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NT Farmers Association

Business Case for the Construction of a Cotton Gin in the Northern Territory

September 2019

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Executive summary

Purpose and Overview

The agricultural sector is a key pillar of the Northern Territory economy, contributing significantly to employment opportunities and economic prosperity, particularly in regional and remote areas. The sector, which includes fodder and broad acre cropping, supports various downstream industries including retail and wholesale trade, manufacturing and transport. Cotton, as part of the broad acre sector, has risen to the forefront of the sector's priorities, having the potential to become the reliable cornerstone crop farmers have been seeking. Recent successful trials of growing cotton in the north have sparked significant interest from local and interstate growers and international investors, who see the crop as a potential to diversify the agricultural sector and the Northern Territory economy. To capitalise on these successful trials, the industry is looking to significantly expand its cotton production, with grower forecasts reaching around 400,000 bales in the next decade. However, to achieve this scale of production and generate positive margins, processing facilities need to be close to production sites. Therefore, a successful and commercial Northern Territory cotton industry is critically dependent on the establishment of a nearby gin[1].

The purpose of this Business Case is to assess the long-term viability of a proposed cotton gin in Northern Territory. It has been developed for the Northern Territory Farmers Association Inc. (NT Farmers) to support their application to receive Northern Territory Government funding under the Grants Program of the *Local Jobs Fund*, administered by the Northern Territory Department of Trade, Business and Innovation (DTBI). This Business Case has been prepared in accordance with the *Local Jobs Fund* Infrastructure Grant Competitive Process Guidelines and the Infrastructure Grant Application Business Case Guidelines issued by DTBI.

Strategic Rationale and Project Need

Historically, the Australian cotton industry has been predominantly based in Queensland and New South Wales, creating a $2.5 billion export trade market into key Asian ports. The industry employs over 10,000 people across farms and processing plants throughout Australia in non-drought years and is buoyed by significant scientific research and investment. Indirectly, the industry supports a variety of sectors nationwide, including logistics companies, agricultural land development, merchants and exporters. The livestock industry in these jurisdictions has also greatly benefited from the availability of the by-product of cotton ginning, cotton seed[2]. The by-product became particularly sought after during recent drought to supplement feedstock due to limited availability of other grains and fodder. Due to transport costs and various biosecurity regulations, the cotton seed was retained primarily within New South Wales and Queensland, disadvantaging other States and Territories.

In 2019, cotton growing trials resulted in over 4,500 bales of cotton being harvested by five growers across the Northern Territory and Kimberley regions. This however involved sending the unprocessed cotton over 3,000km to be processed (ginned) and exported from Queensland. This report analyses the efficiency and cost of this movement, compared to a scenario where the cotton is ginned locally and exported from the Port of Darwin. The report finds that Northern Territory growers, who are utilising cost effective trucking backload rates, are charged an extra 34 per cent to their overall costs to gin and export their cotton through Queensland. Despite being Northern Territorian-grown cotton, if ginned in Queensland, the cotton seed not able to be transported back to the Northern Territory for the benefit of the local beef and livestock industry, due to uneconomical transport costs and biosecurity constraints. A local cotton gin therefore, has the potential to create significant cost savings for Northern cotton growers and added-value benefits for the Northern beef industry.

On the back these successful Territory trials, at least 10 new local and interstate growers and international investors are expected to enter the industry in the Northern Territory for the coming season. These growers will have to rely on back-loading rates for transport to Queensland while the rates are available, but will expect to see a transport cost uplift of 60 per cent once the backload capacity is fully utilised. This is an unsustainable scenario in the context of building a strong cotton

[1] Key message of the *Northern Australia Food and Fibre Supply Chains Study Synthesis Report* developed by the Federal Department of Agriculture.

[2] DAF (2019) https://www.daf.qld.gov.au/business-priorities/agriculture/disaster-recovery/drought/managing/cotton_seed-feeding-beef-cattle

industry and is likely to disincentivise local grower expansion and deter interstate and international investment to the Northern Territory. Figure 1 depicts the projected cotton bale production in Northern Australia (across the Northern Territory and Kimberley region) as well as indicating when and how many cotton gins may be viable in the region. These figures are based on engagement with over 40 land owners and growers in the region. Given this certainty of supply, a cotton gin in the Northern Territory would provide up to 88 jobs (during gin operations), creating potential for employment in farming, land development and transport.

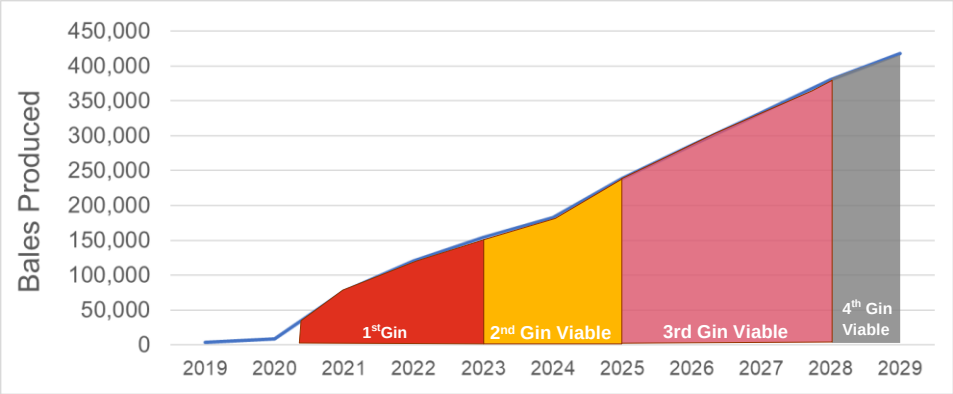

Figure 1: Northern Territory projected cotton bales

Expansion of the Northern Territory's cotton industry has the potential to drive the economic transformation that the Territory needs. Profitable expansion however, is dependent on local, interstate and international grower confidence to pursue land development and reach forecast production volumes, and this confidence comes from the presence of a nearby gin. Increased grower confidence and production leads to interest from national and international private sector investors. Private sector investment however, is then dependent on government intervention as a strong signal of support to facilitate enabling processing infrastructure. The project's conceptual strategy is depicted in Figure 2.

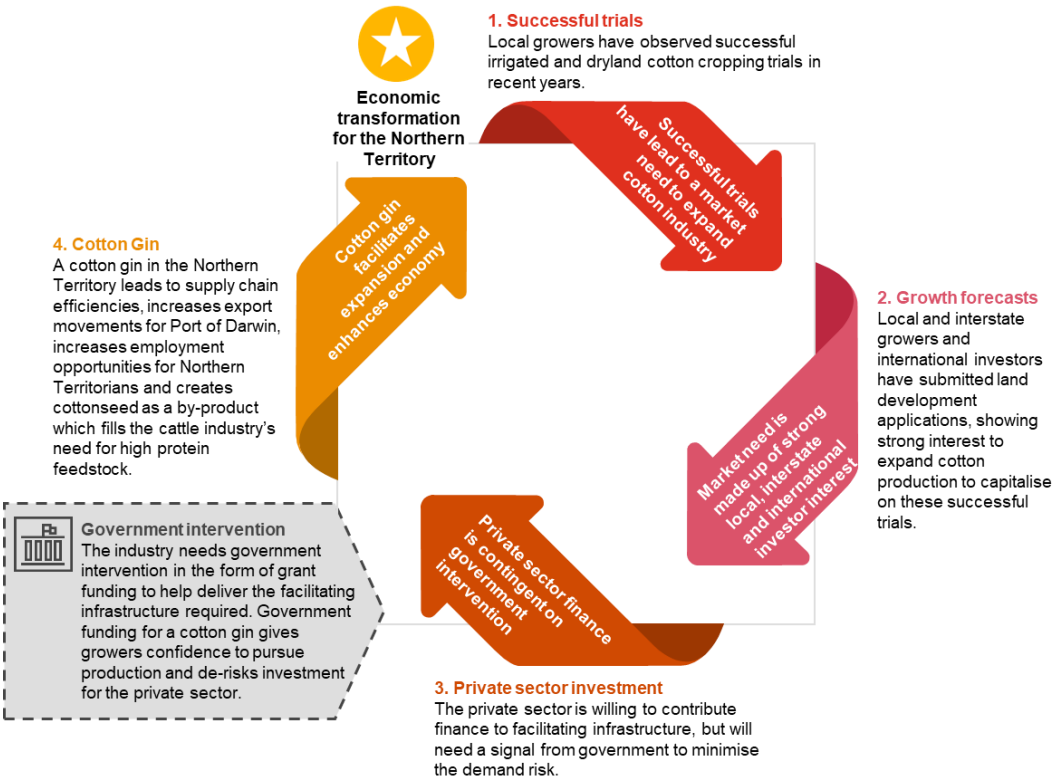

Figure 2: Cotton gin strategic concept

The Northern Territory now has the opportunity to capitalise on the current and potential benefits of a highly prospective Northern Australian cotton industry, with the gin taking supply from local Northern Territory growers and Kimberley regional growers. With an ever improving grower skillset, favourable climate and soil conditions, as well as proximity to export markets, investment is needed to provide the infrastructure that will propel the industry and provide stimulus across the Northern Territory economy. NT Farmers has commissioned this Business Case to apply for $10 million in funding through the *Local Jobs Fund,* which will be matched by private sector funding through their partners as well as equity investments by local, interstate and international grower-investors. Growers will finance the remaining amount to build a $28 million facility[3] in the north to cater for the forecast growth. This project will directly and indirectly spark economic transformation across the Territory; diversifying the economy, providing employment and investment opportunities.

Location options

This Business Case included a detailed location options assessment which evaluated the efficiencies of transport from farms to export markets for each location as well as assessing various operational and socio-economic criteria. The options longlist was developed through stakeholder engagement and also focuses on locations of population and agricultural significance in Northern Australia. The potential locations identified to build a cotton gin were:

- Katherine, Northern Territory
- Edith Springs, Northern Territory
- Kununurra, Western Australia
- Mataranka, Northern Territory
- Darwin, Northern Territory.

In September 2019, a Multi-Criteria Assessment (MCA) workshop was facilitated and attended by over 30 participants from across Northern Australia. The aim of this workshop was to use the MCA process to select the most suitable location based on agreed upon criteria. The workshop shortlisted Katherine and Kununurra as the potential locations to progress through to further detailed assessment of their respective offer transport costs and efficiencies. These locations were identified as preferred primarily based on each towns' capacity to operate the facility and the potential economic impact on the local population. After detailed analysis of transport efficiencies, taking into account road and rail availability, and where the majority of cotton production will be beyond 2024, Katherine was considered the most optimal location to build Northern Australia's first cotton gin.

It is understood that the Department of Infrastructure, Planning and Logistics (DIPL) has received funding approval to construct the Katherine Agribusiness and Logistics Hub (the Hub). Initial consultation with DIPL confirm the Department's support of placing a cotton gin in the Hub. The Hub's masterplan comprises of four stages, with stage one set for completion in 2022; a utility enabled transport logistics area. It is also understood, that presently there are no existing long-term contractual agreements in place with industrial customers to utilise this transformational space. Initial investigations conducted by DIPL flagged the feasibility for a cotton gin within the Hub during stage four of the development. While there may be a misalignment of timing between the demand and feasibility for a cotton gin in Katherine, and the staging for the Katherine Agribusiness and Logistics Hub, there is an opportunity for the Northern Territory Government to use the cotton gin as the Hub's first industrial anchor customer by 2022. Upon successful receipt of grant funding, it is expected that NT Farmers and its proponents will continue to consult with DIPL regarding the requirements and timing of the cotton gin's integration with the proposed Hub's masterplan.

Alignment with *Local Jobs Fund* objectives

This project aligns with the objectives of the *Local Jobs Fund* as it is expected to ignite an economic transformation for local cotton farmers and the flow on opportunities for employment in the Northern Territory, as demonstrated in Table 1.

[3] At 15 per cent capital cost contingency and $30 million at 25 per cent contingency.

Table 1: Alignment with the *Local Jobs Fund*

Fund Objective	Project Alignment
Industry level common user interface	A gin in the Northern Territory will provide ginning services to the growers in the Northern Territory and other Northern Australia regions. The common user gin will provide the sector with an industry level interface for all growers, the opportunity to gin their cotton locally as opposed to disparate operations elsewhere in Australia or overseas.
Improve linkages and opportunities for upstream and downstream Territory businesses	Ginning in the Northern Territory will create opportunities for downstream grower businesses and link them to and create opportunities for other upstream businesses in warehousing. Importantly, it will produce cotton seed for feedstock for the cattle industry. The by-products of the cotton ginning process and the subsequent cropping development will have a significant impact on the intensification of the Northern beef industry, which has been lacking sources of protein for cattle.
Generate a step increase in economic output and value-add in the Territory economy	Given the opportunities created in downstream and upstream businesses, the cotton gin is expected to generate various benefits for the Northern Territory economy through increase producer surplus. Refer to Section 15 for the analysis on the project's proposed economic benefit to the Territory.
Have a significant proportion of the project benefits flowing to businesses other than the applicant	NT Farmers as the applicant is an industry body that advocates for agribusiness in the Northern Territory. Therefore, the majority if not all of the project benefits of the gin are expected to flow to several separate beneficiaries. These include, but are not limited to: • Local growers • Queensland Cotton (as buyers of cotton bales) • Cotton merchants • Warehousing businesses • Transportation businesses • Shipping businesses • Businesses requiring cotton seed for feedstock • Cotton seed processing businesses • Local businesses where the gin is located.
Provide open access and transparent pricing to all users	The 'gin-as-a-service' model proposed for this project ensures that users are given access to and transparency of pricing of its services.
Create significant new and enduring employment for Territorians beyond the direct jobs created from the project	The gin is expected to directly employ more than 30 positions for Territorians with gin operations alone, and at least 50 new farming (and related) jobs. Given that the gin is a key part of a wider cotton processing and supply chain, the gin is expected to create broader and enduring employment opportunities for relevant businesses.

Securing funding from the Northern Territory Governments *Local Jobs Fund* will underpin the viability of the project. The grant funding, coupled with Queensland Cotton's proposed funding contribution, will give financiers the confidence that the gap between feasibility and bankability will be closed. An important outcome of the fund contribution to the project is that it allows the cotton industry to focus on achieving a substitution to ginning cotton interstate, thereby bringing the economic benefits back to the Northern Territory.

Economic and Commercial Outcomes

The project is estimated to contribute $15 million during the construction phase and $22 million per annum (in steady state) during the operations phase to the Katherine region in the form of increased GRP. The cotton gin is estimated to create or support an estimated 71 FTE jobs during construction and create or support an estimated 88 annual FTE jobs during operations in the Katherine region.

With grant recognised as income, the NPV of the project is approximately $2.2 million, representing 12 per cent internal rate of return, with project cashflows showing available funds for equity distribution towards private investors. Excluding the income from the grant, the NPV of the project is negative at -$5.4 million, and therefore not represent a bankable project for the Proponent. This demonstrates the need for the grant funding to assist the project's viability.

Recommendations

The project is seeking to utilise a grant from the *Local Jobs Fund*, co-financed by private investment, to build this flagship cotton gin on a site that is part of the Northern Territory Government's regional and industrial development vision. The fund is an $89 million co-investment fund which will assist high growth potential Northern Territory businesses to increase exports of goods and services; while substantially increasing local employment and stimulating regions.

This project clearly aligns with these objectives and is strongly supported by key stakeholders. NT Farmers and its partners would like to work closely with the Northern Territory Government to further develop the region's cotton industry with the assistance of the grant funding.

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Glossary

Abbreviation	Term
AASB	Australian Accounting Standards Board
ABS	Australian Bureau of Statistics
ACST	Australian Central Standard Time
AUD	Australian Dollars
CAPEX	Capital Expenditure
CEDA	Committee for Economic Development Australia
CPI	Consumer Price Index
CSIRO	The Commonwealth Scientific and Industrial Research Organisation
DAF	Department of Agriculture and Fisheries
DIPL	Department of Infrastructure, Planning and Logistics
DTBI	Department of Trade, Business and Innovation
EIA	Economic Impact Assessment
FTE	Full-time equivalent
FY	Financial year
GRP	Gross Regional Product
GST	Gross State Product
Ha	Hectares
The Hub	Katherine Agribusiness and Logistics Hub
IO	Input-output
IRR	Internal rate of return
Infrastructure Grants	Infrastructure grants for transformational economic growth projects
JV	Joint venture
KM	Kilometre
MCA	Multi-criteria assessment
ML	Megalitre
MO42	Navigation Act 2012 Marine Order 42 (Cargo Stowage and Securing)
MOU	Memorandum of Understanding
MSC	Maritime Safety Committee
NAIF	Northern Australia Infrastructure Facility
NPAT	Net profit after tax
NPV	Net present value
NT Farmers	Northern Territory Farmers Association Inc.
O&M	Operations and maintenance
OLAM	Queensland Cotton
ORIA	Ord River Irrigation Aria
P.a.	Per annum
PV	Present value
PwC	PricewaterhouseCoopers Australia

Abbreviation	Term
RCTI	Recipient created tax invoice
SA 3	Statistical Area 3
SEIFA	Socio-Economic Indicators for Areas
SOLAS	Safety of life at sea
VGM	Verified gross mass

1 Introduction

1.1 Context

PricewaterhouseCoopers (PwC) has been engaged by the Northern Territory Farmers Association Inc. (NT Farmers) to develop a Business Case to support their application to receive Northern Territory Government funding. The grant funding targeted by NT Farmers is the $10 million Infrastructure Grant under the Grants Program of the *Local Jobs Fund*, administered by the Northern Territory Department of Trade, Business and Innovation (DTBI).

1.2 *Local Jobs Fund*

The *Local Jobs Fund* is an $89 million co-investment fund which will support economic transformational projects and help high growth potential Territory businesses. It is comprised of a suite of four products:

- Loan guarantees
- Business investment concessional loans
- Equity investments
- Grants program, comprising:
  - Priority sector collaborative grants
  - Infrastructure grants for transformational economic growth projects (Infrastructure Grants).

The objective of the *Local Jobs Fund* is to:

> *"Support economic transformational projects and assist high growth potential Territory businesses to increase exports of goods and services both interstate and/or overseas, and/or substantially increase local jobs and outputs to local markets."*

Key outcomes of the *Local Jobs Fund* are to increase the long term productive capacity of the Northern Territory economy, create long term jobs and economic growth, and meet long term economic infrastructure priorities in regional economies. More specifically, infrastructure grants will be targeted at economically transformational projects that deliver broader benefits to the Northern Territory and generate a step-increase in economic activity and output. The Infrastructure Grant Program will prioritise funding to projects that:

- Propose industry level common user infrastructure
- Improve linkages and opportunities for upstream and downstream Territory businesses
- Generate a step increase in economic output and value-add in the Territory economy
- Have a significant proportion of the project benefits flowing to businesses other than the applicant
- Provide open access and transparent pricing to users
- Create significant new and enduring employment for Territorians beyond the direct jobs created from the project.

To receive funding under the Infrastructure Grant Program of the *Local Jobs Fund*, proponents are required to submit to an initial feasibility study, followed by a Business Case by 4:00pm, 27 September 2019 (ACST).

1.3 Findings from feasibility study

This Business Case is the second step in NT Farmers' application to receive grant funding. In August 2019, NT Farmers was required to submit a feasibility study on behalf of the project proponents to DTBI. The purpose of the feasibility study submission was to present the case to receive the required funding to complete this Business Case in support of their official *Local Jobs Fund* application.

Key findings of the feasibility study found:

- Successful commercial demonstrations of blocks of cotton in 2019 (combined with over 50 years of cotton trials in the Northern Territory and Ord region), has created significant interest in cotton farming, with at least 10 new farmers entering the industry from both local and interstate areas in the coming season. Local growers have committed to ramp up cotton production in 2020, with several properties in the region being purchased by experienced cotton farmers to begin development of cotton production.
- There have been significant tracts of land acquisitions over the past 12 months, with new investors looking to develop cropping operations from what were exclusive pastoral operations. These proposed major farming developments have been going through clearing and non-pastoral lease applications to make way for significant expansion plans for the cotton farming industry.
- There is strong interest in expanding the cotton industry in the Northern Territory from local growers through to major eastern seaboard established cotton farmers, Western Australia Ord region farmers and international investors. To capitalise on this strong investor interest, the Northern Territory must provide the right enabling infrastructure to create supply chain efficiencies and farm land expansion, thereby significantly de-risking the opportunity for investors.
- Despite prospects for cotton production growth, broader industry expansion is limited by the availability of a local ginning facility. The cotton produced in the Northern Territory and Ord region is currently transported to Queensland for processing at a cost between $100 and $200 per bale, which significantly cuts into profitability and sustainability, with bale price around $500 per bale. It should also be noted that this transport cost is reliant on cheaper truck backloading rates.
- Establishing a local gin is paramount in the development of the Northern Territory cotton industry; creating the basis for further significant investment in the Northern Territory agribusiness sector. Without a gin, there is a major disincentive for farmers to expand cotton production, due to the significant transport costs to ginning facilities in Queensland.
- Cotton ginned in the Northern Territory would be shipped from the Port of Darwin to customers in Asia, thereby significantly increasing local businesses exports.

1.4 Purpose and structure of the report

The purpose of this Business Case is to assess the long-term viability of a proposed cotton gin in Northern Australia. It has been developed in accordance with the *Local Jobs Fund* Infrastructure Grant Competitive Process Guidelines and DTBI's Infrastructure Grant Application Business Case Guidelines. This Business Case is structured as per Figure 3.

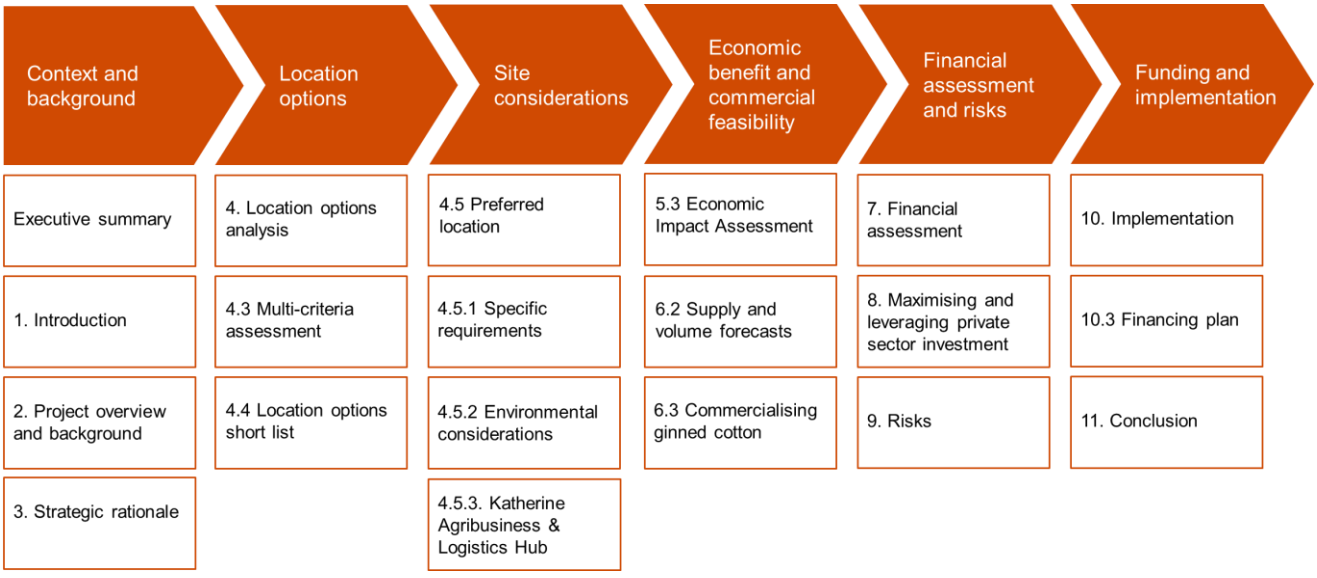

Figure 3: Business Case structure

2 Project overview and background

2.1 Purpose and overview

Critical to the project's strategic rationale, is understanding the project's background to ensure appropriate context when reviewing the project strategy for execution. The purpose of this chapter is to provide context to the project and present relevant project background information. This chapter is structured as follows:

- **Australia's cotton industry -** a high level background to the Australian cotton supply chain and its position in the global market
- **Current status of Northern Territory cotton -** local context to the cotton industry in the Northern Territory
- **Details of project proponents and sponsors -** outlines the relevant stakeholders that support the project**.**

2.2 Australia's cotton industry

Australia plays a key role in the global cotton industry, being the third largest exporter of lint and through producing research that has transformed cotton farms across the globe. Australia exports $2.5 billion of cotton lint each year to spinning mill customers across the globe, with domestic lint sales accounting for 1 per cent of global trade[4]. Cotton is grown almost exclusively in New South Wales and Queensland where ginning and port operations are already established. The economic flow on effect of the cotton industry plays a vital role in underpinning the viability of hundreds of Australian communities in these states with 1,200 cotton farms across New South Wales and Queensland employing 10,000 workers during non-drought years. This is 15 times as many as grazing employees and five times as many as dryland cropping employees[5]. In New South Wales cotton is grown along the Darling, Barwon, Lachlan and Murrumbidgee rivers. In Queensland, cotton is predominantly grown in the Darling Downs, Dirranbandi, Macintyre Valley, Emerald and Theodore. The current gin and warehouse operators in Australia east are shown in Figure 4[6].

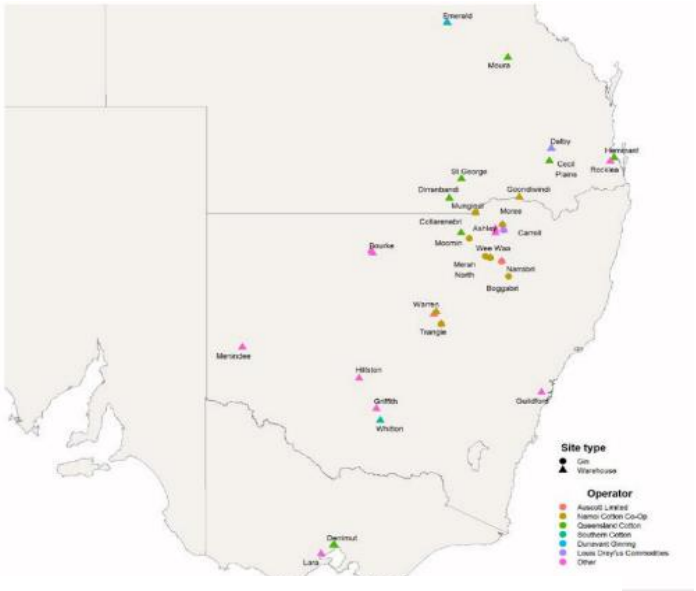

Figure 4: Gin and warehouse operators in Australia

[4] IBIS World Industry Report (2019), A0521 Cotton Ginning in Australia Industry Report

[5] Cotton Australia (2019). https://cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-the-australian-cotton-industry

[6] Bureau of Infrastructure, Transport and Regional Economics (2018). https://www.bitre.gov.au/publications/2018/Freightline_05.aspx

1,200 cotton farms across New South Wales and Queensland employ 10,000 workers; 15 times as many as grazing and five times as many as dryland cropping.

Cotton ginning operations are an important part of the agricultural support services sector and the national cotton industry. For optimal supply chain efficiencies, cotton gins are typically situated in close proximity to cotton farms and process raw cotton from the growers to extract lint and seed; with multiple farms often feeding a single gin. In Australia, gins act as an intermediary and do not purchase cotton lint, however they may pre-purchase processing by-product (cotton seed) for sale to graziers.

There are approximately fifteen cotton merchants in Australia and any one of these entities may purchase cotton from a grower regardless of where it is ginned. The merchant is then responsible for transporting the bales from the gin within seven days of processing and is charged for warehousing, loading, packing and shipping to overseas markets. The merchant and grower will receive advice from a classing house as to the quality of the cotton which then indicates the final value of the cotton. The grower is paid by the merchant post classing and if the gin purchased seed from the grower, the grower may issue a recipient created tax invoice (RCTI) to the gin. The majority of harvesting and sales will occur towards the end of the financial year, after planting in between October and December[7]. There are varying cotton seasons with the main planting of cotton in Queensland and New South Wales being October each year and harvesting and ginning taking place in May to July. The supply chain process is shown in Figure 5.

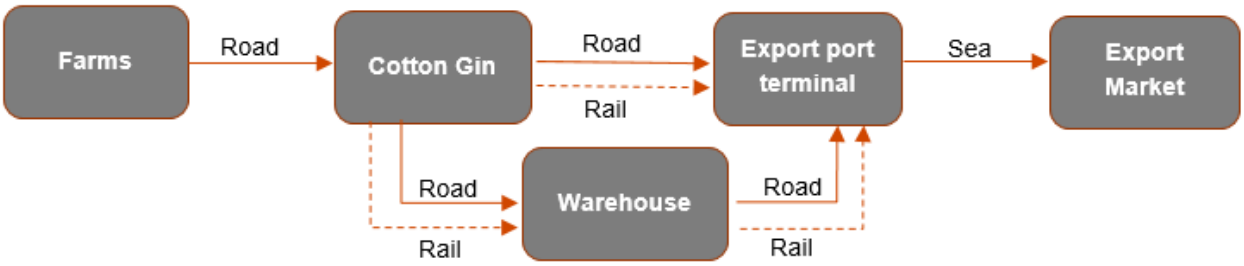

Figure 5: Cotton to export process

In Australia, the primary mode of transport for raw cotton from farms is by road, where cotton rounds are loaded on trucks and transported to the gin. The standard allowable size of the raw cotton round is 2,400kg (known as a 'large round'), which produces approximately 4.4 cotton lint bales per round or 26.6 cotton lint bales per standard single trailer, as pictured in Figure 6. Transporting cotton in large rounds however, is only accepted when transporting them within a 100km radius of the gin. Figure 7 shows a double trailer stacked with small cotton rounds, each trailer carrying up to 15 cotton rounds, an equivalent of 37.5 cotton lint bales per trailer. Stacking smaller cotton rounds on trailers achieves more favourable freight efficiencies, however adds a cost to the grower for wrapping of the additional bales.

[7] Based on advice from Queensland Cotton.

Figure 6: Large cotton round on single trailer

Figure 7: Small cotton round on trailer

Once processed, the cotton bales are warehoused and ultimately shipped to international markets. Most of the cotton lint is destined for the international textile industry in the form of bales, while cotton seed goes to the oil extraction industry or direct to graziers.

Cotton seed is a by-product of the ginning process, and the major domestic market for the Australian cotton industry. Cotton seed is then broken down into oil and husk, with the husk being sold as cotton seed meal; a high protein, high fibre food source for livestock. During recent drought, demand for cotton seed caused the price to surge from $350 per tonne in May 2018 to $650 per tonne in July 2018 before stocks were completely depleted[8]. This is due to recent drought placing immense strain on the availability and price of livestock feed with producers having substituted cotton seed meal as an alternative, cheaper supplementary food source to grain and hay[9]. Due to reduced transport costs, farmers located in cotton processing regions are better placed to order and receive the cotton seed meal. Cotton seed meal provides not only a secondary source of income to gins, but a vital food source for local livestock producers; particularly in dry and drought affected areas. This protein source could intensify the Northern Territory beef industry if supply was reliable and cost effective.

2.2.1 Australian cotton in the global market

Australia exports 99 per cent of its cotton to textile manufacturers in China, Bangladesh, Vietnam, India, Indonesia and Thailand in the cotton lint form. The Australian cotton industry operates in an unregulated market and growers can either deliver directly to processors or via cotton merchants. The value of Australian cotton varies between AUD$300 to $600 per bale. Harvested cotton is primarily made up from the following:

- 42 per cent cotton lint
- 48 per cent cotton seed
- 10 per cent cotton trash.

According to CSIRO, Australian cotton is considered some of the highest quality; with Australian lint attracting a higher price on the global market. Australia's cotton growing productivity is now the world's highest; with an average of 10 bales per ha (irrigated crop). Dryland growers in all areas of the country have been able to rely on average production of 3-4 bales per ha. As a result of CSIRO trials on cotton varieties, in conjunction with grower experimentation, Australian cotton has achieved a 40 per cent increase in water productivity over the last decade[10]. Studies of irrigation during drought scenarios were undertaken by researchers which recommended 5 to 6ML per ha irrigation for cotton in these extreme conditions. This is approximately half the global benchmark of 10ML per ha as stated by the Queensland Department of Natural Resources, Mines and Energy. Overall, Australia's average cotton irrigation requirement is approximately 6.8ML per ha and has proven in practice to be a drought resistant crop.

As a result of these studies, experiments and trials, the world now acknowledges Australia as the first mover in scientific advances that the industry needs. 50 per cent of all dryland cotton in the United States and about one-third of cotton in Brazil, Turkey and Greece have benefited from CSIRO bred varieties. Given the growing efficiency and highly sought after end product, the Australian cotton industry has built a reputation in remaining a global industry leader. However, the existing cotton producers in Queensland and New South Wales are struggling to against adverse weather conditions to cater to the world's demand. These states are now looking to the Northern Territory to capitalise on recent, successful dryland cotton cropping trials and contribute to maintaining Australia's position as a key player in the global cotton market. To do this, additional ginning infrastructure is required, with all Northern Territorian cotton currently trucked interstate to Queensland. Additional facilitating infrastructure will not only enable industry expansion and economic growth in the Northern Territory, but also promote further industry expansion of Australia as a whole. Coupled with further research, Australia's cotton industry will continue to push the boundaries of sustainable and productive cotton growing, with the aid of government funding and industry support.

[8] https://www.beefcentral.com/production/cotton seed-meal-prices-surge-amid-supply-shortage/

[9] https://www.theland.com.au/story/5381898/go-easy-on-cotton seed-beef-producers-advised/

[10] https://cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-water

2.3 Current status of the Northern Territory cotton industry

As established by the NT Farmers initial feasibility study, there is strong interest in cotton farming and expansion from local and interstate cotton growers as well as international investors. As part of this growth prospect, the Northern Territory has observed several development applications for cropping with many apply for clearing and non-pastoral lease approvals. In the last 12 months, significant tracts of land have changed hands with new investors seeking to convert exclusively pastoral operations to cropping. These properties include:

- Auvergne and Newry
- Lakefield
- Manbulloo and Scott Creek
- Flying Fox
- Barkly Tabelands.

There has also been several Douglas Daly farmers investing in irrigation infrastructure and committing to planting cotton this season. A number of pastoral leases have also committed to trialling cotton in several regions including:

- Adelaide River Valley
- Mary River Valley
- Katherine/Daly
- Roper Valley
- Sturt Plateau
- Barkly Tablelands.

In the Northern Territory, once the crops have been harvested, they are formed into cotton rounds and trucked to cotton gins in Queensland. Given that Queensland gins are over 3,000km away from Northern Territory-based cotton farms, cotton rounds are bundled into a smaller sized round to allow stacking and a greater number of bales per trailer.

Cotton industry expansion in the Northern Territory has previously been proposed by large corporations from southern states. What differentiates this proposal is that there is significant local farmer and community support behind this project. The Northern Territory cotton industry and local farmers are well positioned to drive and deliver this project. There has been strong interest from major eastern seaboard cotton farmers as well as international investors in expanding the cotton industry in the Northern Territory. Details on the outcomes of these trials and their expansion plans are further discussed in Section 3.3.

The current state of Northern Territory cotton relies on:

- Availability of trucking backloads where the trucking company has had a forward leg with freight from the east coast of Australia to the Northern Territory region and is in a position to offer competitive rates for repositioning back to the east coast of Australia.
- Ginning of the cotton at a Queensland gin provides input into critical mass (overall volumes) where economies of scale can be gained.
- Utilisation of already available infrastructure for the storage and handling of the cotton.
- Linkage to major cotton traders on the back of long developed supply chains into mature markets. This is primarily around the ability to reach into international cotton markets through major east coast shipping ports and the shipping companies servicing those ports.
- Export port arrangements with Darwin, which does not currently export cotton, and the Port of Brisbane which currently exports all of Northern Territory-grown cotton.

2.4 Details of project proponents and sponsors

Given the widespread growth and interest in the Northern Territory cotton industry, a number of groups have expressed the need for infrastructure investment to sustain profitable growth. Key proponents for a cotton gin in the Northern Territory include:

- Northern Australia Cotton Growers
- OrdCo, the growers cooperative from Western Australia
- Brookstead Farming Co
- Northern Territory Farmers Association
- Queensland Cotton (also known as OLAM Australia).

In addition to providing resources and information to undertake feasibility studies, the groups have financial capacity to invest in the project and industry. Queensland Cotton has provisionally agreed to contribute the funds as required for the project[11].

NT Farmers has partnered with Queensland Cotton, one of the most experienced cotton ginners and marketers in Australia that already operate a number of gins in Queensland and New South Wales. Queensland Cotton is a multinational company with a strong financial backing and a team of skilled managers and operators within the cotton industry. NT Farmers has been able to be the conduit for farmers not only in the Northern Territory, but also in the Ord region, to align with a commercial cotton ginner and marketer (Queensland Cotton) to create a potential new commercial body that will further invest in the establishment of the first cotton gin in the Northern Territory.

NT Farmers is the trusted and effective representative for farmers in the Northern Territory. NT Farmers support and represent established and emerging agribusinesses through effective advocacy, driving research, development and marketing to meet opportunities and challenges for member and stakeholder engagement services. The Association has an established network across the whole of Northern Australia through its food futures network and has identified and cultivated the development of cotton as the potential cornerstone industry for the further development of farming in the Northern Territory.

As the peak industry body representing cropping farmers in the Northern Territory, NT Farmers has already invested considerable time and resources into developing the business case to construct a cotton gin in the Northern Territory. This has included significant investment of staffing and resources to work with farmers, potential investors and the downstream players (ginners, marketers and logistics providers). NT Farmers has worked closely with Northern Territory Government departments such as:

- Department of Trade, Business and Innovation
- Department of Primary Industry and Resources
- Department of Environment and Natural Resources
- Department of Infrastructure, Planning and Logistics.

NT Farmers has worked with these Departments to not only promote the opportunity but to also create a pathway for development through the issues of land tenure as well as the development of the pathway to market for the product.

2.4.1 Letters of support

The following stakeholders have also provided supporting evidence demonstrating their commitment to finance and/or overall support of the project. Letters of support have been received from:

[11] Private sector investment to match grant funding is provided through a combination of funding provided by Queensland Cotton and local, interstate and international grower-investors.

- Ag Connect
- Blackbull Station Douglas Daly
- Brett & Suzanne Gill, owners and managers of Malilangwe and Douglas Daly properties
- Brookstead Farming Pty Ltd
- Cleveland Agriculture
- Cross Pacific Investments Pty Ltd
- Greenview Farm Pty Ltd
- Hands on Agriculture
- Maliproduce Katherine NT Pty Ltd
- Northern Territory Agricultural Company
- Northern Livestock and Agriculture
- Oasis Farms
- Tipperary Group of Stations
- Wispy Enterprises.

3 Strategic rationale

3.1 Purpose and overview

The purpose of this chapter is to demonstrate the strategic rationale of the project and its alignment with the objectives of the *Local Jobs Fund*. The successful cotton growing trials observed in the Northern Territory are also discussed in this chapter. While the industry is harvesting successful crops, economic transformation and growth is being hampered by a lack of a cotton gin. To achieve economies of scale and supply chain efficiencies, a cotton gin is required to transform organic growth into targeted and purpose-driven growth.

This chapter is structured as follows:

- **Strategic rationale and market need -** presents the argument for a cotton gin and the Northern Territory's competitive advantage as a location for a cotton gin
- **Existing cotton trials -** outlines the current status of trials in the region
- **Alignment with *Local Jobs Fund* -** demonstrates how this proposal aligns with the strategy and objectives of the *Local Jobs Fund*.

3.2 Strategic rationale and market need

Strong local commitment and nationwide interest means that the Northern Territory can capitalise on the potential economic benefits from a growing Northern Australia cotton industry. With an ever improving cotton growing skillset, technology and proximity to key export markets, now is the time for the Northern Territory to invest in infrastructure that will facilitate exponential growth in the cotton sector. The project aligns with the objectives of the *Local Jobs Fund*, supporting economic transformation and employment in the Northern Territory.

3.2.1 The opportunity

Despite the widespread interest and local grower commitment, without a cotton gin to service Northern Territorian and Northern Australian farmers, there is a major disincentive for them to significantly expand cotton production. Farmers need confidence that expansion is viable before investing significant amounts to develop land and build facilities to hold and distribute their crop. Development of a 'fee-for-service' cotton gin not only instils confidence but also significantly de-risks the opportunity for farmers to expand. It would provide an industry-wide signal that the Government, industry and community are united towards a common goal – to transform the Top End's cotton industry into an economical, sustainable and value-adding sector.

Based on consultations with local growers and industry stakeholders, the proposal for a cotton gin has previously been considered within the industry. Those attempts however, have often been spear-headed by large multi-national corporations with the objective of creating scale and efficiencies outweighing the objective of creating economic transformation and employment opportunities for local growers and their communities. This is what differentiates this proposal from others in the past. NT Farmers has widespread backing and support from the local farmers, spanning the Northern Territory and northern Western Australia. This proposal is specifically targeted at directly stimulating the township of where the cotton gin could be located, creating broader positive opportunities and flow on benefits to the Northern Territory economy.

The most prominent need for a local cotton gin is to eliminate the requirement to send cotton grown in the North to other States for processing. Cotton produced in the Northern Territory and Western Australia is currently shipped to Queensland for processing at a cost of up to $100 per bale for Territory famers and $200 per bale for Ord Valley farmers; an overhead that nearly doubles without the short term availability of backloading rates. With an average price of $500 to $600 per bale, transport costs significantly reduce the profitability for cotton farming operations as well as their ability to expand. There is an opportunity to 'remove the middleman' by vertically integrating the cotton industry in the Northern Territory with growing, processing and exporting cotton all within the region. Recent trials of cotton in the Northern Territory have been a success, giving farmers the confidence that expansion is possible should local procession infrastructure be established. Details of successful cotton trials is further discussed in Section 3.3.

3.2.2 An additional 'value-add' for the economy

One of the many flow on effects of ginning in the Northern Territory is cotton seed - a by-product of the ginning process. Cotton seed is rich in protein and fibre and provides 'a complete meal' for cattle and other grazing herd, particularly during drought periods when fodder and other grain becomes scarce. Being able to locally source cotton seed meal would promote the intensification of the Northern Territory beef and grazing industry which has been lacking protein sources. This demand for high protein feedstock has also been exacerbated by the existing weather conditions, inhibiting the growth of traditional feedstock sources. The by-products (cotton seed) from cotton ginning in the Northern Territory and the subsequent cropping development will have a significant impact on the intensification of the Northern beef industry; which has been lacking protein sources.

3.2.3 Competitive advantage

In addition to the opportunity for vertical integration of cotton growing, processing and exporting in the Northern Territory, a cotton gin in the north is also supported by the Northern Territory's competitive advantage in having favourable weather conditions, shorter transit times to export hubs, support for scalability and water requirements. The Northern Territory's competitive advantages are further discussed below.

Favourable weather conditions

Within Queensland and New South Wales there has been ongoing drought and environmental conditions that has depressed the future of Australian cotton production as well as other competitive crops, reliant on water. The Northern Territory however, has proven its ability to grow and harvest quality cotton crops on dryland. Existing farmers and new entrants have successfully grown cotton crops in the Northern Territory region with good results in recent years. A new genetically modified cotton version (Bollgard 3) that can repel pests that closed down the industry in the 1970s, has contributed to this success.

Reduced costs to growers

A detailed analysis was undertaken to understand the current costs of growing cotton in Northern Australia and trucking to Queensland to be ginned and exported, versus ginning locally and exporting via Darwin. It should be noted that the cotton industry currently relies on the former, with cheap backloading rates allowing the industry to operate in the short term. Table 2 provides an overview of cost (including export to mainland China) for:

- **a Katherine based gin** with warehouse located at either Katherine (rail to Darwin port) or Darwin (truck to Darwin port warehouse)
- **a South East Queensland based gin** with warehouse located in Brisbane (truck to Brisbane port)
- a price for two growers:
  - Kununurra (50km radius from Kununurra)
  - Katherine (50km radius from Katherine)
- a price for both small rounds, reflecting current transport operations (large round costs in Appendix B).

To complete the high level analysis, the following assumptions have been made:

- Trucking costs are based on a roundtrip operation (3x trailer combination road train) from point of loading to delivery destination and empty return ($3 per km)
- Katherine to Darwin will be either a two-way trucking operation or a rail operation
- No additional cost of wrap for the different rounds (large versus small) is contemplated. This is being treated as an on-farm cost. No time or associated costs have been factored in the analysis for loading or unloading of trailers
- Costs include export to mainland China at $16 per bale from Brisbane and $44 per bale from Darwin (which is expected to decrease in line with increased port movements in and out).

Detailed results, assumptions and full costings are available in Appendix B.

Table 2: Analysis of a Current Operations vs a Northern Gin

St George, Queensland Cotton Gin		
Logistics Scenario (cost/bale)	Katherine Grower	Kununurra Grower
Backload Rate	$124.52	$156.55
Non – Backload Rate	$204.59	$268.64

Katherine, Northern Territory Cotton Gin		
Grower location (cost/bale)	Transport and Warehouse Options After Ginning	
	Katherine Warehouse & Rail to Darwin Port	Road to Darwin Warehouse
Katherine Grower	$81.16	$87.19
Kununurra Grower	$161.23	$167.26

Table 2 indicate the need for a gin in Northern Australia, particularly if the cotton industry grows to any considerable size. With increased supply backload rates will no longer be available and would make the industry unsustainable in the long term.

Shorter transit times from Darwin than Brisbane

Existing Northern Territory cotton is sent to a Queensland-based gin with the cotton lint transported to the Port of Brisbane for export and the cotton seed sold to farmers in New South Wales and Queensland. The Port of Brisbane is serviced by all major container shipping companies and during the cotton export period there is a predominantly balanced trade with full and empty 40 feet dry containers available through the port. The shipping lines calling Brisbane are part of a voyage rotation calling in to a number of ports around Australia to either direct international export destinations or to a trans-shipment port in Asia for the on-carriage of containerised goods to end export destinations.

The transit times from the Port of Brisbane into Asia will vary by destination, however typically take 18 to 21 days to the main ports in Asia. Transit times reflect the period from when the loaded vessel departs from the port until arrival or presentation of a customer's container at the nominated export port. Darwin, unlike Brisbane, is centrally located and proximate to Asia and the Port of Darwin provides services into all export destinations. The Northern Territory has a competitive advantage over the Port of Brisbane with transit times to Asia significantly shorter at nine to 12 days to all major ports. The Port of Darwin currently has sufficient capacity to accommodate the short to medium demand created by the projected cotton processed by the proposed cotton gin (refer to Appendix B for capacity estimates).

Darwin is serviced by three major shipping companies:

1 ANL / CMA CGM Australia

2 Swires Shipping

3 PAE Mariana Line.

The Port of Darwin has two major stevedoring companies, Qube and Linx, which provide services to the shipping companies and operate on a 24 hour, seven-day week basis subject to weather conditions. These stevedoring companies both have the capability to provide shore-based cranes for vessel operations and services for preparing the cotton for export. The Port is also under a long-standing lease arrangement with Landbridge Group from the Northern Territory Government and there is ample land availability surrounding the port for future infrastructure development.

The Port of Darwin is also strategically equipped with rail connections from Katherine directly to the Port, which significantly reduces a level of double handling of shipping containers.

Scalability

Based on consultation with cotton growers in the region, adequate production of cotton for the proposed cotton gin is projected. In addition, there is confidence among these growers of their ability to provide the required inputs in the future. Given that this project is proposed to be partly grower funded and has significant local grower support, it is intended that growers will sign up to long-term contracts to ensure the adequate supply of cotton to the gin. Various industry benchmarks indicate that for a standard-sized and fully automated gin, a throughput of over 55,000 bales per year generally leads to viable operation.

Based on grower production forecasts, the proposed cotton production in the Northern Territory alone is expected to reach over 80,000 bales by year 2021; prompting the urgent need to construct the first gin in the region.

The project's production forecasts indicate that the project is scalable with a second, third and fourth gin potentially required within the next decade to meet the high levels of confident supply. Additional supply from Ord Valley growers has the potential to double these projection figures, particularly in the short term.

Water considerations

Traditionally, cotton growers are subject to carrying water over season which requires a different and more costly production system for cotton farmers. The proposed cotton farms in the region are unlikely to carry water over season and are more likely to capture and use water in the same season. It is proposed that the cotton farms supplying the cotton gin will capture and use water from existing waters sources in the same season. The Northern Territory has the advantage of observing consistent and sufficient rainfall for its estimated demand, therefore, water does not need to be carried between seasons. This type of water and farming production system is an advantage to the Northern Territory given that the local growers have already considered efficient use of water, including dryland cropping.

3.3 Existing cotton trials

Given Australia's position in the global cotton industry, Northern Australia and in particular the Northern Territory, is now primed to make its mark. During 2019, two farmers planted and harvested approximately 100ha of rain fed and irrigated cotton in the Northern Territory along with three farmers in the Ord Valley of Western Australia. While the Northern Territory has an increasing cotton grower base and proximate location to major export hubs, it is limited in achieving sustainable growth due to a lack of an available local processing facility. The cotton currently produced in the Northern Territory and northern Western Australia is presently transported to Queensland for processing and shipping, at a significant cost to growers cutting into profitability and sustainability. Recent harvests from cotton trials in Northern Australia could be ginned in the Northern Territory, allowing the associated benefits to flow back to the Northern Territory economy. These examples include, but are not limited to:

- The Tipperary Station's 60 ha of the trial crop being harvested and dispatched 3,000km to St George in Queensland for ginning in the 2019 harvesting season
- KAI's 150 ha of crop harvested from the Ord scheme's Lake Argyle, and transported 3,500 kilometre to Dalby in Queensland for ginning in the 2019 harvesting season.

The major limiting factor to sustainable growth and economic stimulus for the Northern Territory cotton industry is the availability of a local processing facility.

Despite previous failed attempts to develop the cotton industry (growing and processing) in Northern Australia, industry support combined with local grower initiative and new technologies, have resulted in recent trials being successful. Growers are now aware that growing cotton in the north is possible and profitable, albeit new infrastructure is still required to capitalise on this opportunity and further grow the industry.

Trial growers have discovered that cotton can deliver the returns required to allow for the development of greenfield sites into cropping operations; with rates of return above 10 per cent. The success of these crops is likely to see at least 10 new farmers enter the industry from both local and interstate in the coming season. Based on detailed stakeholder engagement, the key future cotton growing regions for the Northern Territory are summarised in Table 3 and Figure 8.

Table 3: Cotton production forecast in Northern Territory Regions

Northern Australia Cotton Growers	Harvested	Projected Bales	
Region	**2019**	**2024**	**Potential**
Douglas Daly	635	48,570	233,200
Manbulloo / Katherine	-	43,900	165,000
Auvergne	-	9,000	45,000
Roper Valley	-	12,600	84,000
Sturt Plateau	-	52,400	100,200
Barkly Tablelands	-	40,000	120,000
Adelaide River Valley	-	40,000	160,000
Ord Valley	3,325	178,200	238,500

*Size of black dot correlates to relative size of production forecasts, red dot indicates potential gin location.

Figure 8: Potential cotton production in the Northern Territory from 2024

In the last 12 months, significant tracts of land have changed hands with new investors seeking to convert exclusively pastoral operations to cropping. Properties currently seeking development applications for cropping are outlined in Table 4.

Table 4: Properties seeking development applications[12]

Property	Comment
Auvergne and Newry	Based on stakeholder consultation, the industry expects that the Auvergne and Newry properties area development to be a mixture of dryland and irrigated land with approximately 20,000 ha of black soil land and 5,000 ha of irrigated land available for development. Both properties are under one owner.
Lakefield	Based on stakeholder consultation, the industry expects that the Lakefield Station property in Sturt Plateau will develop land to allow for 1,200 ha of irrigated cotton and 4,500 ha of dryland cotton.
Scott Creek/Manbulloo	Based on stakeholder consultation, the industry expects that the Scott Creek and Manbulloo properties near Katherine will develop land to allow for dryland cotton crop on up to 100,000 ha.
Flying Fox	The land on the Flying Fox property in the Roper Valley is expected to be a mixture of dryland and irrigated land, limited by the amount of water available.
Barkly Tablelands	Based on stakeholder consultation, the industry expects that the Rockhampton Downs and Ucharonidge properties will seek to develop up to 10,000 ha or 40,000 cotton bales.

The Northern Territory local cotton farming industry is confident in the production and growth of cotton in the region. The current constraint is the development of industry expansion such as location of infrastructure, proximity to energy and water and access to transport and logistics infrastructure. Based on stakeholder consultation, the farm development costs for cotton on black soil land is estimated to be around $8,000 to $10,000 per ha inclusive of water infrastructure, property and equipment costs. This cost is comparable to the dam construction estimated for the Flying Fox property which proposed an approximate cost of $200 per ML (stored).

[12] Auvergne and Flying Fox properties have not historically lost a development application

Other land available for development in the Katherine and Douglas Daly study area region includes red soil land, providing the opportunity to develop irrigation and dryland cropping land. The Northern Territory Land Corporation is also in the process of releasing up to 30,000 ha of suitable cropping land throughout the region, with some parcels offering significant water availability. This growth potential, in conjunction with trials in the Ord Valley, will significantly stimulate the industry in Northern Territory.

The economic flow on effects of a thriving cotton industry will be widespread, as proven in southern states. While local support is strong, investment is needed to fully realise the potential of this industry. A local cotton gin in the Northern Territory is the next logical step to fully realise the potential of the cotton industry in the Northern Territory, boosting local economies and international trade.

The barrier to the future growth for both regions is access to a viable cotton gin for the processing of the cotton crop and handling of lint, seed and trash. Cotton seed is high in protein (22 per cent) and is a value add to the cattle industry as a feedstock whereas the trash, once processed, is a high-value mulch.

3.4 Alignment with the *Local Jobs Fund*

The *Local Jobs Fund* is an $89 million co-investment fund which will support economic transformation projects and assist high growth potential Territory businesses to increase exports of goods and services both interstate and overseas; while substantially increasing local employment and stimulate regions. This project aligns with the objectives of the fund as it is expected to ignite an economic transformation for local cotton farmers and the flow on opportunities for employment in the Northern Territory, as demonstrated in Table 5.

Table 5: Alignment with the *Local Jobs Fund*

Fund Objective	Project Alignment
Industry level common user interface	A gin in the Northern Territory will provide ginning services to the growers in the Northern Territory and other Northern Australia regions. The common user gin will provide the sector with an industry level interface for all growers, the opportunity to gin their cotton locally as opposed to disparate operations elsewhere in Australia or overseas.
Improve linkages and opportunities for upstream and downstream Territory businesses	Ginning in the Northern Territory will create opportunities for downstream grower businesses and link them to and create opportunities for other upstream businesses in warehousing. Importantly, it will produce cotton seed for feedstock for the cattle industry. The by-products of the cotton ginning process and the subsequent cropping development will have a significant impact on the intensification of the Northern beef industry, which has been lacking sources of protein for cattle.
Generate a step increase in economic output and value-add in the Territory economy	Given the opportunities created in downstream and upstream businesses, the cotton gin is expected to generate various benefits for the Northern Territory economy through increase producer surplus. Refer to Section 5 for the analysis on the project's proposed economic benefit to the Territory.
Have a significant proportion of the project benefits flowing to businesses other than the applicant	NT Farmers as the applicant is an industry body that advocates for agribusiness in the Northern Territory. Therefore, the majority if not all of the project benefits of the gin are expected to flow to several separate beneficiaries. These include, but are not limited to: • Local growers • Queensland Cotton (as buyers of cotton bales) • Cotton merchants • Warehousing businesses • Transportation businesses • Shipping businesses • Businesses requiring cotton seed for feedstock • Cotton seed processing businesses • Local businesses where the gin is located.
Provide open access and transparent pricing to all users	The 'gin-as-a-service' model proposed for this project ensures that users are given access to and transparency of pricing of its services.

Fund Objective	Project Alignment
Create significant new and enduring employment for Territorians beyond the direct jobs created from the project	The gin creates more than 30 employment positions for Territorians in gin operations alone. Given that the gin is a key part of a wider cotton processing and supply chain, the gin is expected to create broader and enduring employment opportunities for relevant businesses.

Securing funding from the Northern Territory Governments *Local Jobs Fund* will underpin the viability of the project. The grant funding, coupled with Queensland Cotton's proposed funding contribution, will give financiers the confidence that the gap between feasibility and bankability will be closed. An important outcome of the fund contribution to the project is that it allows the cotton industry to focus on achieving a substitution to international export of un-ginned cotton, thereby bringing the economic benefits back to the Northern Territory.

4 Location options analysis

4.1 Purpose and overview

The Strategic Rationale chapter confirmed the need for investment in a cotton gin facility in Northern Australia to:

- Stimulate the Territory economy
- Provide employment opportunities
- Enable local economies
- Establish a strong cotton industry in Northern Australia
- Intensify the Northern Territory beef industry through protein rich cotton seed.

The purpose of this chapter is to explain the evaluation of the potential location options for a cotton gin in Northern Australia and the process of eliminating options to recommend a preferred location(s) for further analysis. This chapter is structured as per the following:

- **Location options long list -** describes the location options considered in this analysis
- **Multi-criteria assessment -** outlines the methodology, assessment and results of the location options analysis
- **Location considerations -** briefly describes high level characteristics of the proposed location

All options are within close proximity of the Port of Darwin and given the notion that all volumes would be exported via this port, the sustainability of the Port of Darwin was also considered in providing longer-term future capacity. The sustainability of the Port of Darwin was considered against current and future service levels, including shipping services and trade balance for supply of export containers.

4.2 Location options long list

The options analysis focused on the location of the facility and factors affecting its position. The location options assessed are listed below and mapped in Figure 9.

- Kununurra, Western Australia
- Katherine, Northern Territory
- Edith Springs, Northern Territory
- Darwin, Northern Territory
- Mataranka, Northern Territory.

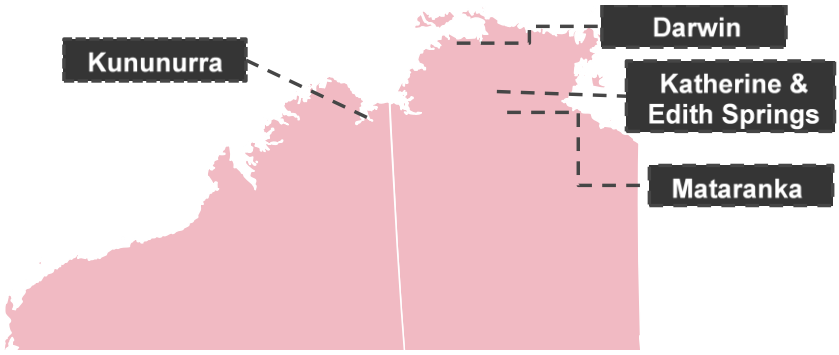

Figure 9: Location options map

The location options for assessment were a result of consultation with cotton growers and NT Farmers' related stakeholders. The five selected site options are located close to or within Northern Australia's population and commerce centres; which was deemed an appropriate place to begin further analysis. The five sites are connected by the Victoria and Stuart Highways and have been highlighted as areas proximate to current and future cotton growing regions.

4.3 Multi-criteria assessment

4.3.1 Methodology

A Multi-Criteria Assessment (MCA) workshop was facilitated on 17 September 2019 at the Katherine Research Station. The MCA process was used to identify the preferred location option(s) for the cotton gin to allow for more detailed and targeted

analysis of the options. The workshop was well attended with over 30 attendees present to assess the five potential location options, representing all cotton growing regions outlined in this analysis, including a strong presence from the Ord Valley growers. The attendees were a broad representation of the cotton industry in Northern Australia and are outlined in Table 6.

Table 6: MCA attendees

Stakeholder	Stakeholder type	Name and/or position
CRC for Developing Northern Australia	Industry	Sally Leigo, NT Representative
Northern Territory Cotton Growers Association	Industry body	Bruce Connolly, Chairman
NT Farmers	Industry body	Andrew Philip, Industry Development Officer Simon Smith, President Paul McLaughlin, Vice President
Northern Agriculture	Local grower – Northern Territory	Nick Black
Northern Livestock & Ag	Local grower – Northern Territory	Sam McBean
Tipperary Group	Local grower – Northern Territory	Tom Polkinhome
Hands on Agriculture	Local grower – Northern Territory	Chris Howie
Malilangwe	Local grower – Northern Territory	Matt Dennis
Vermelha Station and Scott Creek/Manbulloo	Local grower – Northern Territory	David Warriner
Ceres Downs	Local grower – Northern Territory	Sarah Measey
OrdCo	Local grower – Western Australia	Fritz Bolten, Rob Boshammer, Willem Bloecker, Gabi Bloecker, Daryl Smith
Auvernge/Newry	Local grower – Northern Territory	Steve Petty (on behalf of international investor)
Buratovich Hnos	International investor	Eduardo Buratovich

The MCA is a quantitative assessment process designed to establish preferences between options by reference to an explicit set of criteria. The MCA process was conducted in five stages:

- Stage 1: Identify options
- Stage 2: Develop criteria
- Stage 3: Determine criteria weightings
- Stage 4: Evaluate options
- Stage 5: MCA.

The location options analysis is based on distances and trucking backloads assumptions. Existing benchmarks of Queensland-based gin operations with exports through the Port of Brisbane were also applied as points of reference.

4.3.2 Options overview

An options overview was presented to the workshop participants, including detailed information and maps of each location. Participants were presented with the following information on each location to inform and support decision making:

- Location type
- Location/proximity to key Northern Australia hubs
- Existing infrastructure
- Water, power and sewage availability
- Environmental considerations.

Participants had the opportunity to visualise the ‘projected 2024’ and ‘beyond 2024’ cotton growing areas, to enable proper judgment when evaluating what locations would be close to the cotton supply, as depicted in Figure 10 and Figure 11

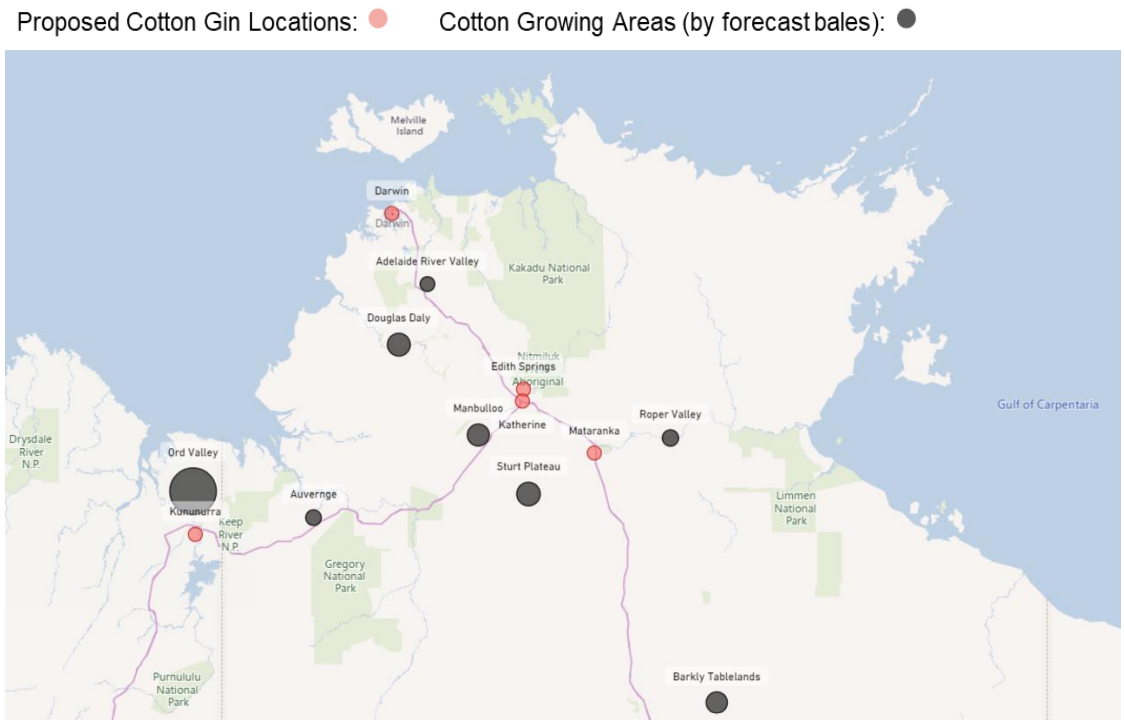

Figure 10: Forecast cotton production (up to 2024) in proximity to proposed gin locations

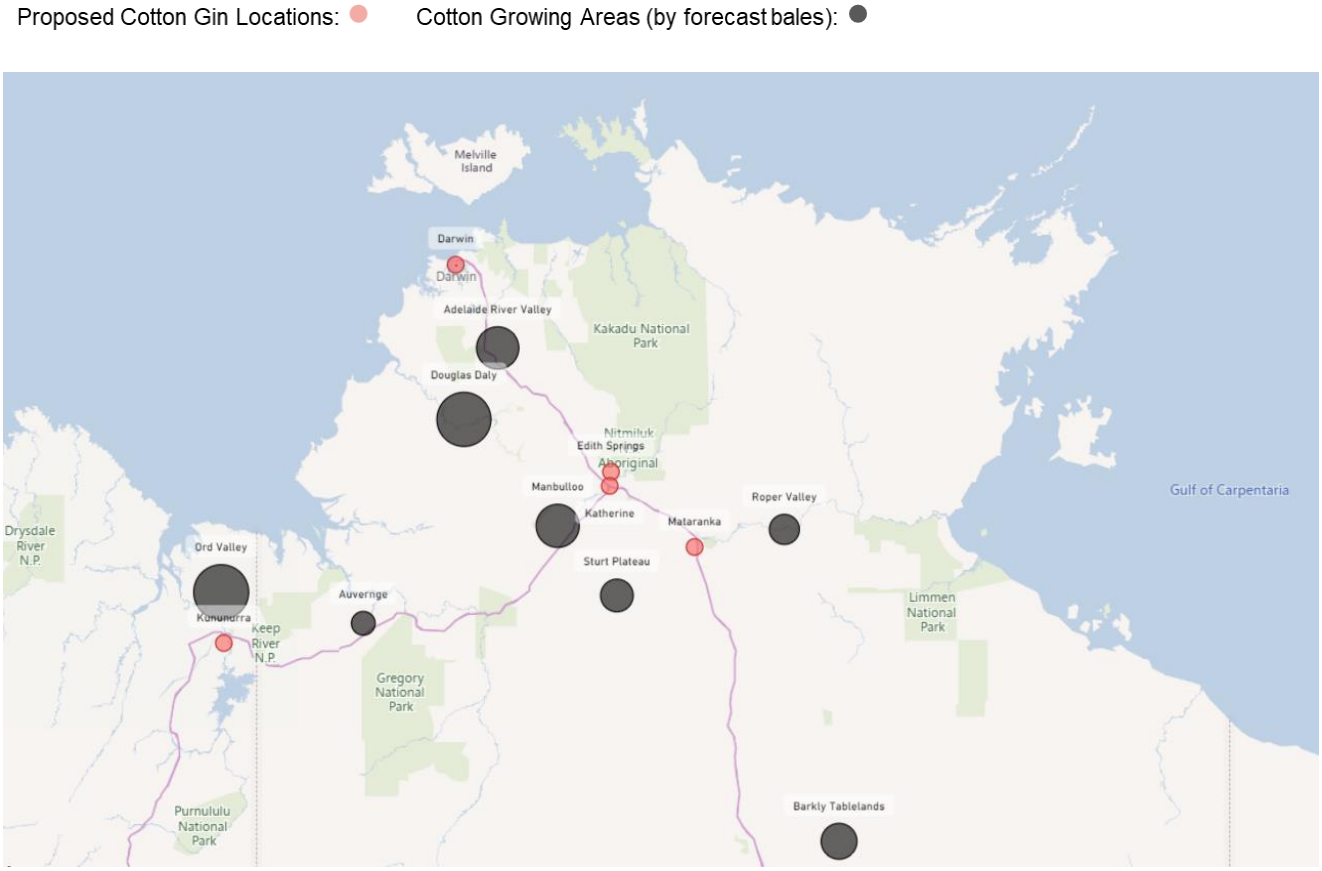

Figure 11: Forecast cotton production (beyond 2024) in proximity to proposed gin locations

4.3.3 Criteria

A list of criteria and factors to be considered in the site selection process were developed based on the Strategic Rationale chapter and user requirements for a cotton gin identified through engagement with stakeholders. These criteria were developed by PwC to reflect the consensus view of the most important drivers for site selection. The six key criteria used in the MCA are described in Table 7.

Table 7: Criteria and considerations

Criteria	Description	Key Considerations
A	Operational viability	• Availability of land: native title, land use zoning, financial • Environmental: protecting townships from noise and dust pollution • Availability for utilities: power, gas, water and sewage • Access to local population for skilled staff to construct, operate and maintain facility • Availability of essential services for staff: accommodation, financial, educational and vocational • Proximity and availability of social services for staff: medical, postal, recreational and cultural • Ease of access to site to allow for repairs, maintenance and inspections by travelling staff • Proximity of emergency services: fire, police and ambulance
B	Proximity to export hubs	• Distance by road to the Port of Darwin • Distance by rail to the Port of Darwin
C	Proximity to cotton farms	Proximity to major cotton growing areas, primarily: • Adelaide River Valley • Ord Valley • Douglas Daly • Roper Valley • Start Plateau • Barkly Tablelands • Katherine
D	Local economic outcomes	• Noticeable economic impact on the community: direct and indirect employment opportunities during construction and operations • Ability to invest in local businesses • Diversification of local economy • Attract global investment into the Territory • Avoid resumption of private land and public assets
E	Access to transport logistics	• Access to reliable roads that are suitable and safe for staff, heavy vehicles and machinery • Access to rail facilities including loading docks • Access to the site by local airport for urgent repairs and maintenance • Feasible costs to reach the site
F	Cost	• Costs to construct facility: transport of materials, access to skilled trades, road infrastructure upgrades and site civil works • Costs to operate facility: rates of utilities including power, water and sewage • Costs to operate facility: access to local staff and skilled tradespeople

In addition to these criteria, there were three critical site requirements identified through industry research and stakeholder engagement that were embedded in the MCA criteria definitions. The three non-negotiable requirements of an appropriate cotton gin site include:

- **Location size:** The chosen site must have at least 60ha of land to allow for storage of raw cotton, seed and trash as well as the ability for potential scaling up of operations.

- **Utilities:** The site must have reliable access to power and water
- **Resilience:** The chosen site must be accessible in an incident of extreme weather including flooding and must therefore have adequate road infrastructure
- **Bio-security:** The site must be located to permit transport of cotton including cotton seed across various Northern Australia bio-security regions
- **Noise pollution**: The site must be secluded from residents within the receptor zone
- **Dust pollution**: The site must be secluded from nearby populations; accounting for prevailing winds.

4.3.4 Criteria weighting

A pairwise comparison was used to calculate a weighting for each criterion. This process compares criteria in pairs to select a more significant and less significant criterion resulting in revealed significance within the set of criteria. All criteria have been identified as important and have been developed to align with the objectives of the project. The pairwise analysis was undertaken during in the MCA workshop. During the workshop, the process for completing a pairwise analysis was explained to the participants, and the ranking of criteria was agreed upon and endorsed by those present. The ordered ranking of criteria is shown in Table 8.

Table 8: Criteria pairwise comparison

Rank	Criteria	Description	Weighting
1	C	Proximity to cotton farms	33%
2	F	Cost	26%
3	A	Operational viability	20%
4	D	Local economic outcomes	13%
5	E	Access to transport logistics (road and rail)	7%
6	B	Proximity to export hubs	2%

Given the stage and nature of the assessment, Criteria E and B were not considered critically important as all locations were likely to suffer score similarly in these criteria. This was reflected in the weighting derived through the process by participants.

4.3.5 Options scoring

The MCA was completed by scoring each of the location options against the criteria using a five-point colour rating system (with a background numerical scoring system) outlined in Figure 12. A total score for each option was used to rank the options and determine the preferred location(s). The scoring was determined via a collaborative discussion during the facilitated workshop process, where key stakeholders discussed and then moderated an agreed rating for each option against each criterion.

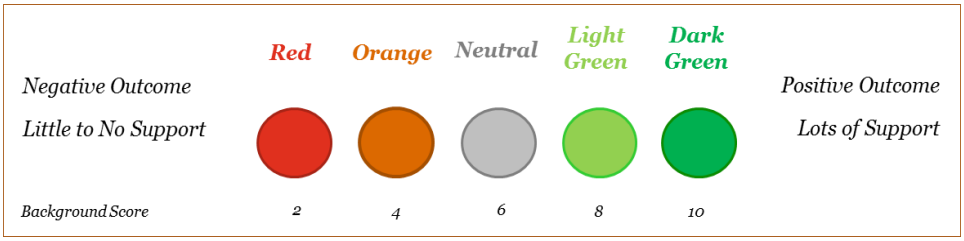

Figure 12: MCA scoring methodology

The workshop involved an open discussion to allow participants to provide insight and feedback on each of the criteria and each option was rated accordingly. Each of the key elements to be considered for each criterion were also discussed to ensure each option was scored objectively. A full analysis of the scoring for each option is presented in Appendix A.

4.3.6 Summary of MCA

Figure 13 illustrates the output of the MCA workshop which summarises the scoring of each of the sites including their weighted values and ranking.

Options		A	B	C	D	E	F	Score	Rank
1	Katherine							8.8	1
2	Edith Springs							6.3	4
3	Kununurra							7.9	2
4	Mataranka							4.7	5
5	Darwin							7.1	3
	Weighting	20%	2%	33%	13%	7%	26%		

Figure 13: MCA summary results

Figure 13 shows the scoring and ranking of each state, identifying the most preferred location(s) to progress on to further analysis. The highest ranked option, Katherine, scored 8.8 due to its central location, which allowed it to score highly in '*proximity to cotton farms*' and its proximity to a population centre allowed it to score highly in '*operational viability*' and '*cost*'. As these three criteria had the largest relative weights, Katherine scored highly and was the highest valued location in the MCA.

The second highest scoring option, Kununurra, has a similar population and reasonably sized township which allowed it to score highly against '*operational viability'* and '*local economic outcomes'.* Despite this, Kununurra as a gin location is limited by its relatively remote location and lack of direct access to export hubs. This was evidenced when evaluating against '*cost*' '*access to transport logistics*' and '*proximity to export hubs*'. However, given the high weighting of *'operational viability'* Kununurra was able to score the second highest and was the second highest ranked location.

Darwin scored lower than Katherine and Kununurra in all options other than *'proximity to export hubs'* and *'cost'*. In the *'cost'* criteria Darwin was the highest scoring option, due to its location in a major population; allowing for ease of staffing and lower construction costs. Darwin scored poorly in the highest weighted criteria *'proximity to cotton farms'*, given that it is 900km from the Ord Valley and 320km from farms near Katherine. The overall impact of a project like this was also thought to be felt less in Darwin than other regional sites, yielding a low score in *'local economic outcomes'.*

Edith Springs and Mataranka were both heavily penalised due to their remoteness. Participants were concerned the facility would struggle to attract staff and have a much higher construction cost, scoring it low in *'operational viability'* and *'cost'*. Given these were highly weighted criteria, Edith Springs and Mataranka were not selected for further assessment.

To understand the importance of the weightings, a sensitivity test was undertaken with all weightings made equal. The result yielded the following results as shown in Figure 14.

Options		A	B	C	D	E	F	Score	Rank
1	Katherine							9.3	1
2	Edith Springs							6.3	4
3	Kununurra							7.3	3
4	Mataranka							5.3	5
5	Darwin							7.3	2
	Weighting	17%	17%	17%	17%	17%	17%		

Figure 14: Equal weighted criteria sensitivity test

This result again confirms that the preferred location for the site as Katherine.

4.4 Location options short list

The attendees agreed to progress Katherine and Kununurra as the preferred locations for detailed analysis. The analysis will provide a detailed cost comparison of the two options, including various methods of integrated road and rail transport. The analysis builds on the presented figures in section 2.3 regarding competitive advantage of shipping from Darwin compared to Brisbane. A summary of results is provided below based on stakeholder defined assumptions, however, a full breakdown of the costs for transport is provided in Appendix B. This Appendix provides figures for a Darwin based gin for completeness. The results below provide a cost (including export to mainland China) for:

- **a Katherine based gin** with warehouse located at either Katherine (rail to Darwin port) or Darwin (truck to Darwin warehouse)
- **a Kununurra based gin** with warehouse located at either Katherine (rail to Darwin port) or Darwin (truck to Darwin port warehouse)
- a price for four growers:
  - Kununurra (50km radius from Kununurra)
  - Katherine grower 1 (50km radius from Katherine)
  - Katherine grower 2 (150km radius from Katherine)
  - Katherine grower 3 (250km radius from Katherine)
- a price for both small rounds and large rounds.

To complete the high level analysis, the following assumptions have been made:

- Trucking costs are based on a roundtrip operation (3x trailer combination road train) from point of loading to delivery destination and empty return ($3 per km)
- Katherine to Darwin will be a two-way trucking operation or a rail operation
- No time or associated costs have been factored in the analysis for (loading or unloading of trailers
- A Kununurra based gin will have no local warehousing facilities for storage or handling of the cotton bales and loading of export containers. The cost of transporting empty 40 feet shipping containers between Darwin-Kununurra was deemed to be cost prohibitive in gaining maximum payload tonnes per export shipping container. All cotton lint bales will either be trucked to a Darwin based warehouse or a Katherine based warehouse (where rail is utilised)
- No additional cost of wrap for the different rounds (large versus small) is being considered. This is being treated as an on-farm cost.

Table 9 shows that a gin in Katherine with a rail connection for transport of bails to the port of Darwin is the most cost efficient option for the majority of growers.

Table 9: Kununurra and Katherine Gin Transport Costs

Kununurra Gin				
Grower location ($cost/bale)	Large Round		Small Round	
	Katherine Warehouse Rail to Darwin	Darwin Warehouse Road to Darwin	Katherine Warehouse Rail to Darwin	Darwin Warehouse Road to Darwin
Kununurra Grower	113.88	117.93	110.63	114.67
Katherine Grower 1	237.74	241.78	198.71	202.75
Katherine Grower 2	260.26	264.30	214.72	218.76
Katherine Grower 3	282.78	286.82	230.73	234.78

Katherine Gin				
Grower location ($cost/bale)	Large Round		Small Round	
	Katherine Warehouse Rail to Darwin	Darwin Warehouse Road to Darwin	Katherine Warehouse Rail to Darwin	Darwin Warehouse Road to Darwin
Kununurra Grower	197.02	203.04	161.23	167.26
Katherine Grower 1	84.42	90.44	81.16	87.19
Katherine Grower 2	106.94	112.96	97.18	103.20
Katherine Grower 3	129.46	135.48	113.19	119.22

While it will cost a Kununurra grower $161 per small bale to gin and warehouse in Katherine, the closest Katherine grower will pay $191 per small bale in transport costs to gin in Kununurra; with the most distant Katherine grower paying $230 per bale. Given cotton production is projected to be strong in the Northern Territory, particularly within 50km from Katherine (Manbulloo) and 150 to 250km from Katherine (Douglas Daly) a cotton gin located in Katherine would be beneficial to Northern Territory growers. As mentioned in Section 2.3, the Kununurra growers will still benefit from the Katherine gin, avoiding a $269 per equivalent small bale transport cost to gin and export out of Brisbane.

4.4.1 Bio-security

There are currently strict regulations in place regarding the movement between States and Territories of a number of agricultural items to manage the spread of pests and diseases, especially on the movement of items between the Northern Territory and Western Australia. At the time of this analysis, while Government and industry are actively working to address this issue, there has been no official position for the transfer of cotton seed from Northern Australia into Western Australia and in particular the Ord River Irrigation Area (ORIA). Additionally, the movement of export shipping containers into the Ord River region that have originated from an overseas location are subject to internal and external inspections. This is to ensure that no foreign substances are either within the container or external to the container, such as soil that could contain seeds or pests.

There will need to be a significant ongoing evaluation on bio-security to ensure that the free movement of either cotton seed or export shipping containers is not only exempted between the State and Territory but also what monitoring systems and processes are in place to conform with regulatory requirements.

4.5 Preferred location

Given the outcome of the MCA workshop, and the results of transport logics cost estimates it is clear that Katherine would be the preferred location for a cotton gin in Northern Australia. The next step however, is identifying a site within Katherine that can cater for the requirements of a cotton gin (as outlined in the MCA criteria) within a feasible timeframe. During initial stakeholder engagement, the proposed Katherine Logistics and Agribusiness Hub was identified as a possible site in Katherine to establish a cotton gin.

This section outlines in further detail:

- The specific requirements to build and operate a cotton gin in Katherine
- Environmental considerations to operate a cotton gin in Katherine
- Our understanding of the Katherine Logistics and Agribusiness Hub.

4.5.1 Specific requirements to build and operate a cotton gin

The primary constraints to consider for the establishment of a cotton gin are the size of site, and the utility requirements to enable the site**.**

Site Size

An aerial study of large gins in St George, Dalby, Whitton and Moree identify the need for at least 6ha for ginning operations (with approximately three major utility enabled structures) and a total land size of at least 60 ha. This additional land size is

for the storage of raw cotton before it is processed by the facility. This storage area needs to be clear and flat terrain to allow for safe machinery access, however, does not require utilities. Figure 15 indicates the size requirements for a gin in Whitton, New South Wales and Dalby, Queensland; with operational and total size labelled.

Figure 15: Whitton and Dalby Gin Size Footprint

Utility requirements

Based on current estimates, scope and specification, it is expected that the site utility requirements would entail:

- 3 x 1,500 kilovolt (kva) transformers
- 9.5 litres per second to meet peak water demand
- Temperature control system for hot or humid regions, requiring five to eight litres of water per minute
- Sewerage connection.

4.5.2 Proposed Katherine Agribusiness and Logistics Hub

Upon consultation with the Department of Infrastructure, Planning and Logistics (DIPL) it is understood that DIPL has received funding approval to begin development and construction of a multi-user industrial hub in the Katherine region; the Katherine Agribusiness and Logistics Hub. Initial investigations conducted by DIPL demonstrate that a cotton gin would be a suitable addition to the industrial park; which has been flagged for possible construction during Stage 4 of the program. While this program masterplan is high level and indicative, it presents a misalignment between the demand and readiness of the Northern Territory for a cotton gin.

With Stage 1 aiming to begin construction in May 2020, with a year to being commissioned by 2022 an initial 30 ha site enabled with water, sewage and power will be required. Beyond 2022, there are currently no contractual agreements in place with industry for ongoing use of the Katherine Agribusiness and Logistics Hub While demand is likely to increase in line with industrial infrastructure becoming available to key market players, it would be pertinent for NT Farmers to collaborate closely with DIPL regarding the potential to use this cotton gin as DIPL's key anchor customer of the Katherine Agribusiness and Logistics Hub, given the scale of the proposal is significantly larger than anything currently proposed in the Stage 1 Masterplan.

Securing an established site in the preferred location of Katherine is a key note to the viability of the project. To mitigate this risk, NT Farmers is working closely with its infrastructure advisors at Queensland Cotton to understand the detailed land and utility requirements of the gin so that a specific enabled site in the Katherine region may be matched to the specific requirements. However, the advantage of situating the cotton gin on the proposed Logistics and Agribusiness Hub is that this site already has existing supporting from the Northern Territory Government. The Hub was highlighted at a recent *Presentation to CEDA Trustee Board* event, presented by Chief Executive Officer of the Department of the Chief Minister. At the event, Jodie Ryan provided an economic outlook of the Northern Territory, highlighting the Hub as a fully budgeted major project forecasted in the Department's pipeline of major projects. The proposed Cotton Gin facility could provide a major anchor industrial tenant during Stage 1 of the Hub's implementation.

4.5.3 Environmental considerations to establish and operate a cotton gin in Katherine

This section analyses whether there are available facilities and services in the area that are essential to create an acceptable environment in which the gin can operate and its management and labour force can live. Location-specific considerations have been addressed in the location options analysis presented in Section 3. The proposed Agribusiness and Logistics Hub is situated on a portion of the Manbulloo pastoral lease. A pastoral lease is a title for the lease of an area of Crown land to use for the limited purpose of grazing stock and associated activities. Pastoral leases are governed by the *Northern Territory Pastoral Land Act 1992* and *Crown Lands Act 1992*. Native title can co-exist with pastoral leases, regardless of whether a determination of native title has been made. While the land use zoning of the proposed Hub has already been zoned as 'Industrial use', DIPL are currently undergoing consultation with the Northern Land Council and Traditional Owner groups regarding the acquisition of the required land around the proposed Hub.

The project may observe the following restrictions with a pastoral lease site:

- The arrangements may restrict leaseholders from using their land for activities other than grazing
- The expansion of other activities may require additional approvals from government and these may not be transferrable between parties
- As leasehold does not have the same security as freehold, this may affect ability to access finance and capital
- Existence of regulations and requirements that might not apply to other forms of tenure.

There are also additional risks around land capability and vegetation clearance requirements which may be challenged by environmental groups. Given the sites seclusion from residential populations, dust and noise pollution from the gin would be mitigated.

4.5.4 Warehousing considerations

The utilisation of a dedicated warehouse to hold cotton lint bales would have a peak period of between 10 to 12 weeks. The warehouse needs to consider the holding of lint bales under good conditions to ensure the integrity of the stored bales for export. Figure 16 illustrates how cotton lint bales are stored in a dedicated warehouse. The site specifications required for the warehouse include:

- Polished concrete floor
- Fire suppression system
- Low roof height to assist in temperature control
- Installed temperature control system for hot or humid regions
- Large area for stacking of lint bales and forklift access.

Figure 16: Cotton bale warehousing

The warehouse may have the ability to load containers on a drive through basis with storage of lint bales in close proximity to the container loading operation, as depicted in Figure 17. There will need to be some storage capacity at the gin for the initial handling of the cotton lint as it is baled and awaiting transfer to a larger facility for storage and handling, as shown in Figure 18.

Figure 17: Warehouse drive through operation

Figure 18: Additional warehousing

Should the gin and accompanying warehouse be located within the proposed Katherine Agribusiness and Logistics Hub, it may take into consideration the following factors as these also drive the specific location of the warehouse and its proximity to the gin. These factors include:

- Size of the warehouse should be constructed for the future projected cotton lint bales volumes rather the immediate period
- Consideration of a multi-user facility to manage the off-peak periods for adequate return on investment
- Access to a labour force for operations that is also not reliant on seasonal work
- Access to other required services such as a weighbridge (currently included in this project's cost estimates)
- Defined traffic management plan to cater for the volume of expected truck movements (inwards and outwards)
- Opportunities for third-party storage options in the area for cotton merchants to use in the instance of storage capacity.

5 Net economic benefit for the Northern Territory

5.1 Purpose and overview

This chapter showcases how the project will create and sustain new local jobs, increase economic activity and expand productivity highlighting the project's net economic benefit for the Northern Territory. This chapter is structured as follows:

- **Project scenario assessed -** briefly describes the high level project parameters guiding the analysis, also known as the Reference Project
- **Economic Impact Assessment -** assesses the impact of the cotton gin in the Katherine region.

5.2 Project scenario assessed

The project scenario assessed, for which NT Farmers is seeking Northern Territory Government grant assistance, is a Katherine-based cotton gin (i.e. the Reference Project). The specific costs and specifications of the gin are outlined in the Financial Assessment of Section 7. The Reference Project has the following high level supply chain assumptions:

- All cotton from the Katherine and Kununurra regions is ginned at the Katherine-based gin
- Empty shipping containers are railed from Darwin for loading
- Costs for picking up the empty container, repositioning it at the Katherine warehouse for loading, and returning it to the railhead at Katherine are included in the warehousing costs
- Return rail is directly on to the Port of Darwin facility for storage and shipping.

The Reference Project does not include outcomes of revenue from cotton seed or trash as a result of the ginning process. There are several commercial opportunities in utilising the cotton seed and waste, the benefits of which would be realised by local Territorians given revenue from selling the seed and waste would be attributed to the gin. Cotton seed would require its own level of infrastructure for storage and handling as well as access into any identified localised market. Cotton trash would require an area of land, labour and mobile equipment to take the raw product and process it into a mulch. Regardless of the commercial treatment of cotton seed or trash, the gin would still have to manage the volume of by-products. Therefore, the Reference Project takes a conservative position and assumes that the cost estimates include a cotton seed storage shed to house the cotton seed.

5.3 Economic Impact Assessment (EIA)

An economic impact assessment (EIA) was undertaken to consider the impact of the cotton gin in the Katherine region. The assessment considers the stimulus impact of capital outlay and the operational benefit of the cotton gin. The approach to the EIA and the direct and flow-on impacts of the construction and operation of the cotton gin is as follows:

- **Approach -** details the methodology applied to undertake the EIA
- **Economic impact assessment -** which summarises the key output of the input-output model for the total assessment
- **Summary of the economic impact assessment -** which provides an outline of the impacts.

5.3.1 Approach

Analysis on the economy-wide (direct and flow-on) impacts of the construction and operation of the cotton gin was completed using an input-output model provided by REMPLAN. This allows for an estimate of the total economic impacts to the Northern Territory and to the Katherine regional economy arising from the construction and operation of the cotton gin. The economic profiles used to undertake the EIA were the Katherine (SA3) region. The area encompassed in the economic profile is shown in Figure 19. The Katherine region examined does not include all of the relevant local governments however, it provides an indication of the economic impacts expected.

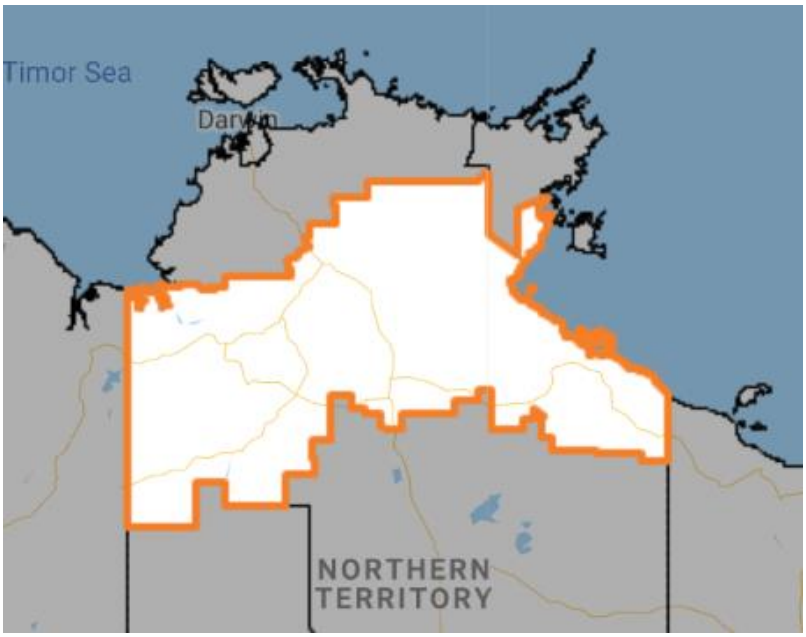

Figure 19: Katherine (SA3) region

The total EIA includes indirect impacts in other sectors or regions of the economy. Indirect impacts include backward linkages through the supply chain of industries, essentially supplier industries, to those industries and businesses directly affected by the construction or operation of a new development.

In summary, the economic impact modelling enables an opportunity to explore how changes in employment or output (sales) in the Agriculture, Forestry and Fishing sectors of the economy in the Katherine region, will impact all other sectors of the economy by modelling the flow-on effects across different industries.

5.3.2 Economic Impact Assessment

The regional economy will benefit from the construction and operation of the cotton gin. While construction of the facility will create a temporary economic stimulus to the economy, the cotton gin will create long term sustained economic contribution through both the direct spending to maintain and run the gin and through the impact that flows through to cotton producers. The results for the economy-wide impacts of the construction and operations are described in the following sections.

An input-output (IO) approach was utilised for this assessment to measure the overall impact or 'shock to the economy' as a result of the cotton gin's construction and ongoing operation. One of the disadvantages of an IO approach is that the model is static and does not take account of the dynamic processes involved in the economy adjusting to an external change. Industries in the model have a linear production function, which implies constant returns to scale and fixed input proportions. The IO approach is based on a set of assumptions about constant and uniform proportions of expenditure. Due to the requirements of the proposed project at this time, an IO approach was deemed suitable for the purposes of the grant application.

5.3.3 Construction phase

The construction costs are outlined in Section 7.3. The cost estimates have been prepared by Queensland Cotton Chief Financial Officer and provide an estimate of the anticipated cost to construct the cotton gin. Given Queensland Cotton's portfolio of cotton gins and interests which span Australia and overseas, they are well positioned to provide contemporary and 'on the ground' understanding of the costs required to construct a gin in the Northern Territory. The estimated construction costs are approximately $28 million.

The economic impact of the cotton gin, over a one year period, is estimated to contribute approximately $15 million to the Katherine region. Value-added factors are used as a proxy for Gross Regional Product (GRP) / Gross State Product (GSP). In terms of employment impacts, the cotton gin is estimated to create or support an additional 71 Full Time Equivalents (FTE) positions in the region during the construction phase. The estimated economic impact during the construction phase

for the Katherine region and the Northern Territory is shown in Table 10 and Table 11 respectively. The impact is expected to be during the construction phase only.

Table 10: Construction phase - Katherine region

Impact	Output ($ million)	Employment (jobs)	Wages and salaries ($ million)	Value-added ($ million)
Direct	28.0	41	4.6	9.1
Indirect	9.5	21	2.2	3.8
Consumption	3.6	9	0.8	2.3
Total	**41.1**	**71**	**7.6**	**15.2**

Table 11: Construction phase – Northern Territory

Impact	Output ($ million)	Employment (jobs)	Wages and salaries ($ million)	Value-added ($ million)
Direct	28.0	38	4.6	9.0
Indirect	15.9	33	3.6	6.3
Consumption	7.7	19	1.8	4.3
Total	**51.6**	**90**	**10.0**	**19.6**

5.3.4 Operation phase

The increased expenditure from the development of the cotton gin has been estimated over a 30-year lifespan. The relevant industry sectors which would be impacted are the Agriculture, Forestry and Fishing industries. The economic impact of the cotton gin are dependent on the incremental number of bales that are produced above the capacity of back loading (as bales would not be profitable if transport costs were subject to normal trucking prices to Brisbane and therefore, not produced and ginned). This analysis assumes that of the full forecast production volumes of approximately 96,000 at steady state years, one third continue to achieve current back loading rates to Queensland gins. The incremental bale production impact to the Northern Territory is therefore assumed to be approximately 64,000 bales per year at a steady operational state.

While recent cotton growing trials have observed significant success, this analysis includes a ramp-up period of one year and a cap at year 2022 production to remain conservative. The economic impacts of the operations of the centre over a 30 year period is estimated to contribute $22 million per annum in steady state to the Katherine region by way of an uplift in cotton production and/or profitability to gin and sell the cotton production. In terms of job impacts, the cotton gin is estimated to create or support an additional 88 FTE jobs per annum in the Katherine region after reaching steady state. The estimated impact during the operating phase for the Katherine region and Northern Territory is provided in Table 12. This does not take into account future development of additional cotton gins in the region.

Table 12: Operation phase – steady state

Region	Impact	Output ($ million)	Employment (jobs)	Wages and salaries ($ million)	Value-added ($ million)
Katherine	Direct	32.2	62.0	3.1	16.1
	Indirect	9.5	19.3	1.7	4.2
	Consumption	2.6	6.7	0.6	1.7
	Total	**44.3**	**88.0**	**5.5**	**21.9**

Region	Impact	Output ($ million)	Employment (jobs)	Wages and salaries ($ million)	Value-added ($ million)
Northern Territory	Direct	32.2	62.0	3.1	16.1
	Indirect	15.0	29.3	2.9	6.4
	Consumption	5.7	14.7	1.3	3.2
	Total	**52.9**	**106.0**	**7.4**	**25.7**

5.3.5 Sensitivities

This section presents a range of sensitivity analyses applied to the default EIA results. Several analyses have been undertaken to assess the responsiveness of the EIA results with respect to changes to construction costs and benefits during the operation phase. The regional economy relevant to the cotton gin is determined to be the Katherine region. Table 13 and Table 14 outline the results (total) from the sensitivity testing undertaken for the Katherine region.

Table 13: Sensitivity analysis for the construction phase – Katherine region

Sensitivity	Output ($ million)	Employment (jobs)	Wages and salaries ($ million)	Value-added ($ million)
20% increase in construction cost	49.3	85	9.1	18.1
20% decrease in construction cost	32.9	56	6.1	12.1

Table 14: Sensitivity analysis for the operation phase in steady state – Katherine region

Sensitivity	Output ($ million)	Employment (jobs)	Wages and salaries ($ million)	Value-added ($ million)
20% increase in cotton production benefits	53.2	106.0	6.6	26.3
20% decrease in cotton production benefits	35.5	70.7	4.4	17.5

5.3.6 Summary

The total economic impacts of the cotton gin across the appraisal period of 31 years (one year of construction and an estimated 30 year asset lifespan, with a residual value of zero, has been assumed in this assessment), is estimated to contribute $15 million during the construction phase and $22 million per annum (in steady state) during the operations phase to the Katherine region in the form of increased GRP.

The cotton gin is estimated to create or support an estimated 71 FTE jobs during construction and create or support an estimated 88 annual FTE jobs during operations in the Katherine region. The expected impact on GRP and jobs across the project lifecycle for the Katherine region are shown in Figure 20 and Figure 21.

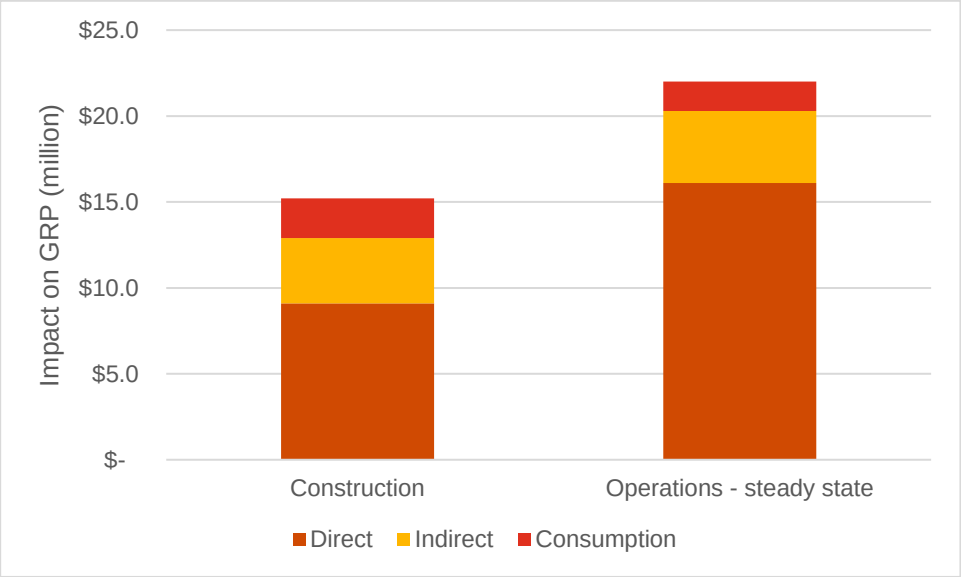

Figure 20: Impact on the GRP of the Katherine region

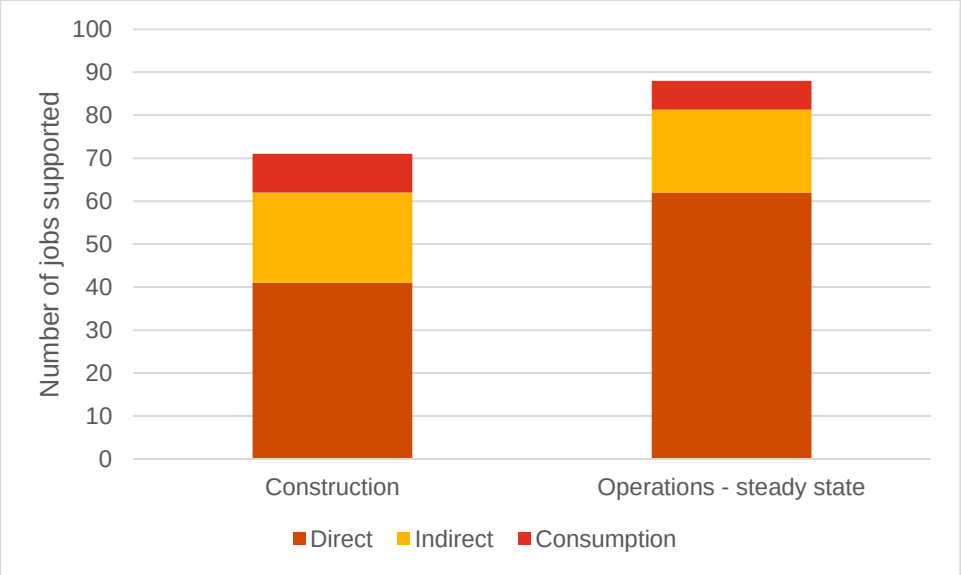

Figure 21: Jobs supported in the Katherine region

The Northern Territory has a relatively large proportion of its population in the more disadvantaged quintiles of the Socio-Economic Indicators for Areas (SEIFA) – an overall measure of disadvantage. The majority of the locations in the region, aside from Darwin, and those closer to Darwin, are below the Australian average of 1,000 points. The Local Government Areas in the region are:

- Katherine – 991
- Victoria Daly - 657
- Roper Gulf – 597.

The cotton gin provides an opportunity to address the social disadvantage in the region and contribute to the ongoing wellbeing and economic development through investment in human capital development.

The approach undertaken to examine the economy-wide impacts represents only incremental (or new) impacts to the economy. This is in line with best practices for EIA to not overstate impacts which may only represent a transfer of, for example, jobs from one firm to another within the same industry.

In summary, the cotton gin is expected to be an economically viable project and contribute:

- 71 jobs supported during construction and 88 jobs supported during steady state in the Katherine region
- $15 million increase in GRP during construction and $22 million per annum increase in GRP during steady state in the Katherine region.

6 Commercial feasibility

6.1 Purpose and Overview

The purpose of this chapter is to demonstrate how the project is commercially sustainable over the medium to long term. The financial assessment which leverages the commercial assumptions is discussed in Chapter 7. This chapter discusses:

- **Willingness to use the gin as a service -** demonstrates users preference of a Northern Territory gin over gins in other regions
- **Volume of cotton supply to the gin -** outlines the main factors considered when analysing product supply.

6.2 Willingness to use the gin as a service

Given the global demand for Australian cotton, it is expected that all cotton processed at the proposed gin will be attached to existing end-market arrangements to export destinations. Therefore, end-market demand is not critical to the gin's commercial feasibility, rather it heavily relies on two interrelated factors:

- Grower and/or cotton merchant willingness to use the gin as a service provider
- Volume of cotton supply to the gin.

The former relies on whether the ginning fee charged by the gin presents a cost effective option for growers and/or cotton merchants to use a Katherine based gin as opposed to the Queensland or New South Wales gins. As previously discussed, while the export costs at the Port of Darwin are higher than that of the costs at the Port of Brisbane, the required costs of transporting bales to Katherine are significantly lower than transport costs to Queensland based gins, thereby creating cost savings to Northern Australian growers that outweigh the higher cost of exporting out of Darwin.

There are approximately fifteen cotton merchants in Australia and any of these entities may purchase cotton from a grower, regardless of where it is ginned. While cotton gins themselves do not purchase cotton in Australia, they may purchase the cotton seed if the sale terms are suitable to the cotton grower. Cotton growers sell cotton to a cotton merchant prior to ginning and cotton merchants must collect ginned cotton from the gin within seven days once ginning is completed. If the cotton grower is not able to sell its cotton to a merchant, the grower stores and moves the cotton to a warehouse within seven days of ginning.

6.3 Volume of cotton bale supply to the gin

While the supply of cotton to the gin is related to willingness to pay, it is also driven by external on-farm factors which affect the growers' ability to achieve forecast volume of supply. Given the high level of local and industry support for this project, it is expected that long-term agreements will be set up between the grower-owners and other local growers in using the proposed gin to process their cotton, as opposed to gins in other jurisdictions. There are three main factors considered when analysing product supply. These include:

- Minimum size facility and plant requirements
- Availability of required inputs
- Assurance of future input supply.

6.3.1 Minimum size facility and plant requirements

The proposed minimum facility size of the gin is equivalent to gin equipment that has the capacity to process 50 bales per hour. Other facilities relying on the output of the gin's operations are also assumed to be designed to cater for at least 50 bales per hour such as, storage sheds and transport and logistics. Specific to this project, other facilities include a press pumping unit capable of processing 55 bales per hour and a bale warehouse capable of storing 50,000 bales.

6.3.2 Availability of required inputs

After the required amount of raw product supply is established, determining if this quantity is available in the needed quality and standard is required. In addition, there is generally a maximum distance within which the gin will source raw cotton. To determine this, consultation with local cotton growers within the Northern Territory and Ord region area was conducted. The

closest growers were identified as being 50km from Katherine, and the furthest are from the Ord Valley; 550km from Katherine. Beyond 2024, a potential 434,000 bales have been identified within this 50km region, and 230,000 from the 550km region in the Ord Valley[13]. The consultations focused on the potential producers' willingness to begin production and their production forecasts.

Production input for the Cotton Gin is measured by the supply of cotton from growers in Northern Territory and potentially the Ord Valley. This is determined by the area of dry land (ha) and area of irrigated land (ha) used for production, multiplied by the yield per ha. The assumptions for production inputs were determined by NT Farmers through consultations with local growers across Northern Australia.

The success of growers in the Ord River region of the Kimberley and in the Northern Territory will allow growers to consider two systems or conditions for cotton growing, which are used in the financial and commercial assessment of this project. These systems are estimated as:

- Irrigated land with a yield of up to 9.5 bales per ha
- Dry land with a yield of 4 bales per ha.

It is anticipated the seasonality for cotton harvesting for the respective regions will be:

- Kununurra: July to August
- Katherine: May to July.

To ensure a conservative analysis is undertaken, several assumptions have been made that cause a downward adjustment to production and supply assumptions. The assumption has been made that annual production will remain constant from the third year of production (2022) onwards. In addition to this, the volumes from the beginning of operations have been reduced by 20 per cent[14] to remain conservative for the purposes of this analysis. Assumptions for the production volumes are included in Table 15.

Table 15: Assumptions of production volumes

	Dry land (NT)	Irrigated land (NT)	Irrigated land (Ord Valley)
Yield (No. of bales / ha)	4	9	9.5
Cap Year (applies to all)		2022 (third year of production)	
Adjustment applied (applies to all)		20%	

Predicted growth of NT cotton production is included in Table 16.

Table 16: Predicted growth of Northern Territory cotton production

Year	No. of Growers	Area Dry Land (ha)	Area Irrigated (ha)	Bales produced	Applied (after 2022 cap)	Adjusted
2020	12	1,550	220	8,180	8,180	6,544
2021	20	15,670	1,600	77,080	77,080	61,664
2022	25	23,445	2,985	120,645	120,645	96,516
2023	30	30,420	3,630	154,350	120,645	96,516
2024	35	36,230	4,250	183,170	120,645	96,516
2025	40	35,000	11,000	239,000	120,645	96,516
2026	45	40,000	14,000	286,000	120,645	96,516

[13] Amount of bales calculated over the forecast period 2020 to 2029.

[14] For conservative analysis, the production volume adjustment has been applied at 20 per cent and is as per Queensland Cotton advice.

Year	No. of Growers	Area Dry Land (ha)	Area Irrigated (ha)	Bales produced	Applied (after 2022 cap)	Adjusted
2027	50	45,000	17,000	333,000	120,645	96,516
2028	50	50,000	20,000	380,000	120,645	96,516
2029 onwards	50	55,000	22,000	418,000	120,645	96,516

Predicted growth of Ord Valley cotton production is included in Table 17.

Table 17: Predicted growth of Ord Valley cotton production

Year	Number of Growers	Area Irrigated	Bales produced	Applied	Adjusted
2020	3	1220	11,590	11,590	9,272
2021	5	8,880	84,360	84,360	67,488
2022	7	13,230	125,685	125,685	100,548
2023	9	16,080	152,760	125,685	100,548
2024	10	19,800	188,100	125,685	100,548
2025	10	19,800	188,100	125,685	100,548
2026	10	19,800	188,100	125,685	100,548
2027	10	19,800	188,100	125,685	100,548
2028	10	19,800	188,100	125,685	100,548
2029	10	19,800	188,100	125,685	100,548

The consultations focused on the potential producers' willingness to begin production and their production forecasts. These data tables demonstrate that there is enough production of raw material to support viable operation of the gin, through measure of projected production forecasts.

6.3.3 Assurance of future input supply

Based on grower production forecasts, the proposed cotton gin is expected to reach approximately 80,000 bales from the Northern Territory region by year 2021 with the construction of the first gin. The project's production forecasts indicate that the proposed project is scalable with a second, third and fourth gin potentially viable within the next decade to meet the high levels of confident supply.

7 Financial assessment

7.1 Purpose and overview

Critical to understanding commercial feasibility of the gin is conducting a financial assessment on the project. This includes financial project cashflows, forecast profit and gauging the financial performance of the gin with, and without the requested grant funding. The purpose of this chapter is to provide an overview of the financial assessment conducted for this project to establish commercial feasibility. The key components in this analysis include:

- **General financial assumptions -** outlines the methodology and input assumptions underpinning the financial assessment
- **Delivery phase -** presents the costs, timing and assumptions expected during the construction of the gin
- **Operating phase -** outlines the operating performance of the gin, including its forecast operating costs and revenues
- **Funding -** presents the impact of the grant funding on the project's financial position
- **Financial summary -** presents the project's overall financial analysis in terms of project valuation, forecast profit and project internal rate of return
- **Sensitivities and scenarios -** tests the financial assessment against various scenarios to present a robust consideration of the project's financial position.

Note: Outputs of the financial assessment presented in the tables throughout this chapter may not sum exactly due to rounding differences in source data.

7.2 General financial assumptions

7.2.1 Methodology

The whole-of-life financial analysis of the project has been undertaken in accordance with industry standards. The project cashflows modelled in this financial analysis are based on the capital costs, operating costs, revenues, depreciation, interest and tax obligations of the proposed cotton gin. These cashflows are presented in real, nominal and present value (PV) terms, defined as follows:

- **Real terms:** represents the cost of the project in today's (2019) dollars
- **Nominal terms**: includes the effect of expected inflation on forecast costs and benefits. Representing the budget impact of cashflows
- **PV:** the discounted present value of a stream of costs or benefits over time.

All values used in the financial analysis are real unless otherwise specified.

A financial model was developed to capture the construction cost, operating costs and income to present the net cashflows and profit to the end of the analysis period (30 June 2051). This approach reflects a typical cashflow analysis methodology for the assessment of infrastructure developments in the agricultural and cotton gin industry.

The key data sources in the financial model are outlined in Table 18.

Table 18: Input assumptions

Input assumption	Description	Source
Capital cost	The cost required to plan, design and construct the project	Queensland Cotton
Operating cost	Ongoing costs required to operate and maintain the gin, as well as salaries and wages	Queensland Cotton

Input assumption	Description	Source
Revenues	Charges for the ginning service. It is assumed that the cotton seed is cost neutral and achieves no additional revenue.	Queensland Cotton and local grower production forecasts

7.2.2 Financial assessment assumptions

The key financial assessment assumptions that have been incorporated into the financial model, and the sources of those assumptions (as at 27 September 2019), are presented Table 19. These include broad assumptions such as general timing and inflation which underpin the discounted cash flow analysis. The general approach to these assumptions was confirmed with key project stakeholders.

Table 19: Financial model assumptions

Input Assumption	Description	Source
Base date for PV analysis	30 June 2020	PwC, taking into consideration the timing of approval processes
Assessment period	31 years	NT Farmers
Period of analysis	Construction period: 1-July-20 - 30-June-21 Operations period: 1-July-21 - 30-June-51	NT Farmers
Construction contingency	15%	Queensland Cotton
Inflation	2.20% per annum applied to each year of the operations phase to represent the inflated price of goods and services over time (i.e. to return out-turn costs).	Escalation applied to the operational phase to convert to nominal terms using the annual average of Darwin historical (2001 to 2019) Consumer Price Index (CPI) retrieved from ABS.
Discount rate	11% Based on the rate of return required by growers to deliver the project given the risk profile.	NT Farmers
Periodic	Annual	PwC
Basis of cashflow	Nominal	PwC
Residual asset value	Nil. Assumed nil to be conservative.	The useful life of the gin's building and equipment is assumed to be maximum 30 years, as per the assessment's period of analysis.
Rounding	Rounding to the whole number.	Some of the totals of the results may differ due to rounding differences.

7.3 Construction phase

Preliminary cost estimates and lifecycle costs have been prepared for the proposed project. These are based on the following:

- All prices exclude GST
- Costs are based on industry benchmark data from similar projects
- Costs include design, planning and approval fees, contract administration, construction costs, contingencies, contractor margins and overheads
- Costs are presented in real 2019 terms, with escalation being applied in the financial assessment
- No allowance has been made for staging or delayed construction costs.

7.3.1 Capital cost estimate

The preparation of the cost estimate for the project has taken into account a number of cost benchmarks against other gins in Queensland and has been provided by Queensland Cotton. The cost estimate has been made based on the following process and assumptions:

- The project has been benchmarked on national projects of a similar size and scale of actual project construction costs, rather than preliminary estimates
- Adjustments have been made for project benchmarking to take into account varying volumes of bales processed at the proposed gin
- Adjustments have been made based on the location of the gin as it impacts general cost of materials and transportation of goods
- Allowances have been made for seasonal impacts, down time and shut down periods due to unfavourable weather conditions
- Estimates have been market tested with market and industry with experience in delivering similar projects in Australia.

The estimated capital cost for the project is outlined in Table 20.

Table 20: Capital cost estimate ($ real 2019)

Item	Specification (if applicable)	Cost ($ real 2019)
Equipment		
Gin Equipment	50 bales per hour	2,500,000
Relocation/Refurbishment		1,000,000
Press Pumping unit	55 bales per hour	500,000
Gin Console/PLCs		700,000
Cyclones		300,000
4 x 4mil btu burners		350,000
Press Console		90,000
Strapper		250,000
Engineer (floor plan/layout)		200,000
Module feeder		800,000
Area/Land	150 ha	1,000,000
Humid air system	5 to 8 litres per min.	100,000
Electrical		
Transformers	3 x 1,500 kva	300,000
MCC		300,000
Wiring		1,000,000
Connections		400,000
Buildings		
Trash house	150 tonnes	250,000
Seed Shed	10,000 tonnes	2,500,000
Gin Building		5,000,000
Bale Warehouse	50,000 bales	3,000,000
Office		250,000
Civil		
Roads/pads/weighbridge		2,000,000
Mobile Equipment		

Item	Specification (if applicable)	Cost ($ real 2019)
Moonbuggies		1,000,000
Forklifts		150,000
Trash truck		70,000
Fire truck		90,000
Loader		250,000
TOTAL CAPITAL COST		**24,350,000**
Add: Contingency (15%)		*3,652,500*
ADJUSTED CAPITAL COST		**28,002,500**

Source: Queensland Cotton (2019).

Additional ongoing capital purchases are made beginning in year 1 of operations. These are included in Table 21.

Table 21: Ongoing capital purchases

Year	Capital purchase
Year 1	250,000
Year 2	250,000
Year 3	500,000
Year 4-30	500,000

7.3.2 Depreciation

The financial assessment has assumed a depreciation method based on units of production for the cotton gin and supporting assets. That is, the total CAPEX for the project will be depreciated on the basis of production of bales per annum. The total bale production for the life of the project is approximately 2.86 million and subsequently the depreciation of the assets is $9.79 per bale produced each year of operations. The assumptions for the depreciation of the gin are included in Table 22.

Table 22: Depreciation assumptions

Item	Assumptions	Production (no. of bales)	Depreciation ($)
Total CAPEX	$ 28,002,500		
Total bale production for the life of the project	2,860,628		
CAPEX to be depreciated per bale	$9.79		
Depreciation year 1 of operations		61,664	3,552
Depreciation year 2 of operations		96,516	944,789
Depreciation year 3 - 30 of operations		96,516	944,789

The depreciation amount under an assumed straight line depreciation method is $933,417 and subsequently has a negligible difference to the project feasibility.

Depreciation on the ongoing capital purchases is made assuming that the purchases are depreciated using the same units of production method with the end of the life of the gin assumed to be the end of the life of those capital purchases. For example, the capital purchase from the 6th year of operation would be depreciated per unit of production until the end of the assessment period. Subsequently it would be depreciated at a significantly lower rate than a purchase made in the 20th year of operation. Table 23 provides an example of this method until FY25.

Table 23: Ongoing capital purchases depreciation ($)

Ongoing capital purchases	FY21	FY22	FY23	FY24	FY25
Opening balance		-	244,611	477,555	942,643
New CAPEX	-	250,000	250,000	500,000	500,000
Total units remaining	2,860,628	2,860,628	2,798,964	2,702,448	2,605,932
CAPEX per unit	-	0.09	0.18	0.36	0.55
Units this period	-	61,664	96,516	96,516	96,516
Depreciation amount	**-**	**5,389**	**17,056**	**34,913**	**53,431**
Closing balance		-	244,611	477,555	942,643

7.4 Operating phase

The operating phase begins immediately after the construction phase and continues until 30 June 2051.

7.4.1 Operational and lifecycle costs

An assessment of the operational and whole-of-life costs has also been carried out based on a 30-year period. In the financial analysis, the cost of goods sold includes direct variable costs including freight, wages and miscellaneous expenses. This section outlines only the operation and maintenance costs of the gin. Reference Table 9 for the transportation costs of the ginned cotton to the relevant export destinations.

Table 24: Variable costs ($ real 2019)

Item	Cost type	Cost assumption ($ per bale)	Annual steady state cost ($)
Freight	Direct	0.25	24,129
Wages	Direct	7.50	723,870
Miscellaneous expenses	Direct	0.10	9,652
Subtotal - direct		**7.85**	**757,651**
Bailing materials	Processing	6.00	579,096
Production fuel	Processing	3.00	289,548
Electricity	Processing	10.00	965,160
Vehicles	Processing	0.50	48,258
R&M	Processing	6.00	579,096
Subtotal – processing		**25.50**	**2,461,158**
Total		**33.35**	**3,218,809**

Labour for ginning operations traditionally use full-time temporary employees to work during the ginning season only. Direct labour includes labourers, forklift operators, front-end loader operators and lead men for each shift. These employees may also be contracted for the duration of the production season. The ginning industry generally pays rates higher than the minimum wage to reflect the need for employees to work during peak periods within the time required.

The gin will also require annual positions so that a level of operational expertise is maintained. Full-time employees will be responsible for training workers each year as well as performing clerical, sales and business development activities. This type of arrangement therefore maintain the stability of employees the FTEs during off-peak seasons.

Due to the seasonal nature of cotton growing, the gin will experience peak operation of the site during harvesting periods and therefore peak demand for seasonal employees to assist in operation of the gin. This will place the highest operational and logistic demand upon the gin in terms of loading and processing of cotton inputs and transportation of ginned cotton. There are a number of operational activities that will require FTEs, representing the direct employee costs to the operation

and management of the gin. This remains constant regardless of the number of cotton bale throughput. An estimate of the peak operational and seasonal staff as well as estimated FTEs is outlined in Table 25.

Table 25: Salaries and wages assumptions

Employment type	Roles	Assumed FTEs	Cost Type	Employee Cost
Full time equivalent	Office Administrator Manager Ginner Assistant Ginner	1 1 2 2	Fixed Cost	Total $600,000 p.a. in real 2019 terms
Casual/seasonal	Double shift workers	23 - 25	Variable Cost	$7.50 per bale p.a. in real 2019 terms

Fixed operating costs were determined by Queensland Cotton. They are incurred annually and are ramped up with production in the initial years of the project. The fixed expenses are included in Table 17.

Item	Annual steady state cost ($)
Salaries	600,000
Vehicles indirect cost	40,000
R&M indirect cost	50,000
Electricity indirect cost	100,000
General office	20,000
Staff amenities	20,000
Telecommunications	20,000
Travel	15,000
Workplace Health and Safety	50,000
Management Fees	200,000
Insurance	33,603
Rates and Land Tax	40,000
Total fixed operating costs	**1,188,603**

7.4.2 Supply assumptions

As discussed in Section 6, the production inputs assumed for the financial analysis is measured by the supply of cotton from growers in Northern Territory and potentially the Ord Valley. To ensure the analysis is conservative, only the Northern Territory cotton production is considered as supply for the gin, and the production will be capped at the volumes in 2022. These figures are included in Section 6 in Table 16 and Table 17.

Local growers make arrangements with cotton merchants who retain the demand risk for the gin. That is, they are responsible for organising buyers of the lint produced from each of their bales provided. Subsequently, it is assumed that the bales supplied to the gin are all processed and sold.

7.4.3 Revenue

Revenue for the gin is achieved through fees for ginning services of cotton bales provided to the gin. It is assumed that each bale supplied is processed and the lint is sold. Revenue is calculated by applying the ginning rate per bale to the anticipated number of bales supplied for ginning. This is outlined in Table 26.

Table 26: Revenue assumptions ($ real 2019)

Assumption	Assumption
Ginning rate ($ per bale)	$80

Assumption	Assumption
Steady state demand (no. of bales)	96,516
Steady state revenue	$7,721,280

7.5 Funding

The project capital investment will be funded using a combination of the grant received from the DTBI's *Local Jobs Fund* Infrastructure Grant and combination of equity and debt. The total grant amount requested is equal to $10 million. More information on the financing and funding plan of the project is provided in Section 10.2. From a cash flow perspective, the grant is proposed to be received upfront upon commencement of the project. However, from a grant income recognition perspective, grants related to assets may be recognised differently in the income statement.

As per AASB120[15], "grants related to depreciable assets are usually recognised in profit or loss over the periods and in the proportions in which depreciation expense on those assets is recognised". Based on this, and with the information provided thus far, the grant has been recognised as revenue in the periods that depreciation is incurred and is distributed on the basis of proportion of total depreciation.

7.6 Financial analysis

Based on current assumptions, the project will achieve positive year on year growth in profits and cashflows following construction. In the first year of operations the net profit after tax (NPAT) is $940,624. Growth in profits continues year on year following first year of operations. Based on these results, there is no need for ongoing subsidies from the Territory or continued equity injections. The project has sufficient cash inflows to cover future cash outflows from financing activities including the required debt repayment. An extract from the financial model is included in Figure 22 which displays NPAT until FY26.

PROFIT & LOSS						
Financial Summary--Nominal						
Financial Year	FY-21	FY-22	FY-23	FY-24	FY-25	FY-26
Revenue	-	5,152,565	8,242,178	8,423,506	8,608,823	8,798,217
Recognition of grant	-	217,486	343,485	349,862	356,475	363,343
Expenses	-	(3,389,452)	(4,704,747)	(4,808,252)	(4,914,033)	(5,022,142)
EBITDA	-	1,980,598	3,880,916	3,965,116	4,051,265	4,139,418
less depreciation	-	(609,014)	(961,844)	(979,701)	(998,220)	(1,017,451)
EBIT	-	1,371,584	2,919,072	2,985,415	3,053,045	3,121,967
less interest expense	-	(27,835)	(25,570)	(23,268)	(20,730)	(18,145)
Corporate tax expense	-	(403,125)	(868,051)	(888,644)	(909,694)	(931,147)
Net Profit After Tax	-	940,624	2,025,451	2,073,503	2,122,620	2,172,676

Figure 22: NPAT 2021 to 2026

7.6.1 Project cashflow

Figure 23 presents the net project cashflows over the analysis period (nominal) and the cumulative present value of cashflows. The net cashflow in FY21 is negative due to the initial capital outlay at the start of the period. The strong cashflows allow for potential expansion in future years. Due to the grant and operational income, the project results in positive cashflows from the start of operations. The cumulative present value of cashflows demonstrate that the project will not make a return on the initial capital outlay until FY41.

[15] Australian Accounting Standards Board - Accounting for Government Grants and Disclosure of Government Assistance – August 2015

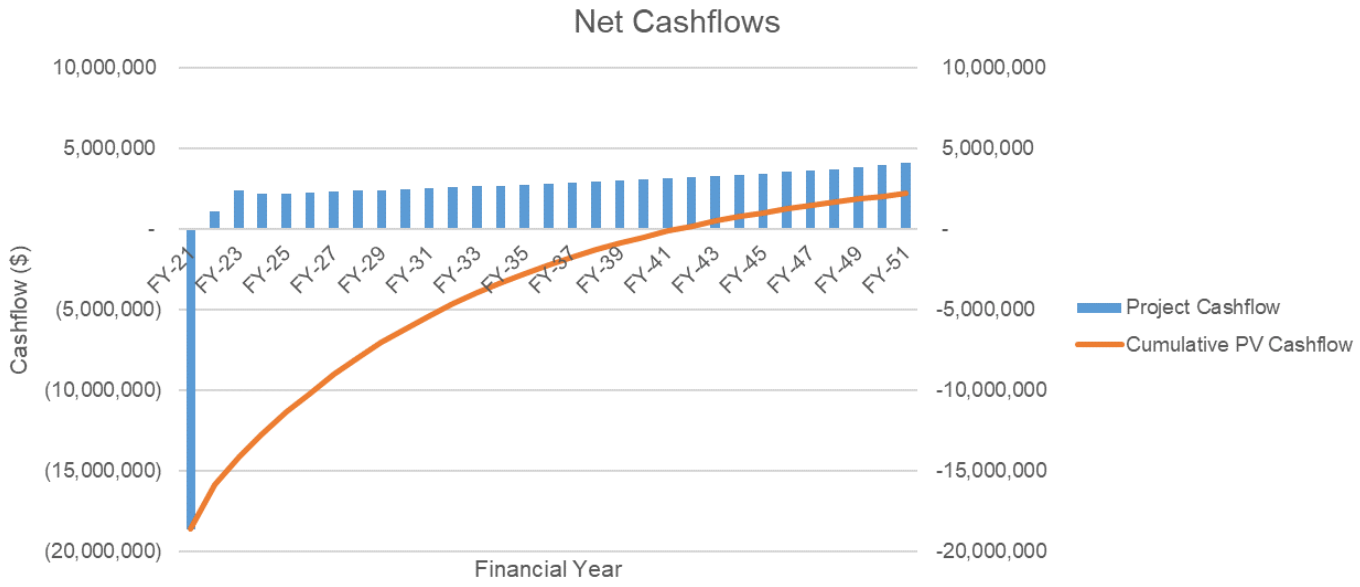

Figure 23: Net project cashflows ($ nominal)

7.6.2 Project net present value and internal rate of return

With the grant recognised as income, the NPV of the project is approximately $2.2 million. This represents a 12.4 per cent IRR. Excluding the income from the grant, the NPV of the project is negative at -$5.4 million, which represents an 8.6 per cent IRR. Figure 24 demonstrates this difference.

PROJECT CASHFLOW & NPV	
Project evaluation - project cashflows	
Net Present Value of Project Cashflows	Present Value ($)
Income	
Revenue	73,271,158
Income from grant	9,009,009
Total income	82,280,167
Expenses	
CAPEX	(30,273,232)
OPEX	(42,188,022)
Corporate Tax Expense	(7,620,194)
Total Expenses	(80,081,448)
Project NPV	**2,198,719**
Project IRR	**12.40%**

PROJECT CASHFLOW & NPV	
Project evaluation - project cashflows	
Net Present Value of Project Cashflows	Present Value ($)
Income	
Revenue	73,271,158
Income from grant	-
Total income	73,271,158
Expenses	
CAPEX	(30,273,232)
OPEX	(42,188,022)
Corporate Tax Expense	(6,210,910)
Total Expenses	(78,672,165)
Project NPV	**-5,401,007**
Project IRR	**8.59%**

Figure 24: NPV of the Project (grant excluded on the right)

7.7 Sensitivities and scenarios

Sensitivities were applied to key financial inputs to determine the relative impact of changes to the assumptions and variables that underpin the financial feasibility of the project. Given the criticality of these various assumptions, the impact on the NPV of the project can be significant.

7.7.1 Price sensitivities

The price assumptions were provided directly by Queensland Cotton. Throughout the market sounding process it was determined that this price is suitable for gins in areas of no competition and as scale increases, prices can be expected to drop. Given this is the sole source of income for the project, the feasibility of the project is extremely sensitive to this input. Subsequently, this has been tested in the financial model.

Prices quoted throughout the market sounding process ranged from $60 to $90 per bale[16]. These were tested alongside the minimum price per bale required to achieve an NPV of zero. Table 27 provides an overview of the findings.

Table 27: Pricing sensitivities

Price/bale	NPV ($)	IRR (%)
$85	8,609,945	16.22
$80	2,198,719	12.40
$76.57	0	11.00
$60	(10,623,734)	2.63

This analysis demonstrates the significant impact the pricing has on the gin. The gin is not viable if the price is below $76.57 per bale. Subsequently, the grant provided is necessary to sustain the operations of the gin, specifically in the event of a lower average price achieved.

Without the grant, the required rate to ensure the project reaches has an NPV over zero is $88.42.

7.7.2 Reduced grant amount provided

A reduced grant amount will impact the feasibility of the project. The minimum grant provided for the project to be feasible is $7,106,845. Despite this, a higher grant amount allows the project to maintain feasibility in the event of volatile prices or capital and operating expenditure. The impact of the grant is outlined in Table 28.

Table 28: Grant amount sensitivity

Grant amount	NPV ($)	IRR (%)
$10,000,000	2,198,719	12.40
$7,106,845	0	11
$2,000,000	(3,881,062)	9.16
$0	(5,401,007)	8.59

7.7.3 Discount rate and IRR

Sensitivities were applied to the discount rate used throughout the financial model. This includes a change of 2.5 per cent in both directions. These results are included in Table 29.

Table 29: Discount rate sensitivities

Change	Discount rate	NPV
Increase by 2.5%	13.5%	(1,417,959)
No change -11%	11%	2,198,719
Decrease by 2.5%	8.5%	7,692,177

[16] Assumptions provided by Queensland Cotton and NT Farmers.

As discussed previously, the IRR of 12.40 per cent is the discount rate that would be required to give the project an NPV of zero.

7.7.4 CAPEX

Sensitivities were applied to the total initial CAPEX amount for the gin. These included an increase or decrease of 25 per cent. The results are included in Table 30.

Table 30: CAPEX sensitivities

Change	CAPEX ($, real)	NPV ($)
Increase by 25%	35,003,125	(3,336,651)
No change	28,002,500	2,198,719
Decrease by 25%	21,001,875	8,024,706

7.7.5 OPEX

Sensitivities were applied to the total OPEX amount for the gin. These included an increase or decrease of 25 per cent. The results are included in Table 31.

Table 31: OPEX sensitivities

Change	OPEX ($, steady state, real)	NPV ($)
Increase by 25%	5,509,265	(5,184,185)
No change	4,407,412	2,198,719
Decrease by 25%	3,305,559	9,581,623

7.7.6 Volume

The assumed volumes had a 20 per cent adjustment applied by Queensland Cotton to ensure the analysis was conservative. A sensitivity analysis was conducted on this adjustment percentage. The result of this is outlined in Table 32.

Table 32: Volume sensitivity analysis

Adjustment	Steady state volume	NPV
45%	66,355	(7,147,647)
40%	72,387	(5,278,374)
20%	96,516	2,198,719
0%	120,645	9,675,811
-20%	144,774	17,152,904

7.7.7 Construction contingency

A 15 per cent construction contingency was applied to the capital costs of the project. A sensitivity analysis was conducted on this contingency. The result of this is outlined in Table 33.

Table 33: Construction contingency sensitivity

Contingency	CAPEX ($)	NPV ($)	IRR (%)
30%	31,655,000	(687,452)	10.621
15%	28,002,500	2,198,719	12.40
0%	24,350,000	5,228,203	15.01

7.8 Summary

The financial analysis shows that over the assessment period, the project results in a positive NPV and project IRR. Based on the aforementioned assumptions, the project will need to raise additional finance debt funding to cover the remaining capital costs after grant funding and capital contribution from local growers are received. This is further explained in the Financing Plan outlined in Section 10.3. Despite strong forecast results, the financial results are considerably reactive to changes in the assumptions, such as price and grant funding.

Without the grant, investment in the gin is commercially unviable as the NPV is below zero. That is, the IRR is too low for the proponent to regularly invest in the project.

The sensitivity analyses demonstrate the heavy reliance of the financial analysis on the underlying assumptions. This further demonstrates the heavy reliance on the grant money received and the potential impact it will have on the project over the assessment period.

8 Maximising and leveraging private sector investment

8.1 Purpose and overview

NT Farmers has commenced a number of discussion to determine the public and private funding and financing of the Cotton Gin and to explore financing options for its future development stages. The current consortia participants include the ten members of the Northern Territory Cotton Growers Group, OrdCo (representing all of the Western Australian farmers), Brookstead Farming Co, NT Farmers and Queensland Cotton, as well as ongoing discussion with a number of major new and potential Northern Territory farming operations.

This purpose of this chapter is to demonstrate how the grant from the Northern Territory Government is completed by private sector investment. This chapter discusses:

- **Proposed capital mix -** outlines the proposed sources of capital for the project
- **Cooperative gin ownership models -** provides and overview of the various gin ownership and operating models for consideration.

8.2 Proposed capital mix

A $10 million grant from the Northern Territory Government's *Local Jobs Fund – Infrastructure Grant* is proposed to be matched by private investment as is proposed as follows:

- $10 million funding from local growers, through local growers respective applications for funds through the NAIF
- Up to $8 million financing from Queensland Cotton through equity investment, both cash and equipment.

Upon structuring a commercial deal, NT Farmers and Queensland Cotton have discussed the potential to set up a Joint Venture (JV) to deliver the project. JV structures are a useful mechanism to expand investment opportunities and to reduce risk. The Northern Territory agriculture sector is under increasing pressure to invest significant resources to undertake new developments with sufficient scale to provide returns on investment. JV partners may share the risks, costs and responsibilities of operating a farm. Upon deal structuring, NT Farmers will need to consider whether to undertake a cooperation or JV arrangement to develop individually and/or jointly owned properties and to jointly meet the costs of obtaining approvals. The risk management with this approach would need to consider the probability of not securing land and water value increasing.

Given that a large proportion of funding will be provided through grower funds, it is assumed that the gin may follow a form of cooperative gin ownership model. These models are further analysed in the following section.

8.3 Cooperative gin ownership models

8.3.1 Grower-owned gin

The grower-owned gin ownership model is a model where the gin is owned by a grower-owned cooperative. The number of growers that are part of the cooperative can vary depending on the size of the gin and individual grower capability to produce sufficient cotton for gin utilisation. The gin predominantly processes the cotton produced by the owners, however may also source cotton from non-owner growers. Current gins with this ownership model include Namoi Cotton in Queensland and RivCott Ginning in New South Wales.

Traditionally, grower ownership is expected to provide:

- **Cheaper ginning costs**: grower-owners benefit from a low ginning fee but will also receive their portion of the profit from their bales through bale rebates and dividends
- **Control**: grower-owners will have control over how their cotton is ginned and be invited to be part of that process

- **Confidence**: grower-owners have greater confidence over the process and pricing
- **Quality ginning**: grower-owners know the gin is tailored to cotton from the specific area and processes and materials involved.[17]

An example overview of the ownership and operating model of the grower-owned gin is shown in Figure 25.

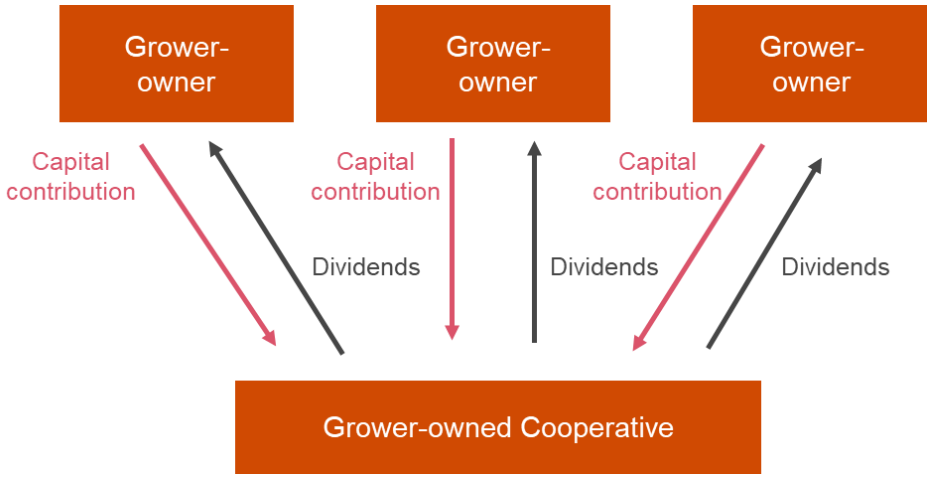

Figure 25: Grower-owned gin

8.3.2 Gin corporation

Corporations exist that specialise in ginning cotton and often own more than one cotton gin. These corporations may be the result of a grower-owner cooperation that has expanded capabilities however, may still be predominantly grower-owned. An example of this model is Windstar Inc. in the United States of America, which owns seven gins built across approximately 40 years. It has recently built another gin on the same land as an existing gin.

As these gins may be grower-owned, these gins will process the cotton produced by the grower however, they generally have excess capacity to accept inputs from non-growers. For the corporations they have a few options in how they generate their revenue, including:

- Purchasing the cotton from growers and selling it after ginning
- Purchasing part of the cotton crop from growers and selling it after ginning
- Providing the ginning services at a fee.

8.3.3 Commercial gin corporation

Commercial gin corporations own cotton farms in areas that have an abundance in resources such as water and land and construct a cotton gin to service to these cotton farm(s). Depending on the size of the corporation, it may have the commercial resources to become vertically integrated and control the entire supply chain to include more processing. The processed cotton is then sold to merchants for export. Tandou was an example of this ownership model, with Tandou owning a cotton farm in New South Wales and a cotton gin in close proximity to the farm. Tandou also owned significant water entitlements, land for other cropping and pastoral land. An example of the operating model of a commercial gin corporation is shown in Figure 26.

[17] https://rivcott.com/About/index.php

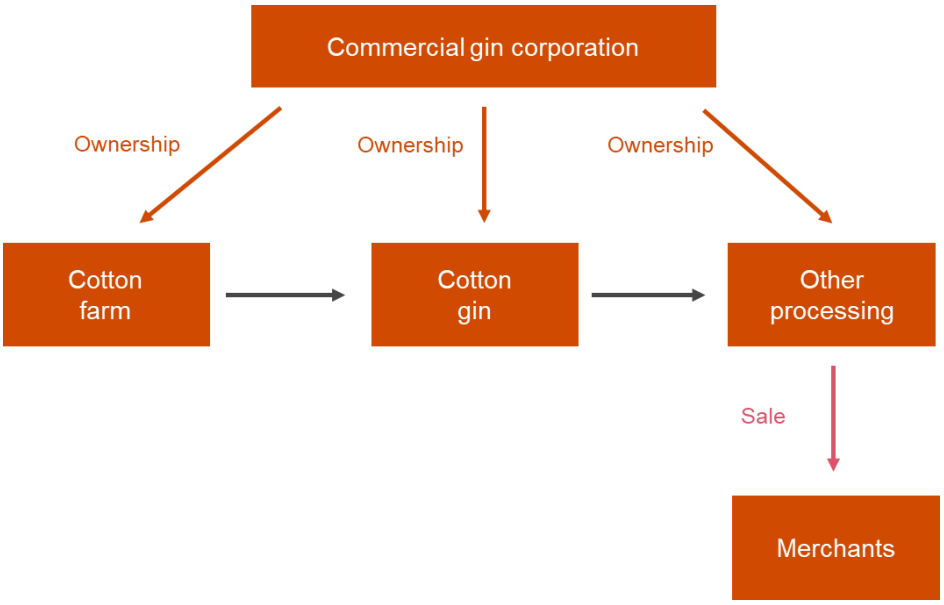

Figure 26: Commercial gin operating model

8.3.4 Proposed ownership model

The ownership model proposed for this cotton gin is a variant the grower-owned gin model. This model is proposed as it is most suitable for the scale and amount of capital available. The difference between the proposed model and the grower-owned model in Figure 25 is that one of the shareholders will be Queensland Cotton. With the additional capital from Queensland Cotton, a larger cotton gin can be developed leading to excess capacity that is not met by the grower-owners. The excess capacity is provided to other growers (or cotton merchants) for a fee. Queensland Cotton will also be in charge of operating and maintaining the gin after development.

Grower-owners will be able to use the cotton gin for their own cotton crops while also receiving dividends from earnings. This increases the accessibility of a cotton gin to surrounding cotton growers, especially those with a smaller scale or without access to adequate capital to partake in the development of the cotton gin. A high-level overview of the ownership and operating model is shown in Figure 27.

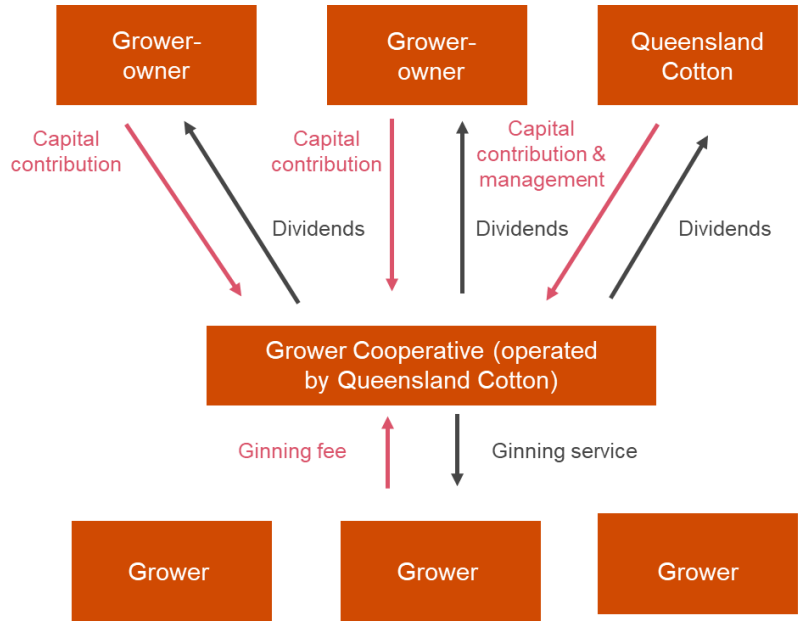

Figure 27: Proposed ownership and operating model[18]

8.4 Sources of new private sector finance

This section details the proposed sources of new private sector finance, including the expected matching level of private finance. The following stakeholders have also provided supporting evidence demonstrating their commitment to finance and/or overall support of the project. Letters of support have been received from:

- Ag Connect
- Blackbull Station Douglas Daly
- Brett & Suzanne Gill, owners and managers of Malilangwe and Douglas Daly properties
- Brookstead Farming Pty Ltd
- Cleveland Agriculture
- Cross Pacific Investments Pty Ltd
- Greenview Farm Pty Ltd
- Hands on Agriculture
- Maliproduce Katherine NT Pty Ltd
- Northern Territory Agricultural Company
- Northern Livestock and Agriculture
- Oasis Farms
- Tipperary Group of Stations
- Wispy Enterprises.

The completed letters of support are detailed in the attached document *Cotton Gin Business Case – Letters of Support.* The financing plan for this project is outlined in Section 10.

[18] In some instances, depending on the gin operator, cotton merchants may play a role in the transaction between growers and the gin.

9 Risks

9.1 Purpose and overview

Risk is defined as “the effect of uncertainty on objectives” and therefore the objectives identified in the strategic rationale are fundamental to ongoing risk management. Critical to successful risk management is the recognition that it relies on all project members continually and actively managing risks as they arise and by seeking to reduce the inherent risks throughout the project lifecycle. Therefore, the purpose of this chapter is to provide an overview of the risk considerations applicable to this project.

This chapter assesses the major risks for the project and comprises the following sections:

- Introduction
- Strategic risks
- Process risks
- Project risks.

9.2 Risk categories

To achieve the objective of expanding the cotton industry, this project proposes a gin-for-service model which is underpinned by the initial strategic rationale to create opportunity for all local growers to minimise their risk and maximise operational viability by ginning in close proximity to their farms.

There are three primary categories of risk that were managed through the initial phases of project development, including:

- **Strategic risks.** Risks that affect NT Farmers at an organisational level and require that action is taken by the Executive Leadership Team or by the organisation’s President.
- **Process risks.** Risks that affect the process of developing the project through the current phase. While they do not necessarily have a direct impact on the cost to deliver the project, they may have significant time, reputation and management cost impacts. These risks are often temporal and change throughout the development of projects and are therefore continually reviewed and actioned.
- **Project risks.** Risks that affect the outcomes of the project and have a range of potential impacts to time, cost, quality, health and safety, reputation and environmental outcomes. Assessment of project risks needs to be regularly reviewed and updated to reflect the current status of the project. The focus of project risk management will also change as the project develops to reflect the roles that different parties play at different stages of the project. In the feasibility stages, as NT Farmers prepares the Business Case, it will seek to indicatively allocate risks to various parties, however, until the project moves from feasibility to procurement and delivery, NT Farmers will by proxy, manage all of the project risks. Post contract execution, the focus will shift to managing the residual risks that NT Farmers has responsibility for under the terms of the contracts.

9.3 Strategic risks

9.3.1 Legislative risk – Australian Maritime Safety Authority Container Weight Verification

The Australian Maritime Safety Authority has introduced changes regarding the *Navigation Act 2012 Marine Order 42 (Cargo stowage and securing) (MO42)* to meet Australia's commitments as a signatory to the International Convention for the Safety of Life at Sea (SOLAS). All containers that leave Australia must have a Verified Gross Mass (VGM) declared on the shipping documents. VGM refers to the total weight of the packed container, as verified by an official party. In 2014, the Maritime Safety Committee (MSC) adopted amendments to its SOLAS regulations to require the mandatory verification of the gross weight of packed containers.

The aforementioned SOLAS amendments introduced two main new requirements:

1 The shipper is responsible for providing the verified weight by stating it in the shipping document and submitting it to the master (or representative) and to the terminal representative, sufficiently in advance, to be used in the preparation of the ship stowage plan

2 The verified gross weight is a condition for loading a packed container onto a ship.

In the Northern Territory however, the chain of responsibility provisions in transport law are not specified. While many offences are the sole responsibility of the driver, some offences in relation to the mass, dimensions and loading of a heavy vehicle are the responsibility of the driver, and/or the person or corporation which caused or permitted to offence to occur. This means that to absolve responsibility from the cotton gin in verifying the weight of the cotton bale shipment, the cotton gin does not own the cotton bales at any point in the supply chain. Rather, the gin is provided as a service between the farmer and cotton merchant, wherein the merchant is responsible for verifying the weight prior to shipment.

9.3.2 Government support

There is a risk that the project will not garner support from DTBI or the Northern Territory Government. This will likely be due to the Business Case for investment in the project being considered marginal or a sub-optimal by Government or a misalignment of Government strategy and policies with the project. Under this scenario the project may have to be delayed or terminated. Current controls in place include:

- Early and ongoing engagement with various levels of Government to ensure that project support is achieved and maintained regardless of changes in personnel
- Ensuring the project is developed in alignment with emerging government priorities, such as in line with the proposed Katherine Agribusiness and Logistics Hub
- Clearly and accurately determining the economic impact of the project to the Northern Territory to ensure it is a non-political topic that can garner the support it needs
- Proving through the Business Case that the project is economically and financially viable and sustainable.

9.3.3 Project feasibility

The most significant risk for the project is that it is not deemed to be economically and commercially feasible at the conclusion of the Business Case. This may be caused by a number of factors, including high capital and operating expenditure due to the required infrastructure and utility requirements of the site, or inaccurate input estimates of cotton supplied. Ultimately, this could prevent the project from being funded and will inhibit future support. The current controls in place include ensuring the user requirements and specifications are considered as reasonable and without gold-plating and undertaking robust economic and financial analyses to justify the financial expenditure. Treatments include regular meetings and discussions with related stakeholders to ensure the gin requirements, anticipated ginning rate and the commercial returns are closely aligned.

9.3.4 Community opposition risk

This is the risk that the community does not support development of the proposed terminal facility and protest against it. Potential causes of this risk include the perception of loss of land, strain on water supplies, dust pollution or noise pollution around the gin, including the potential for construction and longer term impacts on the township. Mitigation strategies for this risk include developing a clear strategic rationale for proceeding with the project, as well as ensuring communities are kept well informed during the project.

9.3.5 Cotton seed bio-security

NT Farmers have been in consultation with government departments in both the Northern Territory and Western Australia, to resolve bio-security issues; in particular the movement of cotton seed between the Katherine region and the Ord River. These discussions promote the interests of growers in both the Northern Territory and Western Australia and seek to understand and mitigate any bio-security risks. Approval must be obtained for proposed arrangements that provide for the biosecurity industry participants to carry out activities to manage risks associated with the specified transport of goods.

9.4 Process risks

9.4.1 Environmental approval processes

This is the risk that the project's environmental conditions of approval are more onerous than anticipated. Potential causes of this risk include the assessed level of impact on matters of national environmental significance (by the Commonwealth Government) are higher than expected and this delays the project. Mitigation strategies for this risk include early engagement with the Northern Territory Government and the relevant Land Councils to determine the most appropriate assessment and approval process for the project.

Environmental impacts are inevitable for any greenfield project. An approach to mitigating some of the inherent risk in greenfield cotton gin development is to add a level of scalability to the project. For example, the gin may scale the amount of land cleared for cotton bale field storage in line with volumes produced. This scaling strategy ensures that field is only cleared when required.

9.5 Project risks

9.5.1 Seasonality hurdles

The gin will be driven by a number of factors as the seasonality of the annual cotton crops will have to contend with the following major hurdles:

- Access to long-term engagement of skilled cotton gin management and labour resources
- Access to skilled trade people for repairs and maintenance
- Reliance on a 10-12-week peak season for capital return, whether the cotton gin or supporting infrastructure
- Cost and reliance of a long-term source of energy for the cotton gin.

Risks related to seasonality hurdles may be mitigated through investments in diversified crop types (i.e. dryland and irrigated cropping). The proposed location of the gin has been strategically placed in Katherine where the town provides access to resources to staff the gin. Recent discussions with the local cotton growers have highlighted the need for reliable power. It is recommended that the gin management negotiates long-term power supply arrangements with utility providers on behalf of the gin.

9.5.2 Supply risk due to environmental factors

The area of interest for the cotton gin development has relatively dense areas of vegetation and large trees. Any proposals for removal of native vegetation are likely to be subject to significant scrutiny by environmental groups given the environmental values of the region. There are expected to be a number of high risks areas where native vegetation cannot be cleared, such as threatened species habitats, which may not become apparent until a full environmental survey is conducted. In addition, soils and topography may limit the amount of developable areas increasing cost and ease of use of the land where irrigated cotton requires relatively flat land with continuous open spaces.

9.5.3 Climate risk

The operation of the gin relies on cotton input which is subject to favourable weather conditions. A lack of rainfall during the wet season can significantly reduce the profitability of cotton production and thereby profitability of cotton ginning. The risk of insufficient rainfall is the limited amount of water that can be captured and stored and from that the risk of reduced yields or a failed crop. Some production regions may be more affected by lower rainfall years than others. For example, the Barkly region may only have a three in five year success rate, whereas the Sturt Plateau may have a four in five year success rate.

Rainfall is a major climatic factor pertinent to the cotton industry, including total rainfall, onset of the wet season and reliability of the wet season. Prolonged dry or wet seasons are unsuitable for cotton crops. Onset of high rainfall in October or November will hinder planting and insufficient rain in December and January can delay planting without irrigation and too much rain during April and May can delay harvest with the associated risk of boll damage. On the possibility of flooding is a risk as the area does not have existing irrigation infrastructure. One mitigating factor local growers are doing to address this issue is to ensure they capture and use water in the same season. Carrying water over season would require a different and more costly production system for the cotton farmers. The proposed cotton farms supplying the cotton gin will capture and use water from existing waters sources in the same season.

Factors such as cloudiness, extreme heat and low soil moisture content can adversely affect cotton crop yields[19]. The climate in Northern Territory provides fewer daily hours of sunshine in the growing season, however, recently developed cultivars have been proven to perform better with fewer hours of sunshine during boll development. Other differences for the Northern Territory are the warmer growing season, typically with sowing in January, and the variability in the planting season to take advantage of the onset of the wet season.

While the weather conditions effectively create a revenue risk that is beyond that control of the gin itself, the risk is able to be monitored through ongoing communication with local growers to determine the level of impact existing weather conditions has on their production forecasts. This ensures that the gin's manager is able to implement strategies to remain commercial in low production seasons.

[19] Welsh, J., Australian Cotton Production Manual 2018, accessed on February 2019 on https://www.crdc.com.au/sites/default/files/pdf/ACPM%202018.pdf.

10 Implementation

10.1 Purpose and overview

The purpose of this chapter is to provide an overview of the funding and financing plan for the project, and the support requested from the Northern Territory Government. This chapter is structured as follows:

- **Strategy to deliver the project -** focuses on project planning activities
- **Approach to financing plan -** demonstrates how the project will be financed
- **Overview of approval process -** which outlines the approvals required for the project's development.

10.2 Strategy to deliver the project

The indicative project timing of key project phases and activities is presented in Figure 28 and in calendar year quarters. In this plan, the project financial investment decision is scheduled to occur in Q2 2020. This timing assumes that land development and environmental approvals are granted by Q1 2020. Construction is estimated to take approximately one year by Q4 2020.

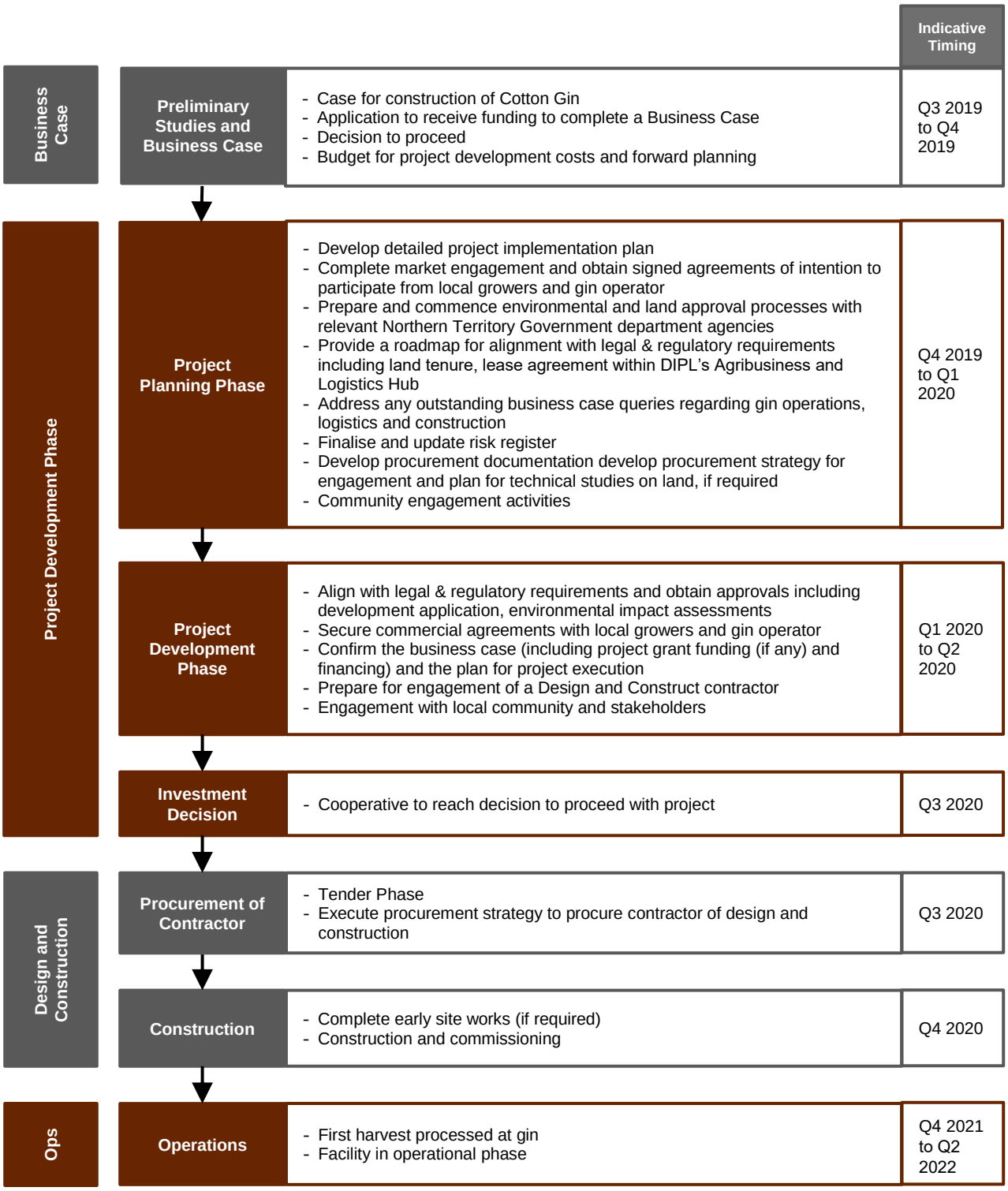

Figure 28: Indicative implementation activities[20]

10.3 Approach to financing plan

NT Farmers is working with Queensland Cotton and their respective business advisors to assess the financing solutions for the development of the cotton gin. NT Farmers has commenced the development of a financing plan which considers the suitability of grant funding, debt, equity as well as funding through the Federal Government's Northern Australia

[20] Gin operations by quarter 2 of the calendar year would align with cotton season and ensure growers are paid on time.

Infrastructure Facility (NAIF). The key elements of the financing plan involves a combination of public funding and private financing as is proposed as follows:

- A $10 million grant from the Northern Territory Government's *Local Jobs Fund – Infrastructure Grant*
- Approximately $10 million financing from local growers, through local growers respective applications for funds through the NAIF
- Up to $8 million financing from Queensland Cotton through equity investment, both cash and equipment
- $0.6 million debt raised from private financiers.

The total amount of grant funding that could be received under the *Local Jobs Fund* is unknown at this stage and will be confirmed once the evaluation of the business case by the Northern Territory Government is complete. The amount of grant funding received will determine the level of financing that is sought from local growers and Queensland Cotton to deliver to project. Table 34 provides a high level overview of the proposed sources of capital required to deliver the project, which are assumed to be 100 per cent used for development capital.

Table 34: Sources of Funds

Source	Amount ($ AUD)	Percentage (%)
Local Jobs Fund Infrastructure Grant	10,000,000	35%
Equity with local grower shareholding	10,000,000	35%
Equity through Queensland Cotton contribution	8,000,000	28%
Debt[21]	618,555	2%
Total sources	**28,618,555**	**100%**

10.3.1 Grant funding

NT Farmers is seeking funding from the Northern Territory Government under the *Local Jobs Fund* to contribute $10 million towards the $28.6 million capital cost of the project (in nominal terms). The amount of grant funding provided to develop the project will be determined by DTBI. The *Local Jobs Fund* is an $89 million co-investment fund which will support economic transformational project and help high growth potential Territory businesses. As part of the Grants Program, this project is seeking $10 million under the *Infrastructure Grants for Transformational Economic Growth Projects Fund.* While this project is seeking the full allocation of $10 million, NT Farmers acknowledges that there is a possible instance in which the full $10 million may not be approved. Therefore, the total funding requirement, net of grant funding, is intended to be fully provided by the project's related parties, Queensland Cotton and the local growers who are part of NT Farmers.

10.3.2 Local grower funding contribution

Several local growers have committed to arrange $10 million in funding as contribution to the delivery of this proposed cotton gin[22]. To assist in delivering the required fund, the local growers are in separate discussions with representatives of the NAIF and have received initial support with the growers' proposal having received approval to progress through to the due diligence stage of the project assessment. Refer to attached *SAP Approval Notification Letter* from the NAIF Chief Executive Officer.

The NAIF is a $5 billion lending facility to provide loans to infrastructure projects in Northern Australia. The primary funding mechanism of NAIF is the provision of fixed rate loans, where interest rates and payback period are project specific. Concessions are limited to the minimum required for the progression of a project, and the rate offered cannot be below commonwealth borrowing cost and administration costs. Provided the Commonwealth does not have the overall majority of risk in a project, the loan could be up to 100 per cent of the debt of the project. Where it may be more appropriate, or where

[21] Additional finance is assumed to be debt, funded from private financiers and repaid by the project.

[22] The initial indicative capital structure is proposed to start at 40 shares at $250,000 or 100 shares at $100,000.

it is necessary to encourage private sector participation, the NAIF Board may consider using an alternative financing mechanism. However, this is only possible through agreement by the Minister. The NAIF cannot offer alternative financing mechanisms that would provide equity or grant funding to a project. NAIF's financial assistance (including the interest rate and payback period) are determined separately for each individual project and not provided until the completion of a strategic assessment.

The Cotton Gin project rates strongly against the NAIF's five mandatory eligibility criteria outlined below:

- Involve the construction or material enhancement of Northern Australia economic infrastructure
- Be of public benefit
- Be located in, or have significant benefit for Northern Australia
- Require a loan that is able to be repaid or refinanced
- Have an Indigenous Engagement Strategy.

NT Farmers has ongoing engagement with NAIF who has expressed strong interest in supporting the project. Market intelligence to date suggests that the concessions provided by NAIF have been conservative (interest rates at 6-7 per cent) however, longer loan tenors, the absorption of merchant or future user risk, tailored loan repayment schedules and/or subordination in security and/or cashflow may be required following consultation with private financiers.

NT Farmers, on behalf of local growers, will have continued dialogue with NAIF closer to the finalisation of the Investment Decision regarding potential support for the project, potential concessionality offered and the assessment requirements to determine the viability of this concessional loan facility for the project. NAIF has confirmed interest in continuing discussions with NT Farmers about the progress of the cotton gin as per the Letter of Support.

10.3.3 Queensland Cotton contribution

Queensland Cotton has committed to contribute of the infrastructure grant and has been in discussions with its executive leadership team around the structure of financing. These discussions view the potential grant funding towards to the capital costs of the project as complementary to private finance, providing a de-risking factor to the project and subsequent level of confidence to their respective financiers. Based on initial feedback, it is expected that Queensland Cotton will contribute up to $8 million in equity investment to the project, through cash and equipment.

10.3.4 Debt

The remaining cost of approximately $0.6 million will be financed through debt. Based on initial discussion, the debt structure may comprise a hybrid of debt facilities, including:

- Term debt financing for company establishment and capital expenditure
- Working capital facility
- Equipment finance.

NT Farmers will work closely with Queensland Cotton to undertake the following process (outlined in Figure 29) to achieve financial close.

Figure 29: Capital raising transaction process

10.4 Overview of status approvals

The proposed cotton gin has various stages with progress to date and conditions precedent for approvals are summarised in Table 35. Approval processes and requirements have been considered in the preparation of the development program, including tasks to be completed sequentially and consecutively.

Table 35: Development approval process

Task	Progress
01 – PROPOSAL	
Liaise with stakeholders, developer and/or investor (i.e. Queensland Cotton)	Task ongoing
Scope proposal	Completed as part of initial Feasibility Study in August 2019
Operational requirements	Task ongoing in conjunction with Business Case development
02 - PROJECT BUSINESS CASE	
Confirm stakeholders, building requirements, site planning and proposed land-use in accordance with, and assess the project against all relevant legislation	Ongoing task included in business case development
Undertake economic and commercial feasibility analysis	Ongoing task included in business case development
Location selection	Preferred location identified as Katherine
Liaise with Department of Infrastructure, Planning and Logistics (DIPL) regarding land and utility requirements as part of proposed Katherine Agribusiness and Logistics Hub	Ongoing task to continue with Business Case approval condition
Confirm ownership model and development model	Analysis commenced as part of Business Case with approval condition signalling requirement to confirm model amongst related parties
Identify external contractors and/or consultants	Business Case approval condition
Structural project timeline/critical path	Business Case approval condition
03 - DELIVERY	
Negotiation of acceptable terms and conditions between parties (DIPL, Northern Land Council, Traditional Owners)	Dependent on discussions with DIPL and Business Case approval condition
Preliminary design and construction drawings	Not yet commenced
Procurement documentation for execution	Not yet commenced
04 - KEY APPROVALS	
Queensland Cotton management and board approval	Business Case approval condition
Environmental authorities	Business Case approval condition
05 - LEGAL	
Agreements executed with local growers	Board approval condition precedent and liaise with Northern Territory Cotton Growers Association
Agreements executed with Queensland Cotton	Board approval condition precedent

Task	Progress
06 - CONSTRUCTION	
Appointment of Cotton Gin project management team	Board approval condition precedent
Commencement of construction	Building works approval conditional procurement
07 - COMPLETION	
Survey plan and building compliance endorsement	Prior to practical completion of construction task
Handover	At practical completion of construction task

10.5 Summary

This chapter demonstrates that there are sufficient sources of funding and finance to finance the cotton gin, subject to the receipt of grant funding, as well as potential concessional debt from NAIF and privately arranged debt and equity. Initial market engagement also suggests that there are adequate funding sources for future development phases of the facility. Parties that have expressed interest in the project (and its potential stages of expansion) have provided letters of support.

11 Conclusion

This report has assessed the case for a potential cotton gin in the Northern Territory. The region's cotton industry has seen widespread growth and interest from farmers and investors on the back of recent successful yields and over 50 years of trials in the Northern Territory and Ord region. Farmers in established cotton growing areas are looking to upscale operations and a number of properties are seeking to convert pastoral land to cropland. As crop prices increase, this trend is expected to continue. Whilst this is good news for the regions and the wider Northern Territory economy, infrastructure must be in place to realise and promote the potential of this growing industry.

NT Farmers has partnered with Queensland Cotton to seek funding for a cotton gin in the Northern Territory on behalf of existing and future cotton farmers. The location options analysis determined that the preferred location of the gin should be Katherine, scoring the highest against operational, economic, transport and social criteria.

The Port of Darwin is well placed to export cotton to international destinations. The development of a gin in the Northern Territory will have a positive impact for future export shipping services, providing more flexibility for cotton producers. An increase of inwards and outwards Port traffic will also lead to a decrease in shipping costs for users. There is ample land for development of key supporting infrastructure in the Katherine region, with the potential to leverage the existing Northern Territory Government's plan for the Katherine Agribusiness and Logistics Hub.

The project has significant support from local growers, industry, community and private investors. The local growers and private sector have committed to contributing capital towards this project to expand their commercial opportunities. This is especially pertinent for cattle farmers to achieve commercial gains offered by using cotton seed as high protein feedstock, leading to the intensification of the Northern beef industry. However, without grant funding the project to construct the gin is unviable financially and commercially, ultimately inhibiting the growth of the cotton industry and Northern Territory economy. Without the grant funding, the Northern Territory will stand to miss out on the opportunity to capitalise on significant potential growth. By contributing financially to the first gin in the Northern Territory, the Government has the opportunity to stimulate the cotton industry with private sector funds expected to develop up to another three gins in the Northern Territory in the next 10 years. Without this initial Government funding, it is unlikely that the industry will achieve this growth and stimulate both the cotton industry and the regional Northern Territory economy.

With the grant funding, the project can expect to receive an acceptable internal rate of return of 12 per cent, with project cashflows showing available funds for equity distribution towards private investors. The project is also expected to create up to 71 jobs during construction and 88 jobs during operation for the Northern Territory. Without grant funding, the project is anticipated to have a negative NPV and therefore not represent a bankable project for the Proponent. In addition to its direct beneficiaries, upstream and downstream business can expect to benefit from the development of the gin through increased exports from the Port of Darwin. This project strongly aligns with the objectives of the *Local Jobs Fund* as it an economic transformation project which creates a step-change in economic uplift for Katherine and the broader Northern Territory economy.

Appendices

Appendix A MCA Workshop 69

Appendix B Detailed Transport Costs 78

Appendix A MCA Workshop

11.2 Multi-criteria assessment

11.2.1 Methodology

A Multi-Criteria Assessment (MCA) workshop was facilitated on 17 September 2019 at the Katherine Research Station. The MCA process was used to identify the preferred location option(s) for the cotton gin to allow for more detailed and targeted analysis of the options. It was well attended with over 30 attendees present to assess the five potential location options, representing all cotton growing regions outlined in this analysis, including a strong presence from the Ord Valley growers. The attendees were a broad representation of the cotton industry in Northern Australia. The attendees are outlined in Table 36.

Table 36: MCA attendees

Stakeholder	Stakeholder type	Name and/or position
CRC for Developing Northern Australia	Industry	Sally Leigo, NT Representative
Northern Territory Cotton Growers Association	Industry body	Bruce Connolly, Chairman
NT Farmers	Industry body	Andrew Philip, Industry Development Officer Simon Smith, President Paul McLaughlin, Vice President
Northern Agriculture	Local grower – Northern Territory	Nick Black
Northern Livestock & Ag	Local grower – Northern Territory	Sam McBean
Tipperary Group	Local grower – Northern Territory	Tom Polkinhome
Hands on Agriculture	Local grower – Northern Territory	Chris Howie
Malilangwe	Local grower – Northern Territory	Matt Dennis
Vermelha Station and Scott Creek/Manbulloo	Local grower – Northern Territory	David Warriner
Ceres Downs	Local grower – Northern Territory	Sarah Measey
OrdCo	Local grower – Western Australia	Fritz Bolten, Rob Boshammer, Willem Bloecker, Gabi Bloecker, Daryl Smith
Auvernge/Newry	Local grower – Northern Territory	Steve Petty (on behalf of international investor)
Buratovich Hnos	International investor	Eduardo Buratovich

The MCA is a quantitative assessment process designed to establish preferences between options by reference to an explicit set of criteria. The MCA process was conducted in five stages:

- Stage 1: Identify options
- Stage 2: Develop criteria
- Stage 3: Determine criteria weightings
- Stage 4: Evaluate options
- Stage 5: MCA.

The site options analysis is based on distances and trucking backloads assumptions. Existing benchmarks of Queensland-based gin operations with exports through the Port of Brisbane were also applied as points of reference.

11.2.2 Options overview

An options overview was presented to the workshop participants, including detailed information and maps of each location. Participants were presented with the following information on each site to inform and support decision making:

- Site type
- Location/proximity to key Northern Australia hubs
- Existing infrastructure
- Water, power and sewage availability
- Environmental considerations.

Participants had to opportunity to visualise the projected 2024 and beyond 2024 cotton growing areas, to enable proper judgment when evaluating what locations would be close to the cotton supply, as depicted in Figure 30 and Figure 31.

Figure 30: Forecast cotton production (up to 2024) in proximity to proposed gin locations

Figure 31: Forecast cotton production (beyond 2024) in proximity to proposed gin locations

11.2.3 MCA detailed assessment

A list of criteria and factors to be considered in the site selection process were developed based on the service requirements outlines in the Strategic Rational chapter and user requirements for a cotton gin identified through engagement with stakeholders. These criteria were developed by PwC to reflect the consensus view of the most important drivers for site selection. The MCA assessment against the six key criteria used in the MCA are described in Table 37.

Table 37: Criteria and considerations

Katherine, Northern Territory		
Criteria	**Description**	**MCA Workshop Remarks**
A	Operational viability	10/10 • Pastoral and freehold land available in the region • Potential to utilise NT government backed Katherine Logistics Hub • Potential for secluded enabled sites to protect town from dust and noise pollution • Sufficient population to support the facility in staffing for construction and operation phases • Sufficient social services available to attract staff to the region if required (medical, recreational, cultural) • Essential services including accommodation, financial, postal, educational available in the town • Fire and police services readily available
B	Proximity to export hubs	10/10 • Rail access to port of Darwin and port of Adelaide • 320km by road to the Port of Darwin

Katherine, Northern Territory		
C	Proximity to cotton farms	8/10 Proximity to major cotton growing areas, primarily: • Adelaide River Valley: 210km • Ord Valley: 520km • Douglas Daly: 260km • Roper Valley: 230km • Start Plateau: 250km • Barkly Tablelands: 830km Manbulloo pastoral region is in the Katherine region
D	Local economic outcomes	10/10 • Population and town size is small enough for the project to have a noticeable and lasting impact • Many local businesses in the region to benefit from increased spending of staff and travelling visitors to the facility. • Potential for region to support facility repairs (i.e. parts, labour etc.) • Residents will have a high tolerance to development • Cotton gin would introduce a new industry to the region (including growing) • Short distance from Darwin for international visitors to the facility
E	Access to transport logistics	10/10 • Highway quality roads available, allowing for safe access to cars, heavy vehicles and machinery • Travel from Darwin is safe and reliable if required • Rail access available, loading facilities required • Local airport to service if emergency access needed • 4wD generally not essential.
F	Cost	8/10 • Town population and established businesses provide competitive construction costs. Distance from Darwin allows for feasible materials transport. • Established water, power and sewage facilities in the region; rates feasible and negotiable • Skilled tradespeople in the region available

Edith Springs, Northern Territory		
Criteria	**Description**	**MCA Workshop Remarks**
A	Operational viability	4/10 • Pastoral and freehold land available in the region • Dust and noise pollution not an issue due to seclusion • Insufficient population to support the facility in staffing for construction and operation phases • Lack of social services available – hard to attract staff • No essential services available (accommodation, financial, postal, educational) • Fire and police services need to travel 40km from Katherine
B	Proximity to export hubs	6/10 • No direct rail access • 280km by road to the Port of Darwin

		Edith Springs, Northern Territory
C	Proximity to cotton farms	8/10 Proximity to major cotton growing areas, primarily: • Adelaide River Valley: 170 km • Ord Valley: 560km • Douglas Daly: 220km • Roper Valley: 270km • Start Plateau: 290km • Barkly Tablelands: 870km • Kathrine / Manbulloo: 50km
D	Local economic outcomes	10/10 • Located close enough to Katherine to allow for economic impact to be felt by residents in the region. • Local businesses in the Katherine region to benefit from increases spending of staff and travelling visitors to the facility. • Potential for region to call upon Katherine to support facility repairs (i.e. parts, labour etc.) • Completely secluded, no residential mass in the area. Will not disturb locals • Facility would introduce a new industry into the region • Short distance from Darwin for international visitors to the facility
E	Access to transport logistics	6/10 • Highway access available, road upgrades required to ensure safety • Travel from Darwin is safe and reliable if required • Issue with B-triples turning into site • Rail access is not direct, 40km away • Local airport in Katherine to service if emergency access needed • 4wD may be required
F	Cost	4/10 • Town remoteness and lack of population will increase capital cost, and mean staff may have to commute from Katherine or Darwin to work. • Limited water, power and sewage facilities in the region; cost to connect to Katherine system will be high • Skilled tradespeople in the Katherine region, travel costs high.

		Kununurra, Western Australia
Criteria	**Description**	**MCA Workshop Remarks**
A	Operational viability	10/10 • Ability to avoid dust and noise pollution by selecting secluded sites in the region • Sufficient population to support the gin during construction and operation phase • Social services are available – increases ability to attract staff to region if required • Essential services available (accommodation, financial, postal, educational) • Police services available, Fire (Volunteer) available • Risk for gin viability, if KAI build gin in the Ord region
B	Proximity to export hubs	8/10 • No direct rail access • Wyndham port available, but expensive (Fremantle is cheaper) • 850km by road to the Port of Darwin

Kununurra, Western Australia		
C	Proximity to cotton farms	8/10 Proximity to major cotton growing areas, primarily: • Adelaide River Valley: 740 km • Ord Valley: <50km • Douglas Daly: 795km • Roper Valley: 760km • Start Plateau: 780km • Barkly Tablelands: 1360km • Kathrine / Manbulloo: 530km
D	Local economic outcomes	10/10 • Population and town size is small enough for the project to have a noticeable and lasting impact • Many local businesses in the region to benefit from increased spending of staff and travelling visitors to the facility. • Potential for region to support facility repairs (i.e. parts, labour etc.) • Cotton gin would introduce a new industry to the region (processing) and support current cotton growing industry
E	Access to transport logistics	6/10 • Highway access available, road upgrades required to ensure safety • No rail access • Long distances to cover from NT regions, increased safety risk • Local airport in Kununurra to service if emergency access needed • 4wD may be required
F	Cost	6/10 • Town remoteness will increase capital cost of construction as well as repairs and operation for travelling staff from Darwin etc. • Established water, power and sewage facilities in the region; potential to negotiate deal with hydro power plant • Skilled tradespeople in the Kununurra region available

Mataranka, Northern Territory		
Criteria	**Description**	**MCA Workshop Remarks**
A	Operational viability	4/10 • Noise and dust pollution manageable due to secluded site • Insufficient local population to support the gin during construction and operation phase. • Social services are limited – reduces ability to attract staff to region if required • Essential services limited • Police and fire services are available.
B	Proximity to export hubs	6/10 • No direct rail access • 420km by road to the Port of Darwin.
C	Proximity to cotton farms	6/10 Proximity to major cotton growing areas, primarily: • Adelaide River Valley: 310 km • Ord Valley: 620km • Douglas Daly: 370km • Roper Valley: 120km

Mataranka, Northern Territory		
		• Start Plateau: 143km • Barkly Tablelands: 730km • Kathrine / Manbulloo: 110km.
D	Local economic outcomes	10/10 • Population and town size is small enough for the project to have large impact • Local businesses in the region to benefit from increased spending of staff and travelling visitors to the facility. • Cotton gin would introduce a new industry to the region.
E	Access to transport logistics	6/10 • Highway access available, road upgrades required to ensure safety • No direct rail access (line runs 20km west of town) • Long distances to cover from NT regions, increased safety risk • Local airport in Kununurra to service if emergency access needed • 4wD may be required.
F	Cost	4/10 • Town remoteness will increase capital cost of construction as well as repairs and operation for travelling staff. • Water, power and sewage facilities lacking in the region; upgrade costs will be significant • Limited access to local tradespeople.

Darwin, Northern Territory		
Criteria	**Description**	**MCA Workshop Remarks**
A	Operational viability	10/10 • Noise and dust pollution potential issue due to population density • Local population large enough to support the gin during construction and operation phase • Amble social services available (including recreational, medical, cultural); increased ability to attract staff to the region • Essential services available • Police and fire services are readily available.
B	Proximity to export hubs	8/10 • Located in the port city, longer distance to port of Adelaide vs Katherine if required
C	Proximity to cotton farms	4/10 Proximity to major cotton growing areas, primarily: • Adelaide River Valley: 110 km • Ord Valley: 830km • Douglas Daly: 200km • Roper Valley: 545km • Start Plateau: 565km • Barkly Tablelands: 1150km • Kathrine / Manbulloo: 320km.
D	Local economic outcomes	4/10 • Population and town size is too large for this project to have a noticeable impact • Local businesses in the region to benefit from increased spending of staff and travelling visitors to the facility, however to less of an extent than more remote locations

		Darwin, Northern Territory	
			• Locals may not be tolerant to noise and dust pollution • Cotton gin would introduce a new industry to the region.
E	Access to transport logistics	8/10	• Reliable, safe road access available for heavy vehicles and machinery • Rail accessible sites would be available • Domestic airport in Darwin to service the facility • 4wD not required
F	Cost	10/10	• Population and town size enables competitive construction costs, as ample resources to staff the facility • Water, power and sewage facilities well established; low rates • Amble access to skilled tradespeople

In addition to these criteria, there were three critical site requirements identified through industry research and stakeholder engagement that were embedded in the MCA criteria definitions. The three non-negotiable requirements of an appropriate cotton gin site include:

- **Location size:** The chosen site must have at least 50ha of land to allow for storage of raw cotton, seed and trash as well as the ability for potential scaling up of operations.
- **Utilities:** The site must have reliable access to power and water
- **Resilience:** The chosen site must be accessible in an incident of extreme weather including flooding and must therefore have adequate road infrastructure
- **Bio-security:** The site must be located to permit transport of cotton including cotton seed across various Northern Australia bio-security regions
- **Noise pollution**: The site must be secluded from residents within the receptor zone
- **Dust pollution**: The site must be secluded from nearby populations; accounting for prevailing winds.

11.2.4 Criteria weighting

A pairwise comparison was used to calculate a weighting for each criterion. This process compares criteria in pairs to select a more significant and less significant criterion resulting in revealed significance within the set of criteria. All criteria have been identified as important and have been developed to align with the objectives of the project. The pairwise analysis was undertaken during in the MCA workshop. During the workshop, the process for completing a pairwise analysis was explained to the participants, and the ranking of criteria was agreed upon and endorsed by those present. The ordered ranking of criteria is shown in Table 8.

Table 38: Criteria pairwise comparison

Rank	Criteria	Description	Weighting
1	C	Proximity to cotton farms	33%
2	F	Cost	26%
3	A	Operational viability	20%
4	D	Local economic outcomes	13%
5	E	Access to transport logistics (road and rail)	7%
5	B	Proximity to export hubs	2%

Given the stage and nature of the assessment, Criteria E and B were not considered critically important as all locations were likely to suffer score similarly in these criteria.

11.2.5 Options scoring

The MCA was completed by scoring each of the location options against the criteria using a five-point colour rating system (with a background numerical scoring system) outlined in Figure 32. A total score for each option was used to rank the options and determine the preferred location(s). The scoring was determined via a collaborative discussion during the facilitated workshop process, where key stakeholders discussed and then moderated an agreed rating for each option against each criterion.

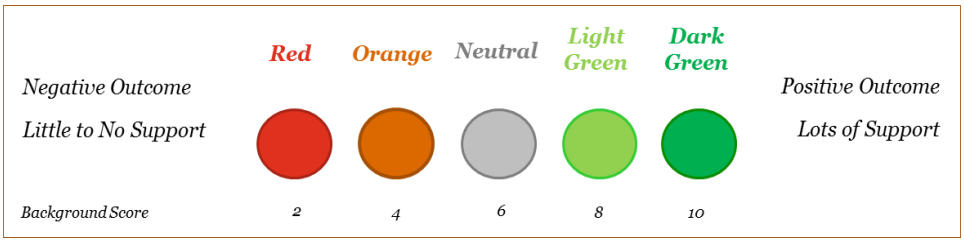

Figure 32: MCA scoring methodology

The workshop involved an open discussion to allow participants to provide insight and feedback on each of the criteria and each option was rated accordingly. Each of the key elements to be considered for each criterion were also discussed to ensure each option was scored objectively.

11.2.6 Summary of MCA

Figure 13 illustrates the output of the MCA workshop which summarises the scoring of each of the sites including their weighted values and ranking.

Options		A	B	C	D	E	F	Score	Rank
1	Katherine							8.8	1
2	Edith Springs							6.3	4
3	Kununurra							7.9	2
4	Mataranka							4.7	5
5	Darwin							7.1	3
	Weighting	20%	2%	33%	13%	7%	26%		

Figure 33: MCA summary results

Figure 33 places each site in order of its rank, identifying the most preferred location(s) to progress on to further analysis. The first option, Katherine, scored 8.8 due to its central location which allowed it to score highly in '*proximity to cotton farms*' and its proximity to a population centre allowed it to score highly in '*operational viability*' and '*cost*'. As these three criteria had the largest relative weights, Katherine scored very highly through the MCA process.

The second highest scoring option, Kununurra, has a similar population and reasonably sized township which allowed it to score highly against '*operational viability'* and '*local economic outcomes'.* Despite this, Kununurra as a gin location is limited by its relatively remote location and lack of direct access to export hubs. This was evidenced when evaluating against '*cost*' '*access to transport logistics*' and '*proximity to export hubs*'. However, given the high weighting of 'operational viability' Kununurra was able to score the second highest.

Darwin was scored lower than Katherine and Kununurra in all options other than 'proximity to export hubs' and 'cost'. In the 'cost' criteria Darwin was the highest scoring option, due to its location in a major population; allowing for ease of staffing and lower construction costs. Darwin scored poorly in the highest weighted criteria 'proximity to cotton farms', given that it is 900km from the Ord Valley and 320km from farms near Katherine. The overall impact of a project like this was also thought to be felt less in Darwin than other regional sites, yielding a low score in 'local economic outcomes'.

Edith Springs and Mataranka were both heavily penalised due their remoteness. Participants were concerned the facility would struggle to attract staff and have a much higher construction cost, scoring it low in 'operational viability' and 'cost'.

Given these were highly weighted criteria, Edith Springs and Mataranka were not selected for further assessment; progressing Katherine and Kununurra with Darwin as an optional.

Appendix B Detailed Transport Costs

Introduction

To assist in decision to construct a cotton Gin in either Kununurra in Western Australia, Katherine in the Northern Territory or Darwin a detailed analysis of transport scenarios was undertaken. This analysis used the existing benchmark of a Queensland based gin operation with exports through the Port of Brisbane. This analysis also investigates the sustainability of the Port of Darwin in providing a long term service for the export of bales out of the Territory.

There are a number of factors that should have a more detailed review, such as trucking operations within the cotton season on how growers can cooperate to better utilise or share trucking operations for transport of seed cotton rounds.

Northern Territory / Kimberley cotton supply

The success from growers in the Ord River region of the Kimberley and in the Northern Territory will allow growers to consider at least 2 systems or conditions for cotton growing, which will be used in this analysis, with the following assumptions:

- Irrigated land with a yield of 9.5 bales per hectare
- Dry land with a yield of 4 bales per hectare

Harvested cotton is primarily made up from the following,

- Cotton Lint at 42%
- Seed cotton at 48%
- Cotton Trash at 10%.

It is anticipated the seasonality for cotton harvesting for the respective regions will be:

- **Kununurra** – July - August
- **Katherine** – May - July

This will stagger the supply of cotton into the gin to some degree. The following tables reflect the expected regions and volumes that will be used within this report. As a guide the following inputs are used in determining the various inputs.

- Bale weight of 227kg
- 1 metric tonne = 4.4 bales
- Approximately 110 bales are loaded in a 40’ shipping container (FEU)
- 40’ Container Payload = weight of bales loaded into the shipping container
- Tare weight = the weight of the empty shipping container + bale straps & bagging
- Gross weight = the combined payload + tare weights.

Depending on the final export destination, this can impact on the payload tonnes (or number of bales loaded per container) due to the respective country’s road regulations, such as Korea.

NOTE: Number of bales below is indicative. See report for projected bales (from grower consultation)

Northern Territory Cotton

Cotton	Weight	Tonnes	# Bales	#Bales/FEU	# FEU	FEU P/L	Tare WT	Gross WT
Bales	0.227	1	4.4					
2019		144	635	110	1	24.97	3.98	28.95
2020		1,135	5,000	110	10	24.97	3.98	28.95
2021		2,838	12,500	110	26	24.97	3.98	28.95
2022		6,583	29,000	110	60	24.97	3.98	28.95
2023		17,252	76,000	110	157	24.97	3.98	28.95
2024		29,964	132,000	110	272	24.97	3.98	28.95

Ord River – Kimberley Cotton

Cotton	Weight	Tonnes	# Bales	#Bales/FEU	# FEU	FEU P/L	Tare WT	Gross WT
Bales	0.227	1	4.4					
2019		755	3,325	110	7	24.97	3.98	28.95
2020		1,078	4,750	110	10	24.97	3.98	28.95
2021		5,391	23,750	110	49	24.97	3.98	28.95
2022		10,783	47,500	110	98	24.97	3.98	28.95
2023		16,174	71,250	110	147	24.97	3.98	28.95
2024		16,174	71,250	110	147	24.97	3.98	28.95

Combined Volumes Cotton

Cotton	Weight	Tonnes	# Bales	#Bales/FEU	# FEU	FEU P/L	Tare WT	Gross WT
Bales	0.227	1	4.4					
2019		899	3,960	110	8	24.97	3.98	28.95
2020		2,213	9,750	110	20	24.97	3.98	28.95
2021		8,229	36,250	110	75	24.97	3.98	28.95
2022		17,366	76,500	110	158	24.97	3.98	28.95
2023		33,426	147,250	110	304	24.97	3.98	28.95
2024		46,138	203,250	110	419	24.97	3.98	28.95

Trucking costs (per km) and methods

A rate of $3 per km and $1.29 per km for backload trucking rates has been applied across all scenarios. These rates are derived from market consultation and conservative assumptions wherever possible. The table below outlines the km and costs for different cotton movements and create the basis for further analysis.

Distance	$/Km	1-Way KM	Cost	2-Way KM	Cost
Kununurra - Katherine	$ 3.00	550	$ 1,650	1100	$ 3,300
Kununurra - Darwin	$ 3.00	829	$ 2,487	1658	$ 4,974
Katherine - Darwin	$ 3.00	316	$ 948	632	$ 1,896
Grower 1 - Katherine/Kununurra	$ 3.00	50	$ 150	100	$ 300
Grower 2 - Katherine	$ 3.00	150	$ 450	300	$ 900
Grower 3 - Katherine	$ 3.00	250	$ 750	500	$ 1,500
Grower 1 - Kununurra	$ 3.00	600	$ 1,800	1200	$ 3,600
Grower 2 - Kununurra	$ 3.00	700	$ 2,100	1400	$ 4,200
Grower 3 - Kununurra	$ 3.00	800	$ 2,400	1600	$ 4,800
Kununurra - QLD Gin 1-way	$ 1.29	3265	$ 4,200		$ 8,400
Katherine - QLD Gin 1-way	$ 1.09	2753	$ 3,000		$ 6,000
QLD Gin to QLD warehouse	$ 3.00	512	$ 1,536		$ 3,072

Traditionally the cotton round (which is the harvested cotton pre ginning) is a standard size as most harvested crops are within a 100km radius of the gin. This hasn't caused many issues with the shorter distances in close proximity but to overcome the tyranny of distance from Kununurra or Katherine, the cotton rounds have been produced to a smaller size to allow a greater number of rounds per trailer.

This image is a standard cotton round on a single trailer set up. The mechanism at the rear of the trailer is used to unload the large cotton rounds from the trailer and placement into external holding bays outside the gin. It is also used to feed the cotton rounds into the gin for processing. Typically, a large cotton round is 2,400 kg in weight and produces approximately 4.4 cotton lint bales or a total of 26.6 cotton lint bales per trailer.

This image shows the small cotton rounds stacked onto a trailer and typically you get 13-15 rounds per trailer at 2.5 cotton lint bales per small round or the equivalent output of 37.5 cotton lint bales per trailer. This is to achieve better freight efficiencies.

Trucking costs between the Kimberley and the Northern Territory into Queensland are subject to supply and demand so this at the moment drives the amount of harvested cotton that could be transported.

The current level of trucking costs is not realistic in the medium – long-term. For the purpose of this report, trucking costs will be determined by a dollar value per kilometre in an attempt to minimise the exposure to fluctuating backload trucking costs. This approach will be across all trucking costs except on current base cotton loads from Kununurra to Queensland. This is defined by a limited crop production at the moment to meet available backloading opportunities. Future increases in cotton from the Kununurra region would potentially be limited against availability of trucks.

The following Table reflects the distances between the various options as well as the following main points:

- Backload cost ex Kununurra - $4,200 per trailer
- Backload cost ex Katherine - $3,000 per trailer

The costs shown for Kununurra and Katherine are reflecting the opportunity per trailer backload into Queensland at this current stage. These costs may vary depending on seasonality and supply of road operators.

The following are the mass management payload weights (weight of cargo that can be carried) that different trucking combinations can be used and is determined by a number of factors, such as trailer manufactured weights or the type of prime mover and its weight.

What is required to be balanced against the available payload weight is the cubic of the cargo to be moved which will ultimately dictate the amount of cotton (in any form) that is transported.

- Single trailer: 25 -28 tonne payload
- B-double (2 x trailer): 34 -38 tonne payload
- 2 trailer road train combination: 50 - 54 tonne payload
- 3 trailer road train combination: 70-76 tonne payload
- Size of the proposed cotton lint bale being High Density (HD) or Ultra Density (UD) in size & weight

The following information relates to the approximate number of HD cotton lint bales per trailer configuration.

- Single Trailer: 120 x HD bales
- B-Double (2 x trailer): 170-185 HD bales
- 2 trailer road train: 200-220 bales

11.3 Shipping: Brisbane, Sydney, Melbourne

Cotton is shipped through the ports of Melbourne, Sydney and Brisbane with Brisbane being the major exporting port. The following tables represent cotton exported through the Port of Brisbane

Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Total Tonnes	Payload	FEU
2,536	2,491	2,957	13,483	55,090	87,536	80,737	67,774	26,701	23,754	31,393	25,095	419,547	25	16,782

Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Total Tonnes	Payload	FEU
97,561	88,315	56,060	20,632	11,306	6,394	2,536	2,491	2,957	13,483	55,090	87,536	444,361	25	17,774

Summary of Exports.

Period	Tonnes	40'Dry Units	Bales/Unit	Total Bales
2018	419,547	16,782	110	1,846,005
2017/18	444,361	17,774	110	1,955,188

Where existing Kununurra and Katherine cotton is sent to a Queensland based gin, the cotton lint once processed would then be handled through existing Queensland – Brisbane based infrastructure. The Port of Brisbane is serviced by all major Container shipping companies and during the cotton export period there is a predominantly balanced trade with full and empty 40' dry containers available through the port.

The shipping lines calling Brisbane is part of a voyage rotation calling into a number of ports around Australia enroute to either direct International export destinations or to a transhipment port in Asia for the on-carriage of containerised goods to end export destinations.

Transit times reflect the period from when the loaded vessel departs from a port until arrival or presentation of a customer's container at the nominated export port. Transit times from the East Coast of Australia into Asia will vary by destination, typically the following is a guide:

- East Coast Australia – Main ports Asia 18 – 21 days transit time.

11.4 Shipping: Darwin

Darwin is centrally located to Asia and the Port of Darwin provides services into all export destinations. Where Darwin currently isn't the size of a major export port like Brisbane there is a balance of trade with surplus 40' empty containers that could accommodate the short – medium period of the Ord River and Katherine cotton industry and projected volumes.

The following table indicates the previous 3 years data on projected empty 40' dry container availability and the corresponding number of bales that could be exported.

Period	40' Empty Units	Bales/40' Unit	Export Bales
2016/17	1627	110	178,970
2017/18	1959	110	215,490
2018/19	1553	110	170,830
Average	**1713**		**188,430**

- It must be noted that availability of 40'containers would adjust to meet future export cotton demand against any contracted shipping arrangements that would be entered into.

Darwin is serviced by three major shipping companies,

- ANL / CMACGM
- Swires Shipping
- PAE Mariana Line

The port has two major stevedoring companies providing services to the shipping companies and operate on a 24 hour / 7-day week principal but subject to weather conditions that may affect the port and related operations. The stevedoring companies are as follows and both have the capability to provide shore-based cranes for vessel operations as well as vessels own cranes:

- Qube
- Linx

The port is under a long-standing lease arrangement with Landbridge Group from the Northern Territory Government and there is ample land availability surrounding the port for future infrastructure development.

One of the opportunities in looking at a Katherine based gin is the rail connection from Katherine directly onto the Port of Darwin, which reduces a level of double handling of shipping containers.

Within the report a cost comparison will show the options for delivering loaded containers to the Port of Darwin for exporting. This will include a position of warehouse infrastructure located at Darwin Port surroundings and what benefits this would bring to the supply chain. Additionally, if a Kununurra based gin was present then the options for transit of the

FX 7/9/19 **1.46**

Ex Brisbane	China	Ex Darwin	China
	USD		USD
OCF	$ 650.00	OCF	$ 2,200.00
BAF	$ 150.00	BAF	$ 700.00
CSF	$ 14.00	CSF	$ 14.00
LSS	$ 10.00	LSS	$ 10.00
Total USD	$ 824.00	Total USD	$ 2,924.00
AUD	$ 1,203.04	AUD	$ 4,269.04
THC	$ 423.00	THC	$ 447.00
TSC	$ 8.50	TSC	$ 8.50
DOC Fee	$ 125.00	Doc Fee	$ 125.00
PAF	$ 12.50	PAF	$ -
POR	$ 120.00	POR	$ -
LOL	$ 150.00	LOL	$ -
Intra E-Bill	$ 60.00	Intra E-Bill	$ 60.00
Total AUD	**$ 2,102.04**	Total AUD	**$ 4,910**
Bales	110	Bales	110
Cost/Bale	**$ 19.11**	Cost/Bale	**$ 44.63**

Legend	
OCF	Ocean Freight
BAF	Bunker Adjustment
CSF	Controlled Temp Charge
LSS	Low Sulphur Surcharge
THC	Terminal Handling Charge
ISS	International Security
Doc Fee	Document Fee
Intra E-Bill	Internal Electronic Bill of Lading
LOL	Lift Off Charge
PAF	Port Access Fee
POR	Port Charge

China	
Destination	12.2
Shanghai	$ 4,909.54
Qingdao	$ 4,909.54

Shipping - Relates to Forestry quote

FX - 7/9/19 **1.46**

China

Destination	12.2	BAF	ISPS	LSS	USD	AUD
Shanghai	$ 2,200.00	$ 700.00	$ 14.00	$ 10.00	$ 2,924.00	**$ 4,269.04**
Qingdao	$ 2,200.00	$ 700.00	$ 14.00	$ 10.00	$ 2,924.00	**$ 4,269.04**

THC	$ 447.00
TSC	$ 8.50
Doc Fee	$ 125.00
Intra E-Bill	$ 60.00
Total	**$ 640.50**

cotton lint bales can be either road or via a proposed coastal feeder service linking the ports of Darwin to Wyndham (96km west of Kununurra). At time of writing this report, the coastal feeder service proposed by Sea Swift is continuing to evaluate the viability of a service and no pricing could be obtained. Sea Swift are intending to commence a service within the first half of 2020.

The cost of export from Darwin and Brisbane will be $44.63 and $19.11 respectively, these numbers will be carried through the analysis below.

Northern Territory/Kimberley cotton to QLD gin and Export

The following parameters have been used as input within this report. All costings will be presented in a $value per cotton lint bale. With the trucking component in the model, there are numerous options on gaining short-term rates for the trucking of either cotton rounds or cotton lint bales to reflect the opportunistic nature of supply and demand. The different trailer combinations available to users is multiple therefore all inputs relating to the trucking are,

- Triple road train combination
- All pricing is based on a roundtrip basis for the Northern Territory and Kununurra operations
- Existing trucking to Queensland from Kununurra and Katherine is on a single 1-way movement. A 2-way comparison on this corridor of trucking has also been calculated
- Current movement from Queensland gin to Queensland warehouse is a 1-way movement
- The standard cost per kilometre will fluctuate against the price of diesel and other fixed costs (wages) but covers all fixed and variable costs in operating a truck and trailer set
- This excludes a margin for the operator and a $3.00/km ($6.00/km roundtrip) has been used for the purpose of this report per road trailer
- QLD cotton gin is assumed to be in St George.

The purpose of this table is to show the equation on the cost per bale with a comparison between a Large Cotton round against a Small Cotton round. Known facts are:

- Large cotton round = 2,400kg
- Small cotton round = 1,350kg
- Cotton lint after processing = 42%
- Cotton lint bale = 227kg
- Number of cotton lint bales = 4.4 per large round and 2.5 per small round
- Number of cotton rounds per trailer = 6 for large round and 15 for small round
- Equivalent cotton lint bales per trailer = 26.6 for large round and 37.5 for small round.

Within the table is the cost per bale without backload trucking rates. This has been included to cover the eventuality of available backload trucking operators not being able to meet seasonal demand for trucking of cotton rounds to Queensland for processing as volumes grow.

Large Cotton Round **Small Cotton Round**

Large Rounds			Small Rounds	
Brisbane Gin (Backload)			**Brisbane Gin (Backload)**	
Cost / Bale Trucking			**Cost / Bale Trucking**	
Cotton Round KG	2400		Cotton Round KG	1350
% Lint / Round	42%		% Lint / Round	42%
Lint Weight	1008		Lint Weight	567
Cotton Bale WT	227		Cotton Bale WT	227
Num Bales/Round	4.4		Num Bales/Round	2.5
Bale Rounds/Trailer	6		Bale Rounds/Trailer	15
Num Bales/TRL Eqiv	26.6		Num Bales/TRL Eqiv	37.5
Per TRL ex Kun - Gin	$ 4,200		Per TRL ex Kun - Gin	$ 4,200
Per TRL ex Kath - Gin	$ 3,000		Per TRL ex Kath - Gin	$ 3,000
Cost/Bale ex Kun	**$ 157.64**		**Cost/Bale ex Kun**	**$ 112.10**
Cost/Bale ex Kath	**$ 112.60**		**Cost/Bale ex Kath**	**$ 80.07**

Sensitivity Nil Backload Rate				
Large Rounds			**Small Rounds**	
Brisbane Gin (Nil Backload Rate)			**Brisbane Gin (Nil Backload Rate)**	
Cost / Bale Trucking			**Cost / Bale Trucking**	
Cotton Round KG	2400		Cotton Round KG	1350
% Lint / Round	42%		% Lint / Round	42%
Lint Weight	1008		Lint Weight	567
Cotton Bale WT	227		Cotton Bale WT	227
Num Bales/Round	4.4		Num Bales/Round	2.5
Bale Rounds/Trailer	6		Bale Rounds/Trailer	15
Num Bales/TRL Eqiv	26.6		Num Bales/TRL Eqiv	37.5
Per TRL ex Kun - Gin	$ 8,400		Per TRL ex Kun - Gin	$ 8,400
Per TRL ex Kath - Gin	$ 6,000		Per TRL ex Kath - Gin	$ 6,000
Cost/Bale ex Kun	**$ 315.28**		**Cost/Bale ex Kun**	**$ 224.20**
Cost/Bale ex Kath	**$ 225.20**		**Cost/Bale ex Kath**	**$ 160.14**

What has not been factored into the costings is the additional cost of plastic wrapping of the round bales at approximately $40 per bale. Therefore extra 11 x small bales (difference between the number of large to small cotton rounds) = $440 per trailer (or $1320 per 3 trailer road train combination)

The following table reflects the cost of transporting the cotton lint bales from the operating cotton gin to an appointed warehouse for storage and handling. Where a single trailer maximum legal payload weight is approximately 28.0 tonnes, the actual cubic mass of the bales dictates a maximum 112 x cotton lint bales can only be loaded per trailer. This is at the top end of allowable payload weight.

QLD Gin to Brisbane WH	
Cost	$ 1,536
Legal WT KG	28000
Bale WT KG	227
Num Bales / Trailer	112
Cost/Bale	**$ 13.71**

Table reflects the cost of Bio-security per container / cotton bale.

DPI / Container	**$ 13.50**
Bales/Container	**112**
Cost/Bale	**$ 0.12**

The following table brings together all the factors relating to the transportation of cotton rounds (large and small) from either Kununurra or Katherine into a Queensland based cotton gin for processing. The main components are:

- Completion of processing the baled cotton lint is trucked to a Brisbane warehouse
- Handling in and out at the warehouse inclusive of container packing

- Bio-security charge
- Shipping with all associated costs from Brisbane Port to a main port China
- Backload trucking rates versus nil backloading trucking rates and effect on the cost per bale.

Using Backload Trucking Rates		
Large Rounds		
Via Brisbane	**Ex Kununurra**	**Ex Katherine**
Shipping	$ 19.11	$ 19.11
Truck to QLD Gin	$ 157.64	$ 112.60
QLD Gin to Brisbane Warehouse	$ 13.71	$ 13.71
Sub-Total	**$ 190.46**	**$ 145.42**
Warehouse In	$ 5.00	$ 5.00
Warehouse Out / Container Pack	$ 6.50	$ 6.50
DPI	$ 0.12	$ 0.12
Sub-Total	**$ 11.62**	**$ 11.62**
Total Per Bale	**$ 202.09**	**$ 157.05**
Small Rounds		
Via Brisbane	**Ex Kununurra**	**Ex Katherine**
Shipping	$ 19.11	$ 19.11
Truck to QLD Gin	$ 112.10	$ 80.07
QLD Gin to Brisbane Warehouse	$ 13.71	$ 13.71
Sub-Total	**$ 144.92**	**$ 112.89**
Warehouse In	$ 5.00	$ 5.00
Warehouse Out / Container Pack	$ 6.50	$ 6.50
DPI	$ 0.12	$ 0.12
Sub-Total	**$ 11.62**	**$ 11.62**
Total Per Bale	**$ 156.55**	**$ 124.52**

Nil Backloading Rates		
Large Rounds		
Via Brisbane	**Ex Kununurra**	**Ex Katherine**
Shipping	$ 19.11	$ 19.11
Truck to QLD Gin	$ 315.28	$ 225.20
QLD Gin to Brisbane Warehouse	$ 13.71	$ 13.71
Sub-Total	**$ 348.10**	**$ 258.02**
Warehouse In	$ 5.00	$ 5.00
Warehouse Out / Container Pack	$ 6.50	$ 6.50
DPI	$ 0.12	$ 0.12
Sub-Total	**$ 11.62**	**$ 11.62**
Total Per Bale	**$ 359.72**	**$ 269.64**
Small Rounds		
Via Brisbane	**Ex Kununurra**	**Ex Katherine**
Shipping	$ 19.11	$ 19.11
Truck to QLD Gin	$ 224.20	$ 160.14
QLD Gin to Brisbane Warehouse	$ 13.71	$ 13.71
Sub-Total	**$ 257.02**	**$ 192.96**
Warehouse In	$ 5.00	$ 5.00
Warehouse Out / Container Pack	$ 6.50	$ 6.50
DPI	$ 0.12	$ 0.12
Sub-Total	**$ 11.62**	**$ 11.62**
Total Per Bale	**$ 268.64**	**$ 204.59**

Katherine, Kununurra or Darwin based cotton gin

Additional Trucking – Transport Considerations

This section will cover the cost of the following transport legs:

- Road transfer of cotton lint bales from Kununurra to a Darwin Warehouse (2-way)
- Road transfer of cotton lint bales from Katherine to a Darwin Warehouse (2-way)
- Return trip by rail of shipping containers between Darwin and Katherine directly onto the Port of Darwin facility

The following table covers the transfer between the Kununurra Cotton Gin and a Darwin based warehouse.

Kununurra to Darwin Warehouse	
Cost	$ 4,974
Bale WT KG	227
Num Bales / Trailer	112
Cost/Bale	**$ 44.41**

This table covers the transfer from the Kununurra cotton gin to a Katherine based warehouse

Kununurra to Katherine Warehouse	
Cost	$ 3,300
Bale WT KG	227
Num Bales / Trailer	112
Cost/Bale	**$ 29.46**

This table shows the cost of transfer of cotton lint bales from Katherine to a Darwin based warehouse.

Katherine to Darwin Warehouse	
Cost	$ 1,896
Bale WT KG	227
Num Bales / Trailer	112
Cost/Bale	**$ 16.93**

This table covers the roundtrip transfer of an empty 40' shipping container from the Port of Darwin to the Katherine railhead. The empty container is picked up by a road operator for movement to the Katherine based warehouse for loading and then return back to the railhead for transfer to the Port of Darwin. This cost of loading the container is included in the Katherine warehouse costs.

Darwin-Katherine Return	$	594.22
Load Container Katherine	$	-
Sub-Total	**$**	**594.22**
Bales per Container	110	
Cost per Bale	**$**	**5.40**

Summary of Transport Costs for Kununurra or Katherine Based Gin

- The following tables reflect the combined costs for growers supporting either a Kununurra, Katherine or Darwin based gin
- Kununurra growers have been costed as same for Katherine based Growers within a 100km radius on a 2-way trucking basis (50km 1-way). This is for large and small cotton rounds.
- The approach to either a located gin at Kununurra, Katherine or Darwin is to also understand where it could be logical for placement of supporting warehousing infrastructure.

The results below provide a cost (including export to mainland China) for a:

- **Katherine based gin** with warehouse located at either Katherine (rail to Darwin port) or Darwin (truck to Darwin warehouse)
- **Kununurra based gin** with warehouse located at either Katherine (rail to Darwin port) or Darwin (truck to Darwin port warehouse)
- A price for four growers:
  - Kununurra (50km radius from Kununurra)
  - Katherine grower 1 (50km radius from Katherine)
  - Katherine grower 2 (150km radius from Katherine)
  - Katherine grower 3 (250km radius from Katherine)
- A price for both small rounds and large rounds.

To complete the high level analysis, the following assumptions have been made:

- Trucking costs are based on a roundtrip operation (3x trailer combination road train) from point of loading to delivery destination and empty return ($3/km).
- Katherine to Darwin will be a two-way trucking operation or a rail operation
- No time or associated costs have been factored in the analysis for loading or unloading of trailers.
- A Kununurra based gin will have no local warehousing facilities for storage or handling of the cotton bales and loading of export containers. The cost of transporting empty 40 ft. shipping containers between Darwin-Kununurra was deemed to

be cost prohibitive in gaining maximum payload tonnes per export shipping container. All cotton lint bales will either be trucked to a Darwin based warehouse or a Katherine based warehouse (where rail is utilised)

- No additional cost of wrap for the different rounds (large versus small) is being considered. This is being treated as an on-farm cost.

Katherine Based Gin				
Ex Kununurra				
Cost / Bale Trucking			**Cost / Bale Trucking**	
Large Cotton Round KG	2400		Small Cotton Round KG	1350
% Lint / Round	42%		% Lint / Round	42%
Lint Weight	1008		Lint Weight	567
Cotton Bale WT	227		Cotton Bale WT	227
Num Bales/Round	4.4		Num Bales/Round	2.5
Bale Rounds/Trailer	6		Bale Rounds/Trailer	15
Num Bales/TRL Eqiv	26.6		Num Bales/TRL Eqiv	37.5
Per TRL ex Kun-Kath Gin return	$ 3,300		Per TRL ex Kun-Kath Gin return	$ 3,300
Cost/Bale	**$ 123.86**		**Cost/Bale**	**$ 88.08**
Katherine /Kununurra - Grower 1			**Katherine/Kununurra - Grower 1**	
Cost / Bale Trucking			**Cost / Bale Trucking**	
Large Cotton Round KG	2400		Small Cotton Round KG	1350
% Lint / Round	42%		% Lint / Round	42%
Lint Weight	1008		Lint Weight	567
Cotton Bale WT	227		Cotton Bale WT	227
Num Bales/Round	4.4		Num Bales/Round	2.5
Bale Rounds/Trailer	6		Bale Rounds/Trailer	15
Num Bales/TRL Eqiv	26.6		Num Bales/TRL Eqiv	37.5
Per TRL ex Grower 1-Kath Gin return	$ 300		Per TRL ex Grower 1-Kath Gin return	$ 300
Cost/Bale	**$ 11.26**		**Cost/Bale**	**$ 8.01**
Katherine - Grower 2			**Katherine - Grower 2**	
Cost / Bale Trucking			**Cost / Bale Trucking**	
Large Cotton Round KG	2400		Small Cotton Round KG	1350
% Lint / Round	42%		% Lint / Round	42%
Lint Weight	1008		Lint Weight	567
Cotton Bale WT	227		Cotton Bale WT	227
Num Bales/Round	4.4		Num Bales/Round	2.5
Bale Rounds/Trailer	6		Bale Rounds/Trailer	15
Num Bales/TRL Eqiv	26.6		Num Bales/TRL Eqiv	37.5
Per TRL ex Grower 2-Kath Gin return	$ 900		Per TRL ex Grower 2-Kath Gin return	$ 900
Cost/Bale	**$ 33.78**		**Cost/Bale**	**$ 24.02**
Katherine - Grower 3			**Katherine - Grower 3**	
Cost / Bale Trucking			**Cost / Bale Trucking**	
Large Cotton Round KG	2400		Small Cotton Round KG	1350
% Lint / Round	42%		% Lint / Round	42%
Lint Weight	1008		Lint Weight	567
Cotton Bale WT	227		Cotton Bale WT	227
Num Bales/Round	4.4		Num Bales/Round	2.5
Bale Rounds/Trailer	6		Bale Rounds/Trailer	15
Num Bales/TRL Eqiv	26.6		Num Bales/TRL Eqiv	37.5
Per TRL ex Grower 3-Kath Gin return	$ 1,500		Per TRL ex Grower 3-Kath Gin return	$ 1,500
Cost/Bale	**$ 56.30**		**Cost/Bale**	**$ 40.04**

Kununurra Based Gin

Same distances for Katherine based growers within the growing radius of Katherine but with an additional 1100km for the roundtrip leg between Katherine and Kununurra. Growers within Kununurra will be priced for trucking as per Katherine Grower 1 (100km roundtrip radius, 50km 1-way)).

Kununurra Based Gin			
Ex Katherine			
Cost / Bale Trucking		**Cost / Bale Trucking**	
Large Cotton Round KG	2400	Small Cotton Round KG	1350
% Lint / Round	42%	% Lint / Round	42%
Lint Weight	1008	Lint Weight	567
Cotton Bale WT	227	Cotton Bale WT	227
Num Bales/Round	4.4	Num Bales/Round	2.5
Bale Rounds/Trailer	6	Bale Rounds/Trailer	15
Num Bales/TRL Eqiv	26.6	Num Bales/TRL Eqiv	37.5
Per TRL ex Kath-Kun Gin return	$ 3,300	Per TRL ex Kath-Kun Gin return	$ 3,300
Cost/Bale	**$ 123.86**	**Cost/Bale**	**$ 88.08**
Katherine - Grower 1		**Katherine - Grower 1**	
Cost / Bale Trucking		**Cost / Bale Trucking**	
Large Cotton Round KG	2400	Small Cotton Round KG	1350
% Lint / Round	42%	% Lint / Round	42%
Lint Weight	1008	Lint Weight	567
Cotton Bale WT	227	Cotton Bale WT	227
Num Bales/Round	4.4	Num Bales/Round	2.5
Bale Rounds/Trailer	6	Bale Rounds/Trailer	15
Num Bales/TRL Eqiv	26.6	Num Bales/TRL Eqiv	37.5
Per TRL ex Grower 1-Kun Gin return	$ 3,600	Per TRL ex Grower 1-Kun Gin return	$ 3,600
Cost/Bale	**$ 135.12**	**Cost/Bale**	**$ 96.08**
Katherine - Grower 2		**Katherine - Grower 2**	
Cost / Bale Trucking		**Cost / Bale Trucking**	
Large Cotton Round KG	2400	Small Cotton Round KG	1350
% Lint / Round	42%	% Lint / Round	42%
Lint Weight	1008	Lint Weight	567
Cotton Bale WT	227	Cotton Bale WT	227
Num Bales/Round	4.4	Num Bales/Round	2.5
Bale Rounds/Trailer	6	Bale Rounds/Trailer	15
Num Bales/TRL Eqiv	26.6	Num Bales/TRL Eqiv	37.5
Per TRL ex Grower 2-Kun Gin return	$ 4,200	Per TRL ex Grower 2-Kun Gin return	$ 4,200
Cost/Bale	**$ 157.64**	**Cost/Bale**	**$ 112.10**
Katherine - Grower 3		**Katherine - Grower 3**	
Cost / Bale Trucking		**Cost / Bale Trucking**	
Large Cotton Round KG	2400	Small Cotton Round KG	1350
% Lint / Round	42%	% Lint / Round	42%
Lint Weight	1008	Lint Weight	567
Cotton Bale WT	227	Cotton Bale WT	227
Num Bales/Round	4.4	Num Bales/Round	2.5
Bale Rounds/Trailer	6	Bale Rounds/Trailer	15
Num Bales/TRL Eqiv	26.6	Num Bales/TRL Eqiv	37.5
Per TRL ex Grower 3-Kun Gin return	$ 4,800	Per TRL ex Grower 3-Kun Gin return	$ 4,800
Cost/Bale	**$ 180.16**	**Cost/Bale**	**$ 128.11**

Darwin Gin and Warehouse

This option is for the location of a Darwin based gin with both Kununurra and Katherine growers delivering in both large and small rounds of seed cotton. The following applies to this option:

- All trucking is based on a roundtrip basis from location
- With the Katherine Growers (1-3), the cost used in the Katherine and Kununurra by radius (50km, 150km & 250km 2-way) has been added to the Katherine to Darwin trucking cost as a worst-case position.

Darwin Based Gin			
Ex Kununurra		**Ex Kununurra**	
Cost / Bale Trucking		**Cost / Bale Trucking**	
Large Cotton Round KG	2400	Small Cotton Round KG	1350
% Lint / Round	42%	% Lint / Round	42%
Lint Weight	1008	Lint Weight	567
Cotton Bale WT	227	Cotton Bale WT	227
Num Bales/Round	4.4	Num Bales/Round	2.5
Bale Rounds/Trailer	6	Bale Rounds/Trailer	15
Num Bales/TRL Eqiv	26.6	Num Bales/TRL Eqiv	37.5
Per TRL ex Kun-Darwin Gin return	$ 5,274	Per TRL ex Kun-Darwin Gin return	$ 5,274
Cost/Bale ex Kun	**$ 197.95**	**Cost/Bale ex Kun**	**$ 140.76**
Ex Katherine - Grower 1		**Ex Katherine - Grower 1**	
Cost / Bale Trucking		**Cost / Bale Trucking**	
Large Cotton Round KG	2400	Small Cotton Round KG	1350
% Lint / Round	42%	% Lint / Round	42%
Lint Weight	1008	Lint Weight	567
Cotton Bale WT	227	Cotton Bale WT	227
Num Bales/Round	4.4	Num Bales/Round	2.5
Bale Rounds/Trailer	6	Bale Rounds/Trailer	15
Num Bales/TRL Eqiv	26.6	Num Bales/TRL Eqiv	37.5
Per TRL ex Grower 1-DWN Gin return	$ 2,196	Per TRL ex Grower 1-DWN Gin return	$ 2,196
Cost/Bale ex Kun	**$ 82.42**	**Cost/Bale ex Kun**	**$ 58.61**
Katherine - Grower 2		**Katherine - Grower 2**	
Cost / Bale Trucking		**Cost / Bale Trucking**	
Large Cotton Round KG	2400	Small Cotton Round KG	1350
% Lint / Round	42%	% Lint / Round	42%
Lint Weight	1008	Lint Weight	567
Cotton Bale WT	227	Cotton Bale WT	227
Num Bales/Round	4.4	Num Bales/Round	2.5
Bale Rounds/Trailer	6	Bale Rounds/Trailer	15
Num Bales/TRL Eqiv	26.6	Num Bales/TRL Eqiv	37.5
Per TRL ex Grower 2-DWN Gin return	$ 2,796	Per TRL ex Grower 2-DWN Gin return	$ 2,796
Cost/Bale ex Kun	**$ 104.94**	**Cost/Bale ex Kun**	**$ 74.63**
Katherine - Grower 3		**Katherine - Grower 3**	
Cost / Bale Trucking		**Cost / Bale Trucking**	
Large Cotton Round KG	2400	Small Cotton Round KG	1350
% Lint / Round	42%	% Lint / Round	42%
Lint Weight	1008	Lint Weight	567
Cotton Bale WT	227	Cotton Bale WT	227
Num Bales/Round	4.4	Num Bales/Round	2.5
Bale Rounds/Trailer	6	Bale Rounds/Trailer	15
Num Bales/TRL Eqiv	26.6	Num Bales/TRL Eqiv	37.5
Per TRL ex Grower 3-DWN Gin return	$ 3,396	Per TRL ex Grower 3-DWN Gin return	$ 3,396
Cost/Bale ex Kun	**$ 127.46**	**Cost/Bale ex Kun**	**$ 90.64**

Summary of options

Kununurra Gin via Katherine or Darwin based warehouse

- All cotton from the Katherine and Kununurra regions is ginned at a Kununurra gin
- Cotton lint bales are trucked to a Katherine based warehouse

- Empty shipping containers are railed from Darwin for loading
- Within the Katherine warehousing costs, an allocation for pick-up of the empty container, repositioning at the Katherine warehouse for loading and return to the railhead at Katherine
- Rail is directly onto the Port of Darwin facility
- Option for cotton lint bales to be trucked from Kununurra to a Darwin based warehouse for storage & handling, loading of export containers and placement at the Port of Darwin.

Cotton Export via Kununurra Gin				
Large Round	**Kununurra Grower**	**Katherine Grower 1**	**Katherine Grower 2**	**Katherine Grower 3**
Truck to Gin	$ 11.26	$ 135.12	$ 157.64	$ 180.16
Truck Katherine WH	$ 29.46	$ 29.46	$ 29.46	$ 29.46
Truck Darwin WH	$ 44.41	$ 44.41	$ 44.41	$ 44.41
Katherine WH Costs	$ 23.00	$ 23.00	$ 23.00	$ 23.00
Darwin WH Costs	$ 17.50	$ 17.50	$ 17.50	$ 17.50
Rail Katherine-Darwin	$ 5.40	$ 5.40	$ 5.40	$ 5.40
DPI Export Container	$ 0.12	$ 0.12	$ 0.12	$ 0.12
Shipping Darwin-China	$ 44.63	$ 44.63	$ 44.63	$ 44.63
Kununurra-Export				
Via Katherine WH	$ 113.88	$ 237.74	$ 260.26	$ 282.78
Via Darwin WH	$ 117.93	$ 241.78	$ 264.30	$ 286.82

Cotton Export via Kununurra Gin				
Small Round	**Kununurra Grower**	**Katherine Grower 1**	**Katherine Grower 2**	**Katherine Grower 3**
Truck to Gin	$ 8.01	$ 96.08	$ 112.10	$ 128.11
Truck Katherine WH	$ 29.46	$ 29.46	$ 29.46	$ 29.46
Truck Darwin WH	$ 44.41	$ 44.41	$ 44.41	$ 44.41
Katherine WH Costs	$ 23.00	$ 23.00	$ 23.00	$ 23.00
Darwin WH Costs	$ 17.50	$ 17.50	$ 17.50	$ 17.50
Rail Katherine-Darwin	$ 5.40	$ 5.40	$ 5.40	$ 5.40
DPI Export Container	$ 0.12	$ 0.12	$ 0.12	$ 0.12
Shipping Darwin-China	$ 44.63	$ 44.63	$ 44.63	$ 44.63
Kununurra-Export				
Via Katherine WH	$ 110.63	$ 198.71	$ 214.72	$ 230.73
Via Darwin WH	$ 114.67	$ 202.75	$ 218.76	$ 234.78

Katherine Gin via Katherine or Darwin based Warehouse

- All cotton from the Katherine and Kununurra regions is ginned at a Katherine based gin
- Empty shipping containers are railed from Darwin for loading
- Within the Katherine warehousing costs, an allocation for pick-up of the empty container, repositioning at the Katherine warehouse for loading and return to the railhead at Katherine

- Return rail is directly onto the Port of Darwin facility for storage and shipping
- Option for cotton lint bales to be trucked from Katherine to a Darwin based warehouse for storage & handling, loading of export containers and placement at the Port of Darwin.

Cotton Export via Katherine Gin				
Large Round	**Kununurra Grower**	**Katherine Grower 1**	**Katherine Grower 2**	**Katherine Grower 3**
Truck to Gin	$ 123.86	$ 11.26	$ 33.78	$ 56.30
Truck Katherine WH	$ -	$ -	$ -	$ -
Truck Darwin WH	$ 16.93	$ 16.93	$ 16.93	$ 16.93
Katherine WH Costs	$ 23.00	$ 23.00	$ 23.00	$ 23.00
Darwin WH Costs	$ 17.50	$ 17.50	$ 17.50	$ 17.50
Rail Katherine-Darwin	$ 5.40	$ 5.40	$ 5.40	$ 5.40
DPI Export Container	$ 0.12	$ 0.12	$ 0.12	$ 0.12
Shipping Darwin-China	$ 44.63	$ 44.63	$ 44.63	$ 44.63
Kununurra-Export				
Via Katherine WH Rail DWN	$ 197.02	$ 84.42	$ 106.94	$ 129.46
Via Darwin WH	$ 203.04	$ 90.44	$ 112.96	$ 135.48

Cotton Export via Katherine Gin				
Small Round	**Kununurra Grower**	**Katherine Grower 1**	**Katherine Grower 2**	**Katherine Grower 3**
Truck to Gin	$ 88.08	$ 8.01	$ 24.02	$ 40.04
Truck Katherine WH	$ -	$ -	$ -	$ -
Truck Darwin WH	$ 16.93	$ 16.93	$ 16.93	$ 16.93
Katherine WH Costs	$ 23.00	$ 23.00	$ 23.00	$ 23.00
Darwin WH Costs	$ 17.50	$ 17.50	$ 17.50	$ 17.50
Rail Katherine-Darwin	$ 5.40	$ 5.40	$ 5.40	$ 5.40
DPI Export Container	$ 0.12	$ 0.12	$ 0.12	$ 0.12
Shipping Darwin-China	$ 44.63	$ 44.63	$ 44.63	$ 44.63
Kununurra-Export				
Via Katherine WH	$ 161.23	$ 81.16	$ 97.18	$ 113.19
Via Darwin WH	$ 167.26	$ 87.19	$ 103.20	$ 119.22

Darwin Gin and Darwin based Warehouse

Cotton Export via Darwin Gin				
Large Round	**Kununurra Grower**	**Katherine Grower 1**	**Katherine Grower 2**	**Katherine Grower 3**
Truck to Darwin Gin	$ 197.95	$ 82.42	$ 104.94	$ 127.46
Darwin WH Costs	$ 17.50	$ 17.50	$ 17.50	$ 17.50
DPI Export Container	$ 0.12	$ 0.12	$ 0.12	$ 0.12
Shipping Darwin-China	$ 44.63	$ 44.63	$ 44.63	$ 44.63
Darwin-Export				
Via Darwin WH	$ 260.20	$ 144.68	$ 167.20	$ 189.72

Cotton Export via Darwin Gin				
Small Round	**Kununurra Grower**	**Katherine Grower 1**	**Katherine Grower 2**	**Katherine Grower 3**
Truck to Darwin Gin	$ 140.76	$ 58.61	$ 74.63	$ 90.64
Darwin WH Costs	$ 17.50	$ 17.50	$ 17.50	$ 17.50
DPI Export Container	$ 0.12	$ 0.12	$ 0.12	$ 0.12
Shipping Darwin-China	$ 44.63	$ 44.63	$ 44.63	$ 44.63
Darwin-Export				
Via Darwin WH	$ 203.02	$ 120.87	$ 136.88	$ 152.89

Comparison of options again Brisbane based gin

This analysis shows the following data:

- Kununurra, Katherine or Darwin based gin (Large & Small Seed cotton rounds) with costs via either a Darwin based warehouse or a Katherine based warehouse and comparison Brisbane current operations but either 1-way or 2-way trucking.
- All costs are a per bale equation
- Darwin gin with Katherine growers (1-3) – added into the Katherine to Darwin trucking costs the additional radius (2-way) trucking costs as a worst-case. This was mainly as the exact location of the growers is unknown.

Comparison Brisbane vs Darwin	Via DWN WH	Via DWN WH	Via Katherine WH	Via Katherine WH
Kununurra	**Large Round**	**Small Round**	**Large Round**	**Small Round**
Kununurra Grower	$ 117.93	$ 114.67	$ 113.88	$ 110.63
Katherine Grower 1	$ 241.78	$ 202.75	$ 237.74	$ 198.71
Katherine Grower 2	$ 264.30	$ 218.76	$ 260.26	$ 214.72
Katherine Grower 3	$ 286.82	$ 234.78	$ 282.78	$ 230.73
Via Brisbane Gin (Backload Rate)	$ 202.09	$ 124.52	$ 202.09	$ 124.52
Via Brisbane Gin (Nil Backload Rate)	$ 359.72	$ 268.64	$ 359.72	$ 268.64
Katherine	**Large Round**	**Small Round**	**Large Round**	**Small Round**
Kununurra Grower	$ 203.04	$ 167.26	$ 197.02	$ 161.23
Katherine Grower 1	$ 90.44	$ 87.19	$ 90.44	$ 81.16
Katherine Grower 2	$ 112.96	$ 103.20	$ 106.94	$ 97.18
Katherine Grower 3	$ 135.48	$ 119.22	$ 129.46	$ 113.19
Via Brisbane Gin (Backload Rate)	$ 157.05	$ 124.52	$ 157.05	$ 124.52
Via Brisbane Gin (Nil Backload Rate)	$ 269.64	$ 204.59	$ 269.64	$ 204.59
Darwin	**Large Round**	**Small Round**	**Large Round**	**Small Round**
Kununurra Grower	$ 260.20	$ 203.02		
Katherine Grower 1	$ 144.68	$ 120.87		
Katherine Grower 2	$ 167.20	$ 136.88		
Katherine Grower 3	$ 189.72	$ 152.89		
Via Brisbane Gin (Backload Rate)	$ 157.05	$ 124.52		
Via Brisbane Gin (Nil Backload Rate)	$ 269.64	$ 204.59		

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