Regional Development Australia
PILBARA

p: 08 9144 0651
w: rdapilbara.org.au
Suite 5/7 Morse Court
Welcome Lotteries House, Karratha

All Postal
Correspondence
GPO Box 1404
Karratha, WA 6714

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An Australian Government Initiative

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Introduction

Regional Development Australia (RDA) Pilbara prepares a wide range of socio-economic studies and undertakes initiatives for the Pilbara region that supports the overall objectives of RDA "an Australian Government initiative that brings together all levels of government to enhance the development of Australia's regions."

In fulfilment of this mandate RDA Pilbara is responding to the call for submissions by Infrastructure Australia (IA) for the next update of the *Infrastructure Priority List*, which will be published in February 2020 on projects and initiatives that fit the definition of 'nationally significant'. RDA Pilbara believes it can provide local intelligence and regional and cross-regional perspective on the merits of individual projects/initiatives.

RDA Pilbara is encouraging consideration by Infrastructure Australia of the potential for two Strategic Development Projects in North Western Australia.

The first opportunity for which we are advocating support is the developments being proposed by the Pilbara Ports Authority (PPA). This submission summarises the key aspects of the proposed developments. Full project details can be provided by the PPA.

Pilbara Ports Development

Background and National Significance of the Pilbara Ports[1]

With a vision of being the global leader in port planning, operations and marine services, Pilbara Ports Authority continuously seeks to improve its operations for the benefit of customers, stakeholders and local communities.

In recent years, Pilbara Ports Authority has handled significant increases in Western Australian exports, and in 2017/18 achieved a record throughput of 699.3 million tonnes, an increase of 30.8 million tonnes from the previous financial year.

To facilitate the increased throughput as well as improve productivity, Pilbara Ports Authority has focused its attention on working as safely and efficiently as possible.

While efficient, Pilbara Ports Authority has also sought to be innovative, and has invested in world leading projects and maritime technologies to maximise port efficiency and safety. These have allowed for the management of larger vessels, increasing vessel draft and increasing loaded capacity on vessels, while reducing risk.

Port Hedland supports the largest bulk export port in the world, shipping a range of commodities including iron ore, salt, manganese ore, chromite ore, copper concentrate and general cargo. This facility has attracted internationally prominent resource companies to the area, contributing at a nationally recognised level to the broader Australian economy.

In 2017/18 the Port of Port Hedland throughput was close to 520 million tonnes with more than 6,000 vessel movements, and this is expected to grow to a throughput of 700 million tonnes per annum over the next decade, bringing in an additional $37 billion in economic

[1] All data is sourced from Pilbara Ports Authority

output for the Australian economy. The Port's supply chain will remain the core of the Port Hedland economy in the foreseeable future. 98% of Port Hedland's commodity movements were for iron ore.

For the Port of Dampier near Karratha, throughput was about 178 million tonnes with over 9,500 vessel movements. Dampier's commodity movement was 82% iron ore, followed by 12% for LNG and the balance for other commodities including salt.

These Pilbara ports are vital to the economy of Australia and its exports to the world.

Port Development Projects

1. Lumsden Point General Cargo Facilities and Logistics Hub - Port Hedland, Western Australia

The Port of Port Hedland is a vital logistics centre for the East Pilbara mining industry. The Port is serviced by national highways, privately operated rail networks and an international airport. A new general cargo hub is proposed at Port Hedland to support increasing trade/product into the Pilbara, ongoing development of iron ore and lithium mines and provide opportunities for expanding agribusiness and other battery metal mines in the region.

Port capacity modelling commissioned by Pilbara Ports Authority indicates existing general cargo capacity at Port Hedland is in the order of 7.1 million tonnes per annum. Recent forecasts indicate that growth in general cargo and non-iron ore bulk commodities will exceed this volume within 2-3 years. This is largely driven by existing customers at Port Hedland and new commodity mine developments and iron ore mine replacement projects in proximity to the Port.

Pilbara Ports Authority has identified a need to develop a Multi-User General Cargo Facility and Logistics Hub at Lumsden Point in the Port of Port Hedland. The development aims to alleviate increasing congestion at existing Port of Port Hedland general cargo infrastructure as well as facilitate future trade growth and new resource trade that cannot be accommodated at existing berths. The development is strategically important to allow continued and increased trade between the Pilbara and international markets, particularly for general cargo, containerised trade, mineral concentrates and livestock exports.

The development involves dredging of channel access, new berths, landside development for a serviced logistics hub and road access from the Great Northern Highway to the wharf. The logistics hub area is intended to provide a variety of infrastructure and facilities (such as product storage laydown areas; heavy duty pavements; sheds and warehouses; conveyors and materials handling infrastructure; truck marshalling areas, vehicle wash down, weighbridge etc.) to support cargo importers and exporters and Port users and service providers.

The Lumsden Point development will maximise synergies with previous port expansion works, harbour dredging and land reclamation by industry and the realignment of the Great Northern Highway by Main Roads WA. The realignment of Great Northern Highway at Port Hedland was completed in 2014. This project jointly was funded by the Federal and State Governments. The realignment project incorporated access to the Lumsden Point development area.

Pilbara Ports Authority has obtained environmental approval for associated dredging and reclamation works and has since completed land remediation works to prepare the area for industrial development.

2. Dampier Cargo Wharf Extension – Dampier, Western Australia

The proposed multi-user, multi-product berth infrastructure at the Port of Dampier will support new trade/product into the Pilbara and planned iron ore and gas project developments, as well as providing redundancy for existing aged infrastructure. The new berth will also provide export infrastructure to support the development of multi-billion-dollar industrial projects in north-western Western Australia.

The existing Dampier Cargo Wharf (DCW) was constructed in the 1980s and is the only berth in the Port of Dampier that handles general cargo vessels. The nearest alternative facility in the region able to accommodate general cargo is located 260 kilometres by road, in the Port of Port Hedland.

The Dampier Cargo Wharf extension is been planned as a multi-user, multi-product facility to accommodate vessels ranging from bulk carriers, to roll-on/roll-off (RORO) vessels, cruise ships, offshore supply vessels and pre-assembled module unloading. The project will support Dampier's role as a dedicated logistics hub for the offshore oil and gas industry, downstream and mining operations in the Pilbara for decades to come. The inclusion of a heavy load deck will provide compatibility of general cargo capability with ports at Fremantle and Port Hedland, enhancing opportunities to support a shipping liner service between other ports in Western Australia and/or ports in Asia.

Fitzroy River Agriculture Development

The second strategic development that RDA Pilbara is highlighting is the potential for Agriculture and Aquaculture in the Fitzroy River Catchment Area in the north of Western Australia.

While this is not yet a developed project or set of projects RDA Pilbara believes it is critical that IA places the agricultural development of the Fitzroy River Catchment Area as a nationally significant opportunity on its radar, for comprehensive future engagement with the relevant state and national agencies.

1. Government Policy

The Fitzroy River Catchment Area has significant potential for irrigated and dryland agriculture and aquaculture development, as outlined recently in a comprehensive report produced by CSIRO[2]. The purpose of this concept note is to provide information on this potential for prospective proponents with an interest in the commercial exploitation of this potential.

2 Water resource assessment for the Fitzroy catchment. A report to the Australian Government from the CSIRO. Northern Australia Water Resource Assessment, part of the National Water Infrastructure Development Fund: Water Resource Assessments Editors: Cuan Petheram, Caroline Bruce, Chris Chilcott and Ian Watson. 2018-06-30. Published Version (pdf) (15.37MB) Published Version (pdf) (191.06MB).

The concept of developing sustainable regional development through agricultural and aquaculture production is in line with Australian, Western Australian, Northern Territory and Queensland governments' policy for developing Northern Australia [3].

As part of the Western Australian Government's commitment to sustainable economic development in the Fitzroy River catchment, the Department of Water and Environmental Regulation is developing a water allocation plan for surface water and groundwater resources in the area by 2024[4]. "A water allocation plan will provide a sound basis for long-term sustainable use of the region's water resources while making sure the unique environmental and cultural values of the Fitzroy River are protected". The water allocation plan will cover:

- Surface water from the Fitzroy River and its tributaries
- Groundwater from aquifers in the Fitzroy Trough and Lennard Shelf area including:
  - ✓ the Grant Group and Poole Sandstone which are large regional aquifers
  - ✓ the Liveringa Group which is an extensive variable unit that acts as a minor aquifer in some areas and an aquitard in others
  - ✓ ancient limestones exposed in the eastern catchment (the Devonian reef complex)
  - ✓ shallow alluvial aquifers that border major rivers.

2. National Significance

Infrastructure Australia uses the IPL to identify major infrastructure proposals that have substantial strategic merit and are of national significance. An infrastructure investment is considered to be nationally significant if, based on the evidence presented, the Infrastructure Australia Board is of the opinion that the investment is expected to have a material impact on national output by:

1. Addressing a problem that would otherwise impose economic, social, and/or environmental costs; or,
2. Provide an opportunity for realising economic, social, or environmental benefits; or,
3. Both addressing a problem and providing an opportunity.

For the purposes of assessing submissions to the IPL, IA has applied, as a guide, a threshold value of $30 million per annum (nominal, undiscounted) in measuring material net benefit, taking potential unquantified quality of life considerations into account.

Development of the Fitzroy catchment meets the criteria of "Provide an opportunity for realising economic, social, or environmental benefits". Prospective proponents would need to estimate whether or not the threshold value of $30 million per annum is reached.

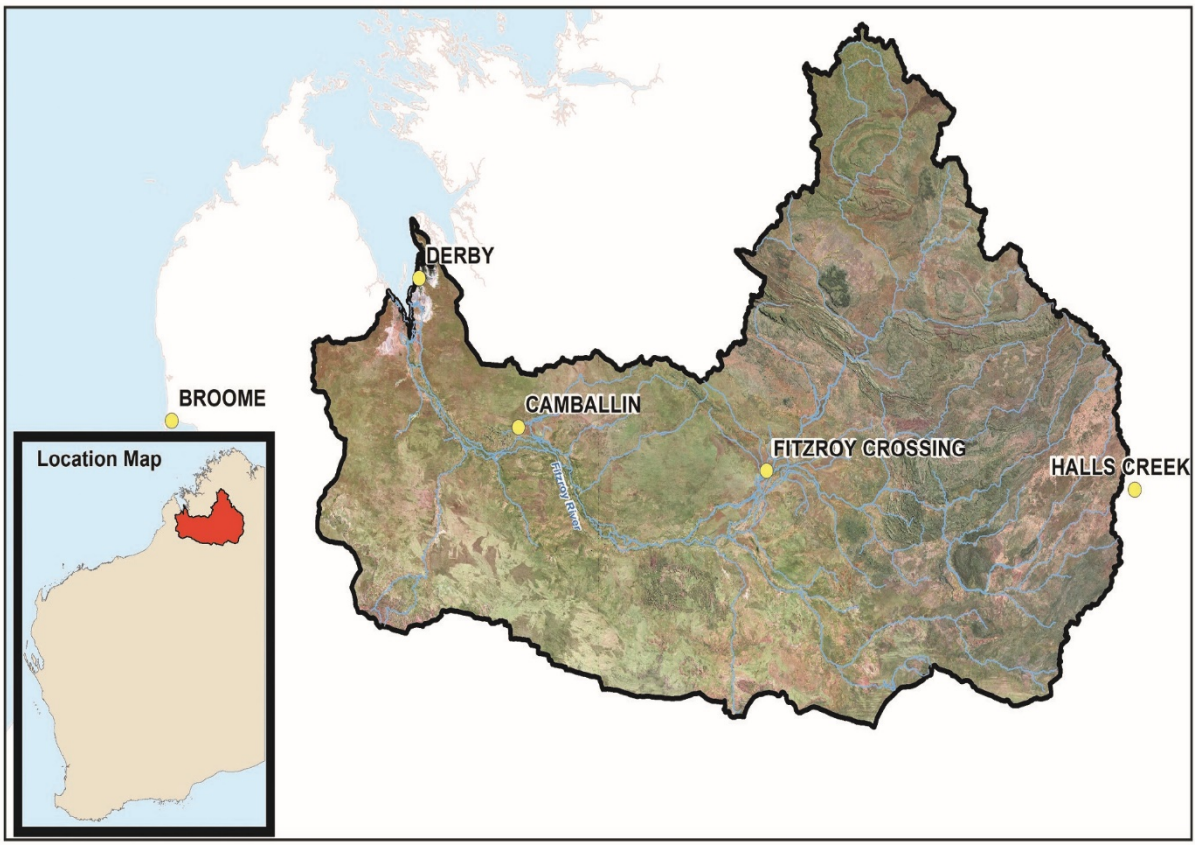
[3] *In 2015 the Australian Government released the 'Our North, Our Future: White Paper on Developing Northern Australia' and the Agricultural Competitiveness White Paper, both of which highlighted the opportunity for northern Australia's land and water resources to enable regional development.*

[4] http://www.water.wa.gov.au/planning-for-the-future/allocation-plans/north-west-region-allocation-plan/water-planning-in-the-fitzroy

3. Fitzroy Catchment Location and Area

The Fitzroy catchment covers approximately 94,000 km^2 of the Kimberley region in northern WA The population is approximately 7,500 people with two main population centres at Derby and Fitzroy Crossing. The Fitzroy River rises in the King Leopold Ranges and drains into King Sound and is more than 700 km long. Most of the catchment is contained within three bioregions (Dampierland, Ord Victoria Plain, and Central Kimberley), but also contains parts of the Northern Kimberley and Great Sandy Desert bioregions. The main land use is pastoralist (95%), with nature conservation and Indigenous Protected Areas covering the remaining area.

The Fitzroy water allocation plan of the Department of Water will cover the Fitzroy River catchment, which extends from near Halls Creek in the east, downstream to the coast near Derby in the west. The plan area may also extend beyond the catchment to cover local groundwater resources. The area is proclaimed for both groundwater and surface water as part of the Canning-Kimberley groundwater area and Fitzroy River catchment area respectively. This means water users, except for small-scale stock and domestic users, require a water licence to lawfully take surface water or groundwater in these areas.



Fitzroy River catchment- indicative water planning area

4. Irrigation Potential and Climate

With a median annual discharge of 4,900 gigalitres (GL) the Fitzroy River has the largest discharge of any river in WA and the ninth largest median annual discharge of any river in Australia north of the Tropic of Capricorn.

Areas of potential irrigation development are found on the deep sandy and loamy soils in the west and central areas of the catchment and the deep catchment clay soils of the Fitzroy River alluvial plain and limestone geologies.

The seasonality of rainfall presents challenges for both wet- and dry-season cropping. While annual rainfall is not always reliable and seasonal forecasting poor, farmers have the advantage of a clear view of water availability, i.e. soil water and dam storage, when they need it most; at the end of the wet season when planting decisions are made. This means farmers can manage risk by choosing crops that optimise use of the available water, or by deciding to forfeit cropping for that season.

5. Commercial Opportunities[5]

5.1 Total Potential Irrigated Areas

The Fitzroy catchment has up to 5.4 million hectares (ha) of potentially irrigable agricultural soils. Of this land area, 4.0 million ha are suitable for spray irrigation of cereals, between 400,000 ha and 590,000 ha for furrow irrigation of cereals, 2.8 million ha for spray-irrigated sugarcane, and about 400,000 ha for sugarcane with furrow irrigation. For aquaculture, such as prawns and barramundi, about 55,000 ha of land are suitable using lined ponds. For all of these uses the land is considered moderately suitable with considerable limitations and would require careful soil management.

The precise area under irrigation will, in any year, vary depending on factors such as irrigation efficiency, water availability, crop choice and risk appetite. Irrigation of this type could be widely distributed across the catchment or concentrated into a smaller number of irrigation areas.

5.2 Water Extraction: Economic value

The CSIRO Northern Australia Water Resources Assessment estimates that developing irrigation for about 160,000 ha of agricultural land along the Fitzroy River could deliver more than 5,000 jobs and create an agricultural hub worth more than $1.1 billion. The State Government is considering making up to 600 GL of water available each year as part of a water allocation plan, just a fraction of the average annual 9,728 GL flow of the Fitzroy river.

Groundwater is the cheapest source of water and unlike water harvesting developments, can be sited on soils not susceptible to flooding. Up to 120 GL/year of groundwater (<5% of recharge) could be extracted from the interconnected Grant Group and Poole Sandstone aquifers. Under a wet season sowing on loamy soils, this volume of water could irrigate about 20,000 ha of crops, such as cotton at an annual gross value of production of approximately $90 million, creating about $140 million of regional economic activity recurring annually and the generation of about 560 jobs. There is up to 50 GL/year of additional groundwater across the catchment that would allow numerous small (<1 GL) to medium-scale (1 to 5 GL) developments suited to irrigated forage production.

It is physically possible to pump 1,700 GL of water in 85% of years from major rivers and tributaries in the Fitzroy catchment into ring tanks near agricultural soils. This volume of water would fill 425 ring tanks (each of capacity 4 GL) and cost approximately $935 million. This would enable 160,000 ha of clay soils under dry-season cotton to be irrigated.

[5] Data Source: CSIRO Northern Australia Water Resource Assessment 2018

This could generate an annual gross value of production of approximately $750 million, and the region would benefit from $1.1 billion of annual economic activity and the generation of about 4,700 jobs.

5.3 Development Options: Considerations

Development options need to be considered taking into account the advantages and disadvantages of the different types of enterprises, which in broad terms are:

- Establishing irrigated cropping is challenging, with high input costs and high capital requirements for new greenfield developments.
- Gross margins between different crop options are highly variable with industrial crops (sugarcane and cotton) and forage hay giving the highest returns.
- For industrial crops to be profitable, local processing is required, and the scale of development and supply commitment needs to be sufficient to justify the investment in processing facilities.
- Horticultural crops, such as bananas, melons and mangoes are more profitable but the locational advantage of supplying to markets earlier than other regions is critical to viability.
- Farming systems that have more than one crop a year or are integrated and supplement the dominant beef production systems in the Fitzroy catchment are most likely to succeed initially.
- Pond-based black tiger prawns or barramundi offer potentially high returns in saltwater near the coastal margin of the catchment.
- Large developments for agriculture are complex and costly and it is prudent to stage development, to limit risk of early failure and allow for small-scale testing on new farms.
- Under the development scenarios the aggregated farm revenue from broadacre cropping is unlikely to cover the cost of infrastructure, so value-adding opportunities through processing will greatly assist in improving commercial viability.

5.4 Indicative Crop Gross Margins

Indicative Gross Margins need to be used with great care. They are sensitive to variations in yield and prices of outputs, and levels and costs of inputs.

- For example gross margins are highly variable between crops, with the industrial crops (sugar and cotton) and the forage hays, particularly Rhodes grass, producing the highest gross margins ($1,000 to $2,000/ha). It is assumed in sugar and cotton that processing facilities (sugar mill, cotton gin) are available locally to reduce cartage costs. Similarly, it is assumed forage hay crops are consumed locally within the pastoral industry. If these processing facilities are assumed to be unavailable then the gross margins for sugarcane, cotton and hay would be negative.
- Gross margins are likewise highly variable between the different horticultural crops, with mangoes (plant variety rights (PVR) types such as Calypso) and watermelons showing the highest gross with returns greater than $10,000/ha. All other crops show positive gross margins when mean prices are assumed, but the returns are mostly less than $10,000/ha.

5.5 Options for Increasing Gross Returns

- Options for increasing gross returns are either through increasing yields or employing more intensive rotational cropping systems (particularly for broadacre crops) that provide more than one crop per year. Significant increases in yield of

most crops have been achieved over the last few decades but these increases are over the longer term through improved genetics and farming system technologies. More intensive cropping systems potentially offer more immediate gains in financial returns. In addition to the potential for higher gross margins, rotations can be designed to help manage disease, pests and weeds, minimise soil and nutrient losses and reduce the need for inorganic nitrogen inputs. The development of a range of two-crops-per-year rotation alternatives, and the management packages and skills to support them, is a likely pre-requisite for economically sustainable irrigated broadacre cropping. The challenges in developing these should not be under-estimated.

- The number of different possibilities for cropping systems is very large, given the range of field crops, horticultural crops, forages and rotations that can be grown in northern Australia.
- Pond‑based black tiger prawns or barramundi offer potentially high returns in saltwater, near the coastal margins of the catchment. Although other aquaculture species are being trialled in northern Australia, prawns and barramundi have established land-based culture practices and well-established markets for harvested products. Aquaculture enterprises are likely to encounter fewer regulatory constraints than those in catchments in other parts of Australia, such as those draining into the Great Barrier Reef.

5.6 Livestock

- Animal production is quite low at present, as a result of the low carrying capacity and the poor quality of forage for much of the year. Weaning rates in the region are typically low (50 to 60%), as are estimated annual liveweight gains, which can range from 80 to 140 kg, with a mean of around 110 kg/animal/year.
- Holdings are large, typically in the range of 200,000 to 500,000 ha. One option for overcoming some of the productivity constraints is to utilise improved forages to complement the base forage provided by semi-intact native woodlands and grasslands.
- There is the opportunity for irrigated forage, grown at the hundreds of hectares scale, to fundamentally alter production of particular animal cohorts and so transform management of large pastoral enterprises. Livestock enterprises are already proven in the Fitzroy catchment. The use of irrigated forage to overcome the feed gap, especially for lactating cows, could significantly increase beef production by increasing calving percentage, enable earlier weaning and increasing rate of weight gain.

5.7 Freight Costs Constraints

Freight costs make up a significant percentage of variable costs and can represent a significant proportion of gross returns. Freight costs can represent over 40% of gross returns for broadacre grains, as these low-value, high-volume commodities need to be transported to Perth. Options for reducing freight costs to market include local processing facilities, higher value horticultural products, and establishing lower cost export options through the ports of Broome or Wyndham. Achieving a long-term profitable cropping enterprise will be difficult without a pathway for reducing freight costs as a percentage of the value of product.

5.8 Capital Costs

- The capital costs of developing water and land resources in the Fitzroy catchment vary widely, such that even when technically feasible options are found, some of these are unlikely to be profitable at the returns and over time periods expected by many investors. The results from the CSIRO assessments suggest that development costs above $15,000/ha (plus $7424/ha farm setup costs) would be difficult to cover from farm gate revenues alone. Gross margins (excluding water supply costs) would need to be above $3,000/ha, before accounting for the negative effects of risks. There is little that potential investors can do in this regard other than focusing on the cheapest development options.
- Adding a processor to a scheme (i.e. vertical integration) could provide increases in revenues (from processed versus unprocessed goods) that are proportionally larger than the additional capital cost of the processing facility. This, or other off-farm value adding options, can assist in improving the commercial viability of a scheme, but can also add risk. Viable processors, particularly in remote locations, rely on secure supplies of raw farm commodities at scale, which requires upfront commitments from farmers supported by assured access to the required water and land.

5.9 Regional Impact of Irrigation

Indirect irrigated agriculture has a greater potential to generate economic and community activity than dryland production. Each $25 million increase in agricultural activity could create about 110 to 270 jobs, depending on the agricultural industry. Large infrastructure projects, such as new irrigation developments in the Fitzroy catchment, are complex and costly investments. In the Fitzroy catchment, irrigation development could result in an additional $0.89 of indirect regional economic benefits per year for every $1.00 spent during the construction phase. The regional economic impact of an annual increase in irrigated agricultural output of $100 million/year is estimated to be an additional $59 million of increased economic activity. During the construction phase, aquaculture development may result in a regional economic benefit similar to that from irrigated agriculture. Once a business has been established, the regional economic impact of aquaculture is higher; $100 million/year of output is estimated to create an additional $80 million of increased economic activity.

5.10 Other Critical Issues

Potential investors would need to take into account the impact of development on ecological functioning that would not be confined to the direct development footprint and would warrant further attention, especially immediately downstream, in drier years and for particular habitats such as wetlands, riparian areas, mangroves and coastal salt flats. Understanding how diverse stakeholder, investor and developer perspectives interact will be crucial in building and maintaining an ongoing social license to operate for future water and agricultural developments.