



# **Mount Isa Townsville Economic Zone and Regional Economic Development Committee**

## **Northern Gas Pipeline - Opportunity/Impact Study Report**

September 2016

# Executive summary

GHD, in partnership with AEC Group, were engaged in 2014 to develop the North West Queensland Regional Development Strategy for MITEZ. This broad-based study identified a range of potential projects, associated key infrastructure requirements and the required enablers that had the potential to support the next generation of economic growth in Northwest Queensland.

Since completion of the strategy, a successful proponent (Jemena) for the Northern Gas Pipeline (linking Tennant Creek to Mount Isa) has been announced.

An updated assessment of the potential opportunities for new projects within the North West Mineral Province and Barkly Regions with a particular, but not sole, focus on those benefits arising from the Northern Gas Pipeline (NGP) has been undertaken.

The updated assessment is to investigate and assess benefits to local supply chain businesses, potential investment and value adding opportunities resulting from the NGP from Tennant Creek to Mount Isa. The assessment also reviews the North West Development Strategy Study and highlights any new or likely opportunities in the North West Minerals Province (NWMP) and Barkly Regions.

The assessment has identified the following benefits to the region:

- Improved access to energy supply to proponents along the pipeline corridor.
- Improved competition for gas supply contracts to new proponents along the NGP and CGP pipeline route, potentially reducing energy costs.
- Increased opportunity for development of energy intensive industries in Tennant Creek and Mount Isa.
- Jemena will operate and maintain the pipeline, hence once construction is complete, there will be only minor opportunity for local supply business to assist with the pipeline proper.
- Opportunities will exist for contractors to construct natural gas laterals to new consumers.

In consultation with Jemena and the Queensland Government, Department of Natural Resources and Mining, the only known consumer of natural gas from the NGP is Incitec Pivot. Avenira may source natural gas from the NGP for the Wonarah Phosphate Project, however no contracts have reached agreement as of yet.

The assessment also found that the NGP serves to partially address the access to energy in the NWMP and Barkly regions, however a number of other enablers are yet to be addressed to provide an improved environment for project and economic development, these being:

- Access and cost of water.
- Access and cost of transportation.
- Labour costs in remote area.
- Regulatory framework for economic development.

Hence, the NGP is considered an important enabler for development in the NWMP and Barkly regions.

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# 1. Introduction

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An updated assessment of the potential opportunities for new projects within the North West Mineral Province and Barkly Regions with a particular, but not sole, focus on those benefits arising from the Northern Gas Pipeline (NGP) has been undertaken.

The updated assessment is to investigate and assess benefits to local supply chain businesses, potential investment and value adding opportunities resulting from the NGP from Tennant Creek to Mount Isa. The assessment also reviews the North West Development Strategy Study and highlights any new or likely opportunities in the North west Minerals Province and Barkly Regions.

## 1.1 Purpose of this report

The purpose of this report is to document the likely opportunities for future development in the North West Minerals Province and Barkly Region, particularly so that industry and community leaders can prioritise efforts to stimulate industry and economic growth in the entire value chain.

## 1.2 Scope and limitations

This report: has been prepared by GHD for Mount Isa Townsville Economic Zone and Regional Economic Development Committee and may only be used and relied on by Mount Isa Townsville Economic Zone and Regional Economic Development Committee for the purpose agreed between GHD and the Mount Isa Townsville Economic Zone and Regional Economic Development Committee as set out in this report.

GHD otherwise disclaims responsibility to any person other than Mount Isa Townsville Economic Zone and Regional Economic Development Committee arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

## 2. Background

### 2.1 Current Access to Energy Supply

The 2014 MITEZ report highlighted that the access to a reliable and cost effective source of energy supply to the NWMP was a key enabler for most projects and industries. The access to electrical or gas energy supplies for existing and potential projects is currently limited in the region between Mount Isa and Tennant Creek. This limited access is understood to be constraining industry and economic development in this region.

Historically, the primary options for energy supply to economic and project development are electricity and natural gas. Renewable energy such as solar and wind systems are also a viable source of energy, subject to the load profile of the development and the availability of the renewable resource in the location of the development.

Typical options for provision of an energy supply are as follows:

- On site self-generation, using diesel, natural gas or renewable resources.
- Extension of a transmission or sub-transmission power line from an existing electricity network infrastructure to the site.

Below, is a snapshot of the current energy supplies in the region.

### 2.2 Current Natural Gas Networks

#### 2.2.1 Eastern Seaboard

At present there are five natural gas transmission pipelines in Queensland, these being<sup>1</sup>:

- The North Queensland Gas Pipeline (NQGP), running from Moranbah to Townsville.
- South West Queensland Pipeline (SWQP), running from Ballera to Wallumbilla (Roma)
- Carpentaria Gas Pipeline (CGP), running from Ballera to Mt Isa
- Roma to Brisbane Pipeline (RBP), running from Wallumbilla (Roma) to Brisbane
- Queensland Gas Pipeline (QGP), running from Wallumbilla (Roma) to Gladstone and Rockhampton

The Queensland-South Australia-New South Wales (QSN) pipeline links the Queensland natural gas network to the Tasmania, New South Wales, Victorian, Australian Capital Territory and South Australia.

From these major pipelines, large industrial customers, gas-fired generators, commercial customers and residential customers are supplied.

These current transmission networks are denoted in Figure 1.

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<sup>1</sup> Gas Transmission and Distribution, Queensland Government, viewed 2 May 2016, <https://www.business.qld.gov.au/industry/energy/gas/gas-overview/gas-transmission-distribution>



**Figure 1 Current Eastern Seaboard Gas Transmission Lines<sup>2</sup>**

Natural gas sources for this transmission network are located in the various basins noted on the map. Liquefied Natural Gas (LNG) is exported from Gladstone

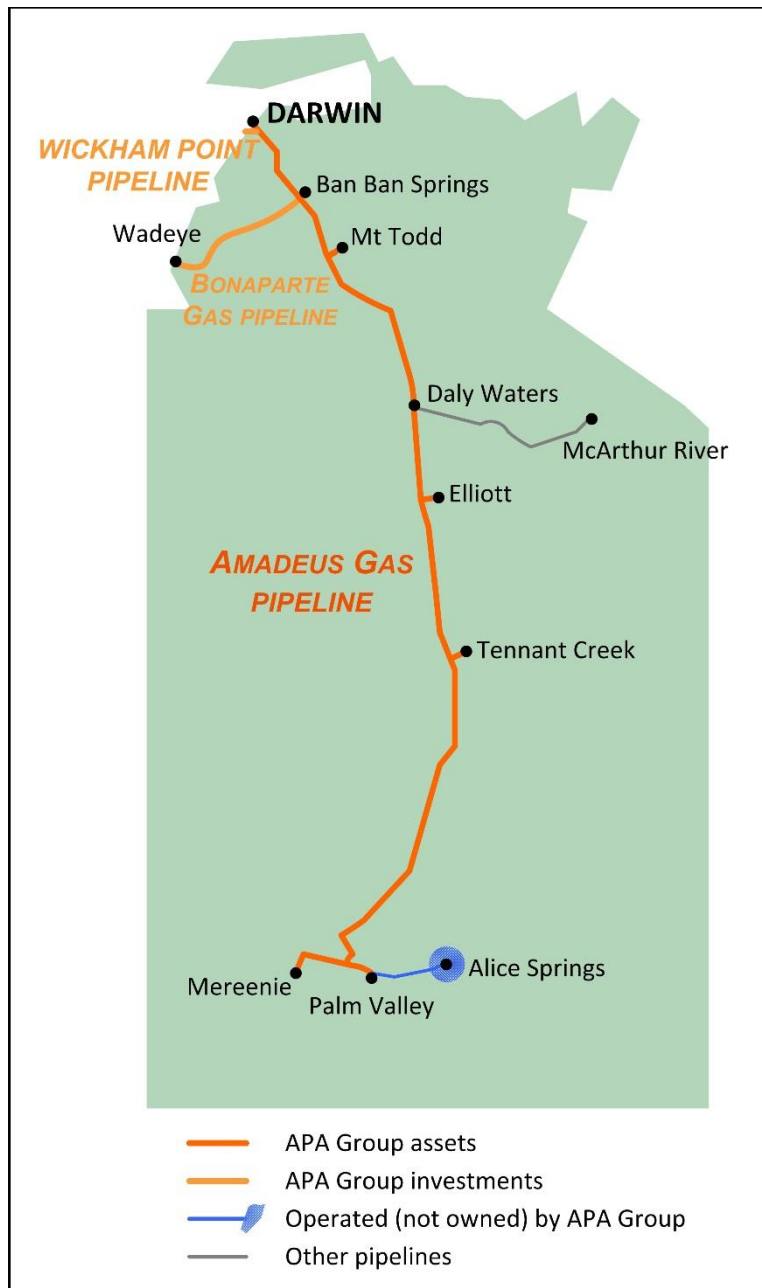
### 2.2.2 Northern Territory

The Northern Territory (NT) natural gas transmission network is currently not connected to those located on the eastern seaboard. The existing NT gas transmission system consists primarily of the Amadeus gas pipeline, which is owned and operated by APA.

This pipeline runs from the Palm Valley and Mereenie Gas Fields west of Alice Springs to Darwin. The Bonaparte Gas Pipeline lateral connects the Blacktip gas field to the Amadeus Pipeline at Ban Ban Springs.

<sup>2</sup> Maps and Multimedia, AEMO, viewed 02 May 2016, <http://www.aemo.com.au/Maps-and-Multimedia>

The original purpose of the natural gas pipeline was to supply gas to the new Channel Island Power Station, near Darwin in 1986.



**Figure 2 Current Northern Territory Gas Transmission Lines<sup>3</sup>**

The existing natural gas line supplies gas-fired power stations in Alice Springs, Tennant Creek and other centres to Darwin, amongst other commercial and industrial customers.

At present the gas in the Amadeus Gas Pipeline does not meet the National Gas Specification.

## 2.3 Current Electricity Generation and Transmission Networks

### 2.3.1 Mount Isa Region

The power transmission system in the NW QLD region consists of 220 kV, 132 kV and 66 kV overhead transmission lines, as follows:

<sup>3</sup> Energy Infrastructure Northern Territory, APA, viewed 03 May 2016, <http://www.apa.com.au/our-business/energy-infrastructure/northern-territory.aspx>



- 220 kV transmission system:
  - Mica Creek – Gunpowder (130 km).
  - Gunpowder – Century (140 km).
  - Mica Creek – Chumvale (100 km).
  - Chumvale – Ernest Henry (50 km).
- 132 kV transmission Line:
  - Mica Creek – Duchess Road – Western Circuit (5.6 km).
  - Mica Creek – Duchess Road – Eastern Circuit (9 km).
- 66 kV Sub-Transmission Line:
  - Duchess Road – Chumvale – Cloncurry (110 km).

The 220 kV transmission network is not regulated by the Australian Energy Regulator (AER), hence there is currently no requirement for Ergon to offer connections to the network.

Glencore has a private 132 kV power network that extends from Mica Creek Power Station to its George Fisher Mine about 25 km to the north. In addition, a 66 kV line extends from George Fisher North to Lake Julius to supply the water pump stations.

The profile of the existing power stations in the region can be summarised as follows:

**Table 1 Summary of Existing Power Generation in the Mount Isa Region**

| Power Station              | Owner             | Primary Fuel                                    | Available Capacity              | Opened  |
|----------------------------|-------------------|---|---------------------------------|---------|
| Mica Creek                 | Stanwell          | Coal (to 2000)<br>Natural Gas (2000 to current) | 302MW (12 Units in CCGT)        | 1960    |
| X41 (located at MIM)       | APA Group         | Natural Gas                                     | 33MW (11 Units)                 | 2007    |
| Phosphate Hill             | Incitec Pivot     | Natural Gas                                     | 30MW (7 Units)                  | 2000    |
| Diamantina and Leichardt   | APA Group         | Natural Gas                                     | 242MW (DPS)<br>60MW (Leichardt) | 2014    |
| Cannington Mine            | EDL               | Natural Gas                                     | 34MW                            | 1997    |
| Small Mine site generation | Mainly mine owner | Diesel  | unknown                         | various |

At present, all substantial generation relies on natural gas as the fuel source for power generation.

### 2.3.2 Tennant Creek Region

The Tennant Creek power system has a single power station, owned and operated by Territory Generation, which is currently in the process of being upgraded by Clarke Energy at an approximate cost of \$26M.

The fuel source for the Tennant Creek Power Station is natural gas from the Amadeus Pipeline.

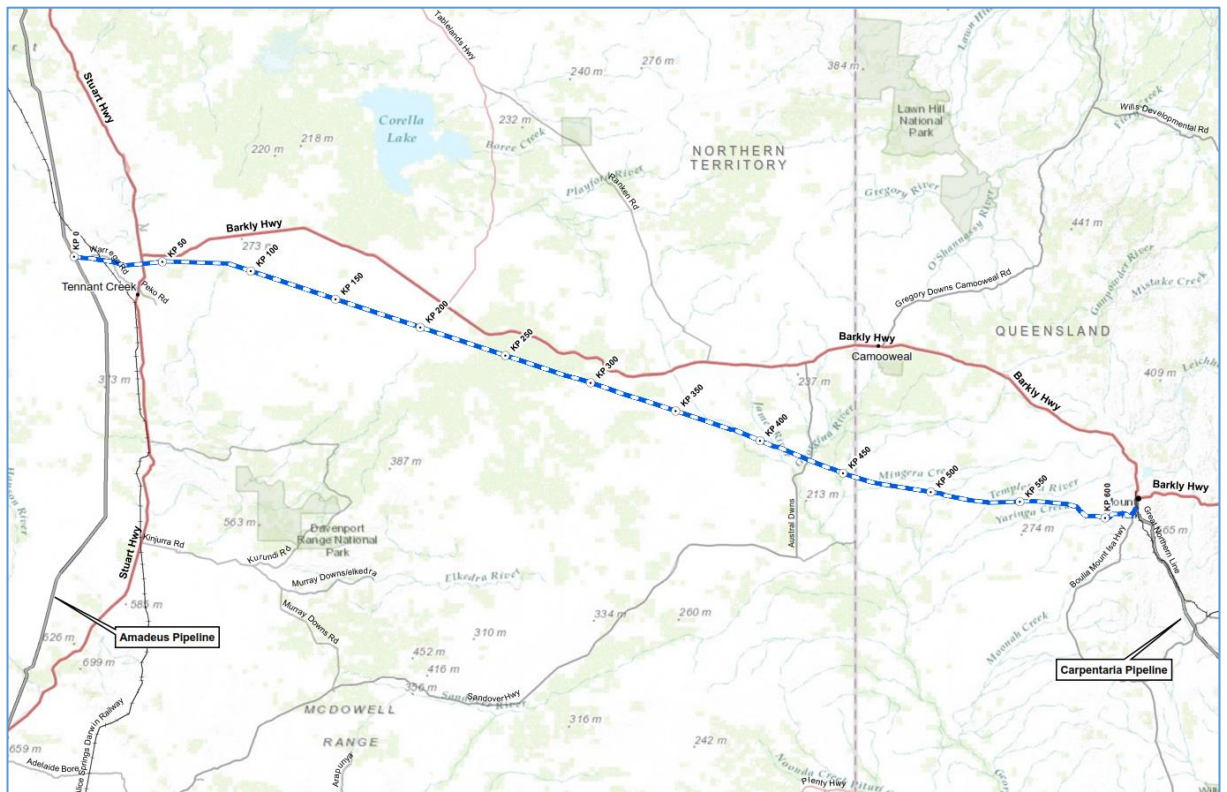
The power is reticulated to nearby loads at 22 kV.

## 2.4 Proposed Northern Gas Pipeline

### 2.4.1 General

The proposed NGP will be constructed by Jemena and their contractors. Jemena owns and operates a diverse portfolio of energy and water transportation assets in the eastern seaboard of Australia. Singapore Power and State Grid Corporation of China are Jemena's major shareholders.

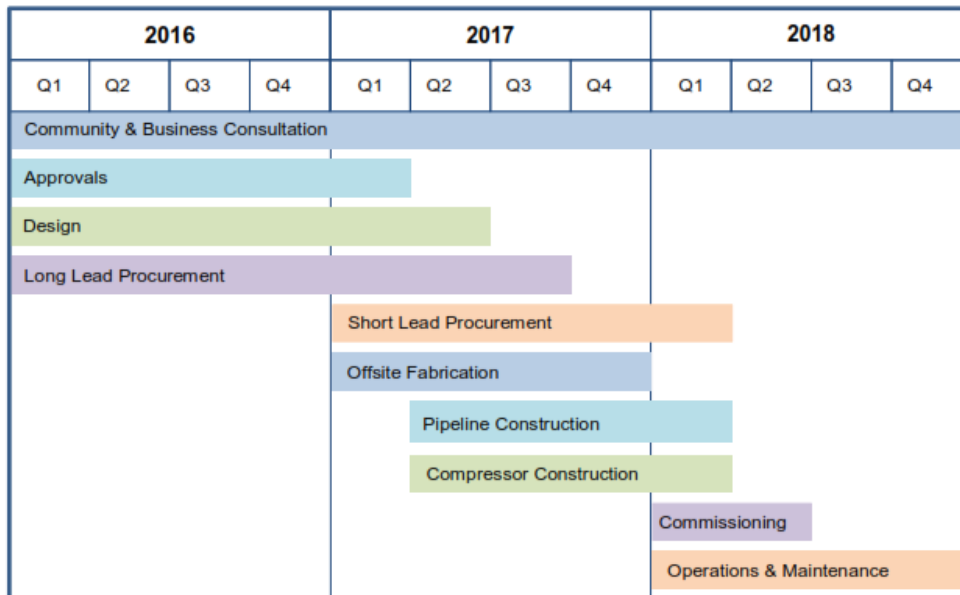
The proposed new gas pipeline is to connect the Northern Territory and Eastern Seaboard gas transmission networks. The current preferred route connects to the Amadeus pipeline north of Tennant Creek (at the Phillip Creek Compressor Station), nominally follows to the south of the Barkly Highway and connects to the Carpentaria Gas Pipeline south of Mount Isa (at the Mount Isa Compressor Station). At this stage, natural gas will flow from the NT into the Eastern Seaboard Gas Market. Refer to Figure 3.



**Figure 3 Proposed North East Gas Interconnector Route<sup>4</sup>**

The NGP is publically listed as an \$800M project, starting in 2017 and operational in 2018 as indicated by Jemena.

<sup>4</sup> Northern Gas Pipeline, Jemena, viewed 02 May 2016, <http://jemena.com.au/industry/pipelines/north-east-gas-interconnector>



**Figure 4 Proposed NGP Project Timeframes<sup>5</sup>**

Jemena list the objectives of the project as being:

- Enables Northern Territory gas to be competitive in the Eastern Seaboard Gas Market.
- Stimulates economic growth in the Barkly and NWMP, now and into the future.
- Minimises, possibly eliminating, the need for financial contribution from the Northern Territory Government.
- Creates regional and remote employment in the NT and QLD through community and business engagement.

As noted prior, as the gas in the Amadeus pipeline does not meet the National Gas Specification, a treatment facility is required to be constructed after the hot-tap point north of Tennant Creek. The outputs from this conditioning facility are expected to be:

- Nitrogen
- Heavy Hydrocarbons

#### 2.4.2 NGP Technical Parameters

Natural gas pipelines are typically constructed to meet a contracted demand (pre-negotiated contacts with suppliers and customers), with minimal spare capacity for expansion.

The NGP was originally nominated to be 355 mm (14 inches) in diameter, capable of carrying 120 TJ/day at the pipeline pressure, however at present, due to commercial considerations a 304.8 mm (12 inches) diameter pipe is proposed. The smaller diameter pipe is suitable for carrying up to 90 TJ/day<sup>6</sup>. Hence, there is ample capacity in the 12" pipeline to service the NWMP and Barkly regions.

Once a gas pipeline is constructed, additional capacity may be provided by either 'looping' or 'compressing'.

Looping is when pipelines are laid parallel to one another to increase capacity along the pipeline route.

<sup>5</sup> NGP Newsletter 3, Jemena, viewed 28 April 2016, <http://jemena.com.au/industry/pipelines/northern-gas-pipeline> Newsletter - Issue 3

<sup>6</sup> Interview with Anton Boeey - Jemena, Australian Financial Review. April 8, 2016

Compressing is done at Compressor Stations, these stations contain one or more compressor units, which receive the transmission flow (which has decreased in pressure since the previous compressor station) at an intake point, increase the pressure and rate of flow, and thus, maintain the movement of natural gas along the pipeline.

# 3. Connection Technical Considerations

## 3.1 General

The capacity of natural gas transmission lines is normally described in terms of the pipe diameter in millimetres or inches and the energy transported, expressed in Joules. Joules are derived units equal to the energy transferred or work done, to an object, when a force of one Newton acts on an object through a distance of 1 m. Given the large volumes, the measure of the energy transported in a pipeline is normally measured in gigajoules (GJ –  $1 \times 10^9$  joules) or terajoules (TJ –  $1 \times 10^{12}$  joules) or petajoules (PJ –  $1 \times 10^{15}$  joules).

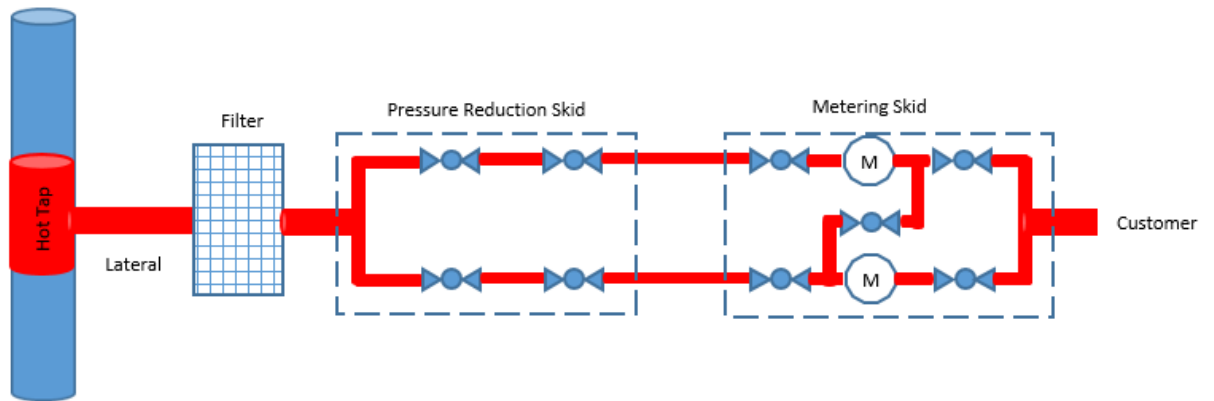
For comparison purposes a 40MW power station would require approximately 10TJ capacity supply.

## 3.2 Physical Connection Assets Required

For a connection to the NGP, the following is required as a minimum:

- Pipeline Hot-Tap – provided by Jemena.
- Pipeline lateral to the customer's site.
- Metering skid at the pipeline inlet and at the customer's site.
- Pressure Reduction skid at the customer's site.
- Water bath heaters at the customer's site.

The contract arrangements and options for funding of the above minimum infrastructure is described in Section 4 of this report.



**Figure 5 Diagrammatic view of Customer Lateral**

## 4. Connection Contractual Considerations

In relation to the contractual arrangements for the provision of the physical gas assets and the supply of the natural gas to a customer site, several combinations exist as per below.

### 4.1 Physical Connection Asset Contract

In order to make a connection into the NGP, several contractual options are available, given the need to fund the capital costs of the construction works required to extend the gas to a proposed site. These include:

1. Payment of the full capital cost plus margin for the entire connection including hot-tap, lateral, metering and let-down skids upfront to Jemena.
2. Payment of the full capital cost plus margin for the entire connection including hot-tap, lateral, metering and let-down skids via an annual capital contribution scheme to Jemena.
3. Upfront payment to Jemena for the hot-tap to the flange, with the remaining assets funded and installed directly by the customer.

Combinations of the above options are also applicable and are all subject to gas consumption volumes and the life-expectancy of the customer connection.

### 4.2 Gas Supply Contract

Primarily two options existing for the provision of the natural gas once the physical assets are in place, these being:

1. Delivered Gas Contract – Under this contractual arrangement, the customer enters into a contract with Jemena for the purchase and supply to the site of the natural gas. In this arrangement the payment for the supplied gas is undertaken by Jemena.
2. Supplier / Transporter Gas Contracts – Under this contractual arrangement, the customer enters into two separate contracts, being:
  - i) The first being with the supplier of the gas.
  - ii) The second being with the transporter of the gas, which in this case will be Jemena.

Either of the gas supply contracts above may be varied by the preferred type of physical connection asset contract type.

As these contracts can be complicated and the optimum option for a customer is subject to considerations such as their volume of consumption, economic life of the customer project and appetite for construction and operation risk, a detailed options analysis is recommended.

## 5. Connection Financial Viability Considerations

Determining the optimum option for the supply of energy to a particular site, a large number of parameters need to be considered, such as:

- Use of the energy (e.g. power generation only, power generation and processing etc.).
- Distance from the NGP to the point of gas supply.
- The Electrical Maximum Demand of the facility.
- The energy consumption volumes.
- The life span of the project, amongst others.

A detailed options analysis is recommended for all projects to determine the optimum solution, however the information below may assist to give context.

### 5.1 Natural Gas Pipeline Costs

The approximate costs of natural gas pipelines may be derived from a rate per inch per kilometre of pipeline. At the current market rates, a rate of \$60,000/inch (diameter)/km can be assumed. This rate includes an allowance for the hot-tap, later pipework, pressure reduction and metering skids.

As the natural gas transmission line will operate at a pressure of 150 bar, any user will be required to install a pressure reduction station, which is likely to cost in the order of \$500,000 to \$1,000,000.

The actual diameter of pipeline required will depend upon the pipeline pressure, electrical and thermal efficiency of the plant being supplied, however the following approximations may be used as a high level reference:

**Table 2 Site Electrical Demand vs Pipeline Diameter**

| Site Electrical Demand (MW) | Approximate Gas Consumption (MJ/hr) | Minimum Pipeline Diameter (inches – mm) |
|-----------------------------|-------------------------------------|---|
| 1                           | 30,000                              | 1.00 " - 25.4 mm                        |
| 5                           | 150,000                             | 2.00 " – 50.8 mm                        |
| 10                          | 300,000                             | 3.00 " – 76.2 mm                        |
| 20                          | 600,000                             | 4.00 " – 101.6 mm                       |
| 30                          | 900,000                             | 5.00 " – 127 mm                         |
| 50                          | 1,500,000                           | 7.00 " – 177.8 mm                       |

Due to constructability issues and cost benefit considerations, a load less than 5 MW is unlikely to be considered economically viable to be connected to the NGP for the purposes of power generation.

### 5.2 Transmission Line Costs

Typical costs for transmission line connections are as follows:

- 66 kV Transmission line - \$400,000/km
- 132 kV Transmission line - \$1,000,000/km

A substation would also be required at the project site at a cost in range of \$20,000,000 to \$40,000,000.

### 5.3 Power Station Construction Costs

For the purposes of a high level comparison, approximate rate for the development of local power station complete, can be assumed to be \$1.6M/MW

### 5.4 Energy Price Comparison

As indicated earlier, the actual natural gas tariff for existing and new natural gas consumers is highly dependent upon the contractual conditions encountered. However, the Australian Energy Market Operator (AEMO) operates the Gas Short Term Trading Market (SSTM). The SSTM is a wholesale market system designed to facilitate short term gas trading driven by daily prices.

As at 9 May 2016, the SSTM gas price in Brisbane is \$5.51/GJ<sup>7</sup>.

For the purposes of a general comparison, the following energy rates may be utilised:

**Table 3 Energy Price Comparison** <sup>8</sup>

| Natural Gas Price (\$/GJ) | Diesel Price (\$/L) | Petrol Price (\$/L) | Electricity Price (\$/kWh) |
|---------------------------|---------------------|---------------------|----------------------------|
| 1                         | \$0.0384            | \$0.0343            | \$0.00367                  |
| 5                         | \$0.192             | \$0.1715            | \$0.01835                  |
| 10                        | \$0.384             | \$0.343             | \$0.0367                   |

The above is based on the following properties of the fuels:

- Natural Gas – 38.7 MJ/kg
- Diesel – 45.7 MJ/kg
- Petrol – 46.5 MJ/kg
- Electricity – 1 kWh = 3.6 MJ

Again these figures are to be considered high level and approximate only as the large number of factors affect the price for each natural gas consumer.

<sup>7</sup> Gas, AEMO, viewed 03 May 2016, <http://www.aemo.com.au/Gas>

<sup>8</sup> About Natural Gas – Reference Guides, Australian Gas Networks, viewed 28 April 2016, <http://www.natural-gas.com.au/about/references.html>



For comparative purposes, the Levelised Cost of Electricity (LCOE) for diesel and gas are as follows<sup>9</sup>:

| Fuel Source                   | Levelised Cost of Electricity (\$)  |
|-------------------------------|---|
| Natural Gas (based on \$8/GJ) | ~\$150/MWh  |
| Diesel (based on \$1/L)       | ~\$300/MWh  |
| Power Network Connection      | ~\$108/MWh plus daily and demand charges (for users greater than 4GWh p.a.) |

## 5.5 Energy Subsidies

It should be noted that energy subsidies for the gas energy market are unlikely to reduce retail costs as the Australian Government currently does not propose to allocate any preserved or subsidised supply component for domestic use and as such users will be subject to export prices.<sup>10</sup>

While there are exploration 'subsidies' supported by the Federal Government, direct energy subsidies for gas fired energy systems are very low and not expected to alter with primary focus of subsidies being directed to renewable sources of energy as evident in Table 4.<sup>11</sup>

**Table 4 Subsidies for Electricity Production, Australia (2013-2014)**

| Fuel/Technology                                       | Aggregate subsidies (\$ millions) | Share of aggregate subsidies | Estimated electricity generation (GWh)* | Estimated subsidies (\$/MWh) |
|---|-----------------------------------|------------------------------|---|------------------------------|
| Coal including share of subsidies paid to coal mining | \$130                             | 4%                           | 151,922                                 | \$0.86                       |
| Gas   | \$15                              | 1%                           | 50,423                                  | \$0.30                       |
| Solar   | \$2,002                           | 68%                          | 4,858                                   | \$412.11                     |
| Wind  | \$388                             | 13%                          | 9,327                                   | \$41.64                      |
| All other renewables (incl. hydro)+                   | \$396                             | 14%                          | 22,599                                  | \$17.53                      |

Notes: \*Electricity generation figures are preliminary estimates

+Some subsidies for wind and solar generation may be included in this category

It is also argued the gas suppliers could also benefit from a review of the Queensland Government Uniform Tariff Policy(UTP) on retail electricity pricing and associated subsidies for regional Queensland.

<sup>9</sup> Australian Power Generation Technology Report, Electric Power Research Institute, 2015

<sup>10</sup> Australian Government – Energy White Paper – April 2015

<sup>11</sup> Electrical Production Subsidies in Australia, Mineral Council of Australia, August 2015

## 6. Opportunities and Enablers

The construction of the NGP presents a number of key opportunities to the NWMP and Barkly regions and beyond. The primary opportunities are described further below.

The opportunities and projects are defined as either:

- Near Horizon Opportunities/Projects – Those opportunities/projects which may benefit from the NGP within 5 years.
- Medium Horizon Opportunities/Projects – Those opportunities/projects which may benefit from the NGP within 5-10 years.
- Blue Sky Horizon Opportunities/Projects – Those opportunities/projects which may develop should the right circumstances occur.

### 6.1 Increased Access to Energy Transmission Network

#### 6.1.1 Natural Gas Suppliers

A key consideration for the development of any onshore or offshore gas extraction project, is the accessibility to gas consumer markets. With the NGP linking the NT and Eastern Seaboard gas markets, prospective natural gas exploration and suppliers can now access an increased number of gas consumers, subject to the cost of gas transmission.

The increase in prospective gas consumers enables increased security of the sale of the gas prior to financial commitment for the project.

Example of natural gas suppliers that may benefit from the NGP include:

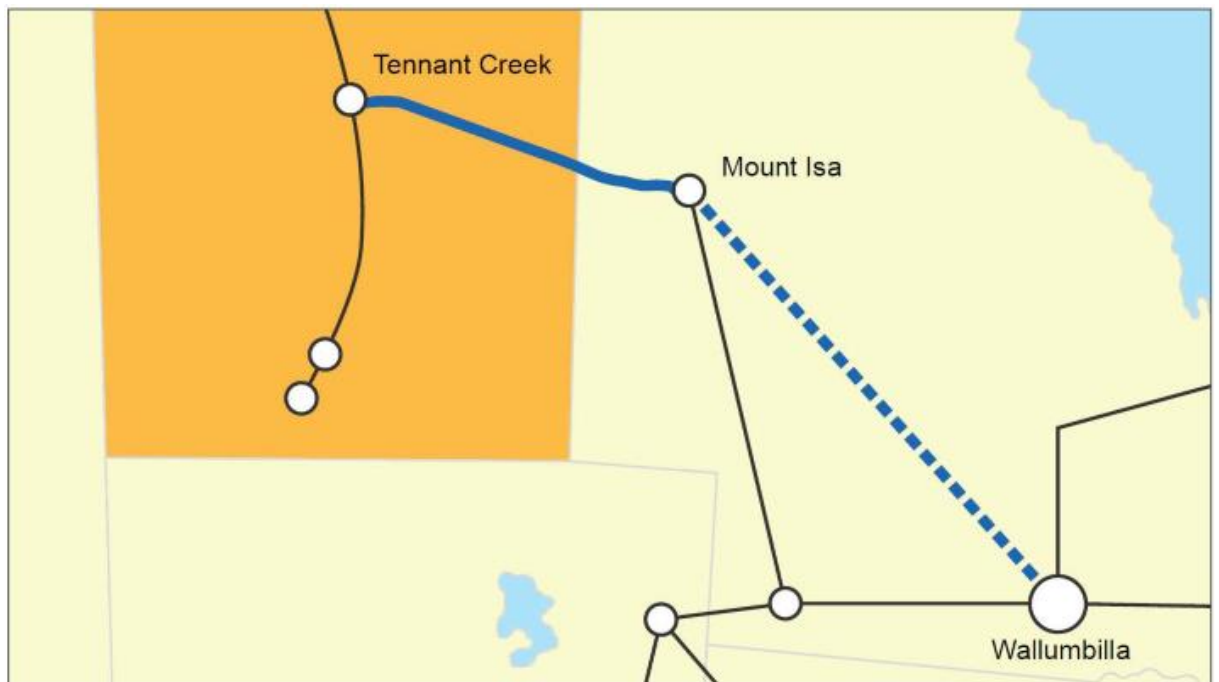
- Power and Water Corporation – Gas Business Unit
- Central Petroleum (Amadeus and Georgina Basins)
- Armour Energy – Various shale gas plays in NT and QLD

The expectation is, subject to gas demand from consumers, that the viability of natural gas extraction projects in the NWMP and Barkly regions is likely to improve with the increase in consumers.

From publically available information from Jemena, a long –term strategy is for a gas transmission line from Mt Isa to Wallumbilla. The purpose of this line is to reduce the reliance on the CGP and the Moomba Hub.

The financial viability of the extension to the Eastern Seaboard will be critically based on the cost of gas supply and reticulation from NT in competition with existing Eastern Seaboard Suppliers.

Factors impacting this viability will be gas demand and available competitive reserves as well as pricing particularly if the current international pricing policy is retained for domestic supply.



**Figure 6 Proposed Jemena Natural gas Transmission Line to Wallumbilla<sup>12</sup>**

An opportunity may exist where the Galilee and Bowen Basins may also be connected to the proposed Jemena transmission line to Wallumbilla.

AEMO's 2016 Gas Statement of Opportunities (GSOO) indicates that gas reserve development is required by 2019 to maintain long-term gas supply adequacy in eastern and south-eastern Australia<sup>13</sup>.

#### ***Near Horizon Opportunities/Projects***

The near horizon opportunities/projects include:

1. Supply of natural gas by Central Petroleum into the Eastern seaboard natural gas network.

#### ***Medium Horizon Opportunities/Projects***

Medium Horizon Opportunities/projects include:

1. Connection of natural gas from the Lawn Hill basin into the natural gas transmission network.
2. Armour Energy shale gas supply connections.

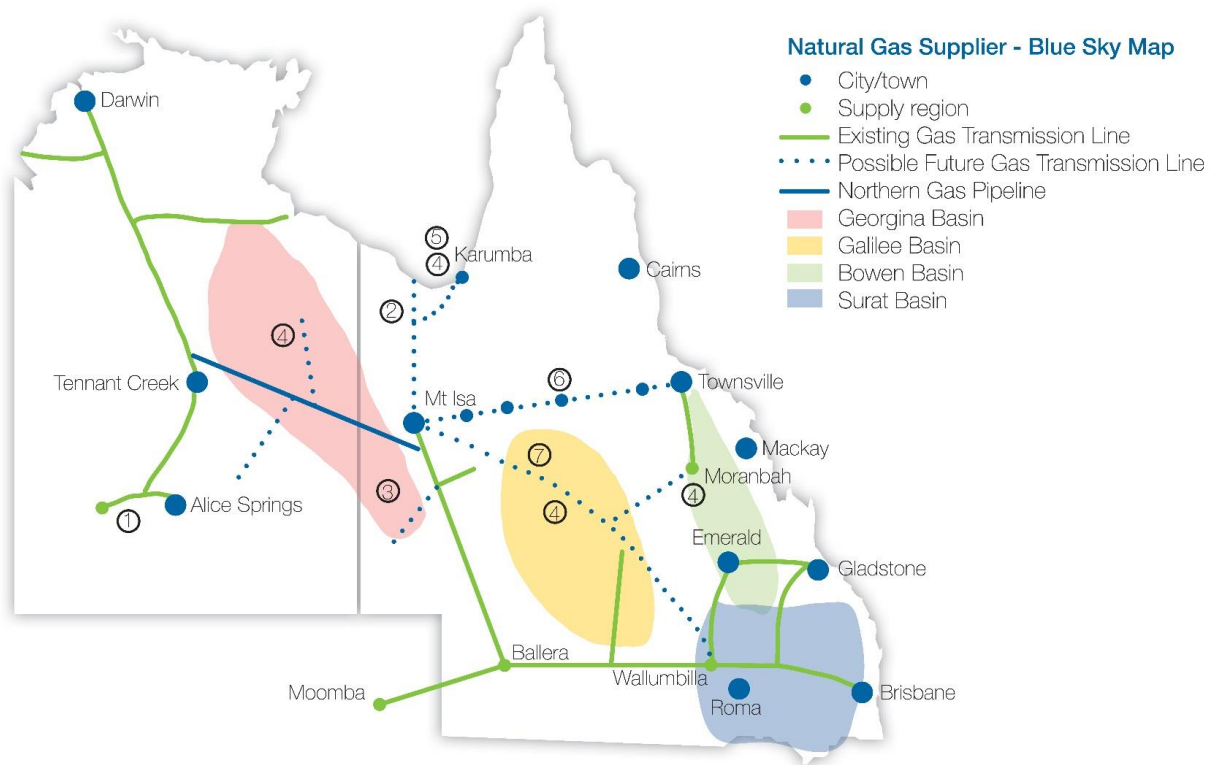
#### ***Blue Sky Horizon Opportunities/Projects***

Blue sky opportunities include:

1. Connections from the Bowen, Georgina and Galilee Basins.
2. On-shore natural gas plant at Karumba for export of natural gas from developed gas fields.
3. Natural Gas transmission line east of Mt Isa to connect to the Galilee and Bowen Basin natural gas collection systems to the NGP and CGP.

<sup>12</sup> Jemena – Northern Gas Pipeline Business Briefing – Mount Isa - March 2016

<sup>13</sup> Gas, AEMO, viewed 03 May 2016, <http://www.aemo.com.au/Gas>



**Figure 7 Natural Gas Supplier – Blue Sky Map**

### **Enablers**

From the stakeholders consulted the enablers required to encourage uptake of natural gas are:

- Removal of the moratorium on fracking in the NT.
- An increase in the quantity of prospective gas customers through promotion and education of the benefits of natural gas for various industries.
- Decreased natural gas transmission costs to increase competitiveness of NT and NWMP natural gas to the consumers located on the eastern seaboard.
- Improved global oil prices.

### **6.1.2 Natural Gas Consumers**

Opportunities for natural gas consumers, essentially falls within two categories, being:

#### **Existing Natural Gas Consumers**

Those existing natural gas consumers, subject to current gas contract expiration and terms, have the opportunity to source less expensive natural gas due to the increased competition.

This reduction in energy costs, allows for production of existing products or processes at lower input cost, improving the financial security of these projects and their contribution to the regions.

#### **New Natural Gas Consumers**

At present, proponents seeking an energy supply for projects in the NWMP and Barkly regions are required to either provide their own diesel-fuelled power station (nominally high ongoing costs) or extend the existing Ergon Energy or Power and Water Corporation network to the project site (nominally high capital cost).

The relatively high cost of these options may result in projects being deemed financially unviable.

Energy may be transported via a new natural gas lateral from a hot-tap off the NGP to the mine site, subject to the mine site demand and distance from the NGP route.

Further opportunities also lie with the localising of beneficiation for extracted ores prior to transportation, which at present is precluded due to the high energy costs.

### ***Near Horizon Opportunities/Projects***

The near horizon opportunities/projects include:

1. Use of natural gas by Avenira for the Wonarah Phosphate Project, located 230 km east of Tennant Creek.
2. Reduced cost of production for Incitec Pivot at both the Mt Isa and Phosphate Hill operations securing the project's financial viability. 10.5 PJ/p.a. equivalent to approximately 1/3 of the pipeline capacity.
3. Improved viability of Glencore Mount Isa Mines Black Rock, open cut project should additional natural gas be required over and above the agreed gas contract.

### ***Medium Horizon Opportunities/Projects***

Medium Horizon Opportunities/projects include:

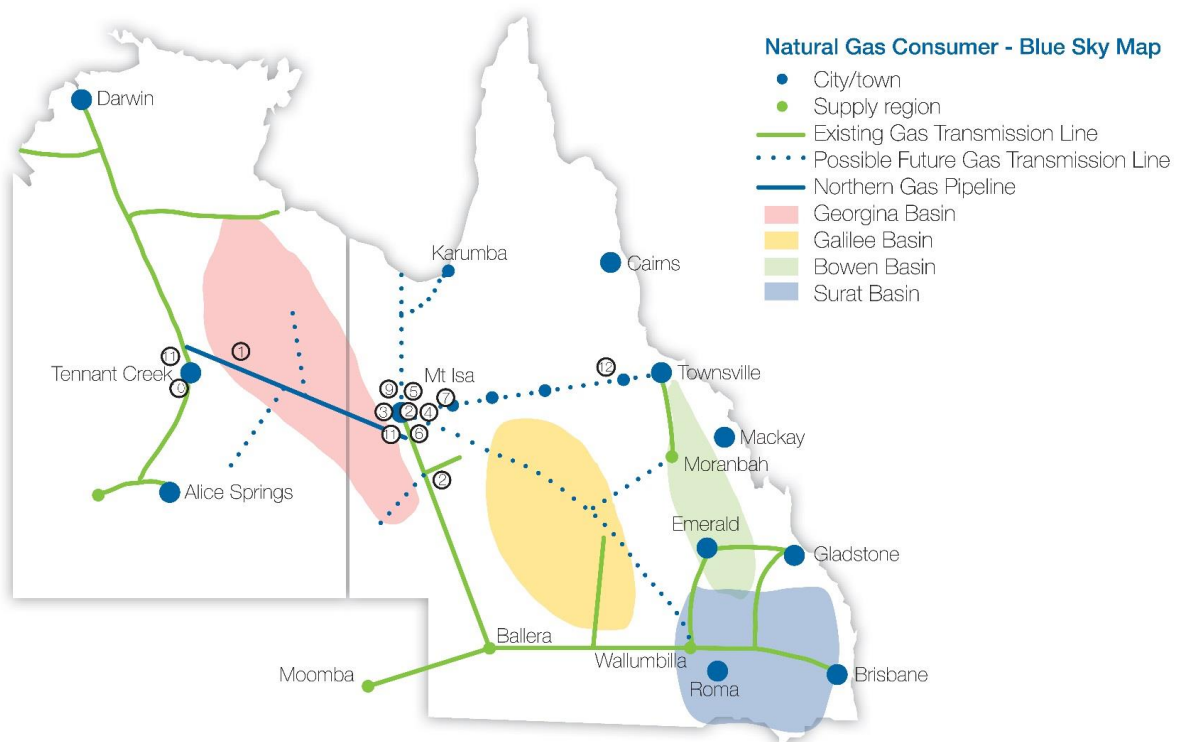
1. Reduced cost of power generation by Stanwell Corporation Limited.
2. Reduced cost of power generation at Diamantina and Leichardt Power Stations.
3. Reduction in power costs for Cannington mine based on reduced gas prices for the onsite generation and potential mine life extension.
4. Reduction of the contract pricing for supply of the natural gas to Glencore Mount Isa Mines beyond the expiration of the current gas contract in 2023.
5. Conversion to gas fired self-generation (19 MW maximum, with potential to expand to 26 MW) at CudeCo, located 17 km north-west of Cloncurry. Although project already financially viable.
6. Build, Own and Operate (BOO) opportunities for power generators (e.g. Stanwell, Clarke Energy, EDL etc.) seeking to provide power supply to project sites along the NGP route.
7. Improved viability of re-opening of Capricorn Copper, Mount Gordon copper mine.
8. Power Supply to identified phosphate deposits to be developed in the future at:
  - Paradise (North and South) previously Lady Jane and Lady Annie deposits.
  - D – Tree.
  - Corrella Bore (South of Phosphate Hill).
  - Highland Plains (NT/Qld Border Area).

### ***Blue Sky Horizon Opportunities/Projects***

Blue sky opportunities include:

1. Mt Peak pig iron processing has been proposed in Darwin, however this processing could potentially be carried out in Tennant Creek.
2. New ore/product beneficiation facilities located in Mt Isa or Tennant Creek, prior to transportation to Port of Darwin or Port of Townsville, reducing transportation cost versus the value of the product being transported.
3. Alexandria, Alroy and Buchanan Dam deposits (130 – 170km from Highland Plains).

4. Natural gas power generation at Julia Creek, Richmond and Hughenden.
5. The demand for gas fired generation is likely to increase to support the development of intermittent renewable generation in the National Electricity Market. Competitively priced natural gas in the NWMP resulting from competition among suppliers over the NGP and Carpentaria pipeline could form the basis of NWMP power generation feeding into the National Electricity Market through a power line connection from Mt Isa to the east coast electricity grid.
6. Development of major renewable electricity facilities in NWMP and NT that use renewable electricity to produce gas (Hydrogen) that is fed into the gas pipelines as the vehicle for storing and transporting renewable energy. The option for blending hydrogen into current natural gas pipelines is under study in a number of regions. The NWMP and NT have significant renewable resources that do not have access to market and the hydrogen production and the gas pipeline network provide this access.
7. Common user lateral pipelines could be developed to service a 'cooperative' of smaller users (mining, agriculture and/or industrial) to help achieve threshold power levels for viable energy supply.
8. A future study is suggested to investigate the feasibility of common user laterals.
9. Beef, Agriculture and Associated Industry. There is limited current agriculture activity in the North West Region, with increased agriculture activity experienced in the Barkly Region. However, the outlook for agriculture in the region is changing, with the Federal Coalition's 2030 Vision for Developing Northern Australia (June 2013) nominating a strong focus on irrigated agriculture-led development.



**Figure 8 Natural Gas Consumer – Blue Sky Map**

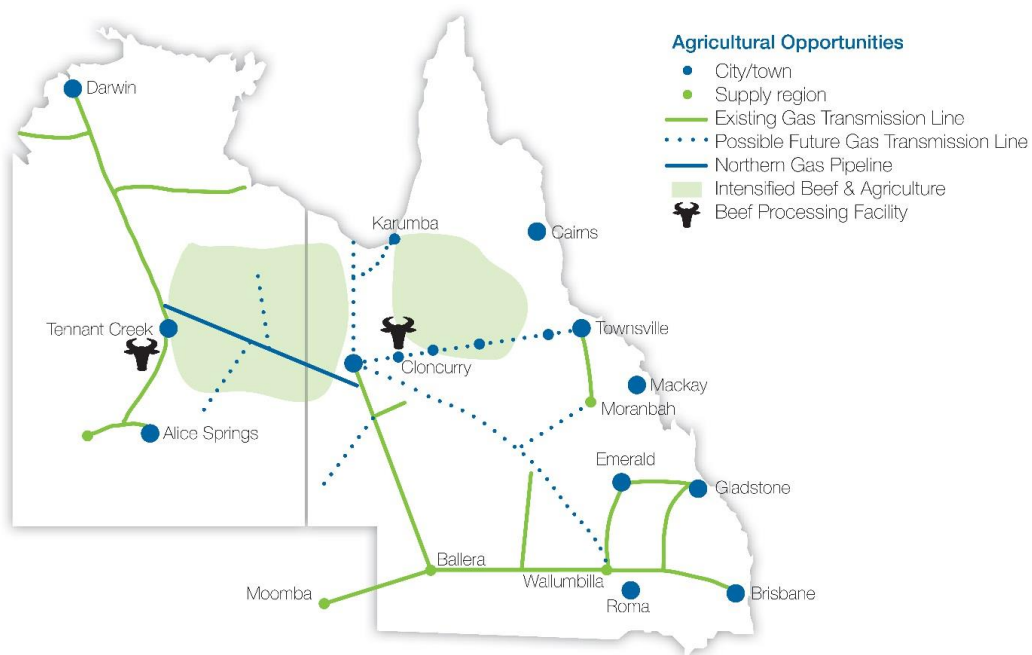
The Barkly and NWMP regions have significant land portions that can be utilised for feedstock growth and intensified beef cattle grazing. The region permits export of the beef in live or processed status through either the Port of Darwin or Port of Townsville, allowing flexibility for exporters to multiple markets.

Water pumping and intensified beef production requires access to an energy source. The new NGP may allow for a coordinated approach to power supply for a number of potential customers.

Meat processing facilities require both power (approximately 2.5-5 MW) and gas supplies (50-100 TJ p.a.), hence the NGP may provide an opportunity for a centralised meat processing facility in the Barkly and NWMP region.

Other agricultural prospects such as:

- IFED to the east also address global food security issues on such a scale that gas energy will be critical and attractive to these developments.
- Three Rivers Irrigation Project – Glenore (90km south of Normanton).
  - 15,000 ha of cotton and associated infrastructure.
  - Cotton processing ginnery.



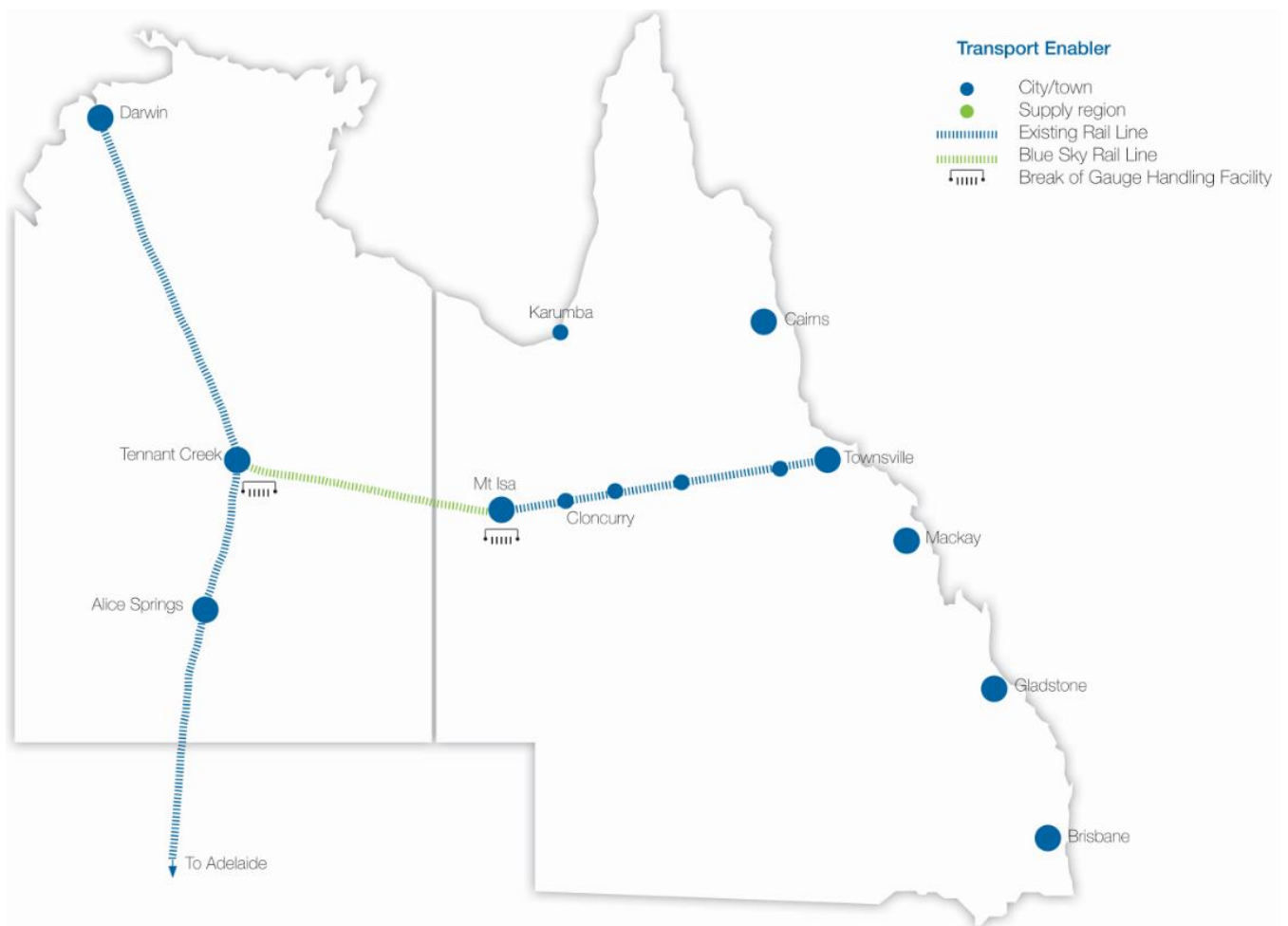
**Figure 9 Agricultural Opportunities**

1. Mount Isa to Tennant Creek Rail Line. A blue sky opportunity focussed on transportation within the region is the establishment of a new rail line from Mount Isa to Tennant Creek. The line route may be able to utilise portions of the NGP easement, however through discussions with Circle Advisory, they have advised that the pipeline corridor is entirely inconsistent with a rail line, for a wide variety of reasons. Therefore, a new corridor would need to be identified and developed.

As the NT and QLD rail systems operate on different line gauges, with the Adelaide to Darwin rail line constructed in standard gauge and the Mount Isa to Townsville line constructed in narrow gauge, a rail goods handling facility is likely to be required at the connection point.

The rail goods handling facility system may be located in either Mount Isa or Tennant Creek.

Financially, the feasibility of a new rail line would be heavily dependent upon the tonnages available for transport. Significant volumes of new rail tonnages would be required to be identified in the NWMP and Barkly regions, through new ore bodies extraction and/or large integrated agriculture and intensified beef volumes.



**Figure 10 Transport enabler**

### **Enablers**

From the stakeholders consulted the enablers required to encourage uptake of natural gas are:

- Increased promotion and education of the potential benefits of using natural gas to potential customers.
- Coordinated approach between users for possible sharing of the construction of natural gas laterals.



## 6.2 Local Supply Chain Opportunities

### 6.2.1 Construction Phase

During the construction phase a number of opportunities will exist for local suppliers in Mount Isa and Tennant Creek, including:

- Camp Accommodation and Catering
- Plant and equipment hire
- Non-Destructive Testing
- Haulage and Transport Services
- Survey
- Local accommodation and catering
- Hydro-testing
- Waste Management
- Pipe Haulage
- Water Bore Drilling
- Drilling and Blasting
- Security fencing supply and installation
- Field Joint Coating
- Bulk earthworks
- Piping Fabrication
- Civil Works
- Electrical and Instrumentation
- Thrust bore
- Concrete supply
- Roads

### 6.2.2 Operations and Maintenance Phase

During the O&M phase of the project, Jemena (or their sub-contractors), will be undertaking the activities such as corrosion monitoring and minor maintenance, hence there is limited ongoing opportunities for the local supply train.

However, should a consumer wish to connect to the NGP, local contractors may be utilised to construct the lateral. Should this be the case, then similar services to those listed in the construction phase will be required.

## 6.3 Enablers for Development

In general, projects require a number of enablers for their viability which effect input costs, these being:

- Energy Supply
- Water Supply
- Transportation Costs
- Labour Costs
- Regulatory Costs

The proportion of impact of each input costs varies for differing industries.

Few stakeholders interviewed nominated energy costs as the sole reason for the viability of their project, however all stakeholders concurred that access to low cost energy supplies is a key input cost factor to most projects and opportunities.

This points to the complex barriers to economic growth and development in the region. Whilst the NGP may present a solution to the accessibility and cost of energy to those adjacent the NGP, continued focus is required on the remaining factors to remove barriers for development.

The key remaining barriers are:

- Access to and cost of water supply.
- Access to and cost of transportation, including flood immunity in the road and rail systems.
- Cost of labour in remote areas.
- Costs associated with regulatory approval processes.

A common view shared by a number of stakeholders was for the Queensland and Northern Territory Governments to ensure that the regulatory environment is suitable for investment in the natural gas industry, thereby encouraging appraisal and development of new natural gas fields.

# Appendices

## Appendix A – Stakeholder List

| Entity  | Name                  | Title  | Contacted?   |
|---|-----------------------|--|--|
| Avenira   | Russell Fulton        | Geology Manager  | Message left – no reply  |
| Circle Advisory                                 | James Kernaghan       | Managing Director  | Telephone Interview  |
| CuDeco  | Mark Roberts          | General Manager – Rocklands Project                          | Telephone Interview  |
| Diamantina Power Station                        | Mark Magnowski        | Manager  | Telephone Interview  |
| Ergon Energy                                    | Mark Biffanti         | Operational Manager  | Telephone Interview  |
| Jemena  | Bob Boosten           | Manager Queensland Pipelines                                 | Telephone Interview  |
| Incitec Pivot                                   | Scott Bowman          | Vice President – Phosphates Value Chain and Energy           | Telephone Interview  |
| Incitec Pivot                                   | Matthew Flugge        | General Manager Group Corporate Affairs                      | Telephone Interview  |
| Incitec Pivot                                   | Tim Lawrence          | Manager Gas, Energy and Utilities                            | Telephone Interview  |
| Incitec Pivot                                   | Sean Sampson          | Group Corporate Affairs Manager                              | Telephone Interview  |
| North West Minerals Province Task Force         | Tony McGrady          | Member   | MITEZ request this to be discussed at Task Force Meeting June 2016 |
| Mount Isa Mines                                 | Trevor Gray           | General Manager Central Services – Mount Isa Mines           | Telephone Interview  |
| MMG Queensland Operations                       | Shane Goodwin         | Manager, Stakeholder Relations - Queensland                  | Telephone Interview  |
| Northern Australia Development                  | Cr John Wharton       | Chair CRC on Developing Northern Australia                   | Telephone Interview  |
| Mount Isa City Council                          | Mayor Joyce McCulloch | Mayor of Mount Isa   | Messages left  |
| Power and Water Corporation – Gas Business Unit | Charles Staples       | Principal Communications Analyst - Gas                       | Telephone Interview  |
| Queensland Government                           | Warren Cooper         | Case Manager Metalliferous at Queensland Department of Mines | Email interview sent – no reply                                    |
| Queensland Government                           | Greg Palm             | Regional Director State Development                          | Message left – no reply  |

| Entity                                  | Name             | Title   | Contacted?            |
|---|------------------|---|-----------------------|
| Queensland Government                   | Susan Harch      | Acting Director - Economics Unit – Lands and Mines Policy   | Telephone Interview   |
| Queensland Rail                         | Michael Mitchell | Regional General Manager North Queensland                   | Telephone Interview   |
| Queensland Resources Council            | Andrew Barger    | Director Economic and Infrastructure Policy                 | Telephone Interview   |
| Regional Economic Development Committee | Bob Bagnall      | Barkly Regional Council                                     | Telephone Interview   |
| Regional Economic Development Committee | Jared Baldwin    | Manager – Remote Concrete                                   | Telephone Interview   |
| Regional Economic Development Committee | Steve Baldwin    | Manager – Outback Caravan Park                              | Telephone Interview   |
| Regional Economic Development Committee | Steven Edgington | Northern Territory Government – Regional Executive Director | Telephone Interview   |
| Regional Economic Development Committee | Steve Russell    | Emmerson Resources – Exploration Manager                    | Telephone Interview   |
| Regional Economic Development Committee | Marion Smith     | Barkly Regional Council – Chief Executive Officer           | Telephone Interview   |
| Rum Jungle Resources                    | Nigel Doyle      | Exploration Manager   | Telephone Interview   |
| Soren Consulting                        | Ross Thompson    | Director  | Telephone Interview   |
| Stanwell Corporation                    | Paul Smith       | Site Manager  | Telephone Interview   |
| TNG Limited                             | Paul Burton      | Managing Director   | Email sent – no reply |



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|         |            | Name                     | Signature                 | Name               | Signature | Date       |
| A       | A. Saxelby | R. Saunders<br>B. Heggie | R Saunders*<br>B Heggie*  | B. Heggie          | B. Heggie | 10/05/2016 |
| B       | B Heggie   | R Saunders<br>B Heggie   | R Saunders *<br>B Heggie* | B Heggie           |           | 26/05/2016 |
| C       | J. O'Brien | R. Saunders              | R. Saunders               | B. Heggie          | B. Heggie | 09/09/2016 |

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