint across the sector, more so in areas where climatic risks are high – cyclones and flooding can make investment in large capital projects risky.

[3] ABS Census Data 2016.
[4] Personal communication with Paul Coomer, North Queensland Bulk Ports.
[5] Personal communication with Garry Porter, Mackay Airport.

Possibilities around processing and value adding, as well as continued export growth, will more likely unfold with:

- improved access to labour and capital
- better transport.

An alternative to value adding could be to work towards developing a regional narrative to promote the produce of the region to domestic and international consumers.

Export opportunities should capitalise on demand drivers and be based on proximity to market. It is important in trade growth to acknowledge and continue the region's strengths and current offerings and build on these as well as look to develop new opportunities in a related space.

Further details on the region, its physical assets and natural and human capital are provided in Attachment A, and details on a commodity by commodity basis, including supply chains and commodity specific analyses are provided in Attachment B.

Study purpose

The primary aim of this study is to identify and detail data for supply chains in agriculture, aquaculture, horticulture and associated waste streams. The study also aims to provide a robust base for future decision making and investment in the Mackay Isaac Whitsunday region with respect to development and export opportunities.

This report:

- examines the opportunities for each supply chain for the major regional commodities by value and volume
- identifies the region's agricultural production capacity and capability
- is anticipated to support a future Phase 2 project to examine markets and opportunities for regional growth and development.

The project has collected data through official sources and stakeholder consultation to a level where the data can be used for testing ideas and looking for opportunities. It acknowledges that further data collection, possibly through audit or detailed case studies, would need to be gathered to scope a detailed investigation or to develop business cases for agricultural growth and development in the region.

Scope

The Greater Whitsunday Alliance (GW3) engaged ACIL Allen Consulting (ACIL Allen) to:

- map the current capacity and export supply chains of the Mackay Isaac Whitsunday agriculture sector to develop a plan to optimise the region's capacity to supply to international markets
- complete a Mackay Isaac Whitsunday agribusiness configuration and capacity assessment including a full literature review, desktop analysis of available data sources and validation of the data through producer and stakeholder interviews and engagement
- complete a detailed analysis that identifies opportunities to enhance export opportunities and efficiencies across Mackay Isaac Whitsunday agricultural export supply chain.

Commodities / products

The major commodities by value and volume in the Mackay Isaac Whitsunday based on official statistics for 2017-18 (refer Table 1.1 and Figure 1.1) are:

- Sugar cane
- Beef cattle
- Horticulture (fruit and vegetables)[6]
- Fish and seafood (wild catch and aquaculture)
- Broadacre crops[7]

TABLE 1.1 OFFICIAL VOLUMES AND VALUES OF MAJOR COMMODITIES IN THE MACKAY ISAAC WHITSUNDAY REGION (2017-18)

Major commodities	Volume	Value (GVP)	% of total agriculture value
Beef cattle	1.04 million head of meat cattle	$474 million	34 - 42%
Sugar cane	8.79 million tonnes	$344 million	25 - 30%
Horticulture (fruit and vegetables)*	53.03 thousand tonnes	$176 - $424million	16 - 31%
Grains	235.17 thousand tonnes	$121 million	9 - 11%
Aquaculture**	1.45 thousand tonnes	$21.2 million	-
Total		$1,136.2 – 1,384.2million	

Note: * Horticulture production is commonly under reported – there may be variability between actual production and value and the official statistics.

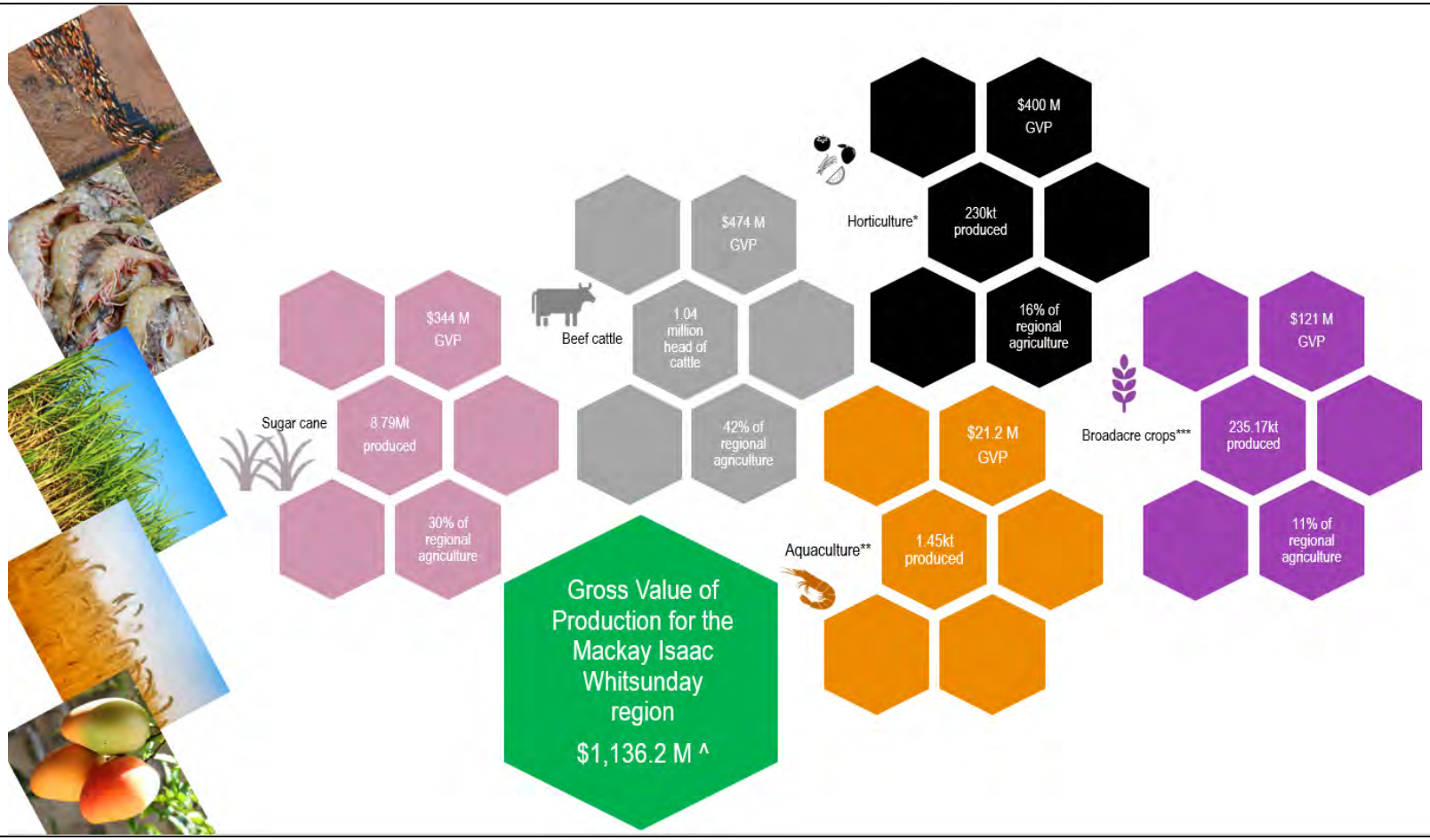
**Wild catch values not available.

SOURCE: ACIL ALLEN CONSULTING FROM AUSTRALIAN BUREAU OF STATISTICS VALUE OF AGRICULTURE COMMODITIES PRODUCED AND AGRICULTURAL COMMODITIES, 2017-18 AND ROSS LOBEGEIGER REPORT TO FARMERS, 2017—18, QUEENSLAND DEPARTMENT OF AGRICULTURE AND FISHERIES BASED ON DATA FROM BRISBANE MARKET INFORMATION SERVICES

Following from stakeholder consultation, and accounting for underestimates in horticulture, ACIL Allen estimates that the value across the sectors is closer to $1,700 million, approximately 25-50 per cent larger than the official value.[8]

[6] Horticulture often includes nuts, flowers and nursery products. In this study we focus solely on fruits and vegetables.
[7] Broadacre crops include wheat, sorghum, oats, barley, maize, rice, cotton lint, triticale, pulses and oilseeds.
[8] This number has been extrapolated from anecdotal evidence and is not verifiable. This number should be used with caution and to reflect that value is generally underestimated. Future research should be conducted possibly through a regional audit for validation purposes.

FIGURE 1.1 OFFICIAL VOLUMES AND VALUES OF MAJOR COMMODITIES IN THE MACKAY ISAAC WHITSUNDAY REGION (2017-18)



Note: * Includes fruit and vegetables only (based on a combination of DAF data and ABS data)

**Official statistics are not available for wild catch fish and seafood

***Broadacre crops include wheat, sorghum, oats, barley, maize, rice, cotton lint, triticale, pulses and oilseeds

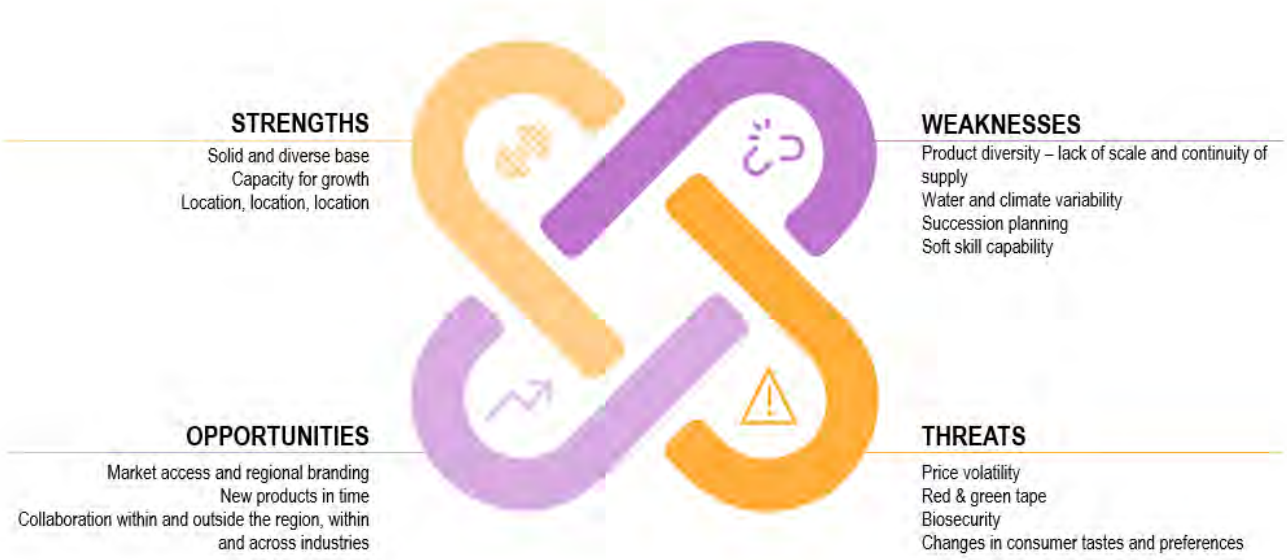
^ Value as reported may not add up due to different sources. The total regional GVP is reported as per ABS statistics. ABS statistics underestimate horticultural production. If DAF data was used this would increase the regional GVP to approx. $1,500 million.

SOURCE: ACIL ALLEN CONSULTING FROM AUSTRALIAN BUREAU OF STATISTICS VALUE OF AGRICULTURE COMMODITIES PRODUCED AND AGRICULTURAL COMMODITIES, 2017-18, DAF AND ROSS LOBEGEIGER REPORT TO FARMERS, 2017--18

Analysis

Following from data collection and stakeholder consultation, we conducted a SWOT assessment of agribusiness in Mackay Isaac Whitsunday (refer Figure 1.2) to highlight the capacity and constraints in the system. Each of the identified strengths, weaknesses, opportunities and threats are discussed below.

FIGURE 1.2 SWOT ANALYSIS FOR THE MACKAY ISAAC WHITSUNDAY REGION



SOURCE: ACIL ALLEN CONSULTING, 2019

Strengths

A solid and diverse base

The Mackay Isaac Whitsunday region has a productive land base suitable for increased agricultural production. The region has a relatively stable climate, reasonable access to water, productive soils, solid road networks recently upgraded (or committed to upgrade). It also has other logistics infrastructure, such as rail, airports and seaport, and a supportive services economy.

It produces multiple agricultural and fisheries products, diversifying its production base and making it more resilient to natural and other disasters.

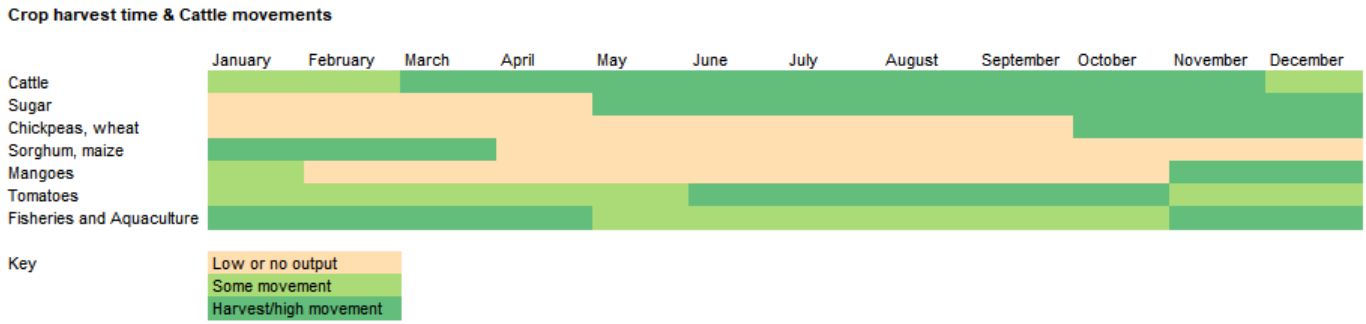
Although all three local government areas (LGA) produce a variety of products, each LGA has a dominant product due to its geographical position.

In Mackay it's sugar cane and, to a lesser extent, beef with some cropping and aquaculture. The climate and soils are ideal for sugar cane production and there is a long history of production, milling and export from the region. In Isaac, beef production and broadacre cropping dominate, although the coastal areas also see cane and aquaculture. In Whitsunday, horticulture (fruit and vegetables) is the dominant output, with some cane and significant expansion in aquaculture.

Seasonality is an important consideration for supply chain logistics and development opportunities. From April to July, across the five main commodities examined, with the exception of beef which is

year-round, there is a minimum of two products being produced at any one time. High levels of activity occur during spring and summer Refer Figure 1.3.

FIGURE 1.3 SEASONAL ANALYSIS OF MAJOR COMMODITIES BY OUTPUT/MOVEMENT



Note: Fisheries and Aquaculture high output during the wet season but can freeze all year around.

SOURCE: ACIL ALLEN CONSULTING, 2019

The diversity of production in the area is as much a barrier as an opportunity. Much of the production, apart from sugar and beef, is not at scale. This is particularly true for horticulture and seafood. The industries are fragmented, and in horticulture there is an over supply, which means a decline in domestic prices and can lead to an increase in waste.

Capacity for growth

There are two key themes here:

i) Increasing supply
ii) Developing new or alternative products (discussed in Opportunities)

We conducted a theoretical value analysis, assuming value is a function of land size and based on current land use to provide an indication of the potential value for agriculture and aquaculture in the region. This analysis suggests that there is about an extra $230 million (or 20 per cent) in value across the major commodities in the region holding all else constant.[9] Each of the key commodities is discussed in terms of capacity below. Detailed analysis on each commodity can be found in Attachment B.

Beef cattle

Beef cattle production potential exists in the order of 20 per cent. Many cattle move through the region, which is close to major abattoirs in Mackay and the Rockhampton and Gladstone areas; and a route to export, typically via Townsville or Port Alma for live exports, and Rockhampton and Brisbane for boxed beef exports. This leads to a potential to investigate feedlotting, better located to the west of the region over the range, which would reduce run off and environmental concerns with respect to the Great Barrier Reef.

The majority of abattoirs in Queensland are not operating at full capacity. One of the reasons for this is security of labour supply, transient labour and social issues. On average there are over 4,000 vacancies in both skilled and unskilled labour each day in abattoirs across Australia. [10]

Sugar cane

There is at least 15 per cent fallow cane land at any time and some farms, particularly on the coast, are very small (<30ha), which can restrict production alternatives and expansion. The potential to grow legumes and other nitrogen-fixing crops on fallow land in rotation with cane exists. Most legume cropping, however, is used for green manure rather than as a cash crop.

[9] This assumes (from stakeholder discussion) an increase in land use of 25%, an increase in 12% for sugar, 20% for cattle and the addition of Tassal's prawn farm.
[10] Personal communication with Australian Meat Processor Corporation.

Cane farming is dominated by older farmers and smaller blocks of land. There is generally poor succession planning and, as a result of rising land prices, little incentives for new entrants. Potential exists to increase sugar cane production capacity by using existing water allocations and through consolidation of land.

Finding the 'magic' byproduct from cane is critical for the survival of the industry over the long term. There have been attempts to make use of cane waste with the only economically successful use to date being the production of power (co-gen) through bagasse.

Sugar mills in the region have approximately 1 million tonnes of spare input capacity. The co-generation plant at Racecourse Mill is fueled with both coal and bagasse as there is spare capacity. The ethanol distillery at Sarina is producing approximately 20 per cent of capacity. Food grade ethanol produced at Sarina is exported from Mackay Port.

Ethanol for fuel has future potential, but there is little or no domestic demand for ethanol and, until international demand increases beyond what Brazil can currently supply, there is no comparative advantage in exporting ethanol.

Horticulture

Horticulture expansion in Bowen region is possible if water could be secured (e.g. a dam at Urannah or access to other water schemes). Without export markets, or at the very least new alternatives grown, then a supply side expansion would likely glut the domestic market. Export markets could encourage a demand side pull if more market access protocols were negotiated.

There is the possibility to produce crops not currently grown in the region (e.g. citrus). There is also the possibility of alternative uses for horticultural waste – noting that many in the region do not see waste as a problem as they already make the best economic use of any byproducts in the system.

Within horticulture there is clearly a need for collaboration either within the region or between other horticultural regions (north for tropical fruit and south for vegetables) to get products to scale and to secure year-round supply.

Broadacre cropping

There is potential to increase the supply of crops, particularly if there is coordination across fallow cane land on the coast with production over the ranges. Through coordination, there may be potential to get to scale in the production of chickpeas and other legumes that work well in both production systems. Exploring new cropping alternatives should focus on products in demand from international markets and those that grow well in the region. Sorghum, for example, grows well in the region, and if the market for fuel ethanol were to open then this could be a possibility.

The advent of Queensland Department of Agriculture's soil quality tool (due to be released by the end of 2019) at a lot level will enable farmers to determine the best crops to plant given their soil type.

One issue that was frequently raised by stakeholders across the region, especially those involved in broad acre cropping, was the ability to export by the container as opposed to bulk exports. Exporting via container means that smaller quantities of a product can be produced and sold. Mackay Port has bulk export facilities but is not containerised. Brisbane, Gladstone, Rockhampton, Townsville and Cairns offer containerisation. At this stage most container trade goes south to Brisbane, but transport costs to Brisbane from Mackay Isaac Whitsunday are high.

There are two main reasons that containers go to Brisbane despite the cost of transport:

i) The cost of port charges at the more northern ports are considered prohibitive.
ii) Often there are not enough ships berthing further north with any regularity or frequency, eroding one of the main benefits of containerised trade - niche product delivered commonly to a tight time schedule.

There may be increased opportunity for containerisation when the CQ inland port at Yamala is operational in 2020.

Fish and seafood - aquaculture and wild catch

The aquaculture industry is set for major increase in productivity following the purchase by national aquaculture company Tassal of two sites in the Whitsunday and Mackay LGA.

There is sentiment that it's best to grow existing markets from products such as prawns and barramundi that do well in the region, rather than try new aquaculture products. The recent Northern Australia Aquaculture Industry Situational Analysis identifies key challenges and opportunities facing the north Australian aquaculture sector. [11] The report states: "Whilst northern Australia has many natural advantages, commercial capacity needs to be developed and built, which in turn provides a competitive advantage for a successful industry." This statement accurately reflects the current aquaculture position for Mackay, Isaac, Whitsunday, although with the recent investment by Tassal the landscape for prawn aquaculture is going to evolve quickly.

Wild-catch fishing in Queensland is highly fragmented and is grappling with social license issues regarding over-fishing. Potential for the industry exists, however, through better communication within industry and continued good management.

Location, location, location

Mackay Isaac Whitsunday is strategically located on a north/south axis with lateral relationships to the west, connected by recently upgraded, or to be upgraded, roads. Currently, due to its high efficiency and frequency of ships, most of the product from the region travels south to Brisbane for redistribution domestically or export by sea or airfreight. Increased efficiencies could be achieved through:

- improvement in railways, particularly narrow gauge
- coordination and collaboration across regions, such as Townsville, Central Queensland and the Far North.

Consideration needs to be given to the natural beauty of the region and the fact that it attracts large numbers of domestic and international tourists. This provides potential for the creation of a regional food culture, a regional brand and cross-industry diversification in conjunction with tourism industry. This may be especially beneficial for niche agricultural product producers such as lychees, finger limes, mud crabs etc.

Weaknesses

Markets are challenging

Like the rest of northern Queensland, the Mackay Isaac Whitsunday region has diversity and comparative advantage, specifically in sugar cane and cattle production. These are also the only two commodities that are typically exported.

Broadacre crops, horticulture and aquaculture currently suffer from scale issues. All three, however, can capitalise on a large and growing overseas market. The comparative advantage that exists for horticulture includes the counter seasonal production of vegetables relative to the rest of Australia. Broadacre cropping, although an important component of agriculture in the region, does not have a specific comparative advantage relative to other regions further south. Aquaculture's comparative advantage is not yet realised but is likely to be seen in prawns and barramundi.

However, there are several important barriers that need to be overcome.

- Phytosanitary barriers
- Providing incentives and building capability
- Continuity of supply at scale

[11] Cobcroft, J., Bell, R., Fitzgerald, J., Dietrich, A. and Jerry, D. (Forthcoming), 2020. *Northern Australia aquaculture industry situational analysis: Stage 1 Report*. JCU, Townsville. https://crcna.com.au/sites/default/files/2020-01/CRCNA_AISA%20Stage_1_20200107.pdf

Phytosanitary barriers and protocol negotiations are the largest barriers to export of horticultural products. Although Federal Government and industry supports exist, the fragmentation of the sector makes it difficult to get the protocols needed high on the agenda. This is exacerbated by the lack of scale in the region and the inability to supply year-round without collaboration with production systems in the south.

Creating the right incentives to export is challenging. Some farmers are just not interested in the extra work required, some do not have the capability and others are not willing to take the risk. Beyond capability building through existing education and support programs, there is scope for showcasing leaders in the industry and highlighting the benefits of export more widely. This could be achieved through increased access and availability of programs or support officers, developing regional brand/s that may reduce the marketing 'burden' on producers.

Continuity of supply is an issue in the Mackay Isaac Whitsunday region (refer Figure 1.). Collaboration across sectors (e.g. planting of crops on fallow cane land) and regions may improve volume of supply and reduce seasonal variation.

Water and climate variability

Agricultural productivity is constrained by water availability and accessibility. Droughts, competing water uses from mining and urban growth and climate change all influence water use in agriculture.

Some of this downside risk can be mitigated through a better understanding of the complex interactions between water, energy costs, labour needs, nutrient use, crop agronomy, soils and salinity. Work such as that being conducted by the Queensland Department of Agriculture and Fisheries (DAF) 'Irrigated Crop Suitability Maps', mapping soil quality with individual land holdings and potential crop production, will fundamentally improve decision making.[12] Other mitigating factors are:

- improvements in infrastructure
- technology and engineering solutions
- education and training skills.[13]

As the impact of climate change on Australian agriculture is likely to be spatially and temporally diverse, it is not clear which regions will be affected.[14] The rate and extent of warming and impacts on rainfall distributions, coupled with increases in frequency and severity of extreme weather events such as cyclones, are likely to be key determinants of the impact that climate can have on the agricultural sector.

The main threats that have been identified include overall productivity declines due to increased extreme weather events, such as heatwaves, bushfires and flooding.

- Crop productivity is expected to decrease due to changes in average rainfall, increase in temperatures and rainfall variability.
- Livestock productivity may decrease due to changes in quantity and quality of available pasture, and temperature increases.

Further, farmers are likely to face additional costs of structural and/or capital adjustment and may have difficulty securing investment for climate-dependent assets such as irrigation infrastructure. Further investing in ecological assets in rural regions may also become challenging.[15]

It is also worth noting, however, that climate change may also provide considerable upside risk, or opportunities, such as the ability to grow crops that could not previously grow in a region due to high or low rainfall. Further upsides can be realised through adaptation strategies that mean, given the gradual change in climate over time, there is scope for farmers in many regions and industries to develop or implement adaptation strategies.

[12] Personal communication with Lew Markey, DAF, 17 July 2019. Whole-of-state mapping expected to be finished by the end of 2019. Mapping tool in pilot form available here: https://www.daf.qld.gov.au/business-priorities/agriculture/sustainable/rookwood-weir/maps
[13] Primary Industries Ministerial Council, 2015, National Water Use in Agriculture RD&E Strategy.
[14] Kingwell, R., 2006, Climate change in Australia: agricultural impacts and adaptation, *Australian Agribusiness Review*, Volume 14, Paper 1.
[15] Ibid.

Succession planning

Agriculture's workforce is ageing and it's estimated that around 23 per cent of the industry's workforce is likely to retire by 2022.[16] This is particularly relevant to the sugar cane sector in the Mackay Isaac Whitsunday region. The average age of a cane farmer is reported to be older than 65 years, and many of them have no succession plan in place. Further, due to high land prices and the proximity of smaller blocks to urban centres, many landholders are choosing not to sell as they are looking to maximise their returns on the back of rising land prices. There is also a lack of younger, innovative farmers with capital available to purchase these properties. The aging population and the lack of succession planning is likely to lead to a major structural adjustment of the cane industry over the next decade.

Soft-skill capability

The Mackay Isaac Whitsunday region is set up to provide supporting services to agriculture. The closure of agricultural colleges in the region and in neighbouring regions is likely to bring with it a loss of skill and capability in the younger population. This is not unique to the Mackay Isaac Whitsunday region. Education and training enrolments across Australia in agriculture-related qualifications in 2016 were around 51,000, down by 8,600 since 2014.[17]

Labour supply issues appear to affect those commodities, such as horticulture, more exposed to seasonal variation. The seasonal nature of agricultural employment also provides challenges and may mean it is more appealing to seasonal workers from overseas. This leads to more challenges due to migration policies and ongoing pressure on the government.[18]

An overall national shortage of skilled staff for aquaculture may also affect the growth of this emerging industry locally. As derived from Cobcroft et al. (Forthcoming), access to skilled, senior personnel is affecting key parts of the industry now, particularly with difficulties and pressures from the (short-)term and conditions of visas.[19]

At times labour has been diverted to mining from agriculture but this does not appear to be the case at the moment.

With regard to exporting, many producers are very good at producing their products but are not as well qualified in the running of a business or marketing their products. The development of these skills may improve opportunities for producers in the region.

Australian Securities and Investment Commission (ASIC) notes that the changing environment presents challenges for "businesses to benefit from government program and policies by becoming export-ready, culturally literate and market savvy".[20]

Opportunities

Market access and regional branding

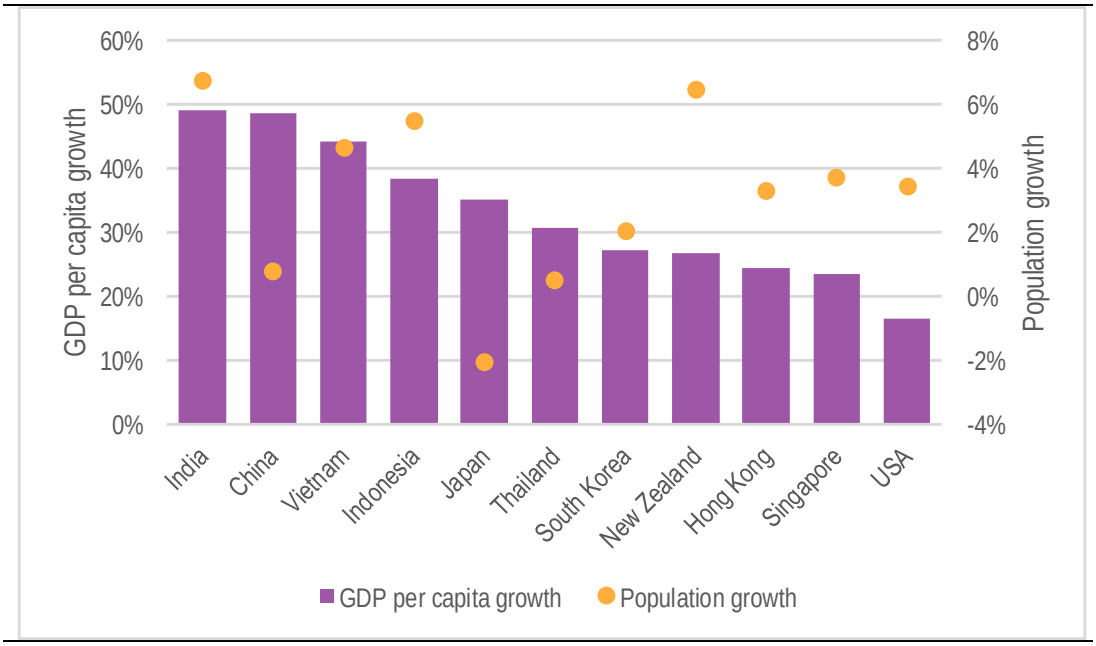
External factors such as demand often have a larger impact on exports than supply-side constraints.

Population growth and rising disposable incomes in key export countries such as China and other Asian nations is likely to be the biggest predictor of future export potential (refer Figure 1.4).

Global food trends are changing and consumers are becoming more engaged with their food supply.

[16] https://www.skillsimpact.com.au/agriculture/skills-forecast/
[17] Ibid.
[18] Ibid.
[19] Cobcroft, J., Bell, R., Fitzgerald, J., Dietrich, A. and Jerry, D. (Forthcoming), 2020. *Northern Australia aquaculture industry situational analysis: Stage 1 Report*. JCU, Townsville. *https://crcna.com.au/sites/default/files/2020-01/CRCNA_AISA%20Stage_1_20200107.pdf*
[20] Ibid.

FIGURE 1.4 2019-2024 GDP PER CAPITA AND POPULATION GROWTH PROJECTIONS



SOURCE: ACIL ALLEN CONSULTING BASED ON INTERNATIONAL MONETARY FUND

We examined global food and agribusiness mega trends from multiple sources such CSIRO, Ipsos and Euromonitor and compiled a consolidated list (refer Table 1.2).This list was assessed by the potential for the Mackay Isaac Whitsunday region to fulfil those 'trends' over the short and longer term.

TABLE 1.2 GLOBAL FOOD MEGA TRENDS – POTENTIAL FOR MACKAY ISAAC WHITSUNDAY?

Consolidated list of global mega trends	Short-term opportunities	Long-term opportunities
Regional/adventurous flavours	√	
Plant based proteins		√
Snacking (or convenience)	√	
Natural	√	
Sustainable supply chains		√
Affordable quality	√	
Premiumisation		√
Connected to the consumer		√

SOURCE: VARIOUS

Specific focus could be placed on the opportunity to create and promote a regional brand that encompasses concepts of 'regionality', 'natural' and 'affordable' for local and global consumers.

Nearly all of these trends provide opportunities for the Mackay Isaac Whitsunday to realise, particularly in 'snacking' of which sugar can be an important input as are fruit and vegetables. Further 'sustainable supply chains' may also provide market development over time.

Sustainability in supply chains is potentially a big growth area. This could be in terms of sustainable production methods, packaging or using food waste products. Plant-based proteins may also be an area for growth, as chickpeas and other lentils are grown in the region. Mackay Isaac Whitsunday also has an opportunity to consider marketing its produce at a regional level around either the concepts of 'natural' or 'sustainable'. While the regional/adventurous food trend is focused on experimenting with food from other cultures, the concept of a regional brand could spill over into this category. Further, there is the possibility with higher value produce such as fish or seafood, or some fruits and vegetable such as mangoes and avocados to consider premiumisation, effectively marketing a product to enhance its premium dimensions.

An alternative way to examine these factors is from an international trade perspective (Refer Table 1.3.)

Again many of these factors are outside the direct control of the region, but a few exceptions should be noted. These are indicated in Table 1.3, with green representing clear opportunities directly in control of the region; yellow possible ones where control might be limited but where there maybe potential for negotiation with State or Federal government. The lighter the shading, the less likely the region will have influence. For example, Mackay Isaac Whitsunday could choose to provide support for intermediate services through local or State government action, however, they are unlikely to influence an external country's trade policy. There is potential, however, to work with industry bodies and the Federal government to help secure market access arrangements.

TABLE 1.3 TRADE FRAMEWORK AND OPPORTUNITIES FOR MACKAY ISAAC WHITSUNDAY REGION

Factor inputs, productivity and costs	Proactive policies to promote trade	Incentives for trade
Land, water, natural resources	Innovation	Trade and competition policy
Transport and trade facilitation	Standards and certification	Business regulatory environment and governance
Intermediate services	Export promotion	External trade policy
Labour markets, skills and technical efficiencies	Economic zones or clusters	Tax policy

SOURCE: ADAPTED FROM THE WORLD BANK

The region, with limited government support, could consider innovative practices or moving towards a standard or certification program around a concept such as region, 'natural' or 'sustainable'. The region could also consider export promotions either in conjunction with the standard or certification, or separately.

New products, in time

The relatively stable climate and a well-located region with good connections (roads, rail and port) means that there will be potential for new products over time. Further potential may come from aquaculture, noting there are other Aquaculture Development Areas (ADA) in and around the Mackay Isaac Whitsunday region. There is also the possibility of additional land available for farming purposes given the impending structural adjustment in the sugar cane industry. At this stage, it is not a question of what can be grown in the region so much as what markets exist.

Mackay Isaac Whitsunday has an abundance of plant matter and there is potential to better use the green waste stream. However, to date, with the exception of ethanol production and the bagasse fired co-generation plant at Racecourse Mill, there has been no product produced at scale.

Ethanol production is currently sub-economic and only produced due to the Queensland government mandate for ethanol in fuel. There is potential for China to consider the use of ethanol blend fuel for vehicles. Should this occur then demand for the product will rise and Mackay Isaac Whitsunday will be well placed to capitalise on production and export given the ethanol plant at Plane Creek and access to Mackay Port.

Stakeholders noted that green waste would be better termed as 'byproducts' as very little is 'wasted' in the system. Most plant and animal matter is returned to the land in the form of green manure or fertiliser.

The Queensland government has highlighted biofutures as a priority industry,[21] with the aim of achieving a "$1 billion sustainable and export-oriented industrial biotechnology and bioproducts sector, attracting significant international investment and creating regional, high-value and knowledge-intensive jobs".[22]

[21] See: https://www.statedevelopment.qld.gov.au/industry/priority-industries/biofutures.html
[22] Ibid.

Mackay Isaac Whitsunday has explored biofutures and a recent regional prospectus notes the region's companion industries and co-location opportunities. [23]

Sustained and continued research and development for the 'new' byproduct, whether that be a high-value nutraceutical such as lycopene from tomatoes or an alternative biofuel source, is paramount.

The region is well placed to capitalise on a commercial opportunity as research and development is ongoing by CSIRO, QUT and others. Once a product with market demand has been identified it would be best to co-locate off the region's existing infrastructure such as Racecourse Mill, Borthwick's abattoir or Mackay Ports.

Continued collaboration on all fronts

Cross-sector collaboration

The agriculture industry generally operates along single sector lines, regardless of the clear common interests across sectors and the fact that many farmers produce more than one product. Queensland, and the Mackay Isaac Whitsunday region are no exception. Cross-sectoral collaboration could grow the region is several ways, for example:

- Cane growers could benefit from discussions with croppers beyond the Eton Ranges to coordinate the production of a single crop such as soy or other legumes, to get production to scale across the region.
- Horticulture and aquaculture could work together on potential for cold-chain logistics and storage and freight.
- Cane, cropping and horticulture could collaborate around green waste opportunities for the region

Cane infrastructure such as the Racecourse Mill, with the co-gen plant, has access to renewable power, steam and water as well as good road access and rail infrastructure to port. This makes the site ideal for processing facilities for horticulture and aquaculture products or biofutures. Plane Creek Mill at Sarina has infrastructure for increased ethanol production should market opportunities present in the future.

Infrastructure collaboration (across regions)

Although each LGA is dominated by a single product - cane in Mackay, beef in Isaac and horticulture in Whitsunday - there is a need to collaborate across regions and products to realise opportunities for agriculture.

Working with surrounding regions to develop transport routes and other facilities is important. This ensures that producers can get their products to market in the most efficient and cost-effective manner to benefit everyone.

Ensuring cross region consistency on heavy vehicle routes from regional areas to port would reduce transport costs, time to market and commodity viability. This includes fixing 'last mile' issues identified by Mackay Port (refer Appendix A).

At the moment, the majority of product whether for domestic consumption or export travels south via road or rail to Brisbane. The exceptions being live export cattle that goes via Townsville or Gladstone, and bulk grains (in a typical season)[24] that go out of Mackay and Gladstone. Noting the importance of export for regional growth, timely access to market for high-value products is critical.

Potential exists for collaboration with air and sea freight out of Cairns, roughly half the distance of Brisbane. Cairns has an international airport as well as port facilities.

[23] See: http://www.greaterwhitsundayalliance.com.au/Pubilications/DoSDMIP_Brochure_A4_4pp_EVersion.pdf

[24] In 2018/19, as a result of drought conditions, the grain supply chain is currently reversed. Very little is being exported and most production in the region is going south for domestic use for human or animal feed. Grain is also being shipped to Queensland from southern and western States. Potential exists too for collaboration with air and sea freight out of Cairns, roughly half the distance of Brisbane. Cairns has an international airport as well as port facilities.

Developing relationships with Cairns airport and consolidating produce from the whole of north Queensland to be exported out of Cairns is an opportunity to retain more value in the north. There is also a vapour heat treatment (VHT) facility at Mareeba, which is currently the approved technology for phytosanitary requirements on most horticultural exports.[25]

Approximately 1.5 million tonnes of agricultural and aquaculture produce a year travels domestically, principally to Brisbane, from Mackay airport as freight, primarily in the belly of domestic passenger planes.[26]

Within the Mackay Isaac Whitsunday region, particularly the Mackay LGA, there are several pieces of underutilised infrastructure that, if scale is achieved, can be used to increase value in the region. Mackay Port has underutilised capacity and potential for storage, as well as grain segregation capacity that could benefit niche grain cropping. Opportunities also exist in collaborating with other regional ports to explore ways to work together rather than in competition to realise export potential for the north. For example, Townsville and Gladstone are both container ports, and Mackay has roll-on roll-off (ROLO) capabilities.

Coordinating shipments up and down the coast to maximise opportunities for export could also be considered. Further there may be increased opportunity for containerisation when the CQ Inland Port at Yamala is operational in 2020.

Threats

Price volatility

Domestic markets are dominated by several large supermarket chains that are able to dictate prices and control the market. Many producers try to secure contracts with the bigger players to reduce their price variability and lock in their forward production.

Australia is a price taker on the global market and price volatility is a risk. Anecdotally, this is one reason why producers in the Mackay Isaac Whitsunday region chose not to export, other than sugar and beef. Some, however, recognise the upside risk is worth it.

There are many other reasons that producers choose not to export and several exogenous issues such as export protocols.

Red and green tape

Agriculture is affected by regulation at local, state and federal levels across the whole supply chain, from production to transport, processing and marketing. Reducing regulatory burden is especially important for the agricultural sector as it is dominated by small businesses. Regulatory burden is considered to have a significant and disproportionate impact on small businesses.

The benefits from reducing regulatory burden for farm businesses include increasing the proportion of time that is dedicated to productive activities.

As an emerging sector aquaculture is particularly vulnerable to high regulatory burdens. Further research is required in aquaculture-environment interactions, which can be used to inform science-based policy. [27]

Mackay Isaac Whitsunday regional stakeholders noted the need for a reduction in various red tape at a state and local government level. From state and local government development applications to food safety requirements, red tape restricts the expansion of their businesses. Green tape was also mentioned as an impediment to growth, particularly in limiting aquaculture development and productivity, but also with respect to sugar cane production under the upcoming reef regulations.

[25] Note that irradiation facilities (currently in Brisbane and Melbourne) are more cost efficient and are likely to be a preferred mode once export protocols allow.
[26] Intelligence provided by Garry Porter from Mackay Airport.
[27] Cobcroft, J., Bell, R., Fitzgerald, J., Dietrich, A. and Jerry, D. (Forthcoming), 2020. *Northern Australia aquaculture industry situational analysis: Stage 1 Report*. JCU, Townsville. https://crcna.com.au/sites/default/files/2020-01/CRCNA_AISA%20Stage_1_20200107.pdf

Biosecurity

Northern Australia, due to its large boarders and tropical climate, has a high risk of biosecurity incursions. There is potential for biosecurity failures to decimate an industry or seriously damage productivity and reduce Australia's access to markets. The current (and potentially expanded) industry in northern Australia is at risk from disease outbreaks caused by pathogens from endemic (existing and new) sources as well as exotic pathogens that are imported. The clean, green and disease-free status are key points of differentiation to the same species products from an overseas (e.g. Asian) market source. [28]

Coordinated response and management by individuals, industry[29] and government is necessary to manage biosecurity risks. Current policy and technical capacity are barely adequate for the existing industry and are without significant capacity development, which is a substantial risk for the industry. There needs to be a clear understanding in language/policy regarding the difference and particular issues for management of operational disease/health management versus incursion of a new, exotic, potentially catastrophic disease outbreak.

Changes in consumer tastes and preferences

In an information-driven world, changes in tastes and preferences dominate consumer behaviour. This may be diet and health concerns to social licence issues such as animal welfare, organic, genetic modification and sustainability. On the flip side, however, the majority of consumers continue to purchase based on price.

Agricultural industries are under increasing pressure to produce products that conform with social licence issues, which can increase the cost of production and price of products.

This is confounded further by issues around global food security and higher food demand in expanding markets such as the Asia Pacific region.

Key findings – data collection

Given the purpose and scope of this study, Figure 1.5 presents a gap analysis of the data collected throughout this process. It highlights where emphasis may lie for sector specific opportunities, or the development of business cases for the region in relation to commodities or supply chain nodes.

All data collected as part of this project is available upon request.

Data has been categorised primarily as good data, directional data, proportional data and limited data. Each is defined below:

- Good data: official statistics and/or robust and verifiable data suitable for use in scoping an investigation but not necessarily detailed enough for a business case.
- Directional data: a good understanding of the data flows (i.e. where the product travels from and to, but not necessarily volumes or frequencies) from reliable sources.
- Proportionate data: data which can be estimated based on good data but is not verifiable.
- Limited data: data that is suitable for testing ideas but is limited either in its availability or its reliability.

[28] Cobcroft, J., Bell, R., Fitzgerald, J., Dietrich, A. and Jerry, D. (Forthcoming), 2020. *Northern Australia aquaculture industry situational analysis: Stage 1 Report*. JCU, Townsville. https://crcna.com.au/sites/default/files/2020-01/CRCNA_AISA%20Stage_1_20200107.pdf

[29] NQBP has recently installed an early warning marine pest detection system in consultation with DAF relating to overseas ships visiting NQBP ports.

FIGURE 1.5 DATA GAP ANALYSIS

Supply chain segment	Sugar	Beef	Broadacre crops	Aquaculture - prawns	Mangoes	All other horticulture	Other green waste streams
Natural resources	Generic regional information						
Labour	Good data	Limited data	Limited data	Good data	Limited data	Limited data	Limited data
Capital	Limited data	Limited data	Limited data	Limited data	Limited data	Limited data	Limited data
Number of businesses	Good data	Good data	Good data	Good data	Good data	Good data	N/A
Production - output	Good data	Good data	Good data	Good data	Good data	Good data	Limited data
Transport	Good data	Directional data	Directional data	Directional data	Directional data	Directional data	N/A
Processing	Good data	Good data	Limited data	Proportionate data	Limited data	Limited data	Limited data
Sales - domestic	Directional data	Directional data	Directional data	Directional data	Proportionate data	Limited data	N/A
Sales - exports	Directional data	Proportionate data	Good data	N/A	Proportionate data	Proportionate data	N/A

SOURCE: ACIL ALLEN CONSULTING, 2019

Four key themes emerge from this analysis and provide direction for the growth and development of agribusiness in the Mackay Isaac Whitsunday region.

1. Building on a solid and diverse base to make the best use of existing assets and infrastructure will help minimise price volatility, fragmentation and structural change.

2. Capacity for growth provides options for adapting to threats and can be used to realise opportunities for collaboration with other regions and across sectors.

3. Collaboration will help to provide scale and continuity of supply which will in turn create market access.

4. Improving soft-skill capability will help producers navigate regulation, meet the market (adapt to consumer preferences) and provides options for adapting to structural adjustment or developing new markets.

Recommendations

This study takes a considered approach to regional agribusiness development so that the region can build on its strengths. Considered and incremental improvements are likely to yield greater benefits in the long run and save costs in the short run.

There is focus on making better use of existing and underutilised assets and removing key barriers as well as finding market solutions for growth and development within each core sector.

To enable these reforms, it is important the region develops leadership, capability and capacity as well look to work collaboratively within the region and across neighbouring regions.

The recommendations are presented in Table 1.4.

The study has allocated potential 'owners' of actions based on what is known and seeks further commitment and assistance from regional stakeholders to assist in identifying suitable partners for progressing the recommendations.

TABLE 1.4 MACKAY ISAAC WHITSUNDAY (MIW) PROPOSED RECOMMENDATIONS AND PATHWAYS

Key priority actions for sector development	Action owner and key partners	Pathways to implementation and time lines	Intended industry impacts
Structural support for future growth			
MIW Agribusiness Futures Committee A collaborative venture to support the MIW region agribusiness sector's growth and development. The members of the venture's committee will contribute to the identification of investment and management actions and seek the resources required to support agribusiness planning, infrastructure and marketing delivery. The committee will adopt a strategic focus on key priority industry sectors and common growth enablers identified in this and other studies.	GW3 RDA DAF Regional Councils Industry Peaks DSDMIP TIQ NQBP	Update the current Growing Greater Whitsunday Agribusiness Committee governance and operations by June 2020 to become the MIW Agribusiness Futures Committee. Instigate GW3 as the host of the group and project. Funding to support committee operations to be provided by GW3 and RDA and in-kind from committee members. Embed the results of the Phase 1 preliminary analysis into the broader management of the MIW Agribusiness Futures Committee, and develop and seek co-investment in Phase 2 regional market analysis. Have the other identified priorities in this report developed into projects with oversight by the committee.	This strategy will result in: • A more coordinated and delivery-focussed approach to managing agriculture related issues. Propose 1 FTE for working as a secretariat to the committee. • Strategic seed funding and staff in kind from MIW agribusiness stakeholders on the committee to further the agribusiness development agenda. Intended impacts include a substantive increase in the region's agricultural GDP and productivity.
Improved data collection mechanism for informed decision making Improve agricultural data collation, synthesis and management within the region. Priority should also be given to obtaining access to CSIRO's Transit Model. Assuming a quick establishment phase, data could be collected to inform the next phase decisions of the MIW Agribusiness Futures Committee.	GW3 RDA DAF Regional Councils	Determining a cost effective option for the region and any potential co-funding arrangements is the first step. Following this is a process of designing questionnaires and working out a sampling strategy prior to deployment. Data entry and storage as well as access arrangements should also be considered prior to data collection. Funding will need to be enduring to ensure data is collected with some frequency to create a valuable time series data set. From this there is further potential to improve and co-ordinate across regions and set up a Northern Australian data repository or knowledge library.	This strategy will result in: • Improving the currently limited availability of data across the regional supply chain (including connecting to wider sectoral studies and other regions). • More informed regional decisions. • Improved economic benefit from unconstrained decision making in agriculture (enabled by data).

Key priority actions for sector development	Action owner and key partners	Pathways to implementation and time lines	Intended industry impacts
Supply chain growth and development – all of region			
Regional marketing/branding – all products Design and develop a regional fresh produce brand for domestic and export purposes with focus on the region's natural beauty and other positively associated attributes that are in-line with global mega trends such as sustainable production. This can be done on a product by product basis or as a broader regional collective. There is likely significant benefit for horticulture and fish and seafood. It is important to align potential branding with market access arrangements to ensure maximum benefit. The benefits of a regional brand are expected to be smaller for bulk commodities like beef, sugar and crops. Consideration should also be given to a Northern Australia brand.	GW3 RDA TIQ DAF BGGA Horticulture Innovation Australia FRDC MLA GRDC	Following phase 2 analytical work on market demand, GW3 with the support of others should consider a business case for developing a regional fresh produce brand, and co-ordinate a marketing strategy to develop and promote the brand. This should take into account other comparative work in Northern Australia and any other Australian regions that are looking at marketing and branding either on a regional or product basis.	This strategy will result in: Increased growth and economic development for the MIW region as a whole. In addition to serving as an income source, agritourism and food tourism can benefit farmers by: • helping create name recognition for agricultural products • helping educate consumers about farming and the region • increasing incentives for the protection of natural resources and natural amenities, as these features are valued by visitors • generating 'spillover' economic development opportunities in rural communities. Implications of this for a region like MIW with an existing tourism brand value may suggest that the potential to leverage off tourism will mean a lower cost, higher benefit opportunity for MIW.

Key priority actions for sector development	Action owner and key partners	Pathways to implementation and time lines	Intended industry impacts
Transport infrastructure Continue to advocate for a clear prioritised and strategic package of investment in key last mile infrastructure such as road train type 1 or equivalent PBS heavy vehicle access in to, out of and through the MIW region. Ensure road infrastructure solutions consider appropriate integrated hub transport options to maximise efficient and effective freight road transport and its interconnection with port, sea, air and rail freight transports options. Focus is toward improved freight delivery speed and reducing cost of crops supply and farm inputs between farm gate to market and from input supplier to farm. Continue to advocate for road upgrades to reduce impact of flooding on freight movement and to decrease travel times for freight transport.	GW3 RDA Regional Councils DTMR NQBP	Through the Committee structure, work together to ensure that a complete and seamless route to port is available for road train type 1 or equivalent PBS heavy vehicle access. Targeted investment pathways include state and federal budget negotiations, ROSI prioritisation and targeted regional development and roads funding arrangements. Ensure road upgrades along the major arterial road connections running north south and east west are limited in impact from flooding.	The strategy will result in: • Continued supply of food and associated agribusiness production inputs during high rainfall periods or at least less lost road freight time and productivity in transport of goods north south and east west due to flooding of roads. • Significant productivity benefits for all industry in the region (e.g. fuel, sugar, grain, fertiliser and mining outputs). • Improved road safety outcomes by removing approximately 14,200 fuel transport heavy vehicles (28,400 single trip movements) off this road route each year due to increased payloads. • A reduction in heavy vehicle transport road route distances from and to the Port of Mackay. • Safer and more efficient and integrated freight road route network servicing the regional agricultural areas, service centres at Paget and the Port of Mackay.

Key priority actions for sector development	Action owner and key partners	Pathways to implementation and time lines	Intended industry impacts
Water Infrastructure Facilitate strategic and prioritised water storage development and rural best practice irrigation schemes along with the implementation of effective and efficient water use technologies and practices to support rural production growth and diversification. Priorities of additional water infrastructure include Urannah Dam, Connors River Dam, Stage 2 Burdekin Falls Dam and associated water supply and distribution into MIW region Consideration should be given to diversification of crops to ensure highest value farm production. This would mitigate products glutting domestic and export markets and ensuring products grown have a dedicated export market with agreed market access protocols.	Bowen Collinsville Enterprise State Govt Commonwealth National Water Infrastructure Fund	Conduct and continue a targeted strategy to advocate to ensure construction of water storage infrastructure and supply of cost-effective water allocation for rural production. The Commonwealth National Water Infrastructure Facility could be a key investment target. Bowen Collinsville Enterprise, Sunwater and DSDMIP have provided preliminary business cases for dam and associated water distribution schemes to the Commonwealth Government and State governments in 2019 that would benefit the MIW region. Continue to support and review these infrastructure projects and their suitability to support regional agribusiness GRP growth. Evaluate current levels of rural water use efficiency within major crops and the level of use of leading water application technologies with the aim of increasing improved irrigation practices and maximising water use efficiency per unit of production. Complete a water supply, connection and distribution strategy and plan for the MIW region which incorporates agribusiness production considerations and goals.	The respective water infrastructure and dam prefeasibility reports outline an aggregate of over $4.5 billion in investment. Construction of water infrastructure will result in 3500 full time jobs with an additional 300 jobs during operations aligned to the water infrastructure. The aggregate dam construction options also have the potential to support significant additional agricultural production. Once steady state production levels under the demand scenarios are reached, agricultural production is estimated to support on an ongoing annual basis: • Over $356.2 million - $734.8 billion in total industry output (including $270.9 - $558.8 million directly). • Over $199.9 - $412.3 million contribution to GRP (including $160.3 - $330.7 million directly). • Over $45.1 - $88.0 million in incomes and salaries paid to households (including $27.4 - $51.5 million in direct wages and salaries). • FTE employment totalling 748 - 1,543 jobs (including 499 - 1,029 direct FTE positions).

Key priority actions for sector development	Action owner and key partners	Pathways to implementation and time lines	Intended industry impacts
Potential for regional processing Explore and build collaborative arrangements with commercial operators and other stakeholders with the goal of establishing a future value-added processing capacity in the MIW region. This should link with the MIW Biofutures Strategy which gives consideration to the circulation of the product streams to drive a value rich environment (including waste streams and lower grade streams returning lower value prices).	GW3 RDA DAF DSDMIP Mackay Sugar NQBP Local industry groups TIQ Wilmar Sugar	Complete analysis of processing facilities options for respective agriculture commodity feedstocks. This should, for example, showcase the facilities available at Racecourse Mill and the Port of Mackay through cross industry channels (including outside agriculture) so that potential investors are aware of the advantages in locating their future businesses at the site.	An industrial biotechnology and bioproducts sector in Queensland could contribute $1.8 billion to Queensland's annual Gross State Product and support 6640 full-time jobs by 2035. MIW is well placed to capitalise on this opportunity given its proximity to sugarcane and other green 'waste' as well as having an existing site such as the one at Racecourse Mill. There are substantial financial and environmental benefits associated with locating refineries in cane-growing areas and being annexed to a sugar mill. These include large savings in transport and energy costs, considerably lower capital costs and reduced labour costs.
Supply chain growth and development - product specific			
Improve horticultural supply chain market access. Improve market access into high demand global markets ensuring diversified approach (i.e. not just Asian markets) to better manage regional risk. Market access protocols are the biggest limiter to direct export markets for horticultural products. Northern Australia needs a coordinated approach in conjunction with Horticulture Innovation Australia and the Commonwealth government.	GW3 Horticulture Innovation Australia CRCNA Commonwealth Government DAF BGGA TIQ Austrade	In potential collaboration with Hort Innovation, market access arrangements for MIW horticultural products should be progressed. This work should dovetail closely with findings of work funded by CRCNA (and conducted by QAFFI) on *Evaluation of the potential to expand horticultural industries in Northern Australia* due for completion in early 2020. There may be specific benefit in updating existing protocols to allow use of irradiation rather VHT technology to reduce costs to exporters (e.g. mangos). Technology is likely to continue to change so protocols should where possible be negotiated with enough flexibility to allow for the use of superior technology as it becomes available.	Improving market access arrangements for horticultural products will increase export potential and boost the value of the horticultural industry in the region. This strategy also has the potential to create value rich opportunities for 'seconds' products that are not marketable in Australia. For example, only 12% of Australian mangoes are exported with a total export value of $30.7 million. 70% by value and volume go to just four main markets (New Zealand, Singapore, Hong Kong and UAE). Negotiations are underway for access to the USA, Taiwan and India.

Key priority actions for sector development	Action owner and key partners	Pathways to implementation and time lines	Intended industry impacts
Horticultural supply chain collaboration and coordination Consider working beyond a local level aligning fruit (e.g. mangoes) with Northern Australia for coordination with tropical fruits and routes to export markets via Cairns. Further, vegetables for export should explore the potential of supply chain collaboration opportunities with other vegetable exporters further south, who also export via Brisbane. Noting that the region has seasonal advantage in domestic markets but not into Asia.	Australian Mango Industry Association (AMIA) Other industry groups CRCNA Advance Cairns Horticulture Innovation Australia DAF BGGA	AMIA should work with the CRCNA, Horticulture Innovation Australia and other tropical fruit industry bodies across Northern Queensland to investigate the potential to export all tropical fruits produced in Queensland ex Cairns, making use of the international airport and existing treatment facilities such as VHT facility at Mareeba.	This strategy will result in the potential to get the sector to scale which will enable increased export opportunities for the region and surrounding regions.
Fish and seafood Advocate for a whole of government regulatory review across the full suite of regulation and legislation that impact on commercial fisheries and aquaculture with an aim to streamline and harmonise regulation and legislation at a local, regional and state level to reduce red and green tape. This will increase business confidence, encourage investment and allow businesses to operate nationally. Within this context, State agencies to consider the benefits of institutionalising the regional presence of full-time DAF officers to support aquaculture business management through legislative approvals and planning processes.	GW3 DAF Other Queensland Government departments Regional Councils Commonwealth Government FRDC APFA ABFA	Regulatory reform is outlined by the FRDC as a key recommendation to government to enable Australia's fish and seafood sector to grow. This is further supported in the 2016 Productivity Commission report which highlights that regulatory burden, particularly with respect to development approvals and compliance with environmental standards, is especially problematic in Northern Queensland. All parties at a local, state and Commonwealth level should work together to reduce any impediment to aquaculture business development in Northern Australia, particularly the high environmental regulations for proximity to marine protected areas (e.g. for the MIW region the Great Barrier Reef Marine Park). This work should dovetail closely with findings of work funded by CRCNA, *Northern Australia Aquaculture Industry Situational Analysis* which identifies key challenges and opportunities facing the north Australian aquaculture sector.	The strategy will result in: • Continued sustainable supply of wild catch seafood from the MIW region. • Production growth for aquaculture in the MIW region is expected to be phased over 2 periods. 2019-2021: o Close to 3500 tonnes of prawns. o $200M new private investment for new development o 160 jobs during construction and over 350 during operations 2021-2024: o Over 25,000 tonnes of prawns o $Over $400 M private investment in new development o Over 1000 jobs during construction and operations.

Key priority actions for sector development	Action owner and key partners	Pathways to implementation and time lines	Intended industry impacts
Broadacre cropping Collaborate with grain production and export supply chains that operate across the Central Queensland and Mackay Isaac Whitsunday regions to create an alliance for increasing scale and improving regional processing opportunities (e.g. CQ Inland Port, Yamala).Grain production and exports operate across CQ and the Mackay Isaac Whitsunday region. This may also improve containerisation opportunities out of Gladstone. Identify pulse and grain cropping supply opportunities aligned to aquaculture expansion and directly aquaculture feedstocks. This would include a focus toward additional grains and pulse production supply, processing and storage infrastructure solutions and regional aquaculture feedstock processing infrastructure.	GW3 Graincorp GRDC CHAA NQBP CQ Inland Port Port of Gladstone	Formalise a collaborative supply chain alliance in the grains sector, working with CQ to integrate the Mackay Isaac Whitsunday broadacre cropping supply chain with the broader region. MIW to work with regional peak bodies, producers and feed processors to identify feedstock supply and processing opportunities in MIW region.	CQ Inland Port is strategically placed to maximise the efficiency of grain exports from CQ and surrounding regions including MIW with a state of the art Graincorp facility. Benefits include: • Improvement of significant volumes of commodities through a road to rail intermodal and bulk commodity facilities connecting to major ports of Brisbane, Gladstone, Mackay and Townsville. • Greater utilisation of rail investment for enhanced and more efficient freight transport outcomes. • Provision of infrastructure required for the movement of bulk and containerised freight from the site. • Increased inter-modal container traffic and benefits for the packing, storage and value adding activities across resources and agricultural sectors.
Sugar Support northern Australia wide completion of a sugar cane industry situational analysis study to verify industry trends, arrangements and constructs with the aim of supporting industry aspirations to deliver a shared industry, supply chain and community vision and strategy to 2050. Investigate and quantify opportunities for the sugar industry in the use of fallow land area each year to generate additional cropping solutions and increased production returns. This opportunity may include supply of grains and pulse feedstock for aquaculture feed production and supply.	SRA RDA Canegrowers Qld Canegrowers Mackay Australian Cane Farmers Association ASMC CRCNA	Working with the sugar cane industry to ensure the Northern Australian Sugar Cane Situational Analysis contains regional visions for key sugar growing areas including the Mackay Isaac Whitsunday region by 2030 and by 2050. A continuous improvement pathway and plan to transform from current operations and situations to the agreed future vision. This program would support industry in its ability to map out required industry reforms and supporting programs for growth and development.	This strategy will result in securing the future of the sugar industry and creating improved industry financial performance and farm level diversification opportunities to strengthen the resilience of canegrowers in the region.

Key priority actions for sector development	Action owner and key partners	Pathways to implementation and time lines	Intended industry impacts
Sugar Develop skills and training to build capability for existing sugar cane farmers and new entrants to sugar cane farming and to assist with succession planning. New entrants with new ideas can be ideal for the development of additional production from sugarcane and alternative crops.	SRA GW3 RDA Canegrowers DAF ASMC	Form a collaborative partnership with the sugar industry to ensure development of capability building and succession planning tools to assist new canegrowers, support existing canegrowers and assist those transitioning out of the industry.	The strategy will result in: • Increased ease of succession planning which will assist industry to transition to its next generation of farmers. • Industry wide evidence suggests: o 35% of sugar cane survey respondents through the Rural Industries Jobs and Skills Research Report (2016) found succession planning 'difficult' o 57% of sugar cane survey respondents were looking to retire in the next 5-10 years. • Skills identified in this report as 'in shortage' included IT and computer skills, accountancy and business and financial management.
Beef and cattle Collaborate with other regional beef and cattle supply chains to create an alliance with CQ and NQ. Beef production, slaughter and export, and cattle production and export operate more widely than just the Mackay Isaac Whitsunday region. Consideration of any new slaughter facilities or live export arrangements should take into account recent investment and capacity available in neighbouring regions.	Agforce ALFA MLA GW3 Advance Cairns RDA CHAA TEL	Working with CHAA and TEL to integrate the Mackay Isaac Whitsunday beef supply chain with the 'Collaborative Supply and Value Chain Cluster for the Beef Sector in 2020'.	This strategy will result in the potential to increase value add and export opportunities for the region and surrounding regions.

A

REGIONAL OVERVIEW

Eight per cent of Queensland's agriculture is produced in the Mackay Isaac Whitsunday region, with agriculture, forestry and fishing the 6th largest industry in that region. Other major industries include mining and services.

The region produces a diverse range of agricultural commodities. Gross value of production (GVP), however, is dominated by cattle, sugar cane, and tomatoes, which account for 78 per cent of the value of the region's total agricultural production. Other key commodities by value and volume include other horticulture (fruit and vegetables), broadacre cropping, and aquaculture (seafood and fish).

The Mackay Isaac Whitsunday region has a young population and is strong from a natural and human capital perspective. The tropical climate brings both positives and negatives. There are high degrees of risk around climate change and the potential for natural disasters, as well as negatives regarding biosecurity risks, generally high in tropical areas. The positives are associated with higher-than-average rainfall and the warm climate.

In the past decade, the region and surrounds have been affected by three severe cyclones (Debbie, Marcia and Yasi).[30] The risk of cyclones and extreme weather events is well understood by the industry, and established management processes are in place. Sugar cane in particular is resilient to extreme weather and is one reason why cane production dominates this landscape.

Output is solid in traditional products, but there is potential for exploring new and emerging product opportunities. This may include adapting to and capitalising on climate change (e.g. new crops or new crop varieties, aquaculture) as well as new and emerging markets using byproducts.

Natural resource and agricultural production base

The Mackay Isaac Whitsunday region is in Northern Queensland, north of Central Queensland and south of Townsville. It occupies 89,900 square kilometres, or 5 per cent of the area of Queensland (1,853,642 square kilometres). Isaac is the largest local government area (LGA) representing 65.5 per cent of the region in terms of size. Mackay is the smallest, with just 8.5 per cent of the region (refer Table A.1).

The land is considered fertile and productive relative to other regions and there is a potential advantage over other regions due to seasonal influences and land availability.

[30] http://www.bom.gov.au/cyclone/about/eastern.shtml#history

TABLE A.5 LAND AREA BY LOCAL GOVERNMENT AND AS A PROPORTION OF THE CENTRAL QUEENSLAND REGION AND THE STATE OF QUEENSLAND

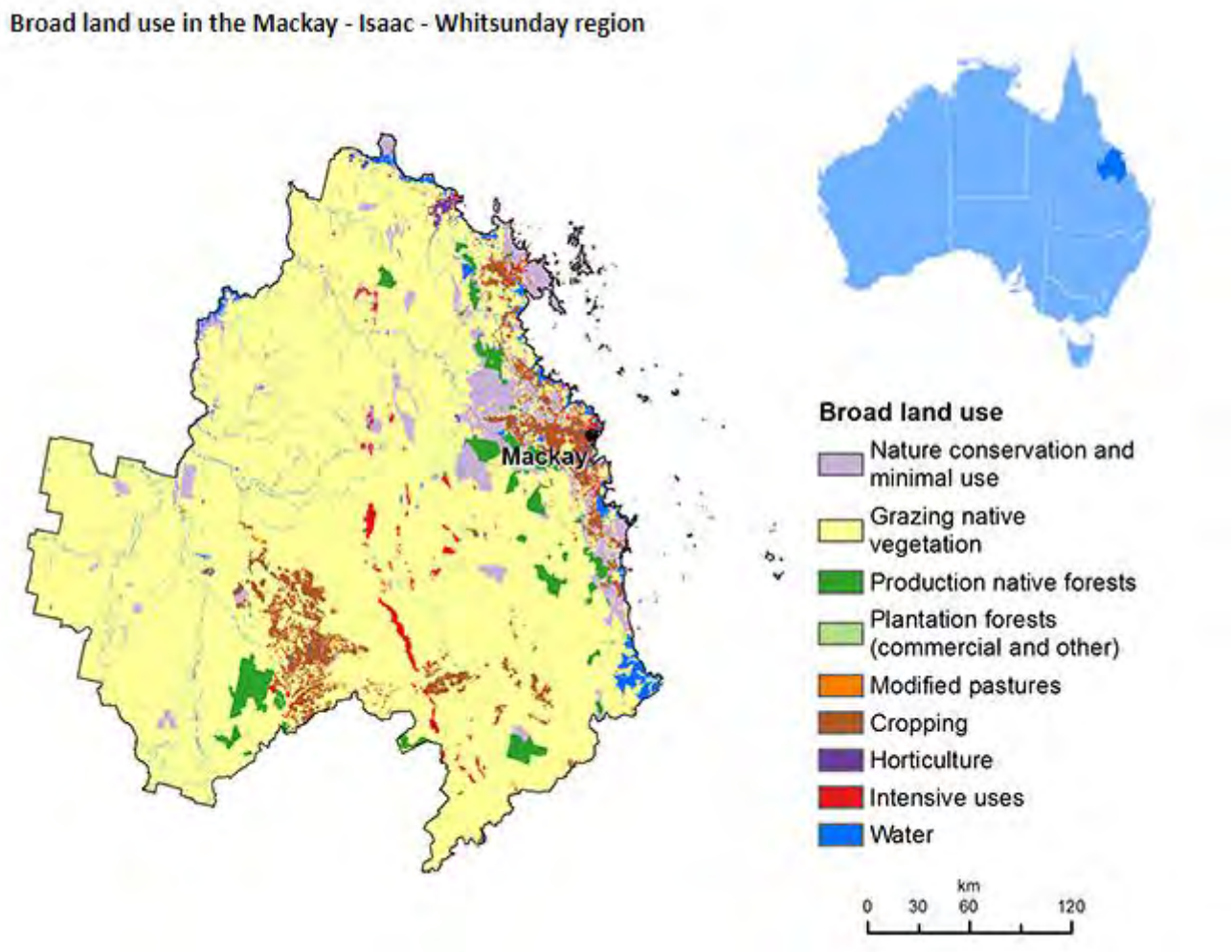
LGA	Area (square kilometres)	Proportion of region	Proportion of Queensland
Mackay	7,622	8.5%	0.4%
Isaac	58,862	65.5%	3%
Whitsunday	23,863	26%	1.6%
Mackay Isaac Whitsunday region	89,900	100%	5%

SOURCE: ABARES: VARIOUS

Most of the region (79,800 square kilometres or 89 per cent) is used for agriculture, predominantly grazing (47 per cent of the region) refer Figure A.1 . Mining is the second largest land use in the region.

Water resources are sparser further inland, with large resources around the Mackay and Whitsunday areas.

FIGURE A.6 REGIONAL LAND USE



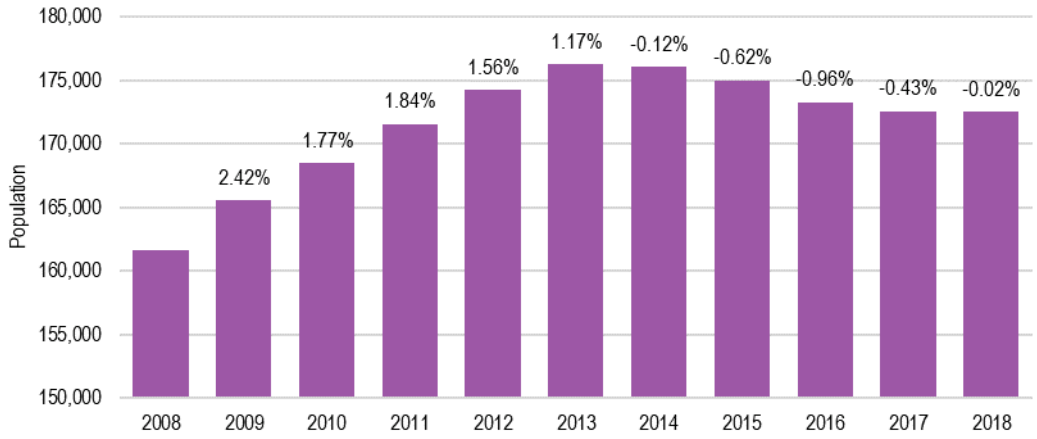
SOURCE: CATCHMENT SCALE LAND USE OF AUSTRALIA - UPDATE DECEMBER 2018

Human capital and the economy

The 2018 REMPLAN and 2016 Census data estimates that the Mackay Isaac Whitsunday region had a population of 172,523 , with a median age of 35, slightly younger than the Queensland median of 37. Since 2011, there has been a 3.4 per cent increase in population across the region. The Queensland Government Statistician's Office predicts that the regional population will grow by 1.1 per cent by 2041.[31]

Isaac is suffering a decline in population and higher education (refer Figure A.2 and Figure A.3). Educational levels have been rising in Mackay and Whitsunday. Weekly incomes have fallen in Isaac between 2011 and 2016, possibly due to the end of the mining boom, which may also account for the fall in population during the same period (refer Figure A.4).

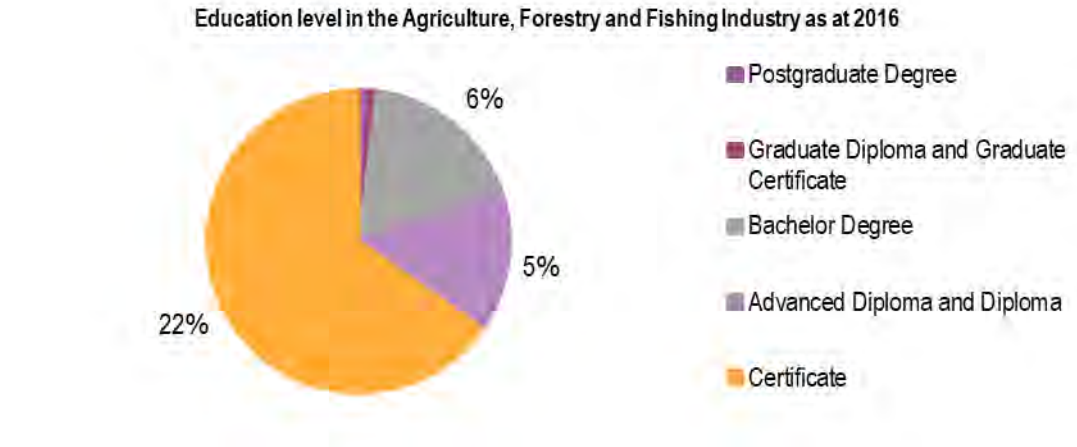
FIGURE A.7 POPULATION CHANGE

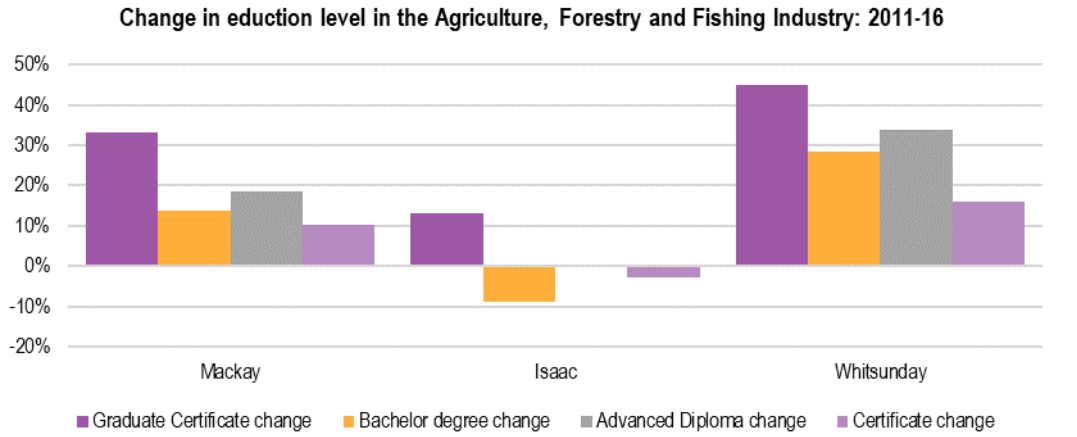


SOURCE: ACIL ALLEN CONSULTING BASED ON REMPLAN

[31] Queensland Government Population Projections, 2018 edition (medium series).

FIGURE A.8 SELECTED EDUCATION LEVELS

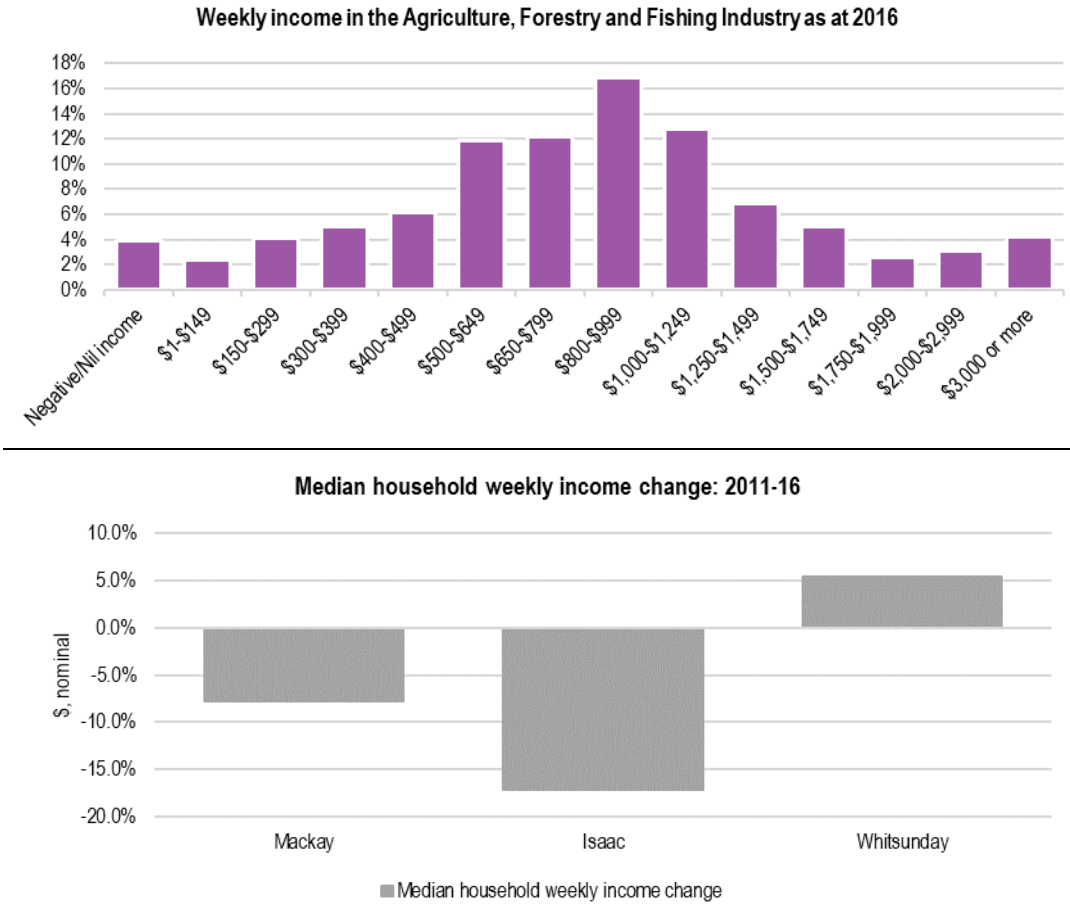




Note: 66 per cent of respondents selected education level 'not applicable' and about 5 per cent did not or inadequately stated their education level.

SOURCE: ACIL ALLEN CONSULTING BASED ON REMPLAN AND AUSTRALIAN BUREAU OF STATISTICS

FIGURE A.9 WEEKLY INCOME



SOURCE: ACIL ALLEN CONSULTING BASED ON REMPLAN AND AUSTRALIAN BUREAU OF STATISTICS

Agricultural industry – farms and businesses

In 2017-18 there were 1,855 farms in the Mackay Isaac Whitsunday region, each with an estimated value of agricultural operations of $40,000 or more[32]. The majority are sugar cane farms (1,148 farms) accounting for about 33 per cent of all sugar cane farms in Queensland. In 2016-17 approximately 35 per cent of all farms in the region accounted for 77 per cent of the total value of agricultural operations.[33]

At 3,337, or 22.1 per cent of all businesses, the number registered for the agriculture, forestry and fishing industry was considerably higher than the number of farms. This industry had the largest number of registered businesses as of 30 June 2018.[34] Across Queensland, only 9.2 per cent of all businesses registered are in agriculture, forestry and fishing.

Employment in agriculture (refer Table A.2) has been relatively stable in all regions, with a slight increase in Whitsunday.

TABLE A.6 TOTAL EMPLOYMENT IN AGRICULTURE, FORESTRY AND FISHING

Year	Mackay	Isaac	Whitsunday	Total Mackay Isaac Whitsunday region
2011 total employment in Agriculture, Forestry and Fishing	1,828	1,033	1,283	4,144
2016 total employment in Agriculture, Forestry and Fishing	1,844	1,041	1,463	4,350

SOURCE: ACIL ALLEN CONSULTING BASED ON REMPLAN AND AUSTRALIAN BUREAU OF STATISTICS

Table A.3 presents the major employer per LGA.

TABLE A7 REGIONAL EMPLOYMENT BY SECTOR (2016)

	Top Employer	Second highest Employer	Third highest Employer
Mackay	Mining	Health care and social assistance	Retail trade
	12%	11%	10%
Isaac	Mining	Agriculture, forestry and fisheries	Education and training
	38%	10%	7%
Whitsunday	Accommodation and food services	Retail trade	Agriculture, forestry and fisheries
	16%	10%	9%

SOURCE: ABS CENSUS DATAAND REMPLAN

In a further breakdown, the 2016 Census showed that 2.1 per cent of people employed in Mackay were employed in sugar cane growing.[35] In Isaac, 7 per cent of people were employed in specialised beef cattle farming[36], and in Whitsunday 2.7 per cent of people were employed in vegetable growing.[37]

[32] 7121.0 - Agricultural Commodities, Australia, 2017-18: ABS only reports data for farms with an annual turnover of $40,000 or more.
[33] ABARES, About my region – Mackay - Isaac - Whitsunday Queensland. See: http://www.agriculture.gov.au/abares/research-topics/aboutmyregion/qld-mackay#forestry-sector
[34] Queensland Government Statistician's Office, Queensland Regional Profiles: Resident Profile: Mackay Isaac Whitsunday, generated in September 2019 available at: https://statistics.qgso.qld.gov.au/qld-regional-profiles
[35] See: https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/LGA34770?opendocument
[36] See: https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/LGA33980?opendocument
[37] See: https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/LGA37340?opendocument

Infrastructure

Transport

Transport infrastructure is critical to agricultural production and distribution. Ports, airports, roads and rail provide the network for the dispersion of inputs and consolidation of outputs to market.

There are four strategic airports within the region - Mackay, Moranbah, Hamilton Island and Whitsunday Coast Airports; and three strategic ports - Abbot Point, Hay Point and Mackay. (Refer Figure A.5). The airports play an increasing role in importing and exporting agricultural produce, but most of the region's agricultural exports go through the Port of Mackay.

The Port of Mackay is Queensland's fourth largest multi-commodity port by throughput.[38] On the export side, it's the state's largest regional exporter of raw sugar and grain and the only exporter of refined sugar.[39] North Queensland Bulk Ports (NQBP)reports that current port trade is at half capacity. To bolster trade activity and therefore growth in the region, NQBP has committed to upgrading port facilities and progressing trade opportunities. Furthermore, $1.3 billion of government funding has been committed to upgrading road infrastructure, which will result in improvements in port transport corridors.[40]

The North Coast Rail line runs up the Queensland coast from Nambour to Cairns in the north. The line carries various freight products, including containerised freight, livestock, and commodities such as sugar and grain. Rail transport has room for improvement particularly with respect to flood points which occur near Bowen, Proserpine and Mackay.

[38] North Queensland Bulk Ports Corporation, https://nqbp.com.au/our-ports/mackay , accessed 28 June 2019.
[39] North Queensland Bulk Ports Corporation, https://nqbp.com.au/trade/trading-through-mackay , accessed 28 June 2019
[40] North Queensland Bulk Ports Corporation, https://nqbp.com.au/our-ports/mackay , accessed 28 June 2019.

FIGURE A.10 MACKAY ISAAC WHITSUNDAY REGION TRANSPORT ROUTES

SOURCE: REGIONAL TRANSPORT PLAN, MACKAY ISAAC WHITSUNDAY, 2018

The *Regional Transport Plan: Mackay Isaac Whitsunday Region (2018)* outlines the direction for shaping the region's transport system over the next 15 years. One of the main goals of the plan is to realise "diverse economic opportunities that complement the region's strengths, location and environment", which includes agriculture.

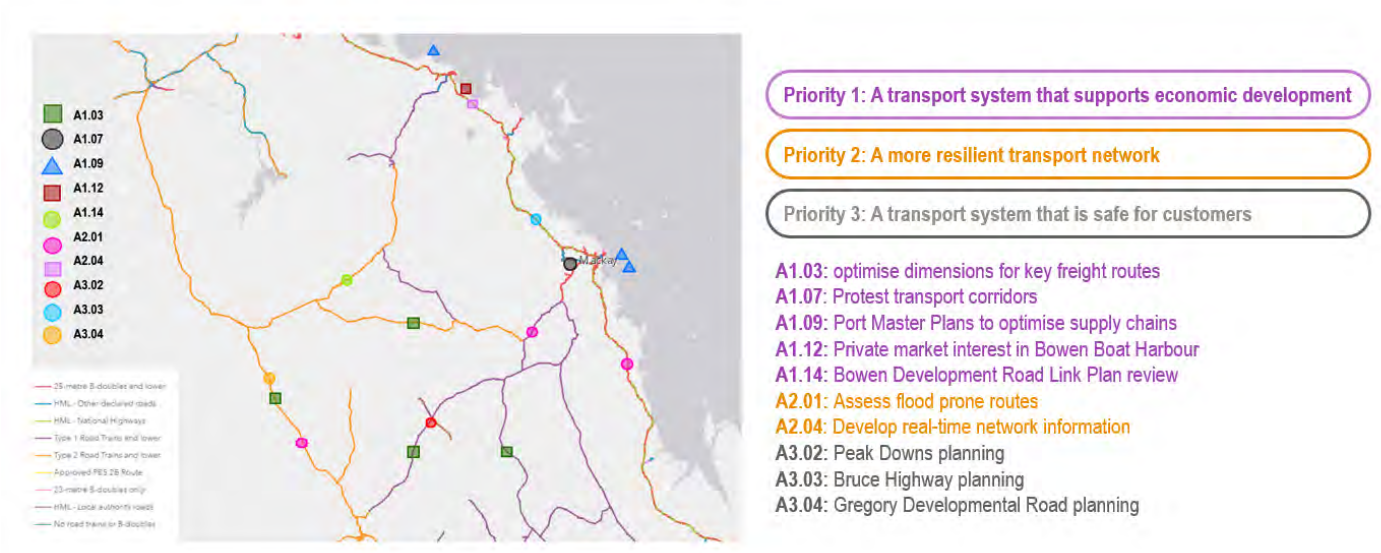
The *Regional Transport Plan: Mackay Isaac Whitsunday Region (2018)* clearly identifies agricultural productivity and supply chain efficiencies as a priority. Many large scale road projects have been undertaken or are committed to be undertaken soon (refer Figure A.6 and Box A.1).

BOX A.1 REGIONAL TRANSPORT PLAN: MACKAY ISAAC WHITSUNDAY

- Thomsetts Road upgrade — provision of overtaking lanes on the Bruce Highway between Mackay and Proserpine
- Dingo Creek and Emu Creek upgrades — construction of overtaking lanes on the Bruce Highway between Proserpine and Bowen
- Bruce Highway safety and capacity construction
- Sandy Gully Bridge upgrade to replace the existing bridge to improve flood immunity
- Gregory Highway, southern approach to Clermont — pavement widening works at various locations on the Gregory Highway as part of the Heavy Vehicle Safety and Productivity Program. This project is undertaken in partnership with the Australian Government
- Vines Creek bridges replacement on Slade Point Road
- Peak Downs Highway timber bridge replacements from Nebo to Mackay to replace timber bridges and approaches at Fiery Creek, Lonely Creek, Boundary Creek and Cut Creek, as part of the Bridges Renewal Program. This project is in partnership with the Australian Government
- Peak Downs Highway, Eton Range realignment. This project is in partnership with the Australian Government.

SOURCE: REGIONAL TRANSPORT PLAN: MACKAY ISAAC WHITSUNDAY REGION (2018)

FIGURE A.11 TRANSPORT PRIORITIES FOR MACKAY ISAAC WHITSUNDAY



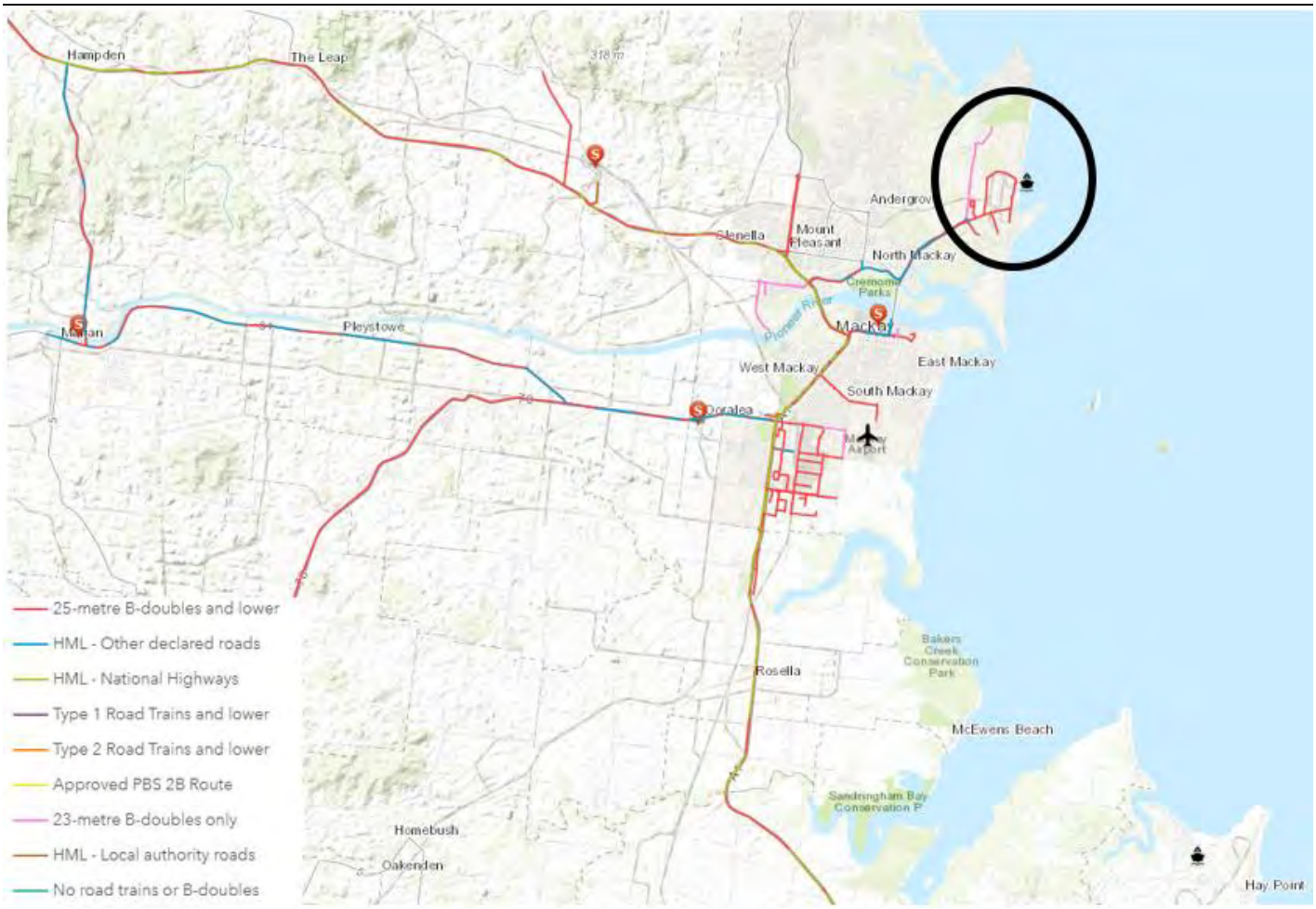
SOURCE: REGIONAL TRANSPORT PLAN: MACKAY ISAAC WHITSUNDAY REGION (2018)

There are, however, some remaining last-mile issues with respect to Mackay, specifically regarding access to the port as shown in Figure A.7.[41] The roads closest to the port accommodate trucks and trailers up to 25-metre B-doubles or lower. This restricts trailers under 9-axles. This limiting factor may mean it is preferable to transport south to Brisbane or north to Townsville where heavier trailers and road trains are accommodated, despite the high cost of transport, frequently raised as a constraint in the stakeholder consultations.

[41] Personal communication with Paul Coomer at North Queensland Bulk Ports.

It is expected that over time as transport is improved there will be considerable benefits across the supply chain.

FIGURE A.12 PORT OF MACKAY ACCESS ROADS



Note: Maps generated using ArcGIS online. The (S) icons represent sugar mills, co-generation plant and one generic icon representing the number of all businesses.

SOURCE: ACIL ALLEN CONSULTING

Water infrastructure

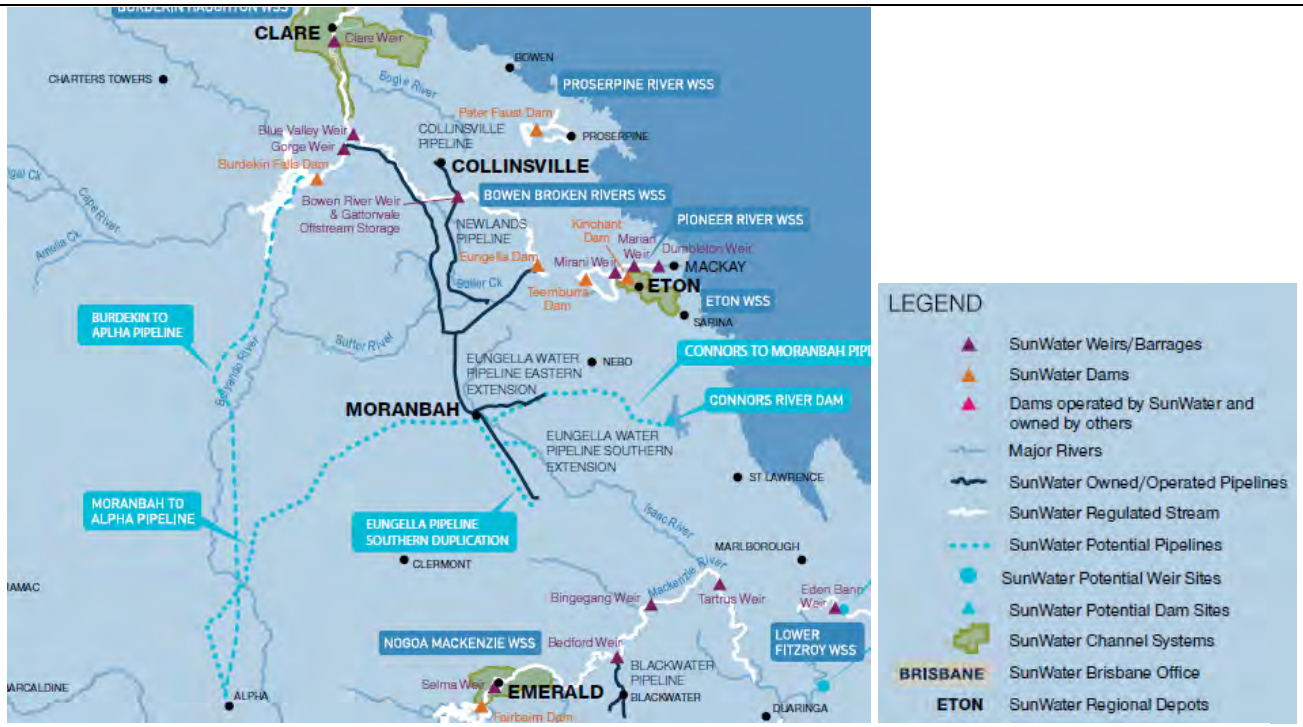
The groundwater and waterway systems that support the Mackay Isaac Whitsunday agricultural sector include several highly developed catchments with regulated flow, mainly as a result of cane farming. Management areas with high proportions of cane farming include Reliance Creek, Sandy Creek, Alligator Creek, Mackay City and Bakers Creek. Areas with flow regulation include Pioneer River and Rock Dam Creek. Refer Figure A.8.

Approximately 51 per cent of agricultural businesses in the region irrigate from a variety of sources, including the Sunwater controlled irrigation schemes[42], groundwater supplies and on-farm, dams and tanks. This is well above the state average of 30 per cent.[43]

In Mackay Isaac Whitsunday, the total volume of water used per business is significantly below state and national averages and highlights the need to develop an Mackay Isaac Whitsunday sustainable water supply plan to meet future agricultural expansion. There is evidence for sugar cane production that only 35 per cent of allocated water is used. [44]

[42] Pioneer River Water Supply Scheme, Eton Water Supply Scheme and Proserpine River Water Supply Scheme.
[43] Refer:
http://www.greaterwhitsundayalliance.com.au/Pubilications/2018005_004_GW3%20EDS%20Background%20Report_Aug%202018.pdf
[44] Stakeholder consultation

FIGURE A.13 WATER INFRASTRUCTURE IN MACKAY ISAAC WHITSUNDAY



Scheme	Related dam	Water Entitlements (GL)	Available Water (GL)	Water Deliveries (GL)	Temporary Transfers Purchase Volume (ML)	No. of customers	Available water (%)
Bowen Broken Rivers	Eungella Dam	38,930	38,930	14,099	294	50	100%
Eton	Kinchant Dam	62,563	62,085	24,420	887	327	99%
Pioneer River	Teemburra Dam	78,110	78,131	24,985	974	24	100%
Proserpine River	Peter Faust Dam	62,876	67,102	24,380	1,779	91	107%
Total Irrigation		**146,700**	**170,247**	**50,387**	**3,356**		
Total		**242,479**	**246,248**	**87,884**	**3,934**	**492**	

SOURCE: SUNWATER

Other facilities

A list of regional agricultural supply chain assets in the Mackay Isaac Whitsunday region is available in Appendix D of the 'Strategy Report'.

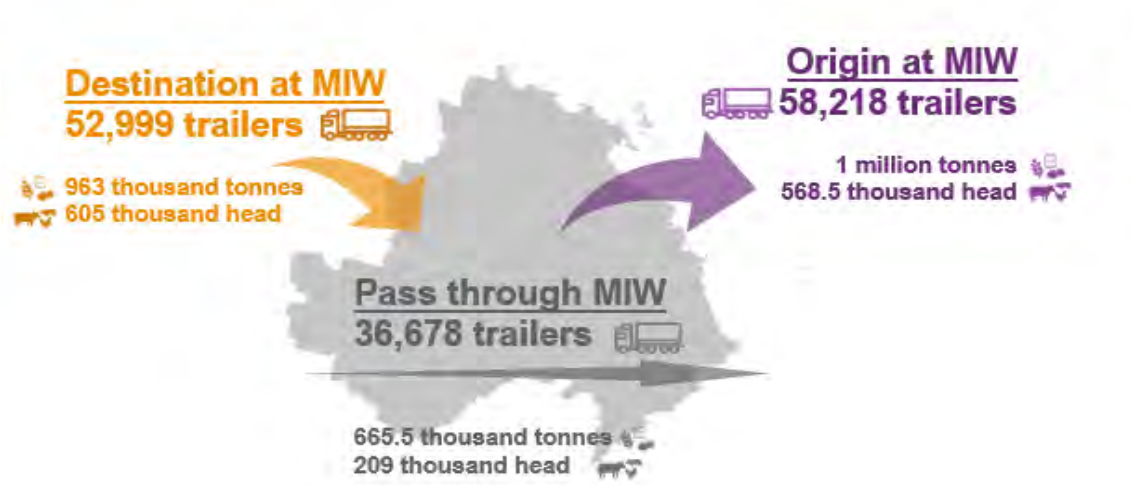
Regional routes to market

Movement of agricultural products are dominated by road.[45] The CSIRO's Transport Network Strategic Investment Tool (TraNSIT) model was applied to North Queensland Bulk Ports of Mackay and Weipa for existing supply chains and transport modes, examining future supply chain scenarios and transport options. It includes the total transport costs from farm to port, plus shipping to destination port for beef (processed and live), grains, pulses, sugar, and horticulture. The main findings for this research for

[45] Approximately 90% of cattle and beef travel by road; just over 50% of grains travel by road and 10% of sugar cane travels by road.

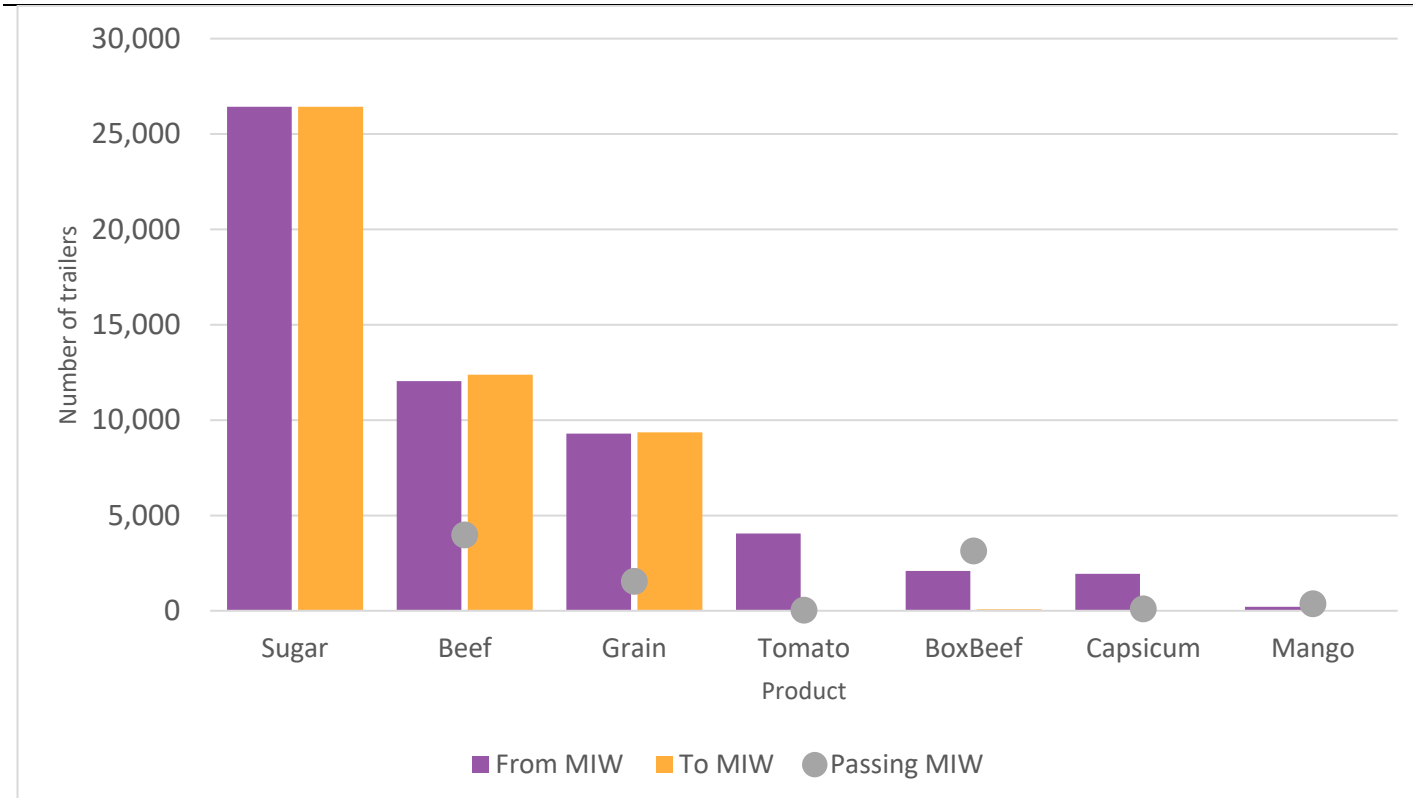
agricultural commodities in the Mackay Isaac Whitsunday are summarised in Figure A.9 and Figure A.10

FIGURE A.14 AGRICULTURAL PRODUCE BY ROAD IN AND THROUGH THE MACKAY ISAAC WHITSUNDAY REGION



SOURCE: HIGGINS AJ, MCFALLAN S, MALLAN E, COCCO R (2019) EVALUATING SUPPLY CHAIN OPTION FOR QUEENSLAND BULK PORT CATCHMENTS– APPLICATION OF TRANSIT. CSIRO, AUSTRALIA.

FIGURE A.15 ROAD TRANSPORT OF AGRICULTURAL PRODUCTS IN MACKAY ISAAC WHITSUNDAY



SOURCE: HIGGINS AJ, MCFALLAN S, MALLAN E, COCCO R (2019) EVALUATING SUPPLY CHAIN OPTION FOR QUEENSLAND BULK PORT CATCHMENTS– APPLICATION OF TRANSIT. CSIRO, AUSTRALIA

Markets

Domestic

With the exception of sugar and beef, the majority of agriculture and fisheries produce from the Mackay Isaac Whitsunday region is intended for domestic consumption. Official statistics combined with stakeholder consultations are reported in Table A.4.

TABLE A.8 REGIONAL PRODUCE FOR DOMESTIC V EXPORT USE

Commodity	Proportion domestic	Proportion export
Beef cattle	30%	70% (includes 10% live exports)
Sugar Cane	15%	85%
Horticulture	>90%	<10%
Broadacre crops*	40%	60%
Aquaculture, fish and seafood	>90%	<10%

Note: * This is a presentation of a typical year. Due to drought conditions across Australia the majority of grain produced is being consumed domestically.
SOURCE: VARIOUS

Exports

Export data is only available at a whole-of-Queensland level but some implications can be drawn regarding key markets for the major commodities produced in the Mackay Isaac Whitsunday region. The top five export countries by value for each of the major commodities is provided in Table A.5.

TABLE A.9 TOP FIVE EXPORT COUNTRIES BY VALUE PER COMMODITY (QUEENSLAND) 2017-18

Cattle	Sugar cane	Fish and seafood	Fruit and vegetables	Grains
Japan	Singapore	China	China	India
South Korea	South Korea	Japan	Vietnam	China
USA	New Zealand	Hong Kong	New Zealand	Bangladesh
China	USA	Vietnam	Singapore	Pakistan
Indonesia	Thailand	USA	India	Vietnam

SOURCE: HTTP://WWW.QGSO.QLD.GOV.AU/PRODUCTS/TABLES/TRADE-DATA-OVERSEAS-EXPORTS-COMMODITY-SITC/INDEX.PHP

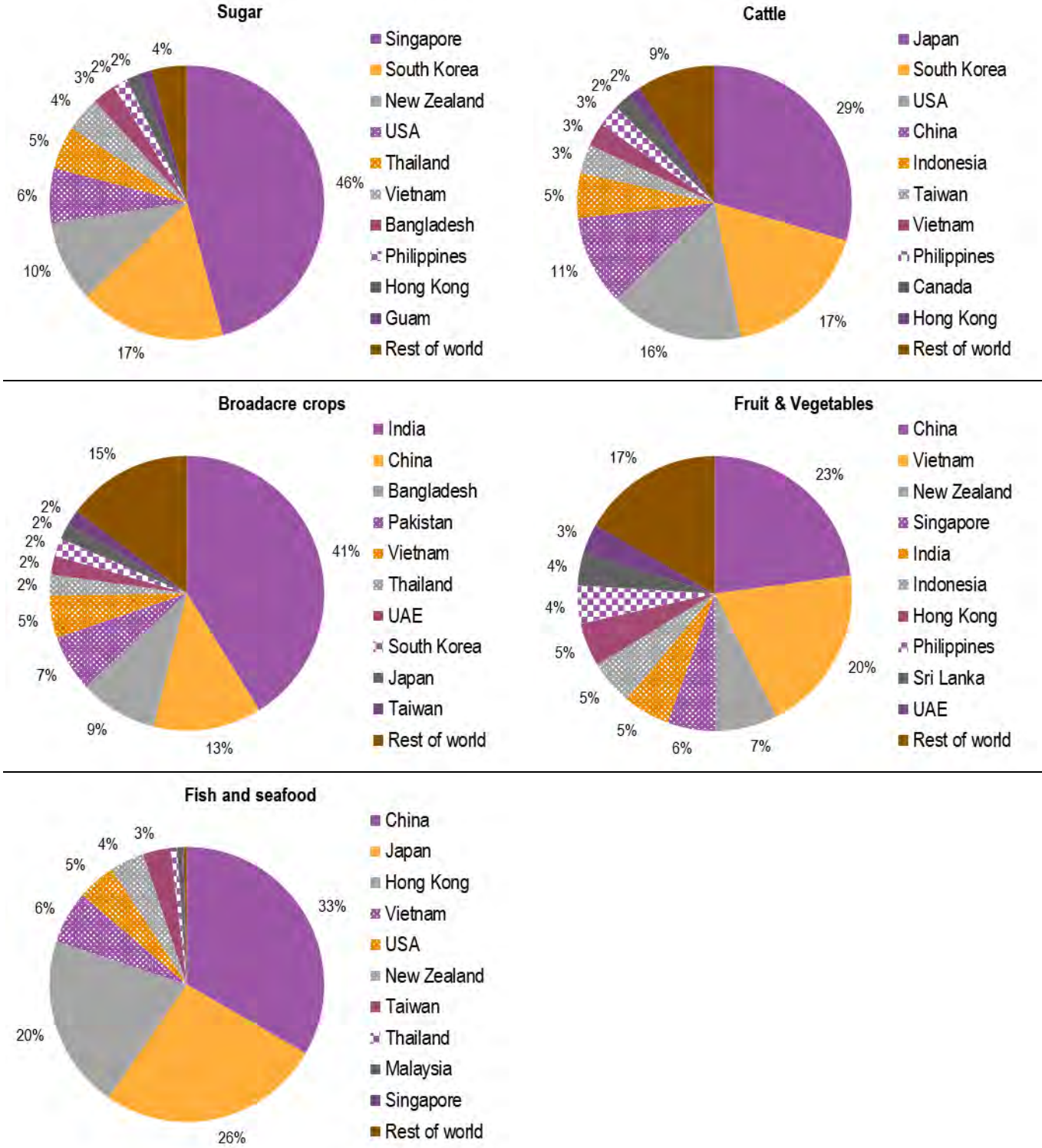
China and the USA are consistent high-value export markets for the major products produced in the Mackay Isaac Whitsunday region. Other Asian countries and New Zealand are close behind. China has been a huge growth market for fish and seafood as well as fruit and vegetables exports over the past three years (63 per cent and 258 per cent growth). Cattle has been steady at 17 per cent growth in the same period.

Figure A.11 displays the breakdown for exports by commodity type, while Figure A.12 looks specifically at mangoes and prawns. Generally, significant value is drawn from a single trading partner across all commodities. Over 46 per cent, valued at around $66 million in 2017-18, of total sugar exported in Queensland is sent to Singapore. A similar proportion of broadacre crops, valued at over $430 million in 2017-18, falling from a record high of over $930 million in 2016-17, is exported to India. Japan imports almost 30 per cent or $1.4 billion worth of cattle products (meat and live). As mentioned above, China is an important partner for fruit, vegetable, fish and seafood products, comprising about 23 to 33 per cent, respectively. This is equivalent to around $45 million for fruit and vegetable products and $28 million for fish and seafood products in 2017-18. Interestingly, China is not the largest partner for mangoes and prawns. Hong Kong is the leading buyer for mangoes in 2017-18 at around $7 million and Japan imported about $22 million worth of prawns.

Overall, Japan has been the highest ranked export partner for Queensland for the past three years due to billion dollar plus transactions of live cattle and meat, as shown in Figure A.13. This is followed

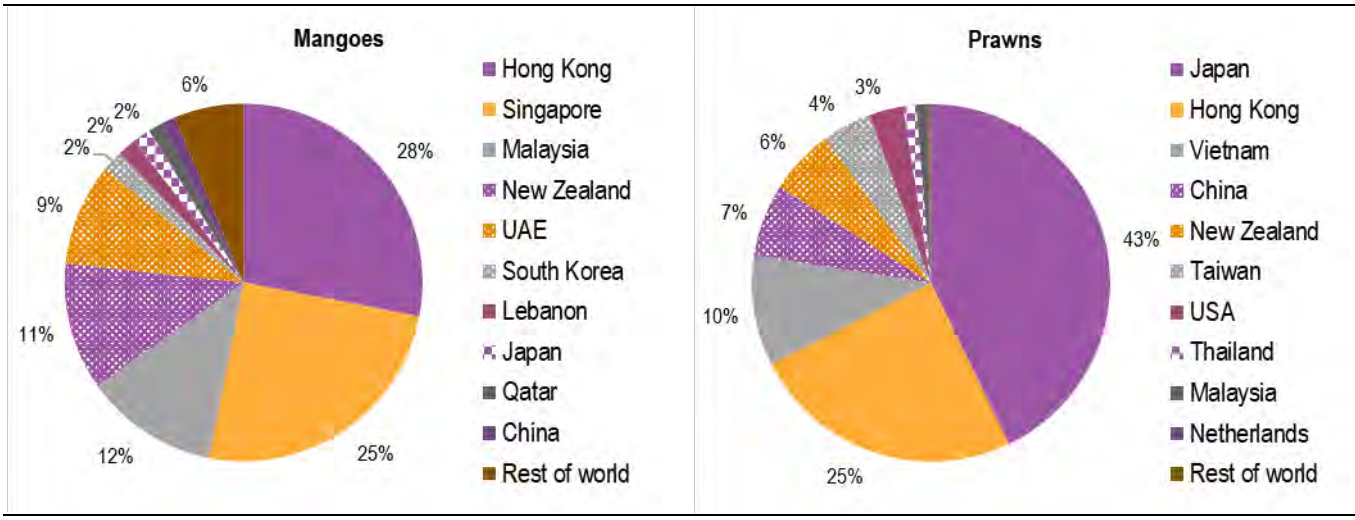
by South Korea and USA, which also trades a large amount of cattle product. China and India are also highly ranked export partners.

FIGURE A.16 EXPORTS BY COMMODITY (QUEENSLAND) 2017-18



SOURCE: QUEENSLAND GOVERNMENT STATISTICS OFFICE

FIGURE A.17 EXPORTS: MANGOES AND PRAWNS (QUEENSLAND) 2017-18



SOURCE: QUEENSLAND GOVERNMENT STATISTICS OFFICE

FIGURE A.18 TOP 5 EXPORT PARTNERS IN THE LAST THREE YEARS FOR SELECTED AGRICULTURAL COMMODITIES (QUEENSLAND)

	2015-16	2016-17	2017-18
Japan	1	1	1
South Korea	3	2	2
USA	2	4	3
China	4	5	4
India	5	3	5

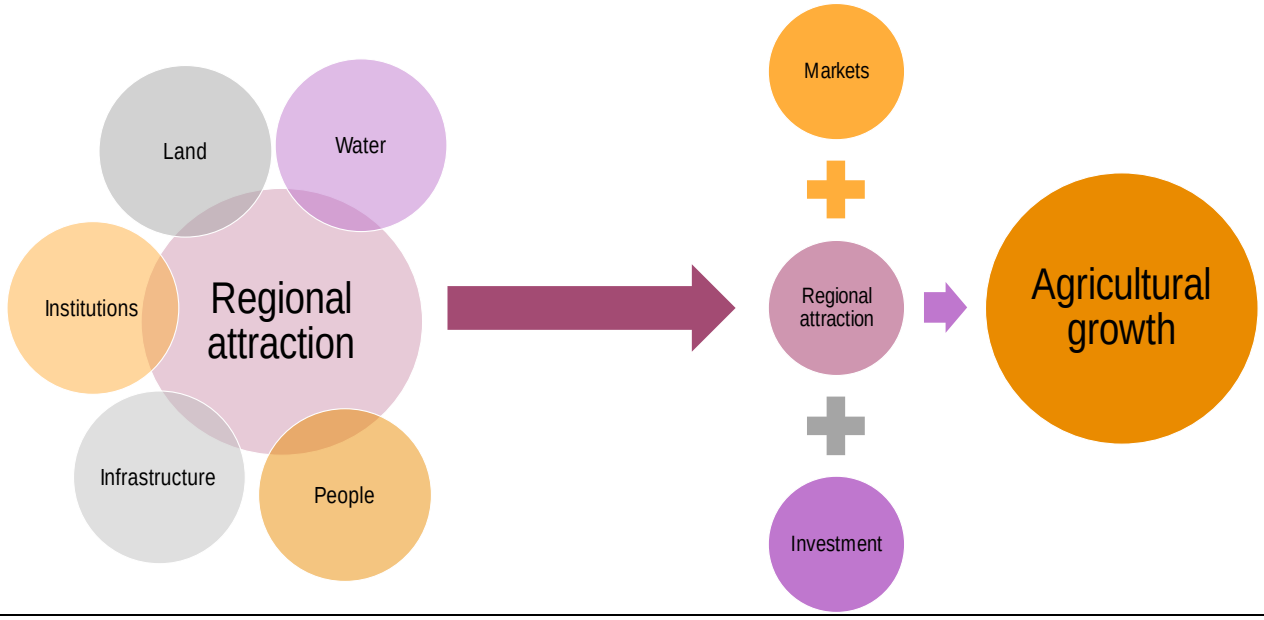
Note: Selected commodities include live animals, meat, food stuff for animals, dairy products, fish products, cereals, fruit and vegetables and sugar.

SOURCE: QUEENSLAND GOVERNMENT STATISTICS OFFICE

Drivers for growth and a comparative assessment

The attractiveness of a region is a multidimensional concept that lies on the intersection of the region's key resources, natural, human, physical and institutional. (Refer Figure A.14). There is a clear link between these resources and harnessing growth. When coupled with regional attractions in Mackay Isaac Whitsunday, and with the addition of markets and investment, this can drive agricultural growth.

FIGURE A.19 DRIVERS OF REGIONAL ATTRACTIVENESS AND AGRICULTURAL GROWTH



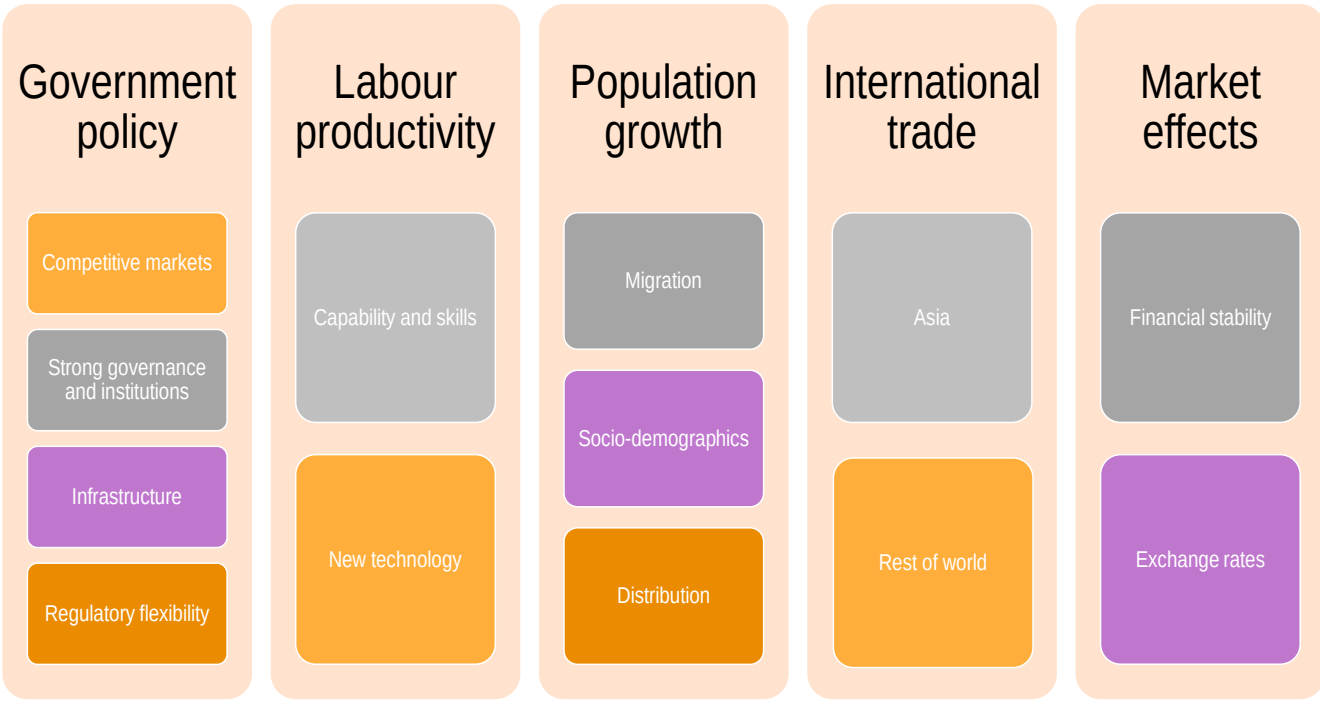
SOURCE: ACIL ALLEN CONSULTING, 2018

Aside from regional attraction, the factors that will contribute to agricultural growth in general involve fundamental considerations of economic growth:

- Competition
- Innovation
- Resource allocation
- Supply chain efficiencies
- Product development and utilisation (refer Figure A.15).

Many of these factors are outside the control of any one industry or any one region.

FIGURE A.20 GENERAL ECONOMIC DRIVERS FOR GROWTH IN AGRICULTURE



SOURCE: ACIL ALLEN CONSULTING, 2018

There are, however, distinct challenges and opportunities faced by agriculture more specifically.

Table A.6 shows where Mackay Isaac Whitsunday clearly demonstrates a positive effect related to agricultural growth factors relative to other parts of Australia.

Dark green indicates positive effects with comparative advantage, while yellow shows those factors where Mackay Isaac Whitsunday does not have a particular advantage.

This analysis suggests that relative to other regions, Mackay Isaac Whitsunday has an opportunity to build a regional brand, develop new products and technology and be supported by strong regional institutions.

TABLE A.10 THE POTENTIAL EFFECTS OF GROWTH FACTORS IN MACKAY ISAAC WHITSUNDAY RELATIVE TO THE REST OF AUSTRALIA

Factors of growth	Potential effect across Australia	Potential effect in Mackay Isaac Whitsunday	Comment
Challenges			
Water availability, access and use	Negative	Positive	Mackay Isaac Whitsunday has reasonable access to water through dams and schemes and has a relatively stable climate.
Climate change	Mixed	Mixed	Climate change can have both positive and negative effects depending on the commodity.
Biosecurity	Mixed	Mixed	Although there is a considerable downside risk of biosecurity incursions, there is the potential for better management of biosecurity to provide increased market access.
Land use competition	Negative	Negative	
High costs of inputs	Negative	Negative	
Domestic market retail price competitiveness	Negative	Negative	
Price volatility	Mixed	Mixed	Upside and downside risk with volatile prices.
Price takers	Negative	Negative	
Protectionist policies overseas	Mixed	Mixed	Generally downside risk, however there is potential to negotiate trade deals and other preferential treatment.
Consumer and social preferences	Mixed	Mixed	Can work in opposing ways and may have different effects dependent on the commodity.
Regulation	Mixed	Mixed	Regulation can impede or enhance growth, however reducing red tape can enhance growth.
Skills and capability	Positive	Positive	Improving skills and capability can provide opportunity for growth.
Opportunities			
Consumer and social preferences	Mixed	Positive	Creating a regional brand and promoting/marketing under this brand will potentially benefit the region.
Market access	Positive	Positive	Proximity to Asia, good route to port and regional airports.
Collaboration	Positive	Positive	Mackay Isaac Whitsunday LGAs have a demonstrated interest in collaboration in the region.
New products and technology	Mixed	Positive	Progressive LGAs can support and develop new products and technology when a market opportunity presents.
Institutional support	Mixed	Positive	Progressive LGAs can demonstrate leadership and advocate for broader institutional support.

SOURCE: ACIL ALLEN CONSULTING, 2019

B

COMMODITY SPECIFIC REPORTS

Beef cattle

Setting the scene

At 42 per cent of total agricultural value, or $474 million in 2017-18, beef cattle production is the largest agricultural contributor to the Mackay Isaac Whitsunday economy.[46] The industry is mature with 867 beef cattle businesses in the region. The larger businesses are more likely to be found in Isaac region although the Mackay area has more business with smaller herd sizes (refer Table B1.11).

Mackay Isaac Whitsunday is a high-volume beef cattle region in terms of total numbers (approximately 8.7% of the Queensland herd) and the numbers of animals that pass through the region on route to market. The Clermont Saleyards saw more than 70,000 head of cattle in the past year[47] with anywhere between 1,000 and 1,500 cattle transported per week.[48] According to stakeholders, cattle come to the region for finishing or feedlotting from as far north as Cape York and as far west as the Northern Territory.

Beef cattle processing occurs all year-round, but cattle movement typically occurs between March and November.

Data on slaughter is unavailable for the Mackay Isaac Whitsunday region, so figures have been derived based on the assumptions that:

- the region comprises of about 8.7 per cent of the total industry in Queensland
- the proportion of slaughter out of total herd numbers is the same in the region as at an aggregated Queensland level.[49]

An estimated 158,000 cattle and calves from the region were slaughtered in 2017-18, resulting in about 48,000 tonnes of meat.

The bulk of beef from Mackay Isaac Whitsunday is processed outside the region, predominantly in Central Queensland but as far south as Casino, NSW. Live exports travel north and out of the Port of Townsville or to Port Alma near Rockhampton.

[46] Australian Bureau of Statistics: 7503.0 - Value of Agricultural Commodities Produced, Australia, 2017-18; 7121.0 - Agricultural Commodities, Australia, 2017-18. This value reflects slaughter of cattle and calves only, so the value of live export is additional to this (this is currently not reported at the region level by the ABS).
[47] Due to rains in Far North Queensland this number is lower than usual.
[48] Personal communication with Isaac Regional Council.
[49] Calculated from 7121.0 - Agricultural Commodities, Australia, 2017-18.

Official data on beef exports are not available at a regional level, but Queensland level data indicates that 73 per cent of beef is exported to Japan, South Korea, the USA and China.[50] As a globally traded commodity, the world price of beef and live exports are an important determinant of the industry's value. According to stakeholders most beef exports go out of the Port of Brisbane due to the port's efficiency, the frequency of the shipments and its location relative to processing facilities.

Domestic product is generally distributed direct from processing facilities and arrangements are made between processors and wholesalers/retailers.

Analysis and recommendations

Supply chain capacity and constraints

Evidence suggests that production capacity could increase by as much as 20 per cent, assuming an increase in cattle numbers on existing grazing land.

Overall, the industry is expanding as expected future global demand is high. Three new feedlots and one abattoir are planned for construction in the region by 2022. This will include a newly approved custom kill abattoir on a farm in Moranbah, south west of Mackay. This facility is expected to have a throughput capacity of 35,000 head per annum.

There is a strong supply chain connection north, south and west, specifically with Central Queensland, the Central Highlands and Townsville. Mackay Isaac Whitsunday's strategic location in Queensland's beef cattle supply chain allows for greater collaboration, connectivity and integration such as locating feedlots closer to abattoirs to reduce travel time of live cattle. This is seen as an opportunity by stakeholders.

There are several cattle breeders in the region selling semen and embryos on both the domestic and international markets. The majority of this activity takes place via agents rather than direct and exports generally go via Brisbane or Sydney.

Labour is generally not considered a barrier on-farm but there are large numbers of vacancies at processing facilities around the country. There is anecdotal evidence that many existing abattoirs are not operating at capacity as a result of labour shortages.

By-products from feedlot and abattoirs are reasonably well established, and are used by producers and processors in several ways. Much feedlot waste such as manure or effluent is used on farm as fertiliser or for mine rehabilitation. There is evidence that while producing biodiesel from cattle waste is possible, it's generally not economic, mainly due to needing larger volumes of waste. Processed by-products can range from heart valves for surgical use, through to tallow (both of which are mainly exported), offal and blood for pet feed and animal supplements and hides for leather. Abattoir waste can also be converted to energy through anerobic digesters and other systems. The aim of many abattoirs is to make as much use of the animal as possible to maximise commercial gain.

In a highly competitive global environment, marketing points of differentiation is important for suppliers. The meat and livestock sector is forward-looking regarding changing consumer preferences and impacts of climate change, but a stronger and more unified marketing message is important for stakeholders.

Although it is a mature industry, stakeholders noted the importance of regional support and soft-skill development. Soft skills refer to things such as export literacy, financial and land management, and marketing and managing compliance.

Some regulation is seen as prohibitive to maintaining current production levels and to expansion. This includes the *Vegetation Management Act, Environmental Protection Act* (EPA) offsets. The vegetation laws were changed in May 2018, with increased protection for some habitats and waterways to the Great Barrier Reef. The EPA includes the requirement to purchase offsets when the natural environmental condition is changed. The updated reef regulations increase the minimum practice

[50] Source: Queensland Government Statistician's Office Trade data: http://www.qgso.qld.gov.au/products/tables/trade-data-overseas-exports-commodity-sitc/index.php

standards requiring beef cattle graziers to use measures to maintain the land in a good or fair condition. This does not require mandatory destocking at this stage.

There is potential for cattle and feedlotting to move out of the coastal zone and over the range. Given the smaller size of landholdings and herd sizes on the coast, and higher land values and land use pressures, this may be a logical progression over time.

Essentially, if production inputs are limited, production outputs cannot grow without increased efficiency at other points of the production process. The concern for graziers is that these regulations are prohibitive to expansion and do not fully recognise the negative implications such as higher cost and reduced global competitiveness. The benefits of the regulations, however, are the strong assurances they provide to the market in terms of animal welfare and sustainability, which could be promoted through marketing channels.

Figure B.21 presents the barriers and opportunities for the beef cattle industry in the region in the form of a SWOT analysis. SWOT describes the strengths, weaknesses, opportunities and threats.

FIGURE B.21 SWOT ANALYSIS: BEEF CATTLE

SOURCE: ACIL ALLEN CONSULTING

An industry infographic (Figure B.22), supply chain (Figure B.23), maps (Figure B.24 and Figure B.25) and tables (Table B.1 and Table B.2) present the key regional data for the industry collected through this project.

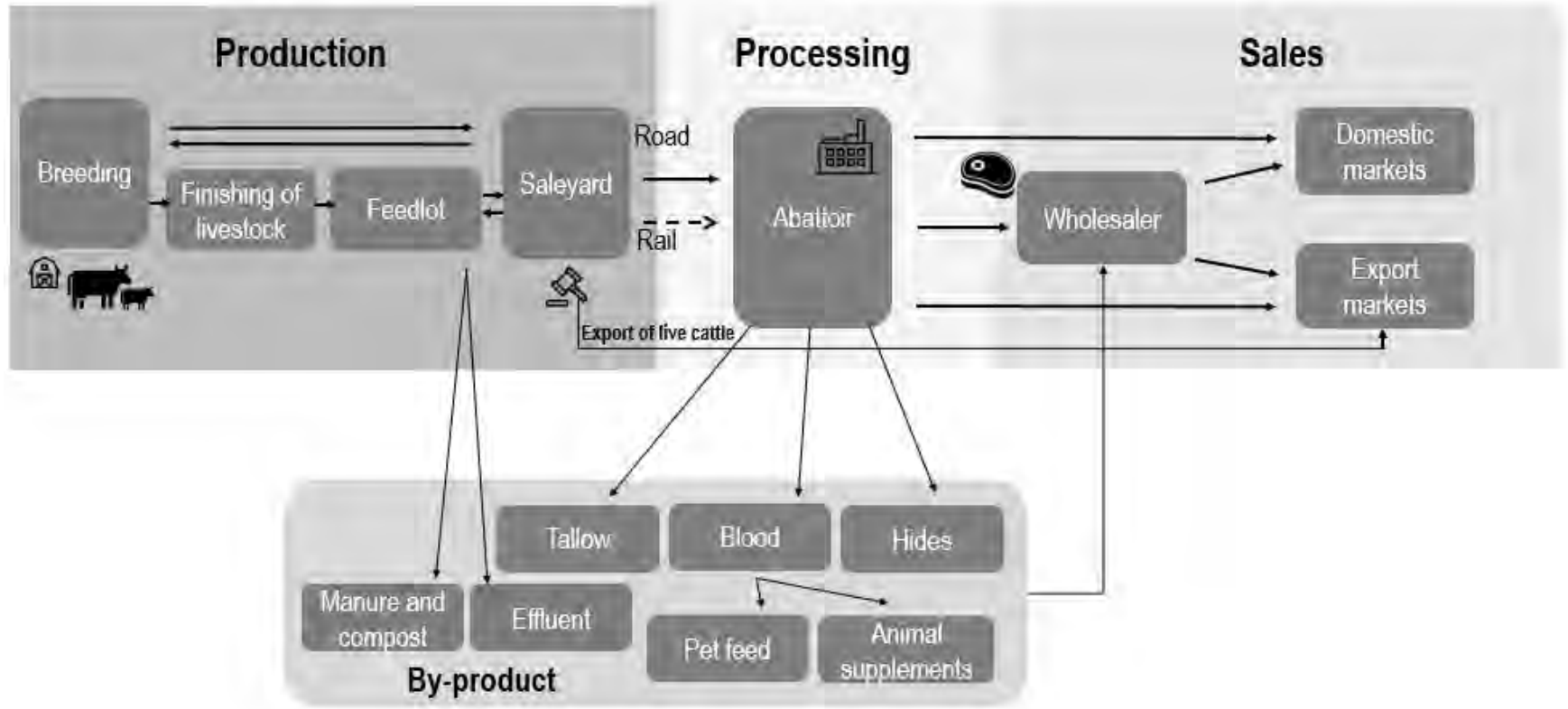
Detailed data is available in accompanying excel spreadsheet.

FIGURE B.22 INDUSTRY SNAPSHOT

Note: * 2015/16 data from Higgins AJ, McFallan S, Mallan E, Cocco R (2019) Evaluating supply chain option for Queensland Bulk Port catchments– Application of TraNSIT. CSIRO, Australia. ** Number of business may also include farms.

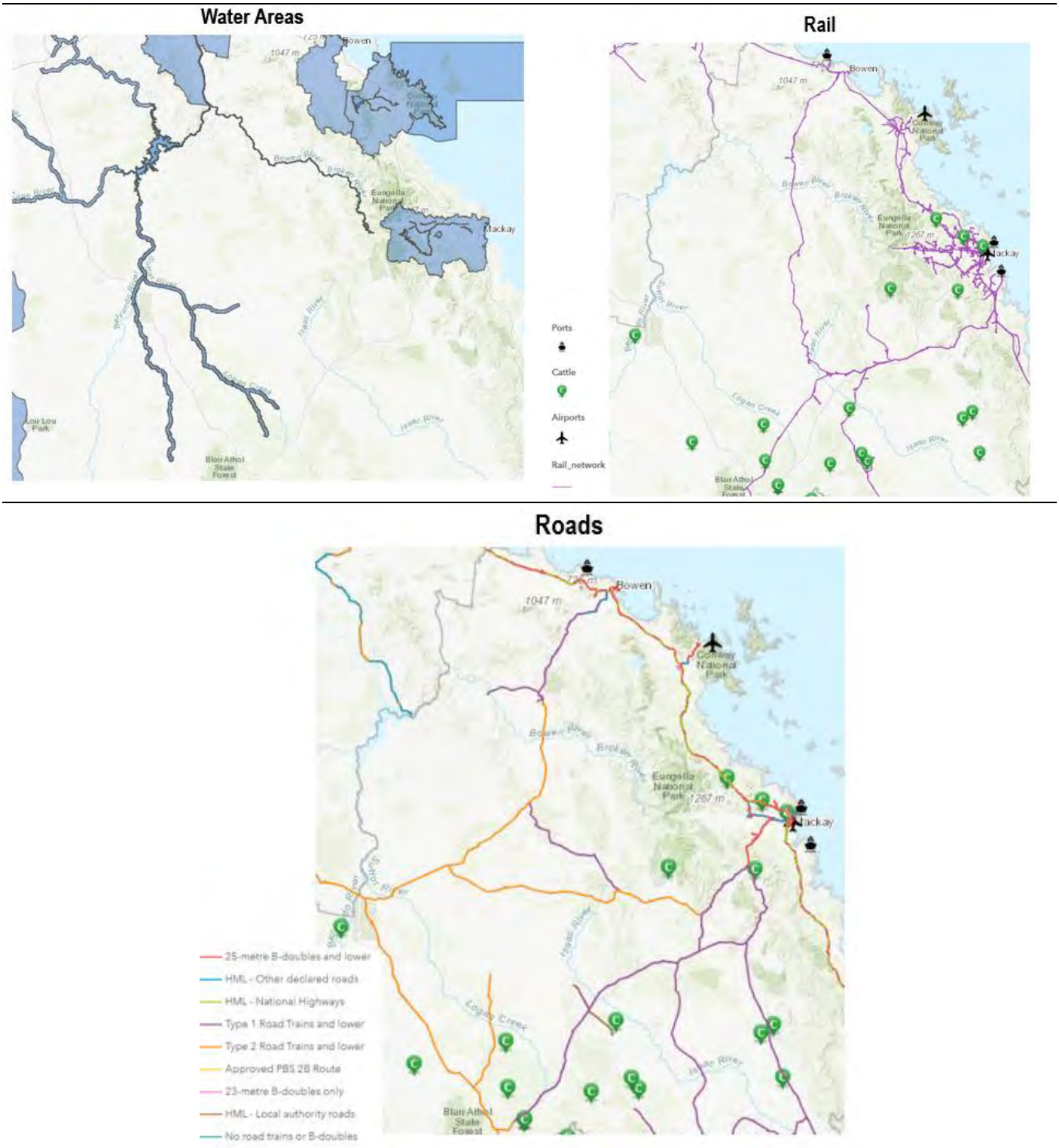
SOURCE: ACIL ALLEN CONSULTING

FIGURE B.23 INDUSTRY SUPPLY CHAIN



SOURCE: ACIL ALLEN CONSULTING

FIGURE B.24 RESOURCES AND INFRASTRUCTURE



Note: Maps generated using ArcGIS online.

SOURCE: ACIL ALLEN CONSULTING

TABLE B1.11 BEEF CATTLE BUSINESSES AND PRODUCTION BY LGA (2015-16)

LGA	Businesses	Cattle number	Slaughter value (m)
Mackay	351	92,213	$52.2
Isaac	363	866,158	$480.3
Whitsunday	153	221,587	$123.3
Total	*867*	*1,179,958*	*$655.80**

Note: as at 2015-16. LGA: Local Government Area.

*This value is significantly higher than the value of slaughter in 2017-18 which is due to changes in global beef prices and other environmental factors. Data on an LGA level is not available for 2017-18.

SOURCE: AUSTRALIAN BUREAU OF STATISTICS

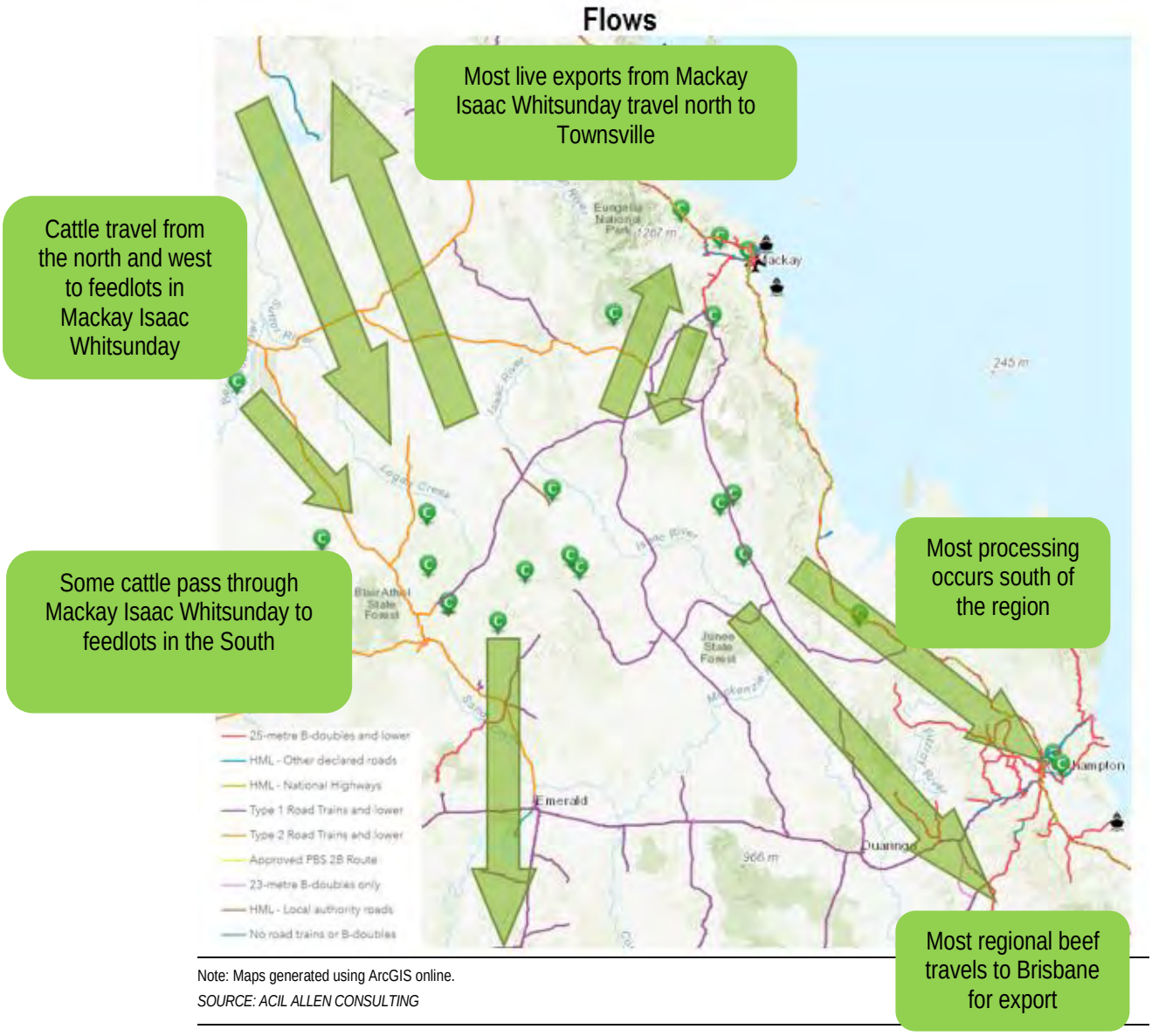
TABLE B.12 INDUSTRY ASSETS

Type	Description
Feedlot	Lotus Park
Feedlot	Barmount
Feedlot	Paringa
Feedlot	Glenmore Downs
Feedlot	Coovin
Feedlot	Glenlea Downs
Feedlot	Claver William Kenny
Feedlot	Laurel Hill
Feedlot	Sondella
Feedlot	Dysart
Feedlot	Tay Glen
Feedlot	Dysart
Feedlot	Kuttabul
Feedlot	Lotus Creek
Feedlot	Neerim
Feedlot	Carrinyah
Feedlot	Engedi
Feedlot	Sarina
Saleyard	Clermont
Abattoir	Borthwicks
Abattoir	Sondella

Note: While care has been taken to ensure this list is complete, there may be cattle industry assets in the region that are not represented in this list, alternatively there may be assets that are not currently in operation and there may be businesses registered but not located within the region.

SOURCE: VARIOUS SOURCES INCLUDING GOVERNMENT LISTS, ONLINE REGISTERS AND STAKEHOLDER CONSULTATION.

FIGURE B.25 INDUSTRY FLOWS



Note: Maps generated using ArcGIS online.

SOURCE: ACIL ALLEN CONSULTING

Sugar cane

Setting the scene

At about 30 per cent of total agricultural value, or $340 million, sugar cane production is a large contributor to the region's economy.[51]

Growing and harvest typically occurs from May to December, in 2017-18, more than eight million tonnes of cane was grown and one million tonnes of raw sugar was produced.

The region is the second largest sugar producing region in the country after the Burdekin region to the north. The climate and soil in the region is very suitable for growing sugar cane compared with other crops and other growing regions across the country. More than 35 per cent, or about 135,000 hectares, of all cropping land in the region [52] is used for sugar cane.

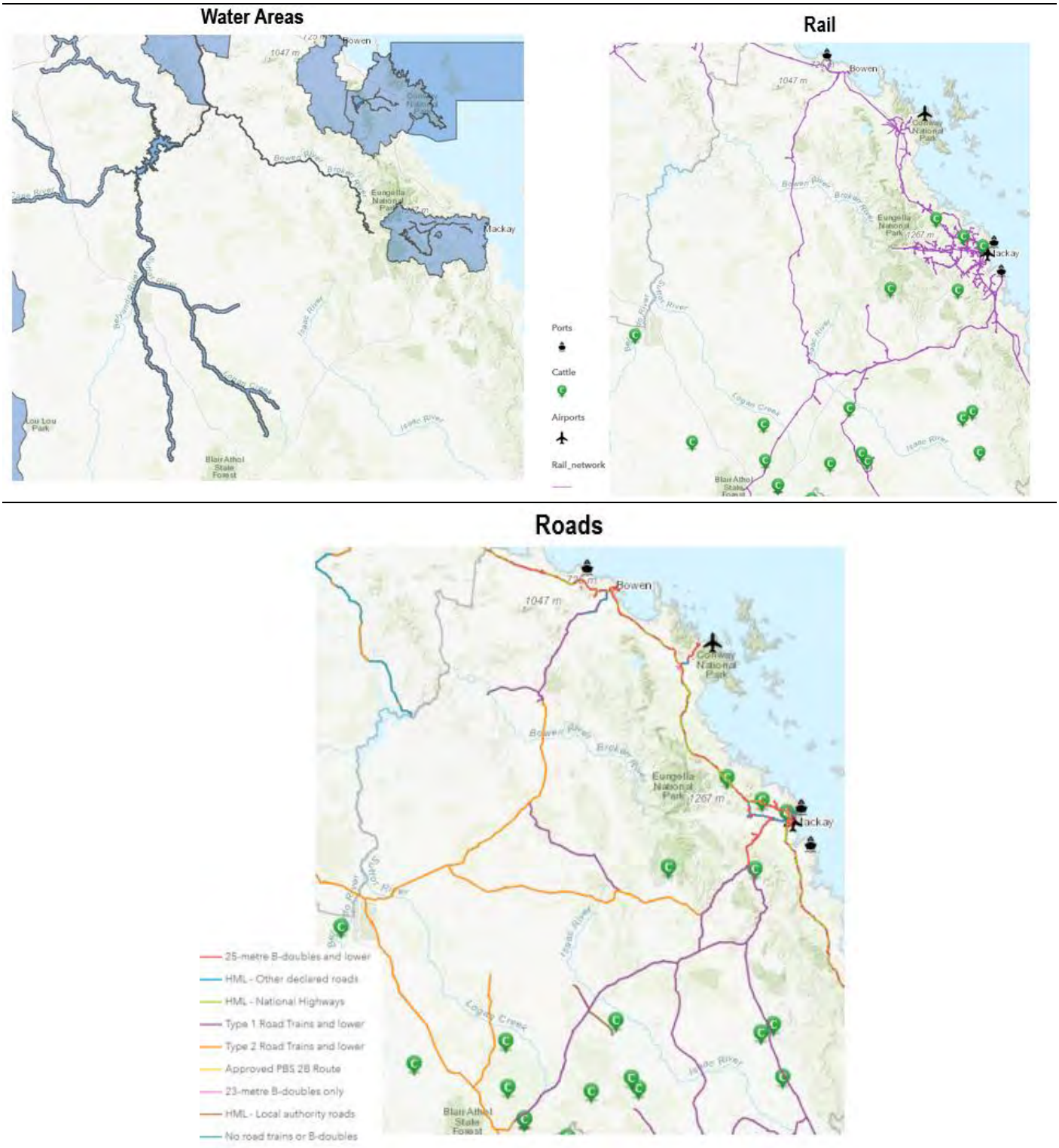
The soil is considered more conducive in Proserpine than the Burdekin area, but the Mackay Isaac Whitsunday region has less accessibility to water.

Mackay Isaac Whitsunday has over 1,100 cane farms and employs about 1,350 people, as shown in

[51] Australian Bureau of Statistics: 7503.0 - Value of Agricultural Commodities Produced, Australia, 2017-18; 7121.0 - Agricultural Commodities, Australia, 2017-18

[52] Australian Bureau of Statistics: 7121.0 - Agricultural Commodities, Australia, 2017-18

FIGURE B.24 RESOURCES AND INFRASTRUCTURE



Note: Maps generated using ArcGIS online.

SOURCE: ACIL ALLEN CONSULTING

TABLE B1.11. THE HIGHEST NUMBER OF FARMS ARE IN ISAAC, BUT THERE IS MORE PRODUCTION IN THE MACKAY AND THE WHITSUNDAY REGION. THE PROPORTION OF EMPLOYMENT SHIFTS AS THE SUGAR CANE LEAVES THE FARM, WITH THE HIGHEST NUMBER OF SUPPLIERS IN MACKAY.

Table B.12 lists the existing major assets. Output is relatively skewed with fewer than 10 growers producing 10 per cent of total output.[53]

Over the past 30 years there has been considerable consolidation in the industry with:

- a reduction in growers (estimated between 10 - 15 per cent)
- an increase in farm size
- some loss in cane growing area and crop size.

Production has declined by about one third over that period, forcing the closure of three mills.

Consolidation and structural change looks set to continue as cane growing is characterised by small landholdings and an ageing population. The average plot size is 30 hectares and the average age of a cane grower in Mackay Isaac Whitsunday is estimated between 65-70 years of age. Succession planning is a major issue for the region according to regional stakeholders.

As a globally traded commodity, the world price of raw sugar is an important determinant of the industry's value. Over the past five years price has been volatile with a variance of $200 per tonne. The indicative price of raw sugar is expected to rise in the short term. Demand, however, is expected to remain strong, particularly from South East Asia.

In the Mackay Isaac Whitsunday region, the transport of sugar cane to the mills and raw sugar to the refineries is primarily via rail.

As well as public rail, there is also the 'Cane rail', which is more than 1,000 kilometres long and in 2017-18 transported over 70 per cent of the 8-9 million of sugar cane produced. Transport via road increases post the milling process to transport raw and refined sugar. The map in Figure B.25 illustrates the directional flows for sugar in the region. Mackay is the core area with southern and northern flows from Proserpine and Sarina mills, respectively. Export flows are also represented. On average, over 600,000 tonnes would be transported via road per year, most of the road transport occurs from mill to port.[54]

Some sugar, around 15 per cent, leaves the region for domestic and export markets but the majority, about 85 per cent, is exported directly from the Port of Mackay. Almost 600,000 tonnes of raw and 280,000 tonnes of refined sugar were exported via Mackay in 2017-18.

The industry has been looking to diversify by reducing its dependence on raw and refined sugar, reducing the volatility in the market and anticipating changing consumer needs This may be product innovation[55] or providing assets and services to other industries within and external to agriculture. The industry aims to rely on sugar for just 50 per cent of its revenue.[56]

Current by-products of sugar cane production are molasses, mill mud (fertiliser) and bagasse (burnt for electricity generation). Molasses is used as animal feed and distilled to produce ethanol for fuel and other uses. Every million tonnes of sugar cane milled produces up to 40,000 tonnes of molasses and 90,000 tonnes of mill mud.[57]

[53] Stakeholder consultation – DAF, Mackay Sugar, Wilmar.

[54] S. McFallan, A. Higgins, C. Bruce and A. Bondarenco (CSIRO), Eddie Mallan (North Queensland Bulk Ports), 2019, *Evaluating supply chain option for Queensland Bulk Port Catchments – Application of TraNSIT*, CSIRO

[55] E O'Brien and T Campbell, 2019, *Final Report: Industry Priorities for value add & diversification opportunities in the sugar industry,* Lazuli Consulting

[56] Personal communication with Mackay Sugar suggests that currently raw and refined sugar are as high as 90 per cent of revenue.

[57] Australia Department of Infrastructure and Regional Development Freightline – Australian sugar freight transport

Analysis

Supply chain capacity and constraints

There is significant capacity in the sugar cane system from production through to processing. Production is restricted due to sub-optimal water use, small plots and an ageing population. Mackay Sugar notes that it has one million tonnes of spare capacity at its mills. There is spare energy, steam and facilities at Racecourse Mill that could be easily used by agricultural input, processing or other manufacturers including those suited to biofutures opportunities. Mackay Port has capacity both to store product and ship product overseas.

At any time, it is estimated around 15 per cent of the land, about 20,000 hectares, is fallow. Utilising this land, or any other land under sugar cane production, for alternatives has been tested but is not considered a preferable option. Yields for other crops are typically lower and the resulting moisture depletion and salinity causes problems for cane growing. Generally, the lot sizes are too small for graziers.

Another risk is the fragmented transition to the next generation of growers. The lack of posterity or succession plans was raised many times in the stakeholder consultations. While older farmers are preparing to retire, the low availability of replacement farmers, combined with the high costs to purchase farms, poses a large risk to this successful transition. Moreover, relatively small farms that produce less than about 15,000 tonnes per year are at risk of being commercially infeasible.

Along with high upfront purchase costs, the ongoing high water and energy during production pose a risk to viability. In addition to the cost of water, on-farm infrastructure is generally out of date and requires time, effort and capital that many older farmers are not able to provide. This means that some farms have less than adequate supplies of water and poor irrigation. The cost of energy can be offset somewhat using co-generation plants fuelled by the byproduct bagasse. The 38MW co-generation plant at Racecourse Mill can generate over 200GWh per year, depending on utilisation. Additional revenue is also generated from the plant as a participant in the National Electricity Market and Large-Scale Renewable Energy Scheme. With a value of bagasse at around $60/tonne and renewable eligibility, the plant can potentially meet the energy needs of a mill and earn millions of dollars in revenue from the electricity market and renewable energy certificates.

Over the past three decades, considerable resources have been allocated to diversifying through new products and utilising by-products (or waste) streams. The industry has extensive and sophisticated infrastructure assets that can be harnessed to develop and move these new product lines. These include the facility at Racecourse Mill in Mackay where researchers are based, and a co-generation plant fired by bagasse that powers the site.

Ethanol is derived from molasses at Wilmar's BioEthanol Distillery at Sarina, which produces about 60 million litres, with capacity for 300 million litres. Biodunder, a by-product from this process, is used as a liquid fertiliser. Mill mud is an important soil conditioner that is used in the region but is too costly to transport far from the mill. Mackay Sugar's Racecourse Mill co-generation plant has used bagasse for electricity generation since 2013. From a technological standpoint, there is still opportunity to expand the waste stream of sugar cane production. However, industry stakeholders see the low economic feasibility as a risk and a constraint. They cite the major reasons being the ethanol mandate effectively subsidising a non-existent domestic market and the lack of comparative advantage due to the high cost of transport to export markets.[58]

Figure B.21 presents the barriers and opportunities for the sugar cane industry in the region in the form of a SWOT analysis. SWOT describes the strengths, weaknesses, opportunities and threats.

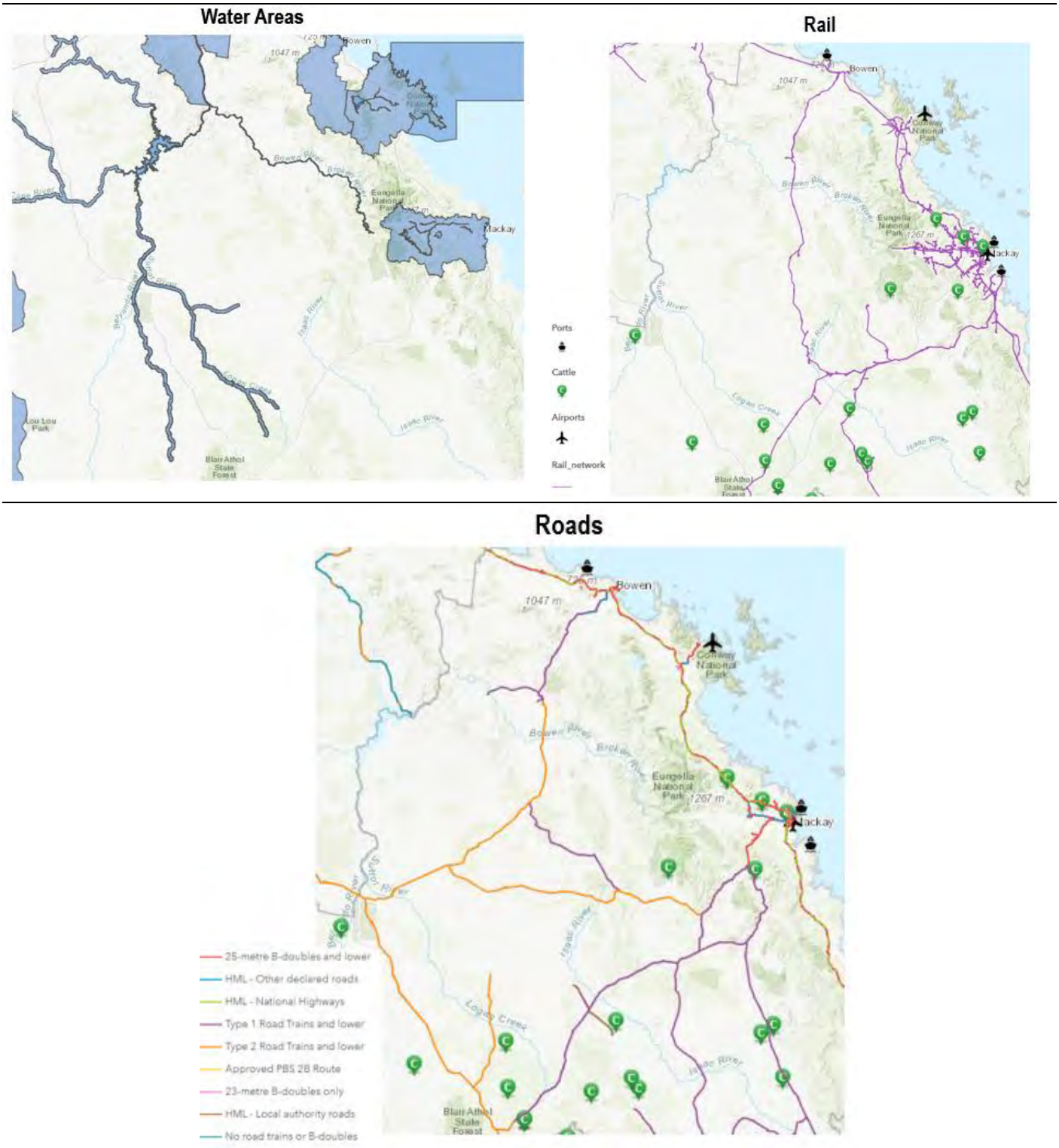
[58] Brazil is the largest supplier and exporter of ethanol.

FIGURE B.6 SWOT ANALYSIS: SUGAR CANE

SOURCE: ACIL ALLEN CONSULTING

An industry infographic (Figure B.7), supply chain (Figure B.8), maps (Figure B.24 and Figure B.10) and tables (

FIGURE B.24 RESOURCES AND INFRASTRUCTURE



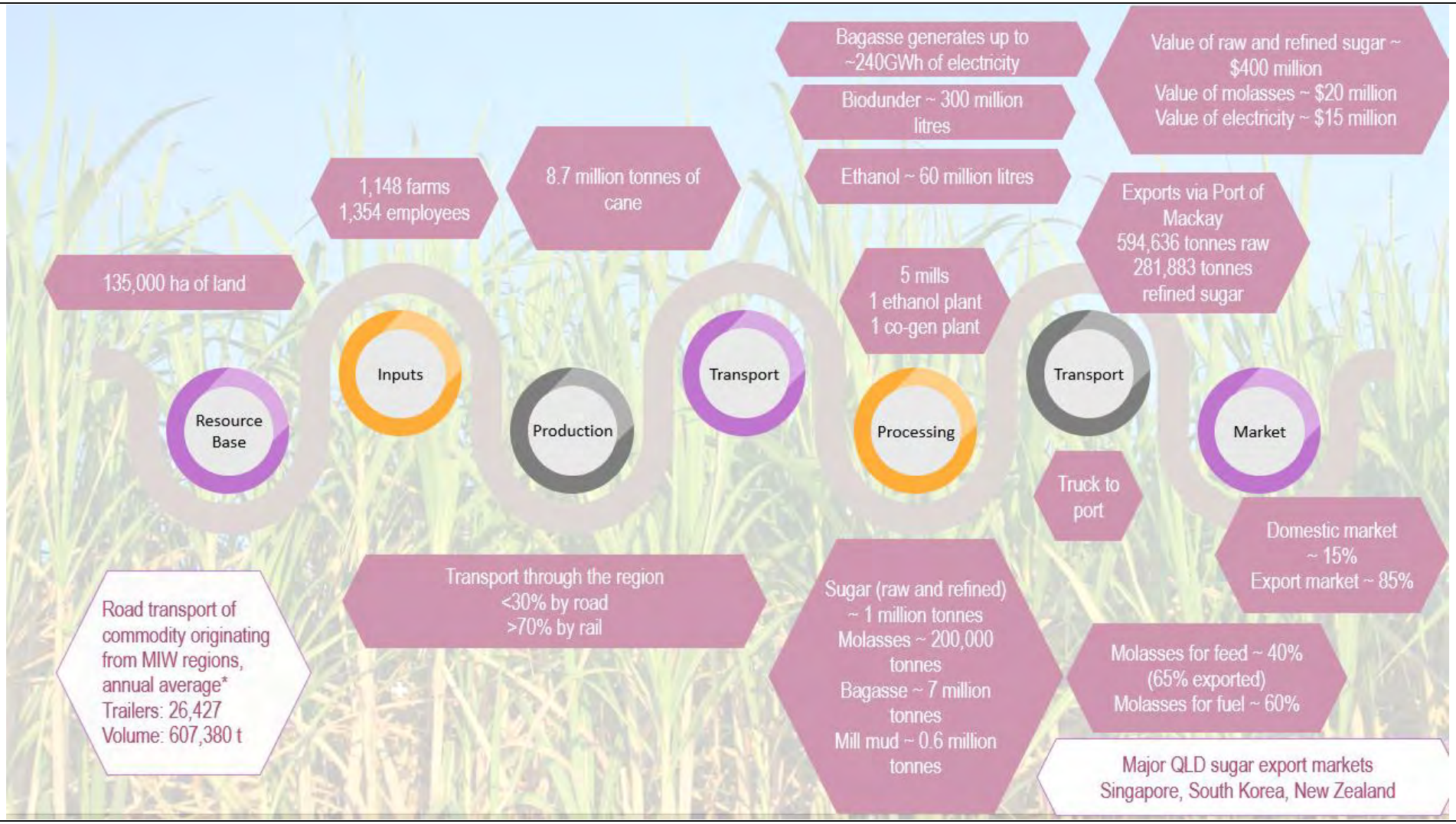
Note: Maps generated using ArcGIS online.

SOURCE: ACIL ALLEN CONSULTING

Table B1.11 and Table B.4) present the key regional data for the industry collected through this project.

Detailed data is available in accompanying excel spreadsheet.

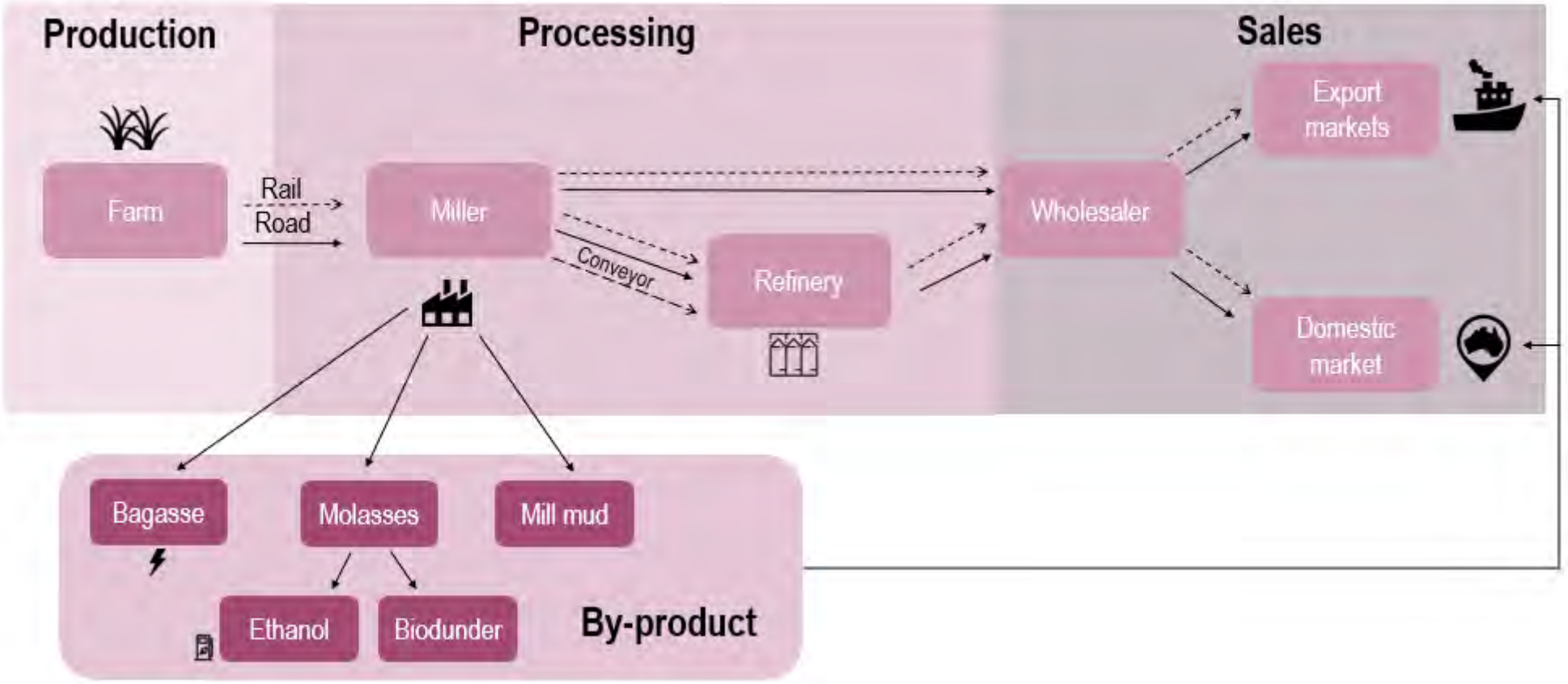
FIGURE B.7 INDUSTRY SNAPSHOT



Note: * 2015/16 data from Higgins AJ, McFallan S, Mallan E, Cocco R (2019) Evaluating supply chain option for Queensland Bulk Port catchments– Application of TraNSIT. CSIRO, Australia.

SOURCE: ACIL ALLEN CONSULTING

FIGURE B.8 INDUSTRY SUPPLY CHAIN



SOURCE: ACIL ALLEN CONSULTING

TABLE B.3 SUGAR CANE FARMS, EMPLOYERS AND SUPPLIERS

LGA	Farms	Employees	Suppliers
Mackay	62	50	1080
Isaac	921	1086	13
Whitsunday	165	218	94
Total	*1148*	*1354*	*1187*

Note: as at 2016-17. LGA: Local Government Area.

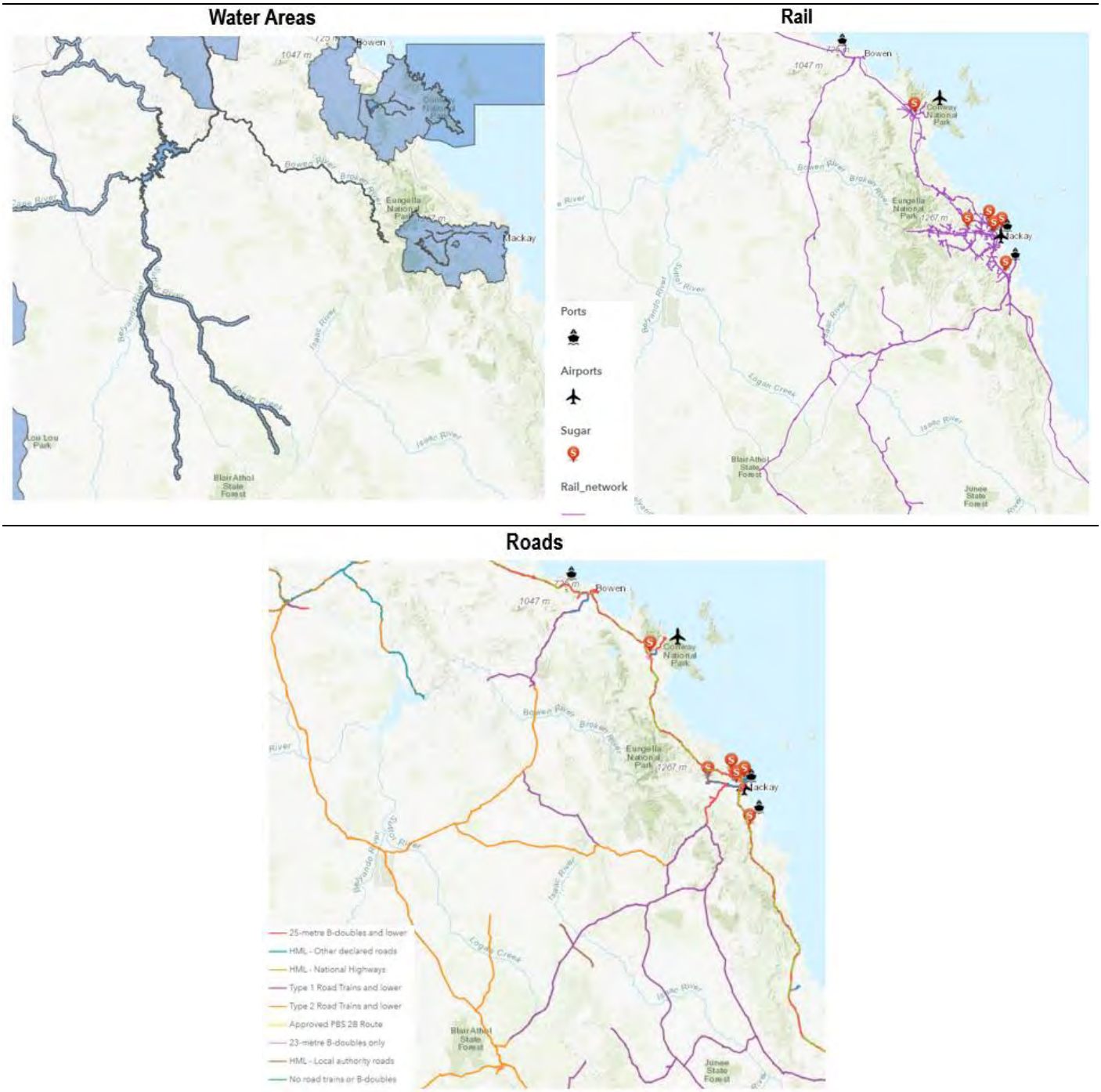
SOURCE: AUSTRALIAN SUGAR MILLING COUNCIL

TABLE B.4 INDUSTRY ASSETS

Type	Description
Mill	Marian (Mackay Sugar)
Mill	Farleigh (Mackay Sugar)
Mill	Racecourse (Mackay Sugar)
Mill	Proserpine (Wilmar)
Mill/Bio-ethanol plant	Plane creek (Wilmar)
Co-generation plant	Racecourse

SOURCE: ACIL ALLEN CONSULTING

FIGURE B.9 RESOURCES AND INFRASTRUCTURE



Note: Maps generated using ArcGIS online.

SOURCE: ACIL ALLEN CONSULTING

FIGURE B.10 INDUSTRY FLOWS

Note: Maps generated using ArcGIS online.

SOURCE: ACIL ALLEN CONSULTING

Horticulture

Setting the scene

For the purposes of this report, horticulture industry focuses on fruit and vegetables, with an emphasis on mangoes and tomatoes. Relative to beef cattle and sugar cane, there is less data available at a regional level for the fruit and vegetables sector; and where there is data available it tends to be inconsistent across sources. The main reason for this is that the horticulture industry consists of many different products and horticultural production is highly fragmented. This is true of horticulture across the country and is not specific to the Mackay Isaac Whitsunday region.

Horticulture is a growing and productive industry, conservatively estimated at contributing more than 10 per cent of the total gross agricultural value in Queensland. Table B.5 reports the official data from the Australian Bureau of Statistics and other data compiled by the Queensland Department of Agriculture and Fisheries.

Horticultural production is notoriously underestimated primarily due to the fear of competition between growers. This means that official surveys are not completed accurately leading to data that is not overly reliable.

During stakeholder consultation for this project, participants stated the data for area, production and consequently value of production were all underestimated[59], while the number of businesses in the region is likely overstated. This study estimates the number of growers is closer to 65, and not higher than 108. It is estimated there are up to 20 commercial (bulk) growers and many smaller farms. The geographic distribution of the industry is largely accurate and is highly concentrated around the Bowen Basin in the Whitsunday region.

The Australian Bureau of Statistics estimate the 2017-18 value of selected fruit (mandarins, oranges, mangoes, strawberries and bananas) in the region at about $5-$6 million, and selected vegetables (melons, pumpkins, sweet corn and tomatoes) at about $85 million, dominated by tomatoes.[60] The average returns compiled from five year data (2012 – 2016) by the Department of Agriculture and Fisheries results in substantially different values in the order of 2-3 times. The value of fruit (bananas, egg fruit, mangoes, melons) is estimated at around $53 million and vegetables (beans, capsicum, chillies, cucumbers, pumpkin, sweetcorn, tomatoes, zucchini and squash) at about $371 million. Findings from the stakeholder consultations place the overall value of the Mackay Isaac Whitsunday horticulture industry to be between $400-$450 million.[61]

[59] These reports were verified by several horticultural experts and other similar and recently completed studies conducted in the region including work done by the Whitsunday Regional Council in 2018.
[60] Australian Bureau of Statistics: 7503.0 - Value of Agricultural Commodities Produced, Australia, 2017-18
[61] This figure includes nuts, flowers and nursery products as well as fruit and vegetables.

TABLE B.5 CROP VALUE AND VOLUME (2017-18)

Fruit or Vegetable	Value ($m, ABS)	Volume (tonnes, ABS)	Value ($m, estimate)	Volume (tonnes, estimate)	Difference: Value	Difference: Volume
Tomatoes	$63.30	26,456	$178.00	89,900	*$114.70 (181%)*	*63,444 (240%)*
Melons	$10.99	14,997	$23.19	21,900	*$12.19 (111%)*	*6,903 (46%)*
Sweet corn	$7.20	3,833	$24.70	11,500	*$17.51 (243%)*	*7,667 (200%)*
Mangoes	$5.20	2,557	$25.48	14,700	*$20.28 (390%)*	*12,143 (475%)*
Pumpkins	$3.65	4,921	$13.05	16,800	*$9.40 (257%)*	*11,879 (241%)*
Strawberries	$0.13	22	nr	nr		
Bananas	$0.05	42	$0.00	0	*($0.05) (-100%)*	*-42 (-100%)*
Mandarins	$0.001	0.5	nr	nr		
Oranges	$0.001	0.4	nr	nr		
Capsicum	nr	nr	$76.15	34,952		
Beans	nr	nr	$66.69	35,100		
Chillies	nr	nr	$6.34	779		
Egg fruit	nr	nr	$4.98	2,083		
Zucchini & Squash	nr	nr	$4.36	2,400		
Cucumber	nr	nr	$1.84	840		

Note: *ABS Total will not add up to the same as is reported elsewhere in this report as ABS includes other fruit and vegetables in the total amounts but this data is not reported at a per crop level. Estimate is a five-year average from June 2012 to November 2016 complied by the Queensland Department of Agriculture and Fisheries based on data from Brisbane Market Information Services. Data provided by Queensland Agriculture Workforce Network via email 04/10/2019

SOURCE: AUSTRALIAN BUREAU OF STATISTICS: 7503.0 - VALUE OF AGRICULTURAL COMMODITIES PRODUCED, AUSTRALIA, 2017-18; 7121.0 - AGRICULTURAL COMMODITIES, AUSTRALIA, 2017-18, QUEENSLAND DEPARTMENT OF AGRICULTURE AND FISHERIES BASED ON DATA FROM BRISBANE MARKET INFORMATION SERVICES.

The region is the most northerly producing region for vegetables and one of the remaining areas for field crops. The climate and soils are well-suited, although access to water can be an issue. Harvest occurs mainly across spring and summer, which provides the region with a domestic seasonal advantage in vegetable production. Mangoes are typically produced during November and December. As a conservative estimate, more than 52,000 tonnes of fruit and vegetables were produced in the region in 2017-18.[62] However, this number could be as higher 230,000 tonnes.[63]

Most fruit and vegetables grown in the region appear to be transported via road south to Brisbane to market wholesalers, distributors and export agents.

About 148,000 tonnes of horticulture produce is estimated to be transported from the region via road annually.[64] Almost another 280,000 tonnes are estimated to pass through the region en route to markets in the south.

The majority of product (>90 per cent) grown in Mackay Isaac Whitsunday supplies the domestic market. Larger and more commercially savvy growers have contracts with the major supermarkets and divert excess supply to overseas markets, typically airfreighted out of Brisbane. The Brisbane Markets is a large consolidator of produce and has several export agents on site. The only regulated air cargo agent out of Brisbane Markets is Lindsay Fresh Logistics.[65] DHL and other regulated export

[62] Australian Bureau of Statistics: 7121.0 - Agricultural Commodities, Australia, 2017-18. Fruit production figure includes mandarins, oranges, mangoes, strawberries and bananas only. Vegetables production figure include melons, pumpkins, sweet corn and tomatoes only. Data not published for some other fruit and vegetables.

[63] . Estimate is a five-year average from June 2012 to November 2016 complied by the Queensland Department of Agriculture and Fisheries based on data from Brisbane Market Information Services. Data provided by Queensland Agriculture Workforce Network via email 04/10/2019

64 S. Mcallan, A. Higgins, C. Bruce and A. Bondarenco (CSIRO), Eddie Mallan (North Queensland Bulk Ports), 2019, Evaluating supply chain option for Queensland Bulk Port Catchments – Application of TraNSIT, CSIRO

[65] Brisbane Markets Limited, *Fresh Source*, Issue 67, Winter 2019, p24

agents are also viable options. Lindsay transport recently built a depot at Bowen due to the high volumes of fruit and vegetables transported south.[66] Table 1.3 provides a listing of the depots in the region. Horticultural goods typically reach the 7,000 square meters of chilled storage in Brisbane ready for the Brisbane Markets.[67]

Up to 10 cent of growers in the region are estimated to directly export, typically to New Zealand but also other countries. Some produce from the region, however, is likely to be consolidated in Brisbane and exported without the involvement of the producer. About 9 per cent of all Queensland horticulture is exported.

Prior to export, and sometimes for distribution interstate, produce needs to be treated to reduce the risk of pests and disease transmission. Phytosanitary export protocols on particular fruit and vegetables require strict compliance (irradiation and vapour heat treatment) for particular trading partners. Queensland has two vapour heat treatment (VHT) facilities - one in Brisbane and one in Mareeba. There is also an irradiation facility in Brisbane and a second in Melbourne.

Transport to treatment facilities is a considerable cost. The transport costs of a tonne pallet of mangoes is $145/ tonne pallet from Bowen to Brisbane, with the cost of VHT treatment at $500/ pallet.[68]

Analysis

Supply chain capacity and constraints

Horticultural production in the Bowen is only constrained by access to water. There is anecdotal evidence around water allocations not being permitted to be used in full, and discussion of failed schemes to divert water from the Burdekin to Bowen. Water issues could be solved through the building of a dam at Urannah, noting however that future production opportunities should focus on different products to those currently grown in Bowen. This would ensure that over supply issues are not further exacerbated.

In the past decade, the region and surrounds have been affected by drought and three severe cyclones: Debbie, Marcia and Yasi. The risk of extended drought, cyclones and extreme weather events is an important issue to the industry given the relatively small window for harvest and transport to market.

The horticulture industry typically over supplies and the Mackay Isaac Whitsunday region is no exception. There are several reasons for this but one of the main concerns is crop failure due to weather or other natural events such as pests and diseases.

As a result, the proportion of product produced and not sold[69] is high, ranging from 20 to 40 per cent.[70] This is a well-known issue and there have been several attempts to develop by-products within the region and in Queensland more generally. Other than product being sold for juicing and puree processing (which appears to be limited), the general consensus is that these by-products are not yet economically feasible.

The two main reasons for this are:

- the lack of market demand
- the cost of transport.

This presents a significant opportunity for the region. However, it is important to take the time to find an economically viable by-product, to co-ordinate across the horticultural industry in the region to get to scale and to ensure access to market at the right price in order to realise the opportunity.

[66] Lindsay also transports Mackay Isaac Whitsunday fish and seafood typically prawns and barramundi south to Brisbane.
[67] Stakeholder consultations.
[68] Stakeholder consultations.
[69] Many stakeholders do not consider this to be waste as they plough any remaining product back into the soil. There is also a distinction between product that could be commercially viable but is generally not (e.g. seconds) and product that could not be sold (e.g. waste).
[70] Stakeholder consultations.

An alternative way to deal with issues with oversupply while diversifying growers' price risk is to encourage exports out of the region. However, there are several considerable constraints impeding exports:

- Phytosanitary barriers and protocols
- Scale
- Seasonality
- Capability of growers

Phytosanitary barriers and protocol negotiations are among the largest barriers to export of horticultural products. Although Federal Government and industry support exists, the fragmentation of the sector makes it difficult to get the protocols needed placed high on the agenda. This is exacerbated by the lack of scale in the region and the inability to supply year-round without collaboration with production systems in the south.

Many producers are very good at producing their products but are not as well qualified in the running of a business or marketing their products. The development of skills and capability specifically in relation to exporting may improve opportunities for producers in the region.

While a constraint, fragmentation in this sector also presents an opportunity for increased collaboration. Through collaboration within or outside the region, growers may be able to overcome the issues around low scale, high waste, expensive transport and other barriers including phytosanitary compliance, other forms of regulation and non-local export market access.

The mango industry, a prominent promotor, has begun to co-ordinate nationally through the provision of information regarding harvest to ensure that domestic supply is not flooded.[71] Opportunities exist for agri-tourism complemented by the strong tourism industry in the Whitsundays. Globally, the region can export produce in the off-season to target trading partners.

Through co-ordination, it may also be possible to develop a regional brand and promote all horticultural produce both domestically and overseas.

There is significant capacity for domestic airfreight through Mackay airport that, if cost effective, delivers product to Brisbane significantly faster for distribution domestically or export. Stakeholders think it is unlikely to be cost effective due to the additional costs of unloading and reloading.

During the stakeholder consultation, various forms of market access hubs were mentioned:

- Processing and packing hub
- Distribution hub
- Export facility that could conduct phytosanitary requirements such as irradiation and vapour heat treatment

As with other opportunities the industry needs to get to scale through collaboration to make export hubs a viable option in the short term.

Figure B.11 presents the barriers and opportunities for the horticulture industry in the region in the form of a SWOT analysis which describes strengths, weaknesses, opportunities and threats.

[71] Personal communication with Marine Epsom, Australian Mango Association.

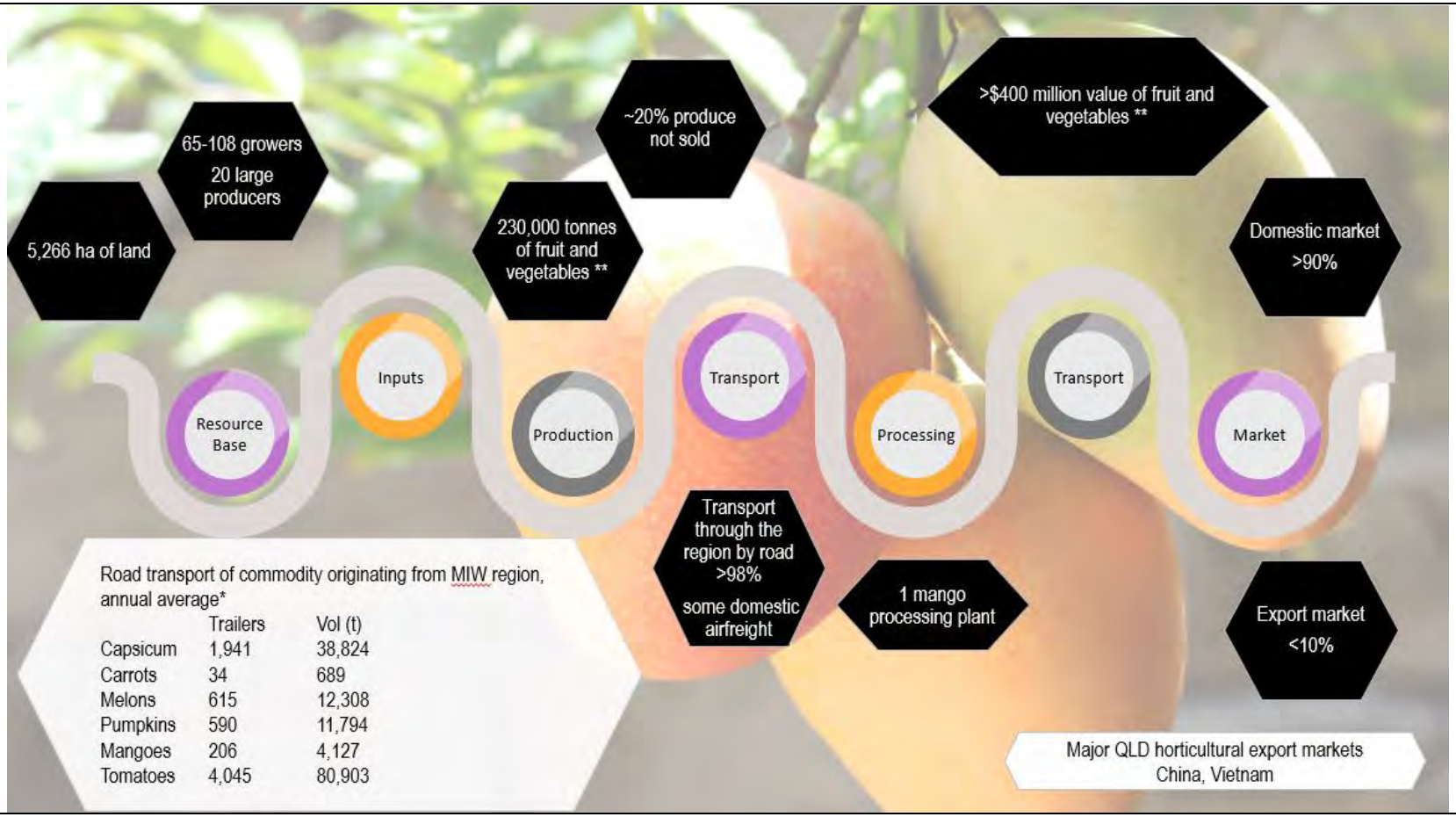
FIGURE B.261 SWOT ANALYSIS: HORTICULTURE

SOURCE: ACIL ALLEN CONSULTING

An industry infographic (Figure B.12), supply chain (Figure B.13), maps (Figure B.14 and Figure B.15) and tables (Table B.6 and Table B.7) present the key regional data for the industry collected through this project.

Detailed data is available in accompanying excel spreadsheet.

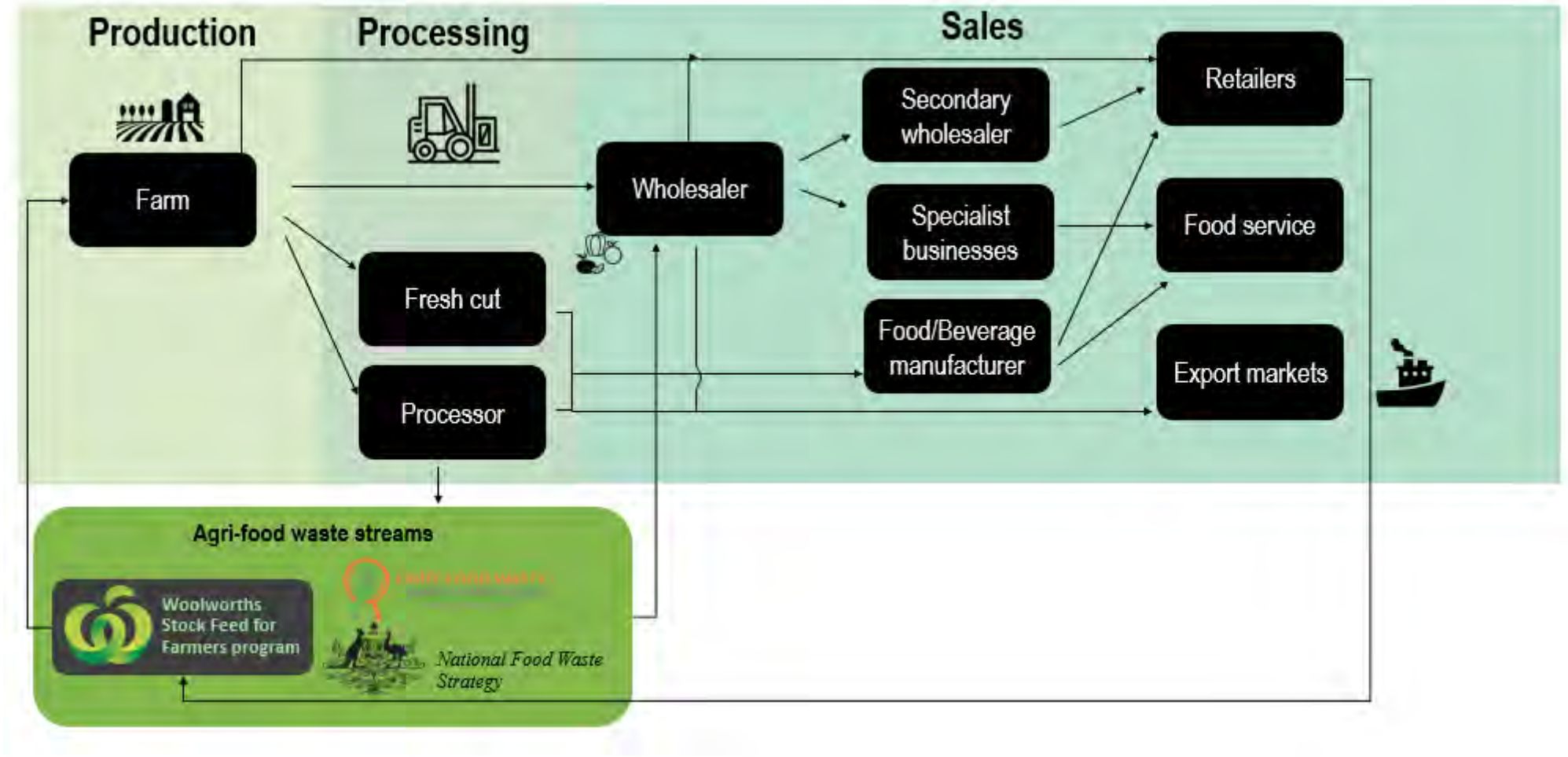
FIGURE B.12 INDUSTRY SNAPSHOT



Notes: * 2015/16 data from Higgins AJ, McFallan S, Mallan E, Cocco R (2019) Evaluating supply chain option for Queensland Bulk Port catchments– Application of TraNSIT. CSIRO, Australia. ** Based on DAF data, does not include all fruit and vegetables produced in the region.

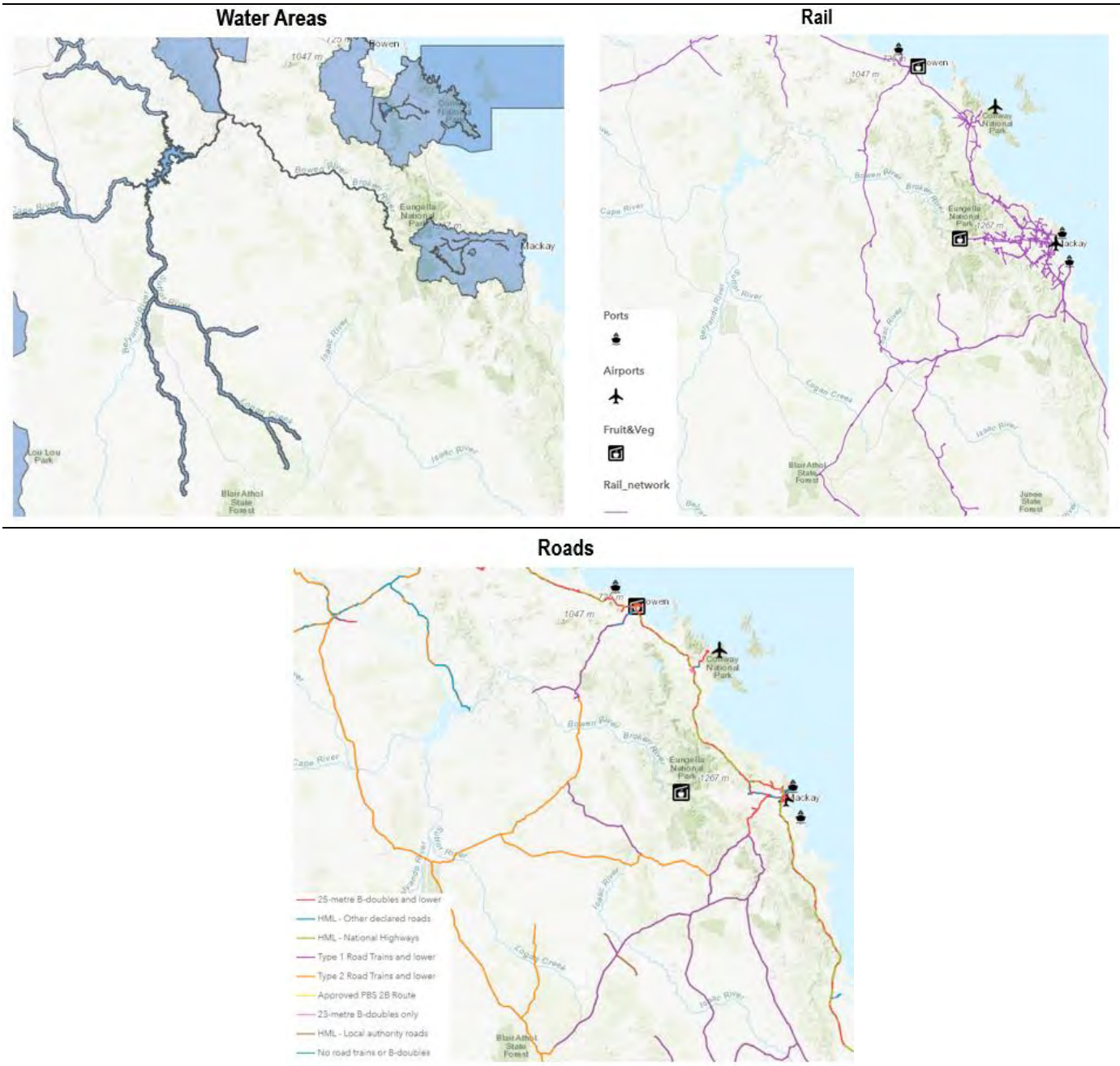
SOURCE: ACIL ALLEN CONSULTING

FIGURE B.13 INDUSTRY SUPPLY CHAIN



SOURCE: ACI L ALLEN CONSULTING

FIGURE B.14 RESOURCES AND INFRASTRUCTURE



Note: Maps generated using ArcGIS online.

SOURCE: ACIL ALLEN CONSULTING

TABLE B.6 INDUSTRY – NUMBER OF BUSINESSES AND AREA

LGA	Businesses	Fruit & Veg Area (ha)*
Mackay	~20	<5%
Isaac	~3	<1%
Whitsunday	~85	>95%
Total	*~108***	*>5200*

Note: Data for businesses as at 2015-16. *Data for area estimated as at 2017-18. **Stakeholder consultation findings estimate that this is close to 65. LGA: Local Government Area.

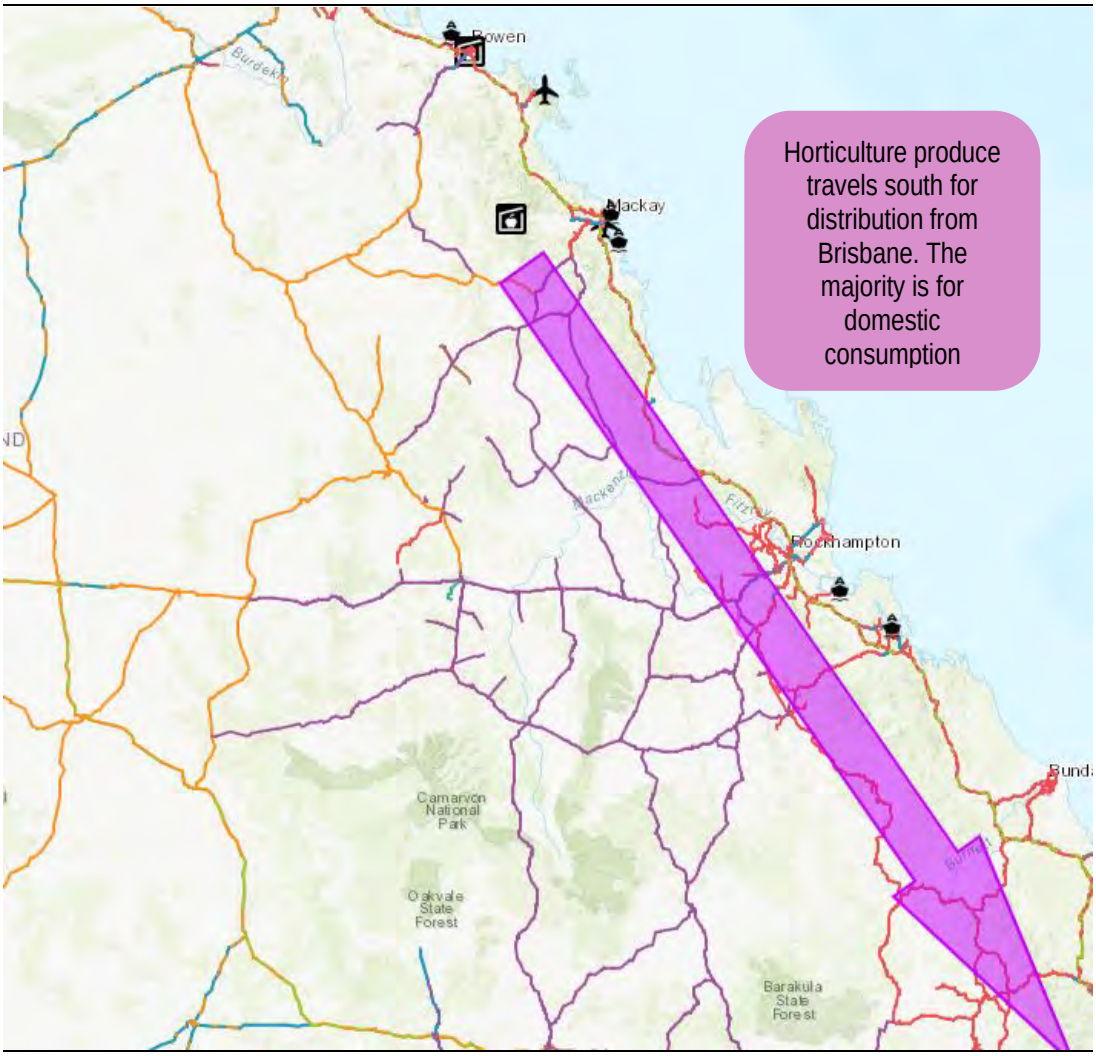
SOURCE: AUSTRALIAN BUREAU OF STATISTICS

TABLE B.7 INDUSTRY ASSETS

Type	Description
Processing plant	Netherdale (Foodpac)
Lindsey Truck Freight depot	Bowen
Transtech depot	Bowen
Followmont (Bootooloo) Transport depot	Bowen
Toll NQX depot	Bowen
Searles Transport depot	Collinsville

SOURCE: ACIL ALLEN CONSULTING

FIGURE B.15 INDUSTRY FLOWS



SOURCE: ACIL ALLEN CONSULTING

Broadacre cropping

Setting the scene

Broadacre cropping[72] is an important agriculture sector in the Mackay Isaac Whitsunday region (the region). It accounted for a total regional value of $124.1 million in 2017-18. Refer to Table B.8

TABLE B.8 CROP VALUE AND VOLUME (2017-18)

Broadacre crops (cereal and non-cereal crops)	Value ($ m)	Volume (tonnes)
Wheat	$26.2	81,424
Oats	-	9
Barley	$0.5	1,778
Sorghum	$16.3	52,692
Maize	$1.2	3,559
Rice	$0.3	864
Triticale	-	-
Cotton lint (irrigated and non-irrigated)	$2.9	1
Pulses	$75.2	94,088
Oilseeds	$1.3	1,615
All other crops	$0.06	-
Total	$124.1	236,031

Note: Totals may not add up due to rounding.

SOURCE: AUSTRALIAN BUREAU OF STATISTICS: 7503.0 - VALUE OF AGRICULTURAL COMMODITIES PRODUCED, AUSTRALIA, 2017-18; 7121.0 - AGRICULTURAL COMMODITIES, AUSTRALIA, 2017-18

Isaac is the largest grain producer of the Mackay Isaac Whitsunday region, accounting for the 98 per cent of all grain produced and 78 per cent of all grains' businesses. Most crops are harvested between October and April.

Typically, grain produced in the Mackay Isaac Whitsunday region is bulk exported out of the Port of Mackay. The majority of exported crops are wheat and pulses, primarily chickpeas. Most of this is handled by GrainCorp Ltd, which has regional depots at Mount McLaren and Capella, and storage and handling facilities at the Port of Mackay, all of which have significant spare capacity. Some bulk grain from the southern part of Isaac travels south and is exported via the Port of Gladstone. The Port of Gladstone exports less grain per year than the Port of Mackay. Given the location of Isaac region, and its proximity to the Central Highlands and Central Queensland, there is a high degree of supply chain connectivity in this broader region. Due to the overlap with beef production and feedlots, the southern flow of beef is similar to that of the southern flow of crops.

The majority (60 per cent, primarily wheat and chickpeas) is bulk exported. There is evidence that containerisation is becoming more popular, although the cost to transport grain by container is often considered prohibitive. This is mainly due to trucking costs to Brisbane or port charges at Gladstone and Townsville, the two main container ports closer to the region.

Containerised product is typically handled by an agent.

Approximately 40 per cent of Mackay Isaac Whitsunday grain is used domestically, some for human consumption (primarily wheat) which is generally milled in southern Queensland. Some grain is used as animal feed. Feed grain either stays within the region or is trucked direct to feedlots both within and outside the region, or south for processing in southern Queensland. Typical feed crops are sorghum, maize, triticale, cotton seed and some oilseeds and pulses.

As a result of drought in many parts of Queensland and Northern NSW, the current grain supply chain is not operating as usual. This year, supply chains are somewhat reversed with the majority of grain

[72] Crops include wheat, sorghum, oats, barley, maize, rice, cotton lint, triticale, pulses and oilseeds.

being retained for domestic use, when usually most grain is exported from Mackay. Brisbane, Gladstone and Townsville Ports are seeing grain inbound from South Australia and Western Australia. Stakeholder consultation suggests that presently much of the grain from Mackay Isaac Whitsunday is travelling to a large feedlot east of Emerald, several feedlots in the Darling and Western Downs as well as travelling north to the Atherton Tablelands. Most of this is being transported by truck.

Analysis

Supply chain constraints and capacity

Within the Mackay Isaac Whitsunday region there is capacity for the production of more grain, especially in the utilisation of land left fallow from sugar cane production (up to 15 per cent at any one time). The advantage of co-ordination between cropping inland and coastal cropping, for example on fallow sugar cane land, is that the region may be able to achieve scale in at least one product. This would enable increase containerisation, which is becoming the preference of local producers.

Through co-ordination there may be potential to get to scale in the production of chickpeas and other legumes that work well in both production systems. The exploration of new cropping alternatives should focus on products in demand from international markets and those that grow well in the region. The advent of DAF's soil quality tool (due to be released by the end of 2019) at a lot level will enable farmers to determine the best crops to plant given their soil type.[73] As is the case for cane and horticulture, there is potential for a new byproduct from waste products. Sorghum, for example, grows well in the region, and if the market for fuel grade ethanol were to open up then this could be a possibility.

The ability to increase container trade of crops was raised by stakeholders across the region, especially those involved in broadacre cropping. Exporting via container means that smaller quantities of a product can be produced and sold. Mackay Port has bulk export facilities but is not containerised. Containerisation is offered at the ports of Brisbane, Gladstone, Rockhampton, Townsville and Cairns.

At this stage most container trade goes south to Brisbane, but transport costs to Brisbane from Mackay Isaac Whitsunday are high.

There are two main reasons that containers go to Brisbane despite the cost of transport:

- The cost of port charges at the more northern ports are considered prohibitive.
- Often there are not enough ships berthing further north with any regularity or frequency, eroding one of the main benefits of containerised trade - niche product delivered commonly to a tight time schedule.

If scale is achieved, other opportunities exist for the industry. This may include containerising Mackay Port and considering a regional packing and distribution hub. However, before building new facilities in Mackay Isaac Whitsunday, consideration should be given to aligning with existing infrastructure and supply chain connectivity. This would suggest aligning with Emerald on the CQ inland port at Yamala is operational in 2020. The Port of Gladstone already has container facilities.

As with sugar cane and horticulture, further investigation into by-products could also benefit the cropping industry.

Improvements to the rail network, particularly the tonne axle limit (TAL), will increase use of railways and improve transport options. Evidence suggests that cost of transporting by rail when available and suitable is considerably cheaper than transport by truck.

As with other producers in the region, croppers need additional support in soft skills such as those relating to marketing, exporting and business management.

Regulation was highlighted as a barrier to expansion. This includes the *Vegetation Management Act, Environmental Protection Act* (EPA) offsets and the proposed reef regulations. Vegetation laws were changed in May 2018, with increased protection for some habitats and waterways to the Great Barrier

[73] Personal communication with Lew Markey, DAF, 17 July 2019. Whole-of-state mapping expected to be finished by the end of 2019. Mapping tool in pilot form available here: https://www.daf.qld.gov.au/business-priorities/agriculture/sustainable/rookwood-weir/maps

Reef. The EPA mandates a requirement to purchase offsets when the natural environmental condition is changed.

Figure B.16 presents the barriers and opportunities for the horticulture industry in the region in the form of a SWOT analysis. SWOT describes strengths, weaknesses, opportunities and threats.

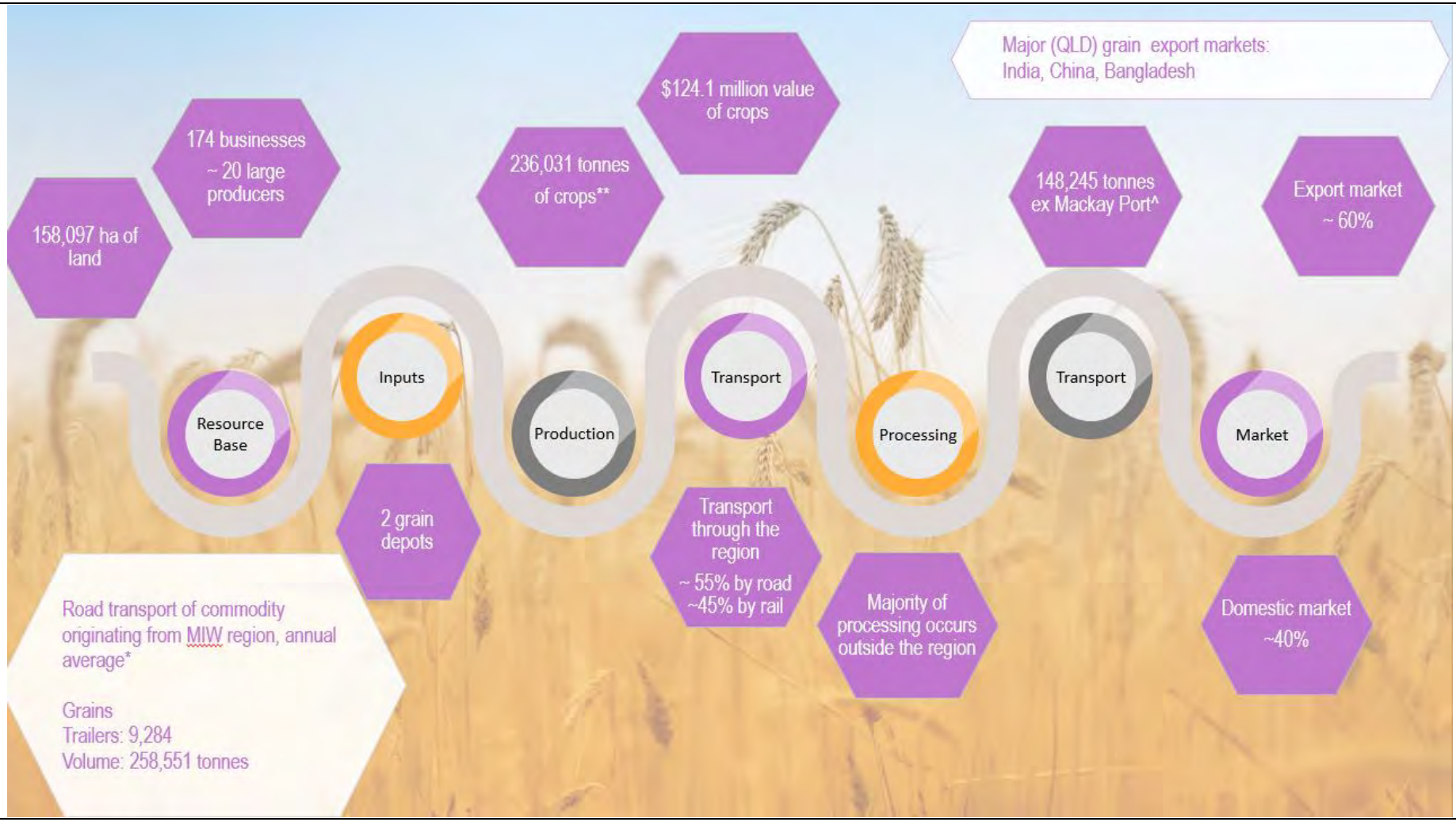
FIGURE B.16 SWOT ANALYSIS: BROAD ACRE CROPPING

SOURCE: ACIL ALLEN CONSULTING

An industry infographic (Figure B.17), supply chain (Figure B.18), maps (Figure B.19, Figure B.20 and Figure B.21) and table (Table B.9) present the key regional data for the industry collected through this project.

Detailed data is available in accompanying excel spreadsheet.

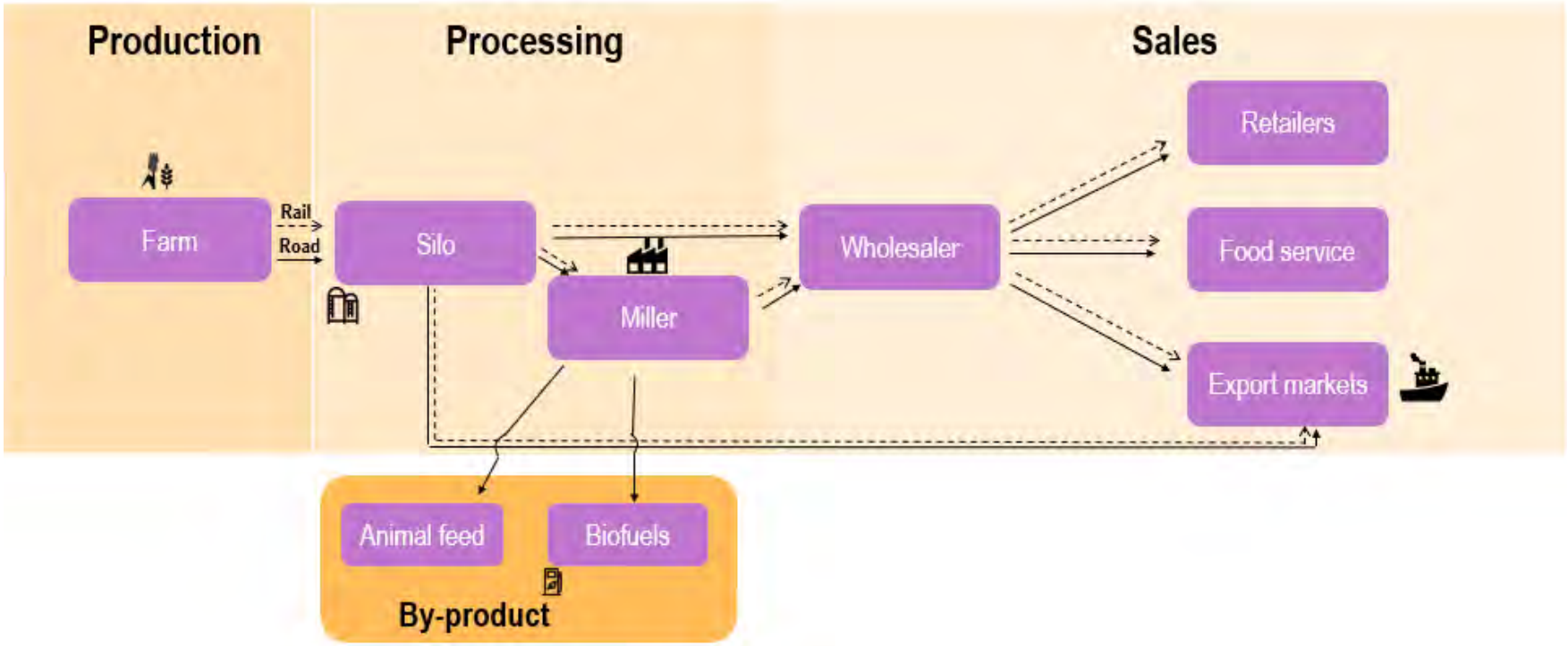
FIGURE B.17 INDUSTRY SNAPSHOT



Notes: * 2015/16 data from Higgins AJ, McFallan S, Mallan E, Cocco R (2019) Evaluating supply chain option for Queensland Bulk Port catchments– Application of TraNSIT. CSIRO, Australia. ** Crops include wheat, sorghum, oats, barley, maize, rice, cotton lint, triticale, pulses and oilseeds. ^Due to drought conditions in SE Queensland and Northern NSW more grain is travelling south for domestic use than typically occurs. This means a reduced volume of exports out of Mackay Port over the last 18 months.

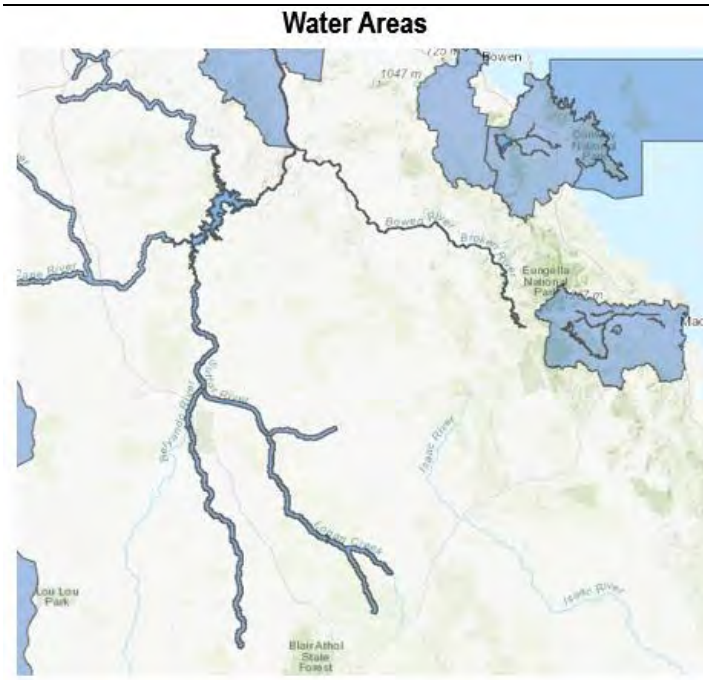
SOURCE: ACIL ALLEN CONSULTING

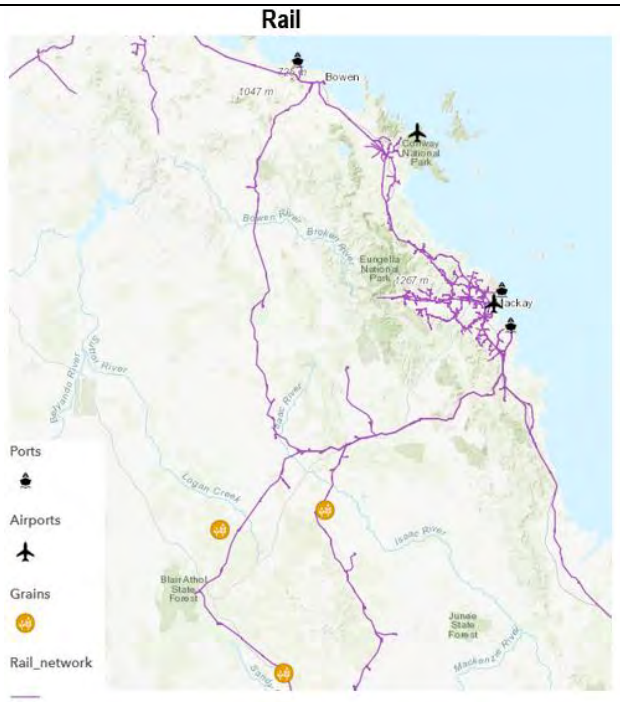
FIGURE B.18 BROADACRE CROPPING SUPPLY CHAIN



SOURCE: ACIL ALLEN CONSULTING

FIGURE B.19 RESOURCES AND INFRASTRUCTURE





Note: Maps generated using ArcGIS online.

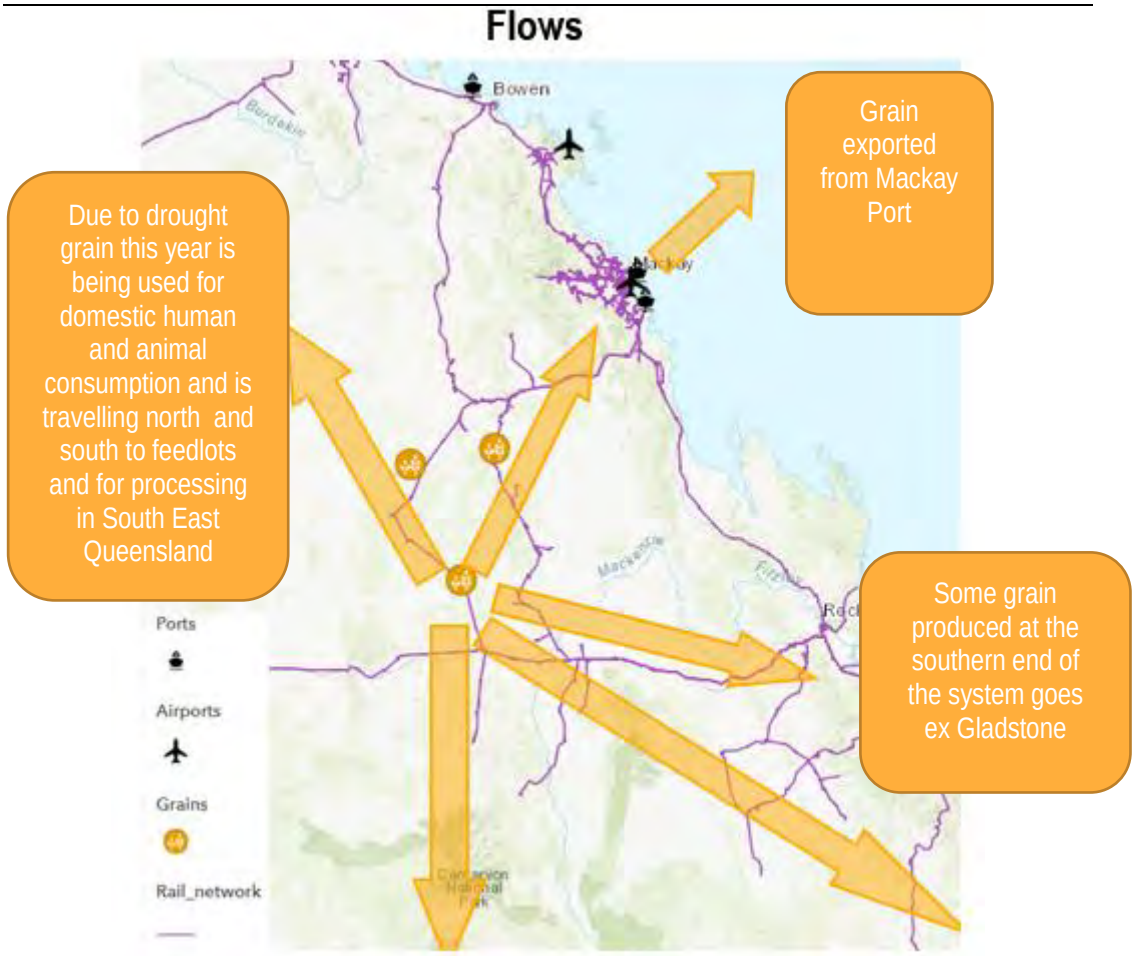
SOURCE: ACIL ALLEN CONSULTING

TABLE B.9 INDUSTRY ASSETS

Type	Description (Name, number or location)
Depot	Mount McLaren
Depot	Capella

SOURCE: ACIL ALLEN CONSULTING

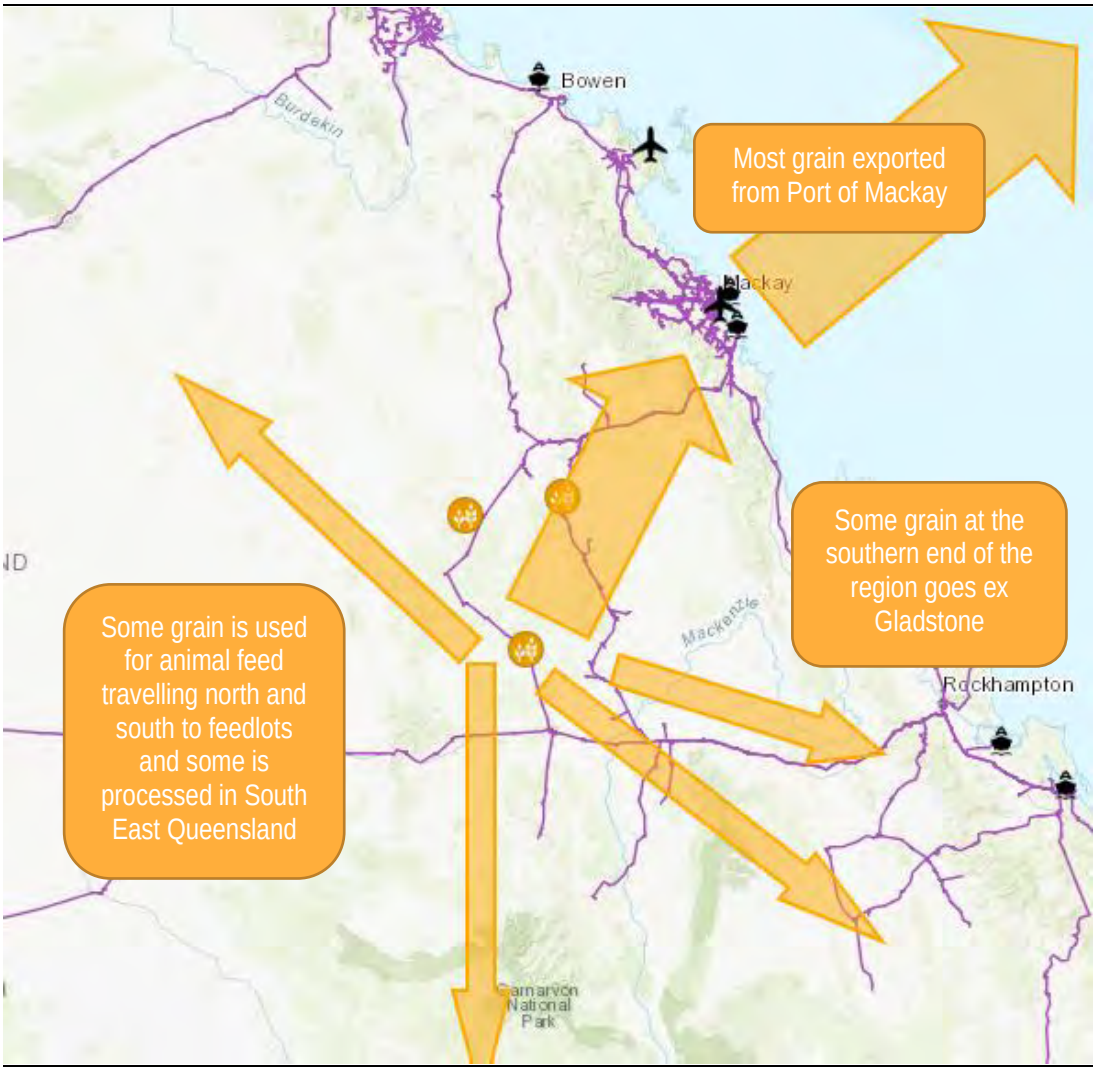
FIGURE B.20 INDUSTRY FLOWS - CURRENT



Note: Maps generated using ArcGIS online.

SOURCE: ACIL ALLEN CONSULTING

FIGURE B.21 INDUSTRY FLOWS - TYPICAL



Note: Maps generated using ArcGIS online.

SOURCE: ACIL ALLEN CONSULTING

Fish and seafood (aquaculture and wild catch)

Setting the scene

The fish and seafood industry comprises commercial wild catch and aquaculture in the Mackay Isaac Whitsunday region. There is less data available compared with some of the other commodities. The fish and seafood industry, however, is emerging as the fastest growing sector in the region of those studied in this project. The industry is concentrated along the coast in all three regions. Table B.10 provides some key regional statistics.

TABLE B.10 FISH AND SEAFOOD – KEY STATISTICS IN MACKAY ISAAC WHITSUNDAY

	Commercial wild catch	Aquaculture
Production (tonnes)	1,118	1,453
Value ($m)	na	$21
Licenses	230	na
Size (ha)	N/A	78
Full time employees	na	71.3

Note: na - data not available

SOURCE: QFISH AND DEPARTMENT OF AGRICULTURE AND FISHERIES: ROSS LOBEGEIGER REPORT TO FARMERS

Wild catch

Although there is 1,118 tonnes of wild caught fish and seafood caught in the Mackay Isaac Whitsunday region, there is no data available on the commercial value of regional wild catch (refer Table B.10). Data does indicate that in the region, wild-catch prawns represent about 20 per cent of total catch, closely followed by crabs, and then coral trout at about 14 per cent.

At a state level, Queensland's commercial wild catch makes up 40 per cent of Australia's catch.

Wild catch fishing in Queensland is highly fragmented. Within the industry 9 boats is considered a large business, and there are no businesses of that size in Queensland. The whole state has just 250 trawlers.

The industry more broadly is grappling with social license issues regarding over-fishing. Potential does exist, with better within industry communication and continued good management. There is a common misconception that wild catch fisheries are unsustainable. Recent work by the CSIRO shows that wild catch fisheries are being fished at less than maximum sustainable yield. For example, the maximum sustainable yield for Queensland fish stocks assessed by CSIRO was just over 20,568 tonnes. This represents a potential increase of around 6,700 tonnes across Queensland. Including species not directly assessed, the CSIRO report estimate this represents a 34 per cent increase in potential wild catch for Queensland. Potential increases were spread across most species with coral trout (caught in the Mackay Isaac Whitsunday region), grey mackerel, and sharks reported as having the largest potential increases.[74]

Aquaculture

Official statistics estimated the value of Mackay Isaac Whitsunday aquaculture at around $21 million in 2017-18.[75] Currently about 1,450 tonnes of seafood, primarily prawns, are produced annually on 178 hectares of land. The highest output occurs during the wet season from November to April, but stocks are frozen and delivered to market all year round.

Northern Queensland has a comparative advantage relative to other aquaculture areas due to more rivers and lower levels of evaporation than other northern areas.

[74] Smith et al, 2019, *What could Australia's total sustainable wild fisheries production be?* CSIRO report for Fisheries Research and Development Corporation, Project 2016/056.

[75] QFish and DAF.

With Tassal's plans to build a prawn farm in Proserpine, the aquaculture sector in Mackay Isaac Whitsunday is expected to grow by about 3 times by 2022.[76] The new Proserpine site will produce 6,000 tonnes per year. About six greenfield sites have been identified across Queensland, totalling 12-14,000 hectares, an enormous increase on the current 78 hectares. In the Mackay Isaac Whitsunday there is a greenfield site at Bloomsbury (refer Figure B.22).[77] This site has:

- 2,126ha on 3 land parcels
- Water access
- Potential 2 creek access (Dempster, Hervey Creeks) for intake/discharge

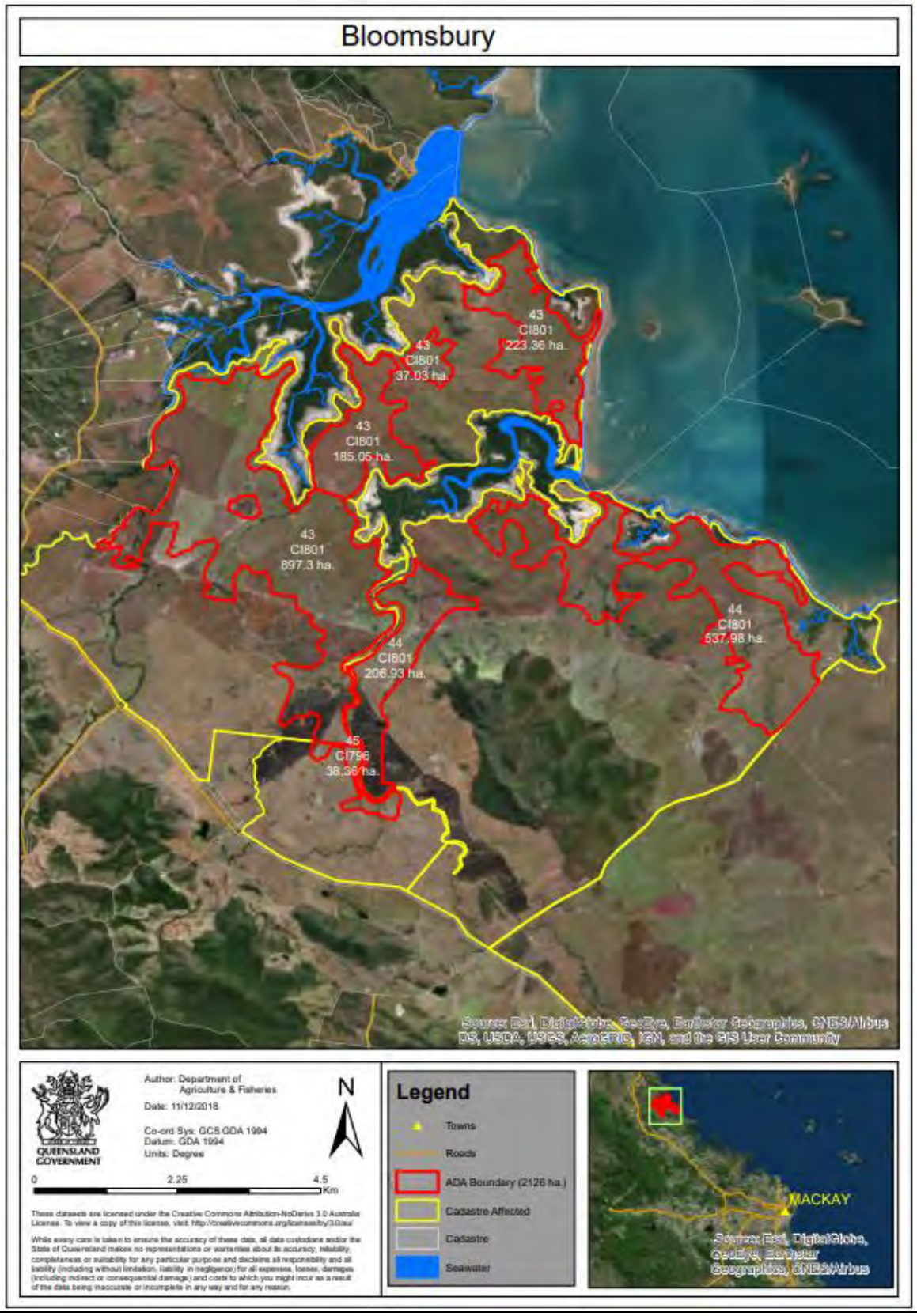
It is suitable for:

- Marine prawns (black tiger and banana prawns)
- Barramundi
- Marine finfish (e.g. tropical groper and cod, cobia, threadfin, snapper, mullet species).

[76] JOINT STATEMENT Premier and Minister for Trade The Honourable Annastacia Palaszczuk Minister for State Development, Manufacturing, Infrastructure and Planning The Honourable Cameron Dick Minister for Agricultural Industry Development and Fisheries The Honourable Mark Furner Fastest growing food industry brings jobs bonanza to North Queensland, 20 August 2019.

[77] Refer: https://www.business.qld.gov.au/industries/farms-fishing-forestry/fisheries/aquaculture/site-selection-production/development-areas/mackay

FIGURE B.22 GREENFIELDS ADA SITE IN MACKAY ISAAC WHITSUNDAY REGION



SOURCE: HTTPS://WWW.BUSINESS.QLD.GOV.AU/INDUSTRIES/FARMS-FISHING-FORESTRY/FISHERIES/AQUACULTURE/SITE-SELECTION-PRODUCTION/DEVELOPMENT-AREAS/MACKAY

Most prawn processing is done on farm, but there is evidence that for some prawn farmers in Queensland it is more cost-efficient to ship raw prawns to Vietnam for processing and bring them back for domestic consumption. This is due to local labour costs.

Mackay Isaac Whitsunday is also home to at least one barramundi farm.

Most aquaculture products from the Mackay Isaac Whitsunday region are transported via road south to market in Brisbane where they are distributed primarily for domestic consumption. Some prawns produced in the region are trucked as far as Western Australia at Christmas time.[78]

Analysis

Supply chain capacity and constraints

From discussions with stakeholders, it appears there is a lot of potential for both wild catch and aquaculture in the region. Aquaculture should focus on tried and tested products such as prawns and barramundi that grow well in the region. There is plenty of scope for prawns as domestic demand is greater than supply, and there is significant opportunity for export in the future. As with other commodities produced in the region, stakeholders note that improving capability, particularly with respect to soft skills (e.g. marketing training, business management etc), could assist the smaller industry players with marketing and exporting opportunities.

An overall national shortage of skilled staff for aquaculture may also affect the growth of this emerging industry locally. As derived from Cobcroft et al. (Forthcoming), access to skilled, senior personnel is affecting key parts of the industry now, particularly with difficulties and pressures from the (short-)term and conditions of visas.[79]There are three major constraints for prawn farming:

- Electricity costs as the water in ponds needs to be pumped and moved constantly; electricity is also required for processing.
- Government regulation, of which 95 per cent are environmental regulations regarding wastewater and run-off.[80] Stakeholders note that Australian environmental standards are much higher than elsewhere, are costly to comply with and limit the intensity of aquaculture. In Queensland, the proximity to the Great Barrier Reef is one reason for high environmental standards. For example, stocking rates must be much lower in Australia than other countries.
- Brood stock, currently reliant on wild stock and mainly from the Northern Territory. Prawn stock takes either two days by road in special facilities or must be flown to Brisbane and trucked north to Mackay Isaac Whitsunday or it could be airfreighted once a week from Darwin to Townsville, and trucked south.

The recent Northern Australia Aquaculture Industry Situational Analysis identifies key challenges and opportunities facing the north Australian aquaculture sector. The report states: "Whilst northern Australia has many natural advantages, commercial capacity needs to be developed and built, which in turn provides a competitive advantage for a successful industry." This statement accurately reflects the current aquaculture position for Mackay, Isaac, Whitsunday, although with the recent investment by Tassal the landscape for prawn aquaculture is going to evolve quickly.[81]

As an emerging sector aquaculture is particularly vulnerable to high regulatory burdens. Further research is required in aquaculture-environment interactions, which can be used to inform science-based policy.[82]

[78] Personal communication with Matt West, Australian Prawn Farms.
[79] Cobcroft, J., Bell, R., Fitzgerald, J., Dietrich, A. and Jerry, D. (Forthcoming), 2020. Northern Australia aquaculture industry situational analysis: Stage 1 Report. JCU, Townsville. https://crcna.com.au/sites/default/files/2020-01/CRCNA_AISA%20Stage_1_20200107.pdf
[80] Personal communication with the Fisheries Research and Development Corporation.
[81] Cobcroft, J., Bell, R., Fitzgerald, J., Dietrich, A. and Jerry, D. (Forthcoming), 2020. Northern Australia aquaculture industry situational analysis: Stage 1 Report. JCU, Townsville. https://crcna.com.au/sites/default/files/2020-01/CRCNA_AISA%20Stage_1_20200107.pdf
[82] Ibid.

Wild catch requires an industry-level response to social licence issues and management of communication regarding the reef. Wild catch could benefit from collaboration and coordination but this needs to occur on a larger scale than just a regional level.[83]

Barramundi needs to focus on co-ordination within the industry to improve quality and consistency of supply. Due to the size of the industry, barramundi is best to focus on these improvements on a national level.[84]

Cross-industry co-ordination at a regional level could be beneficial. The logical cross industry collaboration would be with horticultural produce. Horticultural produce travels a similar route to market, in fact prawns are often transported on the same truck as vegetables.[85] This also opens the possibility of a broader regional brand where fresh, high-value produce could be marketed from the region under a single banner.

An unlikely collaboration may also be possible between aquaculture and cropping. Many of the crops, such as soybeans, produced in the region are used in fish feed. There may be synergies in contracts between local croppers and larger aquaculture facilities such as the new Tassal site. However, it should be noted that fish food is developed at a nutritional level, which means feed stock is generally sourced from the cheapest market as long as it fulfils the nutritional requirements.

The current (and potentially expanded) industry in northern Australia is at risk from disease outbreaks caused by pathogens from endemic (existing and new) sources as well as exotic pathogens that are imported. The clean, green and disease-free status are key points of differentiation to the same species products from an overseas (e.g. Asian) market source. Coordinated response and management by individuals, industry and government is necessary to manage biosecurity risks. Current policy and technical capacity are barely adequate for the existing industry and are without significant capacity development, which is a substantial risk for the industry. There needs to be a clear understanding in language/policy regarding the difference and particular issues for management of operational disease/health management versus incursion of a new, exotic, potentially catastrophic disease outbreak.[86]A final opportunity exists in a collaboration between Mackay Ports and Australian prawn farms to look for an appropriate processing site with access to sea water as well as reliable electricity.

Figure B.21 presents the barriers and opportunities for the fish and seafood industry in the region in the form of a SWOT analysis. SWOT describes the strengths, weaknesses, opportunities and threats.

[83] Personal communication with the Fisheries Research and Development Corporation.
[84] Personal communication with the Fisheries Research and Development Corporation.
[85] Lindsay Transport. Should be noted that barramundi needs to be transported under different conditions.
[86] Cobcroft, J., Bell, R., Fitzgerald, J., Dietrich, A. and Jerry, D. (Forthcoming), 2020. Northern Australia aquaculture industry situational analysis: Stage 1 Report. JCU, Townsville. https://crcna.com.au/sites/default/files/2020-01/CRCNA_AISA%20Stage_1_20200107.pdf

FIGURE B.23 SWOT ANALYSIS: FISH AND SEAFOOD

SOURCE: ACIL ALLEN CONSULTING

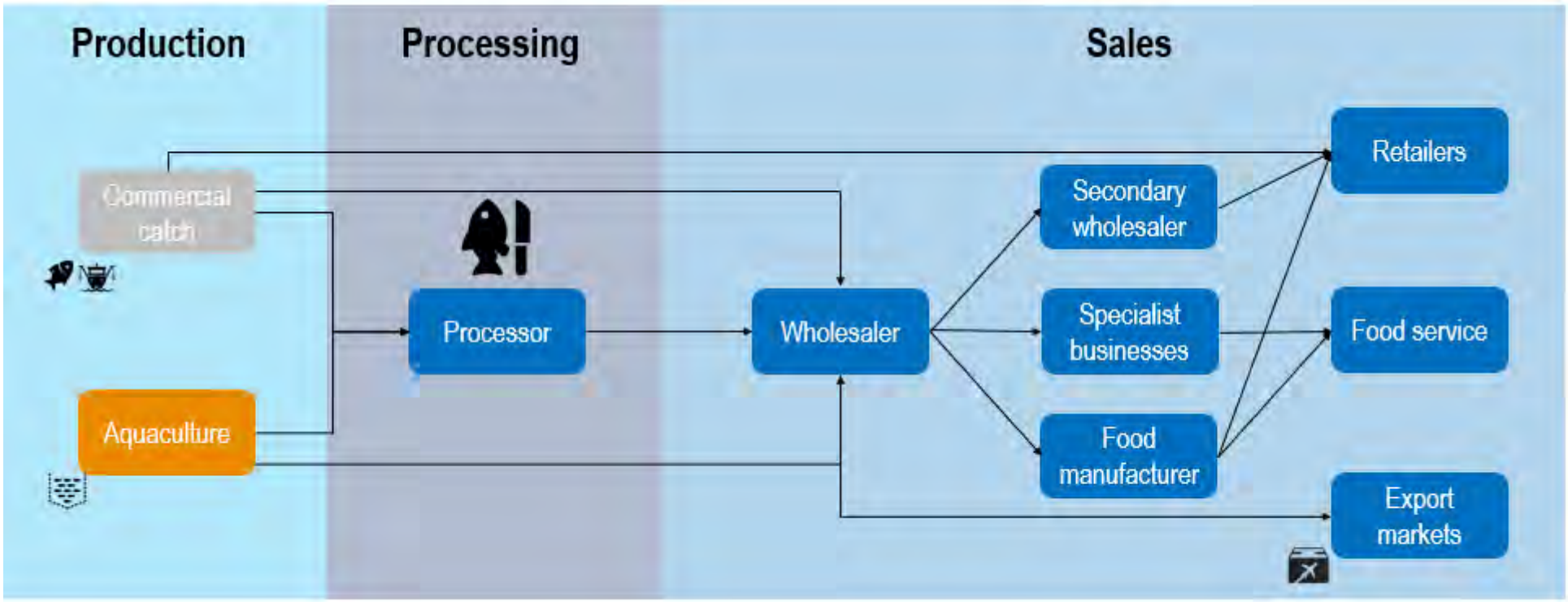
An industry infographic (Figure B.24), supply chain (Figure B.25), map (Figure B.26 and Figure B.27) and table (Table B.11) present the key regional data for the industry collected through this project.

Detailed data is available in accompanying excel spreadsheet.

FIGURE B.24 INDUSTRY SNAPSHOT

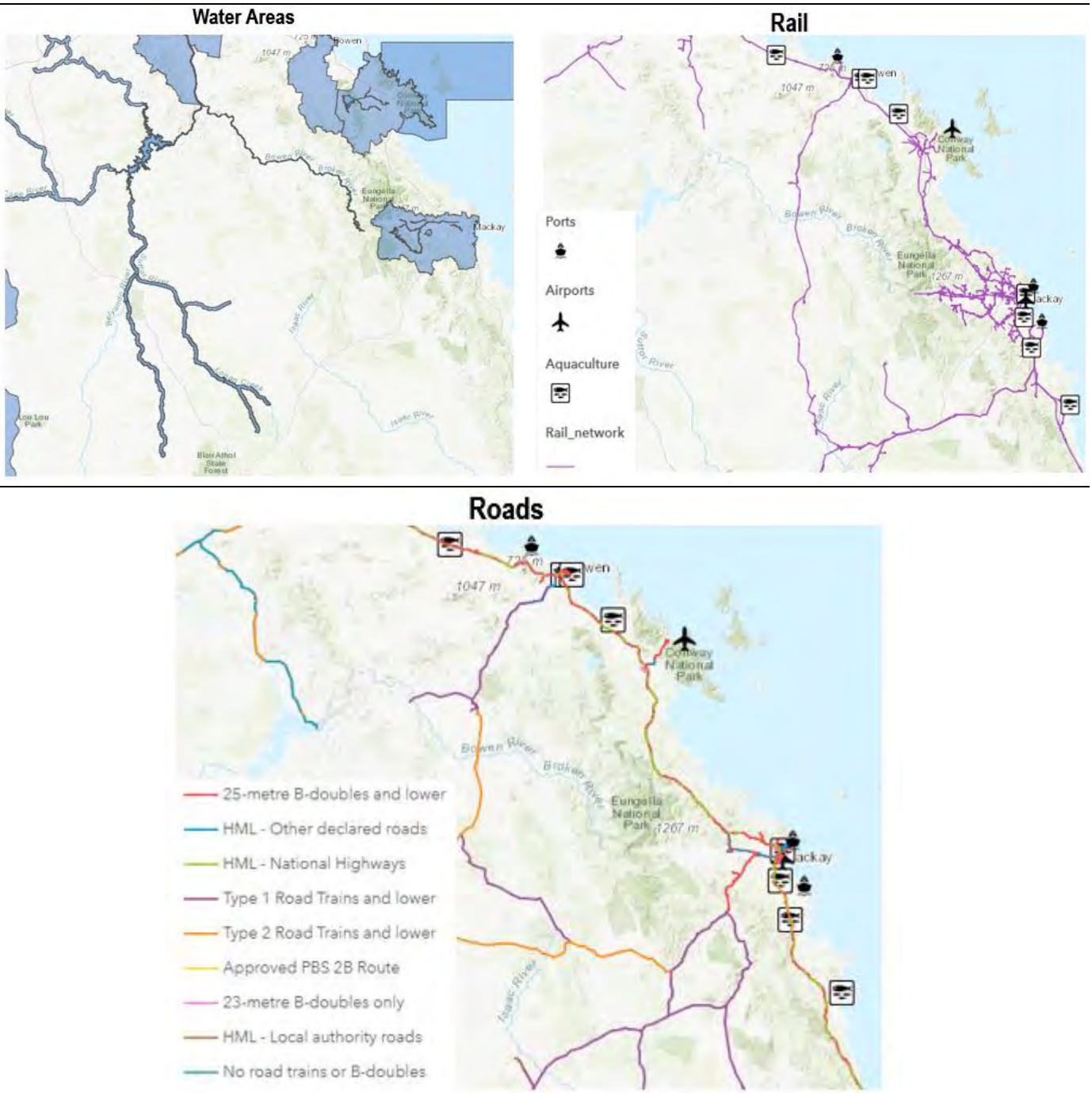
SOURCE: ACIL ALLEN CONSULTING

FIGURE B.25 INDUSTRY SUPPLY CHAIN



SOURCE: ACI L ALLEN CONSULTING

FIGURE B.26 RESOURCES AND INFRASTRUCTURE



Note: Maps generated using ArcGIS online.

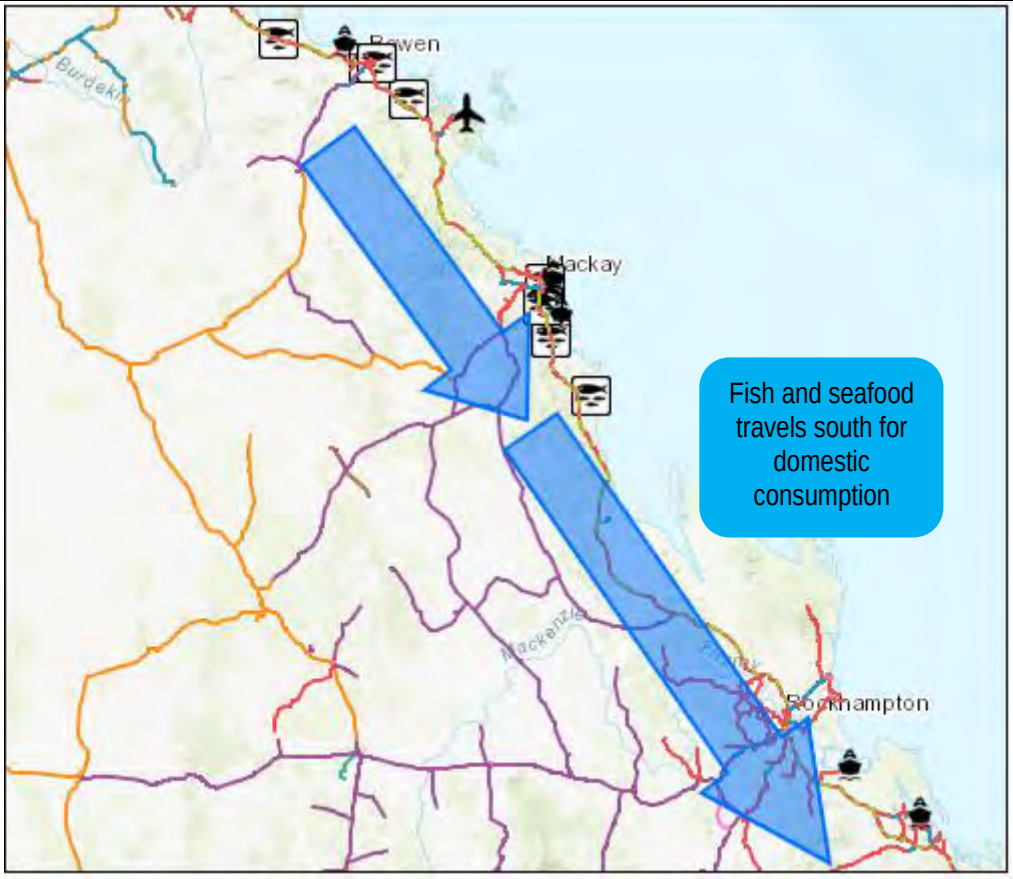
SOURCE: ACIL ALLEN CONSULTING

TABLE B.11 INDUSTRY ASSETS

Type	Description
Prawn farm	Proserpine
Prawn farm	Mackay
Prawn farm	Sarina
Prawn farm	Ilbilbie
Barramundi farm	Whitsunday Barramundi Hatchery
Barramundi farm	Coral Coast Barramundi
Oyster farm	Bowen Fresh Oysters
Wholesaler/Exporter	Arabon Seafood

SOURCE: ACIL ALLEN CONSULTING

FIGURE B.27 INDUSTRY FLOWS



SOURCE: ACIL ALLEN CONSULTING

C

LIST OF STAKEHOLDERS

TABLE C.1 LIST OF STAKEHOLDERS

Surname	First name	Organisation
Alexander	Liz	Central Highlands Development Corporation
Angus	Josie	Signature Beef
Aprile	Pat	Department of Transport and Main Roads
Ashburner	Burn	Canegrowers HQ
Baker	John	AgForce Limited (Central)
Baker	Craig	Lindsay Transport
Barwick	Matt	Fisheries RDC
Boland	Michael	Reef Catchments
Brandenburg	Shane	Isaac Regional Council
Briggs	Adam	Horticulture Innovation Ltd
Burnett	John	Bendemeer - Beef
Cocco	Rob	Regional Development Australia
Collins	Alf	Producer - Beef + Exporter (Genetics)
Coomer	Paul	North Queensland Bulk Ports
Cousin	Teona	Mackay Regional Council
Daniels	Dave	Grain farmer
Davies	Melanie	Whitsunday Regional Council
Davies	Ian	Wilmar Sugar Australia
Doggett	Kevin	Central Queensland Inland Port
Doyle	Paul	North Queensland Bulk Ports
Emerick	Cherry	Vegetables Australia
Empson	Marine	Australian Mango Industry Association (AMIA)
Foster	Brad	Grain Corp
Hayes	Howard	Trade & Investment Queensland
Hodgson	John	Mackay Sugar
Hone	Patrick	Fisheries RDC

Johnson	Nick	McGarrys
Joiner	Brian	Whitsunday Airport
Large	Kate	Aurecon
Lavarack	Amanda	Department of State Development, Infrastructure and Planning
Leeson	Luke	Brisbane Markets
Markey	Lew	Department of Agriculture and Fisheries
Markley	John	FARMACIST
Martin	Ben	Marto Mangoes
McLaughlin	Paul	Bowen Collinsville Enterprise Inc.
McLucas	Deb	Greater Whitsunday Food Network
Monsour	Chris	Prospect Agriculture
Newell	Helen	Department of Agriculture and Fisheries
Porter	Garry	Mackay Airport
Reid	Phil	Paringa Feedlot
Reilly	Ben	Steritech
Rickett	Gordon	Radicle seeds
Sandral	Greg	Sandral Marketing
Smith	Stephen	Aquaculture Industry Development Network (DAF)
Taylor	Ian	Cotton RDC
Thomas	Steve	Grains RDC
Tilley	Steve	Growcom
Tipping	Dianne	Export Council
Trendell	Phil	Department of Agriculture and Fisheries
Walker	Carl	Phantom Produce
West	Matt	Australian Prawn Farmers Association
Wheway	Julia	Queensland Agriculture Workforce Network (QAWN)

D

LIST OF REGIONAL ASSETS

TABLE D.1 AGRIBUSINESS SUPPLY CHAIN ASSETS LOCATED IN THE MACKAY ISAAC WHITSUNDAY REGION

Regional agricultural supply chain asset	Location	Operational	Condition	Is the asset at capacity?	Potential for improvement	Confidence in this information
Airport (domestic)	Mackay	Yes	Good	Yes	Cold chain / storage / freight facility	High
Airport (domestic)	Whitsunday	Yes	Good	Yes	Cold chain / storage / freight facility	High
Port	Mackay	Yes	Good	Yes	Cold chain	High
Rail	Across region	Yes	Room for improvement	Yes	Flood-related issues	High
Road	Across region	Yes	Improving	N/A	Last mile to port issues	High
Cane rail	Coastal region	Yes	Room for improvement	Yes	Infrastructure is old	High
Lindsey Truck Freight depot	Bowen	Yes	Good	Yes	Cold chain	High
Transtech depot	Bowen	Yes	Good	Yes	N/A	Medium
Followmont (Bootooloo) Transport depot	Bowen	Yes	Good	Yes	N/A	Medium
Toll NQX depot	Bowen	Yes	Good	Yes	N/A	Medium
Searles Transport depot	Collinsville	Yes	Good	Yes	N/A	Medium
Feedlot	Lotus Creek	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Capella	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Clermont_1	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Clermont_2	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Clermont_3	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Clermont_4	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Cermont_5	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Clermont_6	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Dysart_1	Yes	Unknown	Unknown	N/A	Medium

Regional agricultural supply chain asset	Location	Operational	Condition	Is the asset at capacity?	Potential for improvement	Confidence in this information
Feedlot	Dysart_2	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Dysart_3	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Mackay	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Marlborough_1	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Marlborough_2	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Marlborough_3	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Nebo	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Pleystowe	Yes	Unknown	Unknown	N/A	Medium
Feedlot	Sarina_1	Yes	Unknown	Unknown	N/A	Medium
Saleyard	Clermont	Yes	Good	Yes	N/A	High
Abattoir	Mackay	Yes	Good	Yes	N/A	Low
Abattoir	Mooranbah	No	N/A	Yes – expected capacity of 35,000 head per annum.	N/A	High
Sugar mill	Marian	Yes	Good	Yes	N/A	High
Sugar mill	Farleigh	Yes	Good	Yes	N/A	High
Sugar mill	Racecourse	Yes	Good	Yes	N/A	High
Sugar mill	Proserpine	Yes	Good	Yes	N/A	High
Sugar mill/Bio-ethanol plant	Plane creek	Yes	Good	Yes - maximum capacity for bioethanol production is 300 million litres.	N/A	High
Co-generation plant	Mackay	Yes	Good	Yes	N/A	High
Processing plant	Netherdale (Foodpac)	Yes	Unknown	Unknown	N/A	Low
Prawn farm	Proserpine	No	N/A	Yes	N/A	Low
Prawn farm	Mackay	Yes	Unknown	Unknown	N/A	Low
Prawn farm	Sarina_1	Yes	Unknown	Unknown	N/A	Low
Prawn farm	Sarina_2	Yes	Unknown	Unknown	N/A	Low
Prawn farm	Ilbilbie	Yes	Good	No	Energy issues	High
Barramundi farm	Mackay	Yes	Unknown	Unknown	N/A	Low
Oyster farm	Bowen	Yes	Unknown	Unknown	N/A	Low
Grain depot	Mount McLaren	Yes	Good	Yes	N/A	High
Grain depot	Capella	Yes	Good	Yes	N/A	High

Note: While care has been taken to ensure this list is complete, there may be assets in the region that are not represented in this list. There may be businesses registered but not located within the region.

SOURCE: VARIOUS INCLUDING DEPARTMENTAL LISTS, ONLINE REGISTERS AND STAKEHOLDER CONSULTATION.

TABLE D.2 RELATED ASSETS UTILISED BY THE SUPPLY CHAIN BUT LOCATED OUTSIDE THE REGION

Related agricultural supply chain asset	Location	Operational
Airport (international)	Brisbane	Yes
Airport (international)	Cairns	Yes
Port	Alma	Yes
Port/container facility	Brisbane	Yes
Port/container facility	Gladstone	Yes
Port/container facility	Townsville	Yes
Intermodal freight terminal	Yamala	No
Abattoir	Casino (NSW)	Yes
Abattoir	Rockhampton_1	Yes
Abattoir	Rockhampton_2	Yes
Abattoir	Hughenden	No
Grain depot	Emerald	Yes
Cotton gin	Emerald	Yes
Sorghum ethanol plant	Dalby	Yes
Produce markets	Brisbane	Yes
Grain mills (multiple)	Downs region	Yes
Steritech	Brisbane	Yes
Vapour Heat Treatment facility	Mareeba	Yes
Vapour Heat Treatment facility	Brisbane_1	Yes
Vapour Heat Treatment facility	Brisbane_2	No
Vapour Heat Treatment facility	Brisbane_3	No

Note: While care has been taken to ensure this list is complete, there may be assets in the region that are not represented in this list. There may be businesses registered but not located within the region.

SOURCE: VARIOUS INCLUDING DEPARTMENTAL LISTS, ONLINE REGISTERS AND STAKEHOLDER CONSULTATION.

E

SUPPORTING SPREADSHEETS

There are excel spreadsheets for the region as a whole and for each individual LGA available on request.

<<Spreadsheets attached as separate files>>

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