16 Economic Environment

16.1 Introduction

This chapter assesses the potential direct and indirect economic impacts of the McArthur River Mine Phase 3 Development Project (the Project) for the local, regional, state and national economies. The aspects of the economic environment that have been considered include the: existing economic environment that may be affected by the Project; costs and revenues to government; and value of lost opportunities for other economic activities.

16.2 Economic Modelling

16.2.1 Methodology

The assessment has adopted an Input-Output (I-O) analysis to identify regional and state economic impacts relating to employment, income and output. This methodology is deemed to be more appropriate than a cost-benefit analysis.

Cost-benefit analysis is predominantly undertaken for evaluating alternative project options at the feasibility stage and also to identify a project's viability / feasibility utilising a range of indicators including Net Present Value, Internal Rate of Return and Payback Period. For private sector projects such as the McArthur River Mine Phase 3 Development Project, the feasibility and full bankable studies generally remain commercial in confidence to the Project's proponent.

The primary objective of the economic assessment in this EIS is to identify the Project's economic impacts in terms of costs and benefits upon local and regional economies / communities. This economic impact does not aim to focus on project viability (which would be the case if a cost-benefit analysis method was adopted) but instead on such matters as the Project's economic impacts on labour markets, income effects, sourcing of materials, local and regional output etc. Cost-benefit analysis does not provide any indication of these economic aggregates flowing on from the Project that may impact local and regional communities and economies.

For this reason, the I-O modelling method was utilised to assess these economic aggregates, both direct and indirect, to the local, regional and state economies during the Project's construction and operational phases. A key requirement for the regional impact assessment is to identify the impacts to a regional community / economy from the perspective of output and impacts on the job market. I-O modelling has been adopted for the Project to deliver these required economic impact assessments at the local, regional and state level.

Material sources used in the assessment include economic data in the public domain and project specific information. The I-O approach is based on industry tables that model the structure of an economy by describing inter-industry relationships. It is a useful approach that can describe total impact on an economy from an initial increase in demand in a particular industry. The full report and methodology of this analysis are contained in Appendix D11 - Economics.

Economic impacts at a regional and national level can be traced through the economic system in a number of different ways. In this assessment, the following impacts are considered:

- direct multiplier effects – increases in economic activity (value-added) and employment that are directly generated in the industry receiving the impact
- indirect multiplier effects – flow-on impacts from industries that support the industry receiving the direct impact
- induced multiplier effects – changes in consumption by the household sector in response to income changes from the direct and indirect impacts
- total multiplier effects – the sum of the direct, indirect and induced effects outlined above.

These impacts can be measured in a number of different ways:

- Output – gross value of production
- Value-added – the additional value not already calculated from the output
- Employment – the increased number of jobs, expressed as full-time employment.

Value-added method is used to consider the value of incremental raw materials at each stage, rather than Output measures. The latter may lead to double counting of impacts, as the gross value of production includes the value of raw materials generated in earlier stages of production. Employment measures the number of jobs required to meet additional production in the economy. It may occur through increased use of existing labour or creation of additional jobs, typically expressed in terms of equivalent full-time employees (FTEs).

There are a number of limitations relating to the application of an input-output methodology which are discussed in the following points:

- this study relies on linkages between mining and downstream/upstream sectors (including households and government) observed at the national level, which is dominated by the coal and iron ore sectors. As such, the inter-sectoral relations for non-ferrous metal ore mining sector (within which zinc-lead-silver falls) may differ slightly from that observed at the national level for the total mining sector. However, differences are likely to be minor. Care should be taken interpreting the specific industry impacts identified within the analysis and more attention paid to the summary impacts at the state and national levels
- the study method used is a conservative approach and has a general bias to overstate impacts. The Australian Bureau of Statistics (ABS) has noted that 'the theoretical basis (of multiplier effects) can produce estimates that may overstate the actual impacts in terms of output and employment' (ABS, 2002). This is mitigated by conservative estimates of the initial construction and operational impacts
- inter-industry relationships are implicitly assumed to be linear across the scale of impacts and relative prices for inputs and outputs assumed to remain in fixed proportion, irrespective of supply conditions for inputs. This means that the results of I-O analysis do not take into account shortages in factors of production or changes in relative prices of inputs.

16.2.2 Input-output tables

An I-O table provides a summary, or a snapshot, of the transactions occurring within an economy over a selected period. The underlying data set for this analysis was the national 2006-07 input/output tables as published by the ABS (2011) (Australian National Accounts: Input – Output Tables – Electronic Publication. Final Release 2006-07 Tables, Cat. No. 5209.0.55.001).

Compilation of a state-based table for the Northern Territory was achieved using published state accounts from ABS (2011) (Australian National Accounts: State Accounts, June 1990 – June 2010, Table 1 Gross State Product & Table 10 Expenditure, Cat. No. 5220.0) and updates on state and industry employment using ABS (2011) (Labour Force, Australia, 85Detailed, Quarterly, Table 5 Employed persons by State and Industry, Nov 1984 – May 2011, Cat. No. 6291.0.55.003).

16.2.3 Input-output multipliers

I-O tables are most frequently used to generate I-O multipliers, which are then used to conduct economic impact analysis.

I-O multipliers capture the direct and indirect effects of an economic stimulus on a region. For example, if demand for transport services from the Northern Territory were to increase, I-O multipliers can be used to estimate the total impact of this increased demand on total output from the Northern Territory, as well as the increase in employment, income and value-added.

Value-added (representing the sum of wages, profits and indirect taxes) is the standard measure used in Australia to represent the size of an economy. At the regional level, an increase in value-added represents the increase in Gross Regional Product (GRP); at the state level, the increase in Gross State Product (GSP); while at the national level it represents the increase in Gross Domestic Product (GDP).

The total economic impact identified by use of I-O multipliers includes the direct effect of the initial increase in demand and the indirect (or flow-on) effects. Flow-on effects result from the linkages between industries in the economy. For example, transport service providers in the Northern Territory purchase inputs from other local industries.

When demand for their output increases, transport companies increase their purchases from other local businesses, who themselves must increase their consumption, some of which will be from other local firms, and so on. These are the flow-on effects that I-O multipliers are able to capture, and it is what makes them such useful tools for economic analysis.

16.3 Existing Economic Environment

16.3.1 Study area

The local area in which the Project is situated is defined as the combined area of the Gulf Statistical Local Area (SLA) and the Borroloola Community Government Council (CGC) area, with the township of Borroloola located centrally. Borroloola is a remote community located on the McArthur River in the Gulf of Carpentaria classified as a geographic entity by the ABS separate from the Gulf SLA. Once considered a frontier town, Borroloola now is considered the major town of the Gulf region.

As a broader geographic boundary, the Lower Top End Sub-Statistical Division (SSD) captures all of the Gulf SLA, Borroloola CGC and the area west to Western Australia. The significance of these geographic classifications is that the ABS produces statistical data at the SSD, SLA and CGC levels.

It is reiterated that data for the SLA and the Borroloola CGC has to be aggregated to determine total data for the Gulf region. These areas are shown in Appendix D11.

16.3.2 Labour profile

The labour profile for the Gulf region around the Project area is presented in Table 16-1. The labour force within the Borroloola and the Gulf region is relatively small at approximately 810 persons, with a total of 29 people unemployed.

16.3.2.1 Occupations

As presented in Table 16-2, the most common occupations undertaken by employees within the combined Borroloola/Gulf region are:

- labourers – 31.4%
- technicians and trades – 16.1%
- professionals – 11.0%
- machinery operators and drivers – 10.7%
- managers – 9.3%.

This compares with the Northern Territory in which professionals are the main occupation type at 18.5%, followed by technical and trade at 15.0% and labourers at 11.7%.

Table 16-1 Labour profile

	Borroloola CGC	Gulf SLA	Combined Borroloola/ Gulf	Lower Top End SSD	Northern Territory
Employed, worked full-time	190	223	413	4,538	63,683
Employed, worked part-time	140	145	285	2,013	21,237
Employed, away from work	21	63	84	906	9,275
Unemployed, looking for work	16	13	29	415	4,206
Total Labour Force	367	444	811	7,872	98,401
Not in labour force	186	252	438	4,510	44,597
% Unemployed	4.4%	2.9%	3.6%	5.3%	4.3%
% Labour force participation	61.9%	55.4%	56.1%	54.0%	60.6%
% Employment to population	59.2%	53.8%	58.2%	51.2%	58.1%

Source: ABS (2007), *2006 Census of Population and Housing*

Table 16-2 Labour Occupation Profile

	Borroloola CGC	Gulf SLA	Combined Borroloola/ Gulf	Lower Top End SSD	Northern Territory
Managers	32 (9.1%)	41 (9.5%)	73 (9.3%)	930 (12.5%)	11,779 (12.5%)
Professionals	41 (11.7%)	45 (10.4%)	86 (11.0%)	1,069 (14.3%)	17,440 (18.5%)
Technicians and trade	63 (18.0%)	63 (18.0%)	126 (16.1%)	1,166 (15.6%)	14,146 (15.0%)
Community and personal	31 (8.9%)	27 (6.2%)	58 (7.4%)	972 (13.0%)	11,365 (12.1%)
Clerical and administrative	12 (3.4%)	23 (5.3%)	35 (4.5%)	783 (10.5%)	13,532 (14.4%)
Sales	10 (2.9%)	12 (2.8%)	22 (2.8%)	388 (5.2%)	6,810 (7.2%)
Machinery operators and drivers	21 (6.0%)	63 (14.5%)	84 (10.7%)	387 (5.2%)	5,533 (5.9%)
Labourers	125 (35.7%)	121 (27.9%)	246 (31.4%)	1,438 (19.3%)	10,998 (11.7%)
Inadequately described/not states	15 (4.3%)	38 (8.8%)	53 (6.8%)	322 (4.3%)	2,587 (2.7%)
Total	350 (100%)	433 (100%)	783 (100%)	7,455 (100%)	94,190 (100%)

Source: ABS (2007), *2006 Census of Population and Housing*

16.3.2.2 Wage Rates

As already indicated, the majority of the workers within the combined Borroloola/Gulf region are employed as labourers (31.4%) and technicians and trades workers (16.1%). Table 16-3 highlights the average incomes for a range of occupations for the Northern Territory. The existing McArthur River Mine (MRM) currently employs approximately 360 personnel, of which approximately 80 reside in the local area. It is estimated that the average MRM salary for local residents is approximately $85,000 which is well above the average Northern Territory salary of $67,443.

Table 16-3 Employee earnings by occupation

	Weekly Income ($)	Annual Income ($)
Farm, forestry and garden	544.20	28,375
Child carers	576.70	30,069
Cleaners and laundry	811.10	42,291
Education aides	819.90	42,750
Personal carers and assistants	822.20	42,870
Receptionists	831.70	43,365
Hospitality workers	882.20	45,998
Agricultural, medical and service technicians	963.90	50,258
Food trades	981.80	51,191
Freight handlers and shelf fillers	968.40	50,492
General clerks	1,013.70	52,854
Health and welfare support	1,127.30	58,777
Personal assistants and secretaries	1,153.10	60,123
Logistics clerks	1,208.50	63,011
Bricklayers, carpenters and joiners	1,252.10	65,284
Contract, program and project administrators	1,275.90	66,525
Food preparation assistants	1,285.40	67,021
Office and practice managers	1,300.80	67,824
Fabrication engineering trades	1,319.50	68,799
Construction and mining labourers	1,354.70	70,634
Plumbers	1,426.10	74,357
School teachers	1,456.20	75,926
Social and welfare professionals	1,459.70	76,109
Natural and physical science professionals	1,475.80	76,948
Truck drivers	1,535.30	80,051
Machine operators	1,706.30	88,966
Electricians	1,825.70	95,192
Building and engineering technicians	1,948.30	101,584
Mechanical engineering trades	1,976.70	103,065
Engineering professionals	2,220.60	115,782

Source: *ABS Employee Earnings and Hours Australia* (2010), Cat.no. 6306.0

16.3.3 Jobs by industry

In the combined Borroloola/Gulf region, a substantial increase has occurred in the number of employees within public administration and safety: from 81 in 1996, to 332 in 2006. Also noticeable is the substantial decline in healthcare and social assistance positions from 149 in 1996 to only 30 in 2006.

Rather than a loss in healthcare and social assistance, it is likely that in subsequent census studies many people have reclassified their field of employment, as public administration and safety, accounting for a large proportion of the growth within that sector. Refer to Figure 16-1 for employment by industry for the combined Borroloola/Gulf region from 1996 to 2006.

Employment within agriculture is highly variable as it tends to be influenced by seasonal and market conditions. Numbers declined from 70 in 1996 to 12 in 2001, before increasing to 64 in 2006. Mining positions increased from 88 in 1996 to 104 in 2006, while construction jobs increased from 22 in 1996 to 45 in 2006.

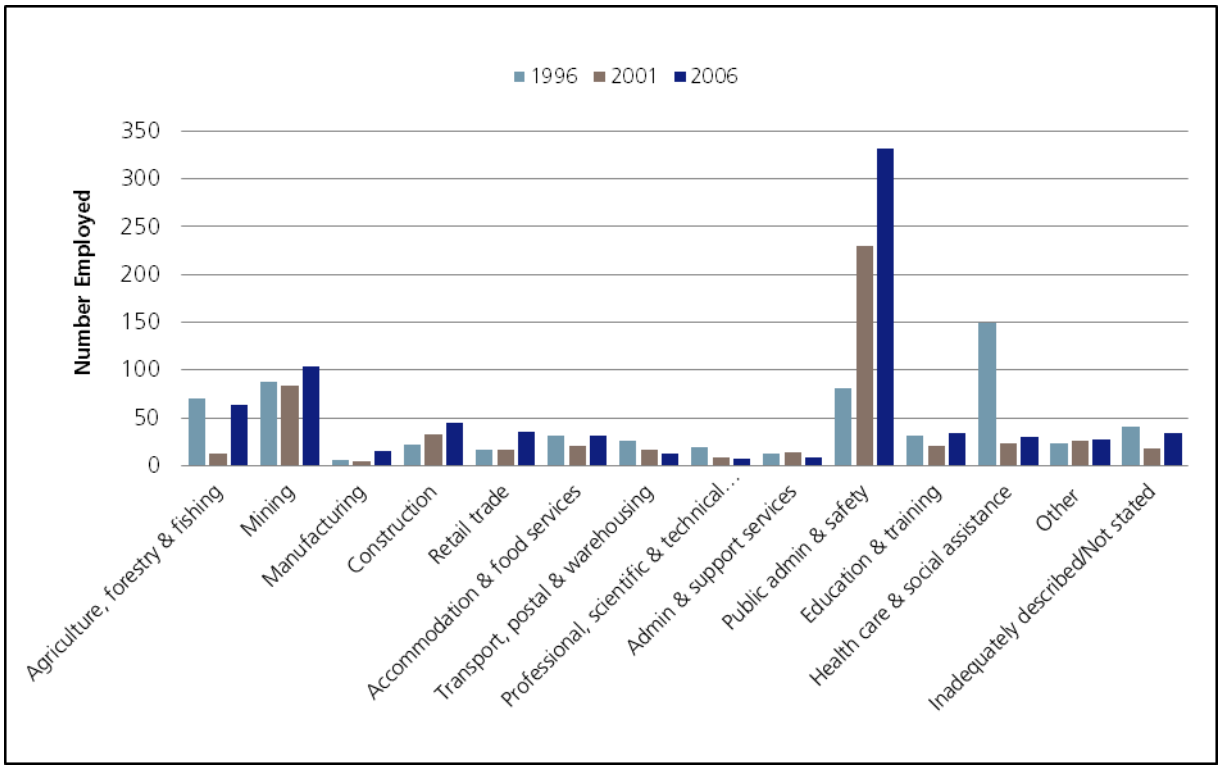

Figure 16-1 Industry of employment for Borroloola/Gulf region between 1996 and 2006

16.3.4 Types and numbers of businesses

ABS statistics relating to the size, in terms of turnover and number of businesses were available for the Roper Gulf Shire and not at the SLA level for either the Gulf or Borroloola CGC. For the distribution of businesses within the Roper Gulf Shire refer to Table 16-4. Key observations are:

- the ABS database does not highlight any mining businesses within Roper Gulf Shire
- total of 81 businesses were recorded within Roper Gulf Shire in 2009
- the majority of businesses were operating within the agriculture, forestry and fishing sector (21), followed by retail trade (15) and accommodation, cafes or restaurants (12)
- 18 businesses had a gross annual turnover of less than $100,000, while another 18 businesses had a turnover between $100,000 and $200,000

- 15 businesses had a gross turnover of between $2 million and $5 million (all within retail trade, accommodation, cafes and restaurants and rental, hiring and real estate services)
- 3 businesses had a turnover of between $10 million and $20 million (agriculture, forestry and fishing).

Table 16-4 Business count by industry for the Roper Gulf Shire (June 2009)

Industry	$0 to $100k	$100k to $200k	$200k to $500k	$500k to $1m	$1m to $2m	$2m to $5m	$5m to $10m	Over $10m	Total
Agriculture, forestry and fishing	6	–	3	3	6	–	–	3	21
Construction	3	6	3	–	–	–	–	–	12
Wholesale trade	–	–	–	3	–	–	–	–	3
Retail trade	–	–	3	–	3	9	–	–	15
Accommodation cafes and restaurants	–	–	3	6	–	3	–	–	12
Transport and storage	3	–	3	–	–	–	–	–	6
Rental, hiring and real estate services	–	–	–	–	–	3	–	–	3
Healthcare and social	3	–	–	–	–	–	–	–	3
Not classified	3	–	3	–	–	–	–	–	6
Total Businesses	**18**	**6**	**18**	**12**	**9**	**15**	**0**	**3**	**81**

Of the 81 businesses for the Roper Gulf Shire, 25.9% were engaged within the agriculture, forestry and fishing sector, followed by another 18.5% engaged in retail trade, and 14.8% in construction and accommodation, cafes or restaurants (refer Figure 16-2).

It should be noted that no mining businesses were recorded as existing within Roper Gulf Shire in 2009. However the ABS database highlights the existence of three mines grossing $50 to $200 million and another three mines grossing $200 million or more, at unspecified locations within the Northern Territory.

Data compiled by the Department of Resources (Northern Territory Government) identified that $193 million worth of zinc-lead concentrate was produced in 2008-09 within the Northern Territory. As the only major zinc-lead mine within the Northern Territory, MRM would account for the vast majority (if not all) of the $193 million of production (and thereby accounting for one of the three mines within the Northern Territory) that produced between $50 million and $100 million as at June 2009.

In addition to the 81 businesses identified, there is also at least one mine (MRM) within the Roper Gulf Shire which had a gross turnover of between $50 million and $200 million. It should be noted that MRM also produces silver as a by-product of its processing activities, which would increase the value of its production above the $193 million for zinc and lead.

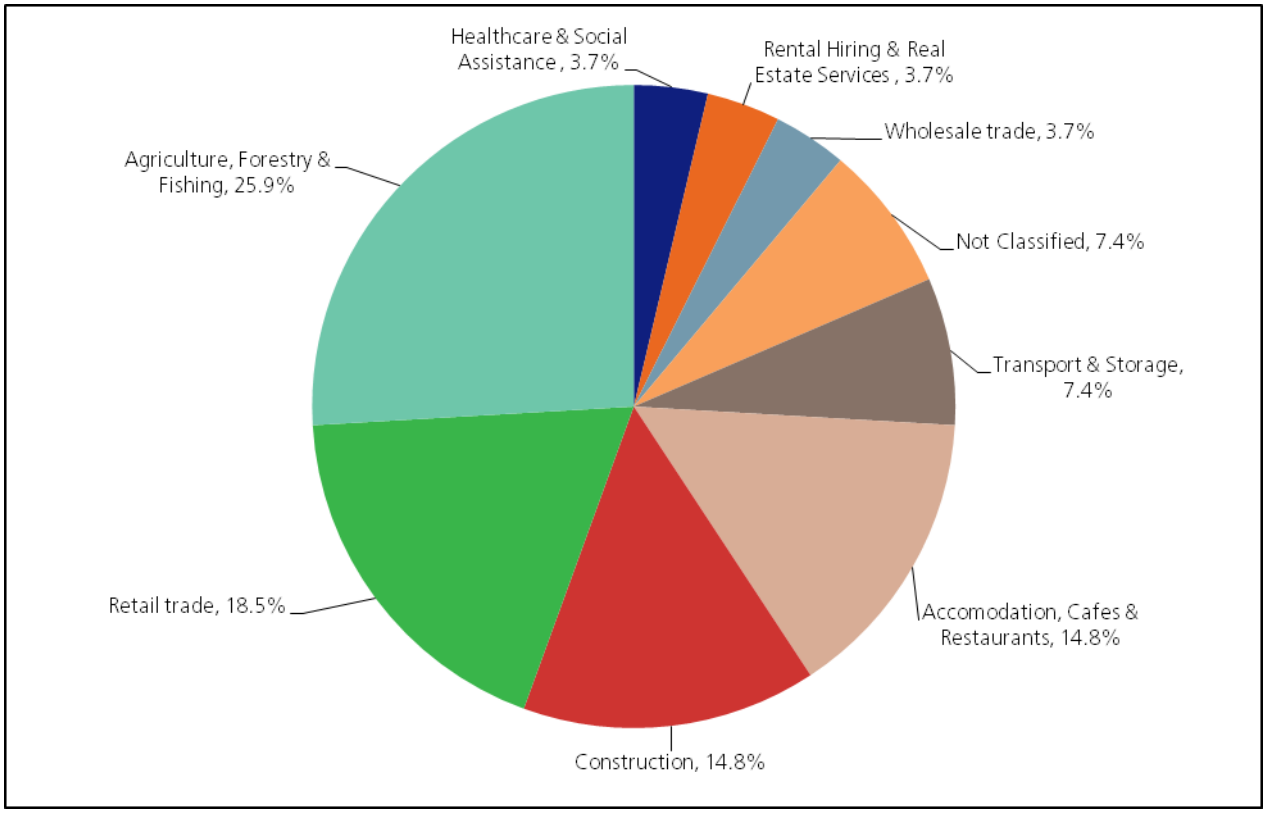

Figure 16-2 Breakdown of Roper Gulf Shire businesses by sector

Refer to Figure 16-3 for the breakup of total gross business turnover within the Roper Gulf Shire for 2008-09 by industry group. The mining sector dominates accounting for 59.8% of gross total business turnover ($193 million from MRM plus $128 million from the 81 recognised businesses) within the Roper Gulf Shire in 2008-09. Agriculture is the next most significant industry accounting for 18.1% of total gross business turnover, followed by Retail Trade at 11.7%.

16.3.5 Key industries relevant to the Project

Although a wide range of local and Northern Territory level industries is expected to be impacted either directly or indirectly by the Project, the following three industries have been examined in more detail:

- mining: Largest private sector employer within the local region
- agriculture: Second largest private sector employer within the local region after mining. Agriculture is also the dominant land use activity within the local area
- construction: Third largest private sector employer within the local region (after mining and agriculture), which is likely to benefit directly and indirectly from the Project.

16.3.5.1 Mining

MRM is the most significant mining activity within the Roper Gulf Shire. Mining is a highly mechanised activity involving the bulk handling of material, including the ore material mined, as well as the zinc-lead-silver concentrate refined on site for bulk export.

Servicing the mining equipment and on-site processing facilities, the mine site, on-site staff and supporting infrastructure, requires a wide range of products and services from other business sectors, some of which is sourced from the local Roper Gulf Shire, but most of which is provided by businesses located at Darwin.

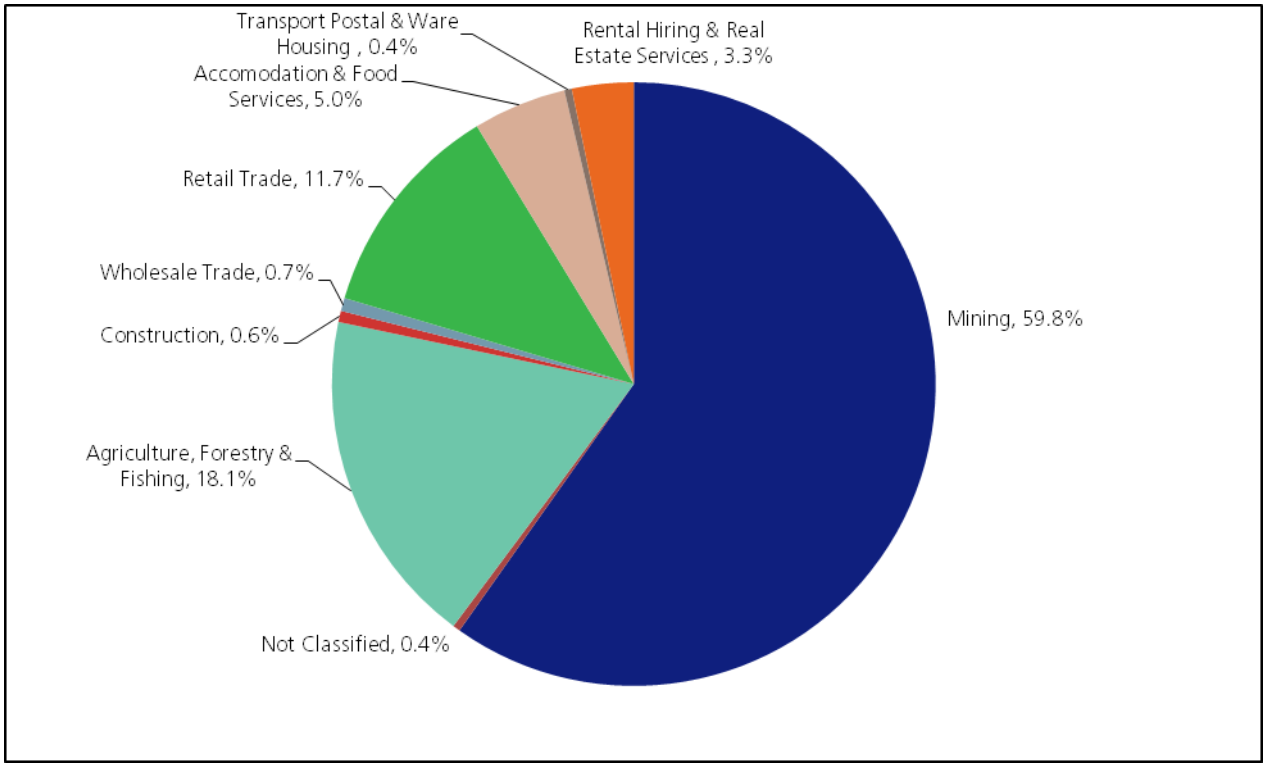

Figure 16-3 Estimated gross turnover Roper Gulf Shire businesses within sector groups for 2008-09

A contract fleet of road-trains is used for trucking the zinc-lead concentrate from MRM to the Bing Bong concentrate storage and ship loading facility (Bing Bong), where the bulk carrier MV Aburri ships the concentrate to the Offshore Transfer Zone for loading to ocean-going vessels for delivery to customers around the world. Carpentaria Shipping Services (CSS) which operates the MV Aburri, is a joint-venture involving P&O Shipping Services, Indigenous Business Australia and a local indigenous enterprise, the Mawurli and Wirriwangkuma Aboriginal Association (MAWA).

Other local business sectors that rely on the MRM activity for income (either directly or indirectly) include construction, property and business services, accommodation and food services.

The mining industry is capital and resource intensive, as well as being significant in terms of employment for remote rural communities. Within the combined BorroloolaCGC/Gulf SLA, mining accounted for 13.3% of the regional workforce. At the state level, mining accounted for 2.1% of the workforce.

In 2008-09, outputs from the mining sector accounted for over 64% of Northern Territory exports and directly accounted for 26.3% of the Northern Territory's 2009-2010 economy in value-added terms. In addition, the mining sector is a substantial purchaser of goods and services, providing significant income to support sectors including transport (air, road and sea), construction, accommodation, food services and professional/scientific and technical services. Figure 16-4 highlights the significance of the mining sector to the Northern Territory's economy in comparison to other key sectors.

MRM is one of seven major mining operations in the Northern Territory. A further 30 mining developments and expansions proposed are in varying stages of development and currently under feasibility investigations.

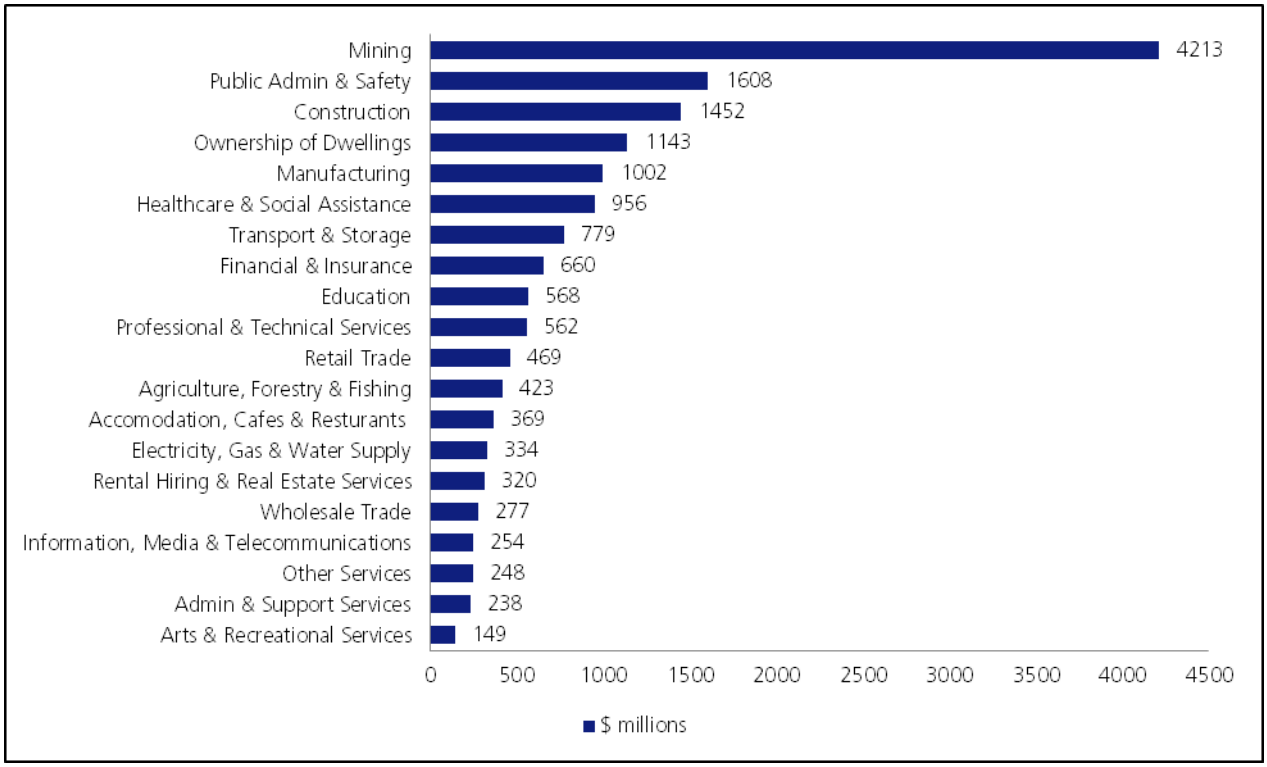

Figure 16-4 Industry value-added for the Northern Territory 2009-2010

Source: ABS (2010) *Australian National Accounts: State Accounts 2009-10*, Cat.No. 5220.0

16.3.5.2 Agriculture, forestry and fishing

The agriculture, forestry and fishing sector is capital and resource intensive and significant in terms of employment, particularly for remote rural communities. Within the combined Borroloola CGC and Gulf SLA, agriculture, forestry and fishing accounted for 8.2% of the local labour workforce and 2.7% at the state level.

As at June 2009, 1,063 businesses were engaged within the agriculture, forestry and fishing sector across the Northern Territory (refer Figure 16-5).

Other significant features of the agriculture, forestry and fishing sector at the state level include:

- value-added contribution of $423 million to the Northern Territory economy in 2009-10
- exports of $1.6 million in aquaculture, $202 million in agriculture and $1.7 million in fishing, hunting and trapping during 2008-09
- employed 3,583 people (Census, 2006).

Livestock production (primarily cattle, calves and also buffalo) dominates the Northern Territory's agricultural sector. According to the ABS, a total area of 48,409,584 ha of Northern Territory land was utilised for grazing (mainly beef) activities in 2008-09. At a high level of analysis (and generalising the stocking and production rate across all of Northern Territory) the average value of production (cattle/calves/buffalo) is $6.33 per ha in 2008-09.

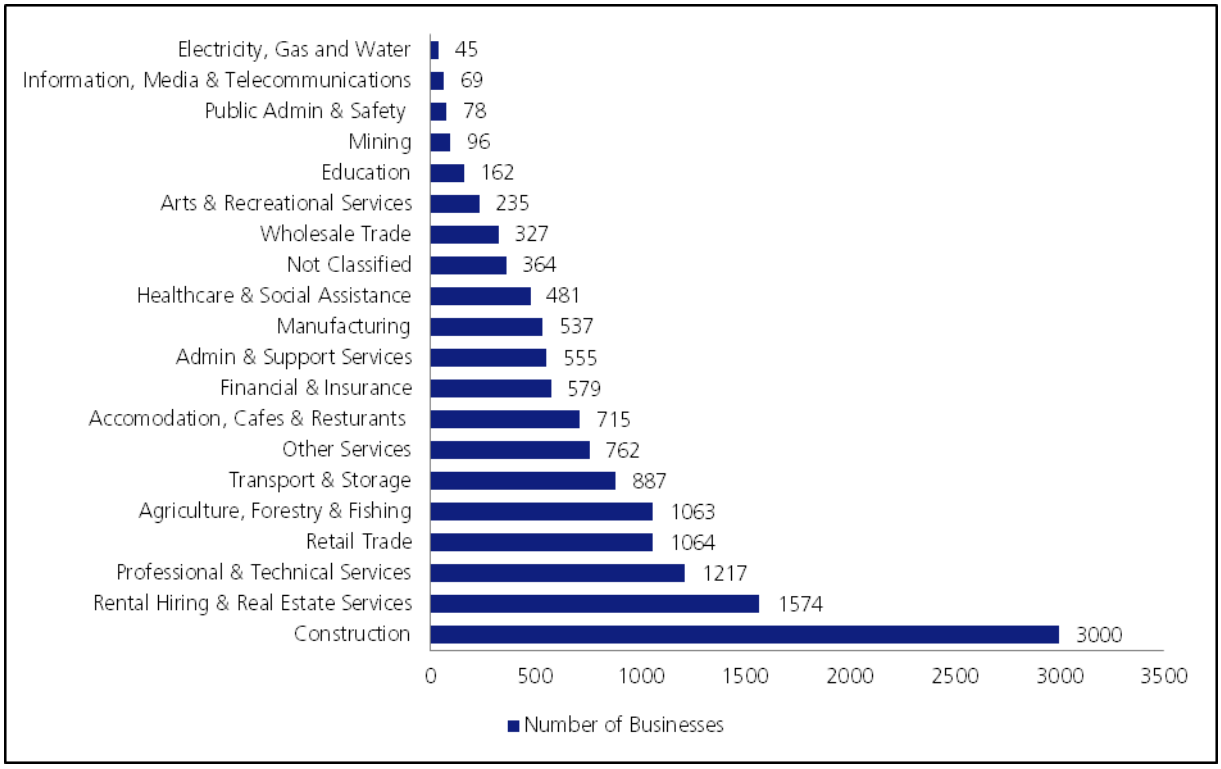

Figure 16-5 Number of businesses by industry for the Northern Territory June 2009

Source: ABS (2010) *Regional Statistics, Northern Territory, May 2010*, Cat.No. 1362.7

Agriculture, forestry and fishing are a significant industry category with 81 businesses within Roper Gulf Shire engaged in these sectors.

Unfortunately, no additional information is available regarding the agriculture, forestry and fishing sector specifically for the Roper Gulf Shire. However, the majority of the 21 businesses identified as operating in this sector are likely to be extensive grazing enterprises breeding cattle. A small number of businesses that may be engaged in fishing are more likely to be linked with tourism related activities.

The McArthur River Station Pastoral Lease, including the Tawallah and Bing Bong pastoral leases, covers an area of approximately 8,000 km^2. All of the MRM and associated infrastructure, including Bing Bong, are located within these pastoral lease lands.

McArthur River Station continues to operate as a commercial cattle production business. Cattle have been excluded from a number of areas including the Caranbirini Conservation Reserve and from MRM's mining and processing areas. The Project will not impact upon McArthur River Station's existing cattle grazing operations.

16.3.5.3 Construction

Construction is the most significant sector within the Northern Territory in terms of both business numbers (3,000) and employment (6,962 employees), second only to public administration and safety sector.

Within the Roper Gulf Shire, the construction sector is very significant in terms of economic activity. The value of approvals for residential building has increased rapidly from approximately $350,000 in 2008-09 to $5.2 million in 2010-11 (note that the 2010-11 values is for the 10 months only up to April 2011), whereas the value of building approvals for non-residential has remained relatively constant at $6 million to $7 million per annum (refer Figure 16-6).

A total of 12 construction related businesses were identified within Roper Gulf Shire (Table 16-4) as at June 2009. A number of these businesses may benefit either directly or indirectly from the Project by:

- engagement at the Project site for either construction or maintenance related activities in relation to buildings and facilities
- engagement for the construction and/or maintenance of off-site housing for local residents employed by the mine
- engagement for the construction and/or maintenance of off-site commercial buildings and infrastructure to businesses supplying goods and services to the Project.

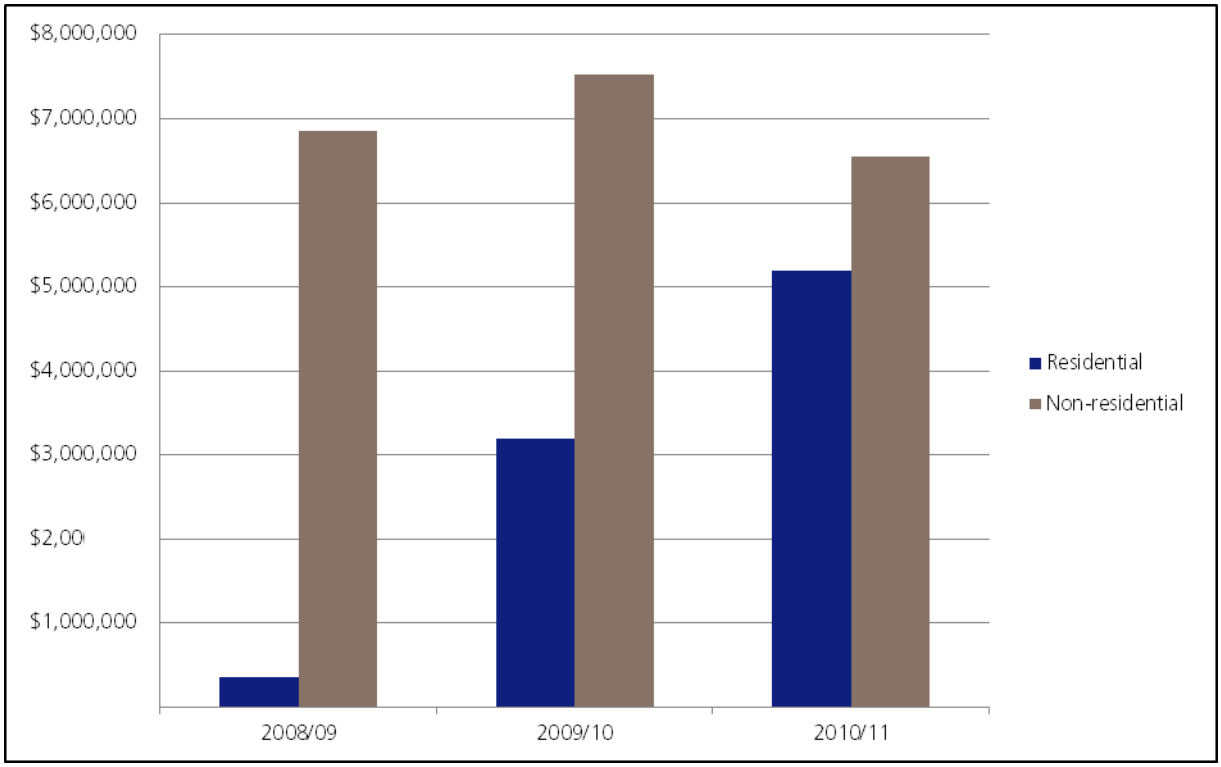

Figure 16-6 Breakdown of the value of building approvals within the Roper Gulf Shire

During the Project's two year construction phase, additional staff will be accommodated on-site for construction related activities. A number of local construction businesses are likely to be engaged for minor works and maintenance related activities during all Project phases.

16.3.6 Residential market

MRM is predominantly a Fly-In/Fly-Out (FIFO) operation. The majority of employees reside permanently in Darwin and only a small proportion of employees live locally (Borroloola, King Ash Bay and neighbouring rural properties etc.). Katherine, as the closest major township, is included in the analysis for comparative purposes, although located approximately 650 km away.

16.3.6.1 House and unit Prices for Darwin and Katherine

Table 16-5 shows the year-on-year (YoY) trends in average market prices for the residential market within both Darwin and Katherine for houses and units.

Table 16-5 Overview of residential housing market at Katherine and Darwin

Year	Katherine		Darwin	
	Median House Price (% change YoY)	Median Unit Price (% change YoY)	Median House Price (% change YoY)	Median Unit Price (% change YoY)
2002	$142,250 (8.6%)	$129,000 (12.2%)	$195,000 (7.4%)	$116,750 (10.1%)
2003	$145,000 (1.9%)	$130,000 (0.8%)	$210,000 (7.7%)	$117,500 (0.6%)
2004	$155,250 (7.1%)	$115,000 (-11.5%)	$246,750 (17.5%)	$129,000 (9.8%)
2005	$169,750 (9.3%)	$127,500 (10.9%)	$290,000 (17.5%)	$157,000 (21.7%)
2006	$200,000 (17.8%)	$137,000 (7.5%)	$354,500 (22.2%)	$215,000 (36.9%)
2007	$252,000 (26.0%)	$202,500 (47.5%)	$390,000 (10.0%)	$243,750 (13.4%)
2008	$270,000 (7.1%)	$210,000 (3.7%)	$415,000 (6.4%)	$268,000 (9.9%)
2009	$296,250 (9.7%)	$180,000 (-14.3%)	$450,000 (8.4%)	$325,000 (21.3%)
2010	$325,000 (9.7%)	$255,000 (41.7%)	$530,000 (17.8%)	$345,000 (6.2%)

Average house prices within Darwin are in the early to mid $500,000 range in 2010, having sustained strong growth since 2002 (more so for houses than units). In 2010 alone, average house prices increased by 17.8% within Darwin.

A key factor driving the Darwin property market has been the increase in mining and resource developments, with other mining projects across the Northern Territory adopting a similar model to that of MRM with on-site mine accommodation and direct FIFO to Darwin. This model limits residential housing impacts on local and regional communities from temporary and permanent workforces that can vary according to the stage of mine developments.

16.3.6.2 Darwin's rental market

The March 2011 Economic Summary Market Monitor (LJ Hooker) states that rents for:

- 2 bedroom units are at $450 per week, up 4.6% from the December 2010 quarter, but still down 2.1% for the year-to-date. Vacancy rates for units are at 1.6%
- 3 bedroom house rents decreased 3.6% to $530 per week; however on a year to date basis increased 3.9%. Vacancy rates for houses stand at 1.5%.

16.3.6.3 Darwin residential market in comparison to other capital cities

The residential market (sale and rental) within Darwin has grown strongly in recent years; resulting in median house prices being comparable to many other Australian cities (refer Figure 16-7). In fact, median house

prices in Darwin (Sept 2010) were higher than those at Perth, Melbourne, Brisbane, Adelaide and Hobart. Median house prices within Darwin have increased every year between 2007 and 2010, in contrast to the Sydney, Canberra and Perth marketplaces in which median prices declined in 2008.

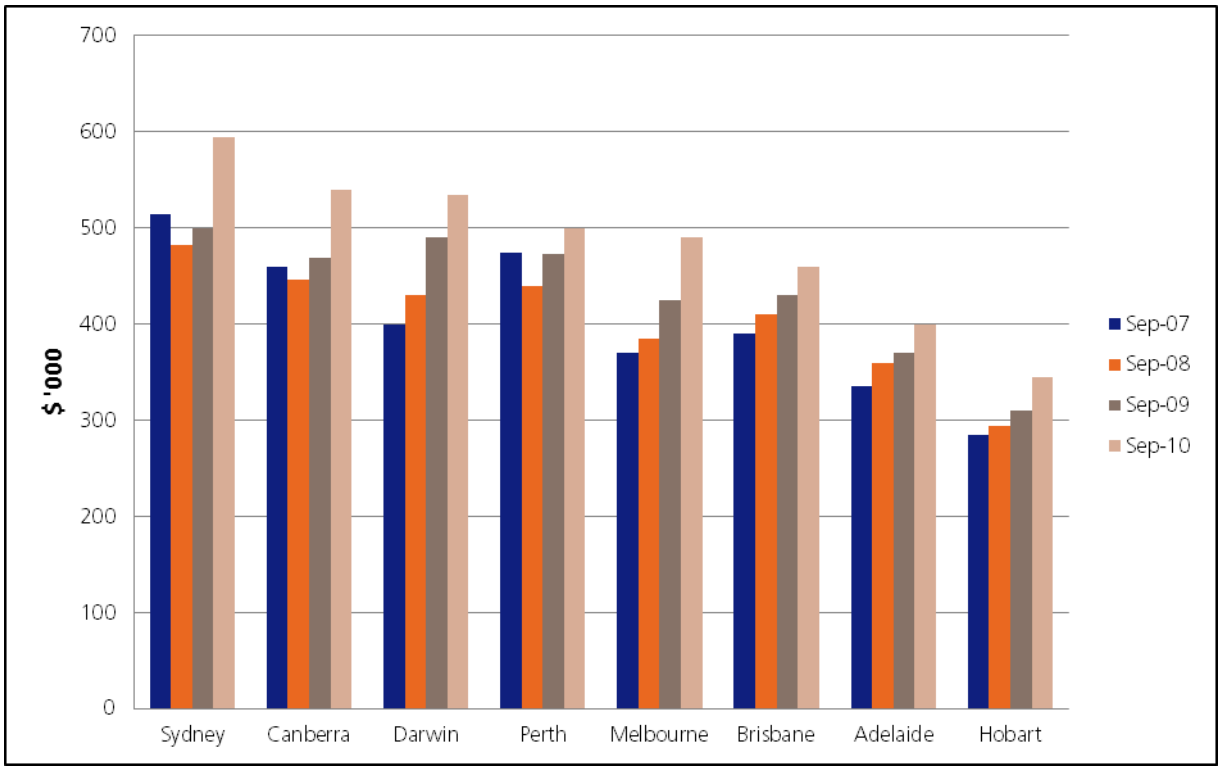

Figure 16-7 Comparison of median house prices across Australian capital cities

A key factor that fuelled growth in Darwin residential housing market prices has been the proposed $12 billion Inpex Gas Project development that encouraged a number of developers to begin residential projects in the Darwin area. It also attracted other residential property investors to acquire property in anticipation of the proposed Inpex development.

16.3.6.4 Non-residential accommodation in Roper Gulf Shire and Katherine

There is a small amount of commercial temporary accommodation available within the Roper Gulf/Borroloola region consisting of three hotels/motels/serviced apartments, offering approximately 184 beds, much of which is aligned with servicing the growing tourism sector. Room occupancy rates at these facilities were 59.5%, 60.6% and 38.3% during the respective October 2010, November 2010 and December 2010 periods (ABS, 2011).

It is expected that visitors and stakeholders associated with MRM are likely to utilise Roper Gulf/Borroloola regional facilities as opposed to facilities located in Katherine due to the significant travel time to MRM.

16.4 Potential Impacts and Mitigation Measures

The Project is expected to positively impact on local, state and national economies. At the local Borroloola CGC/Gulf SLA level, there is forecast to be a direct increase in demand for labour, local services and supplies.

At the state level, there is forecast to be an increase in demand for medium and large sized businesses, particularly within the Darwin region, to supply Project related products and services. The majority of MRM's existing FIFO employees live in Darwin, and this trend is expected to continue with the Project's expanded

FIFO workforce. Northern Territory Government revenues are forecast to receive a significant boost in terms of additional royalty payments and payroll taxes.

At the national level, the increased lead-zinc-silver concentrate production will raise Australia's commodity exports, delivering a positive impact on the national trade balance.

The Project's economic impact analysis has been divided into the following development stages:

- Stage 1 - Construction: covering the construction period between 2012 and 2013 (inclusive). Analyses the effect of the new construction activities directly related to the Project. The direct additional economic benefits are the expenditures related to construction activities that occur over and above that for MRM's existing operation
- Stage 2 - Uplift in production: covering the period between 2014 and 2027 (inclusive). Analyses the Project's operational period that overlaps with the MRM's existing mine operation. MRM's existing operation was planned to be decommissioned at the end of 2027
- Stage 3 - Extended mine operational life: covering the period between 2028 and 2036 (inclusive). Analyses the Project's additional operational period
- Stage 4 - Decommissioning: covering the period 2037 to 2039 (inclusive). Analyses the Project's decommissioning phase once mining and processing has ceased and a reduced workforce is maintained to decommission the site.

16.4.1 Stage 1: Construction (2012 and 2013)

Table 16-6 highlights the economic impact of the Project's annualised construction spend upon the Northern Territory and National economies.

Table 16-6 Stage 1 annual economic impact on the Northern Territory and National economies

	Value-added ($m)	Income ($m)	Employment (FTE)	Output ($m)
Direct	48.96	12.14	189	95.50
Indirect - industrial support	15.56	5.29	75	29.25
Indirect - consumption	9.12	3.30	45	13.99
Total Northern Territory	73.64	20.73	309	138.74
Rest of Australia	6.24	2.24	25	17.08
Total Australia	79.88	22.97	334	155.82

Annual economic impacts on the Northern Territory economy resulting from the Project's direct mine expenditure of $95.5 million per annum during Stage 1 are estimated to:

- increase total output across all industries by $139 million per annum
- increase household income by $21 million per annum
- create direct employment opportunities of 189 FTE and support the creation of another 120 FTE indirectly
- increase Gross State Product by $74 million per annum.

Nationally and inclusive of the above Northern Territory impacts, Stage 1 is forecast to:

- increase total output across all industries by $311.6 million ($156 million per annum)

- increase household income by $45.9 million ($23 million per annum)
- support the creation of 334 FTE
- increase Gross National Product by $159.8 million ($80 million per annum).

16.4.2 Stage 2: Uplift in production (2014–2027)

Table 16-7 highlights economic impact of the Project's annualised operational spend upon the Northern Territory and National economies.

Table 16-7 Stage 2 annual economic impact on the Northern Territory and National economies

	Value-added ($m)	Income ($m)	Employment (FTE)	Output ($m)
Direct	142.82	21.04	216	231.27
Indirect - industrial support	40.48	9.93	167	69.15
Indirect - consumption	16.20	5.86	115	24.86
Total Northern Territory	199.51	36.82	498	325.28
Rest of Australia	17.28	3.98	40	40.05
Total Australia	216.79	40.80	538	365.33

The annual economic impacts resulting from the Project's direct mine expenditure of $231 million per annum on the Northern Territory economy during Stage 2 are estimated to:

- increase total output across all industries by $325 million per annum
- increase household income by $37 million per annum
- create direct employment opportunities of 216 FTE, and support the creation of another 282 FTE indirectly
- increase Gross State Product by $200 million per annum.

Nationally and inclusive of the above Northern Territory impacts, Stage 2 operations is forecast to:

- increase total output across all industries by $5.1 billion ($365 million per annum)
- increase household income by $572.2 million ($41 million per annum)
- support the creation of 538 FTE
- increase Gross National Product by $3.0 billion ($216.8 million per annum).

16.4.3 Stage 3: Extended mine operational life (2028–2036)

Table 16-8 highlights the economic impact of the Project's annualised operational spend upon the Northern Territory and National economies.

Table 16-8 Stage 3 annual economic impact on the Northern Territory and National economies

	Value-added ($m)	Income ($m)	Employment (FTE)	Output ($m)
Direct	159.71	24.02	230	260.24
Indirect - Industrial Support	45.44	11.29	168	77.88
Indirect - Consumption	18.47	6.68	115	28.34
Total Northern Territory	223.62	41.99	513	366.46
Rest of Australia	18.93	4.53	41	45.12
Total Australia	242.55	46.52	554	411.58

The annual economic impacts resulting from direct mine expenditure of $260 million per annum on the Northern Territory economy during Stage 3 are estimated to:

- increase total output across all industries by $366 million per annum
- increase household income by $42 million
- create direct employment opportunities of 230 FTEs, and support the creation of another 283 FTE through consumption induced effects
- increase Gross State Product by $224 million per annum.

Nationally and inclusive of the above Northern Territory impacts, Stage 3 is forecast to:

- increase total output across all industries by $3.7 billion ($412 million per annum)
- increase household income by $418.7 million ($46 million per annum)
- support the creation of 554 FTE
- increase Gross National Product by $2.2 billion ($242 million per annum).

16.4.4 Stage 4: Decommissioning (2037–2039)

Table 16-9 highlights the economic impact of the Project's annualised decommissioning spend upon the Northern Territory and National economies.

Table 16-9 Stage 4 annual economic impact on the Northern Territory and National economies

	Value-added ($m)	Income ($m)	Employment (FTE)	Output ($m)
Direct	22.38	5.66	92	44.0
Indirect - Industrial Support	7.15	2.46	34	13.49
Indirect - Consumption	4.25	1.54	20	6.51
Northern Territory Total	33.77	9.65	146	64.00
Rest of Australia	2.86	1.04	12	7.88
Total Australia	36.63	10.69	158	71.88

The annual economic impacts resulting from the Project's direct mine expenditure of $44 million per annum on the Northern Territory economy are estimated to:

- increase total output across all industries by $64 million per annum
- increase household income by $10 million
- create direct employment opportunities of 92 FTE, and support the creation of another 54 FTE indirectly
- increase Gross State Product by $34 million per annum.

Nationally and inclusive of the above Northern Territory impacts the Stage 4 is forecast to:

- increase total output across all industries by $215.6 million ($72 million per annum)
- increase household income by $32.1 million ($11 million per annum)
- support the creation of 158 FTE
- increase Gross National Product by $109.9 million ($37 million per annum).

16.5 Local significance

The level of economic impact that the Project will have upon the local community is determined two-fold:

- by the amount of goods and services sourced from local businesses, particularly catering services, short-term accommodation and property services
- by the number of mining staff residing locally.

16.5.1 Employment

The Project is expected to require approximately 700 additional jobs over all stages. Of the additional positions, 180 are construction jobs during Stage 1, 110 operational positions for the uplift in production in Stage 2, 355 operational positions in Stage 3 when the existing operation was planned to cease production and 53 employees required for decommissioning in Stage 4 (refer Table 16-10). It should be noted that minor changes to employment numbers will occur as detailed Project design continues.

Table 16-10 Overview of average mine site employment at MRM and all Project stages

Stage	Darwin		Gulf/Borroloola		Northern Territory		
	Existing	Project	Existing	Project	Existing	Project	Total
Stage 1 Construction 2012 & 2013	360	220	80	-	440	220	660
Stage 2 Uplift in Production 2014 to 2027	285	170	65	35	350	205	555
Stage 3 Extended mine operational life 2028 to 2036	–	290	–	65	–	355	355
Stage 4 Decommissioning 2037 to 2039	–	90	–	25	–	115	115

An additional 125 employment opportunities are expected to be created in the region, defined by Gulf SLA that includes the township of Borroloola, across all Project stages, based on current local employment averages.

16.5.1.1 Local employment income

The average annual salary level at MRM is $85,000 per annum, taking into account direct employees and contractors, as well as the variety of job tasks from mining to administrative to support services, based on current local employment averages.

According to ABS data (ABS, 2011), the average household spends approximately 76% of gross household income on goods and services other than income tax, mortgage repayments and superannuation and life insurance.

It is estimated that staff residing locally will spend 60% of their expenditure on goods and services locally, whilst the remainder is likely to be spent elsewhere (travel, holidays, purchase of goods and services from outside the region). Refer to Table 16-11 for the economic impact of local employment income on the Gulf SLA/Borroloola CGC region.

Table 16-11 Annual expenditure on local goods and services within the Gulf SLA/Borroloola

	Stage 1	Stage 2	Stage 3	Stage 4
Number of Existing MRM employees residing locally[1]	80	65	–	–
Total local salary income[2]	$6.8 m	$5.5 m	–	–
Estimated expenditure on goods & services by MRM staff residing locally[3]	$3.3 m	$5.7 m	–	–
Project employees residing locally[1]	–	35	65	25
Total local salary income[2]	–	$2.3 m	$5.5 m	$1.7 m
Total additional expenditure on goods & services by staff residing locally	–	$1.4 m	$2.7 m	$1.0 m

[1]Locally defined as the township of Borroloola and Gulf SLA.

[2]Based on the current average MRM salary of $85,000.

[3]Estimated at 48.4% of total gross income

It is estimated that during Stage 2, the 35 additional MRM staff residing locally will spend approximately $1.4 million annually on goods and services supporting local businesses. Only direct Project employees are included. Additional indirect employment positions within the local community are also expected to be created as a result of this Project related expenditure on local goods and services.

16.5.1.2 Local procurement

The Northern Territory Government has a major initiative called *Buy Territory*, promoting expenditure on local goods and services to support Northern Territory businesses, jobs and the economy.

The Project is committed to a local procurement policy that utilises local businesses that are technically capable and commercially competitive. All potential suppliers to the Project must be accredited by MRM and able to demonstrate that they:

- enforce high standards of occupational health and safety for their employees and contractors
- have regard to environmental considerations when manufacturing, packing or transporting their goods
- respect human rights
- are appropriately insured
- are providing products and services that are fit for purpose.

MRM's procurement procedures are typical of best business practice, generally involving a tendering and negotiation process and contract management.

16.5.1.3 Employment strategies for Indigenous peoples

MRM has developed an Indigenous employment and training strategy in order to sustain and grow the existing Indigenous workforce above 20% of the total permanent employee base. The target of 20% Indigenous employees was reached in 2010 (Xstrata Zinc Australia, 2010). The Indigenous employment and training strategy was developed in association with the Traditional Owners, Borroloola School, Northern Territory and Australian Governments, training providers and recruitment services. The strategy targets Indigenous residents of the region including the Gurdanji, Mara, Garawa and Yanyuwa people, as well as Indigenous residents of other regions.

In addition to direct recruitment for job vacancies, MRM has a trainee program offering nine alternative career paths to engage school leavers and unskilled or semi-skilled workers.

16.5.1.4 Employment strategies for people with a disability

MRM upholds employment principles expressed within its Business Principles and the commitments stipulated within its Sustainable Development Policy. Under this policy, MRM endorses diversity within its workforce, including personnel with disabilities, subject to ensuring that high levels of workplace health and safety requirements are maintained.

16.5.2 Housing and local property value impacts

MRM accommodates all of its existing FIFO employees at a purpose built on-site accommodation village. It is proposed to extend the accommodation village northwards to cater for the Project's increased operational workforce. A temporary accommodation camp will be built to house the workforce during the Project's construction phase and will be decommissioned once all construction activities have been completed. There is not expected to be a significant impact on the Darwin housing market and property values due to the relatively low number of employees required for all Project phases.

The engagement of up to 65 residents from local and regional areas for the Project's operations is not expected to alter significantly the existing local property market conditions or prices.

16.5.3 Local community infrastructure and services

The Project's impact on community infrastructure and services is expected to be limited by the fact that the majority of the additional workforce will be FIFO, accommodated on-site in a village that provide full amenities.

In 2007, MRM, in conjunction with the Northern Territory Government, established the MRM Community Benefits Trust. MRM commits $1.35 million per year to the Trust for the first eight years. The level of funding is then subject to review for subsequent defined periods. Since 2007, around $7 million has been allocated to grants for programs implemented and planned within the Gulf region.

The Trust's plan is to continue supporting the social and economic development of the region with current priorities defined around the development of social infrastructure and commercial facilities in Borroloola, environmental initiatives in collaboration with the Yanyuwa people as part of caring for country programs, education and vocational education training, encouraging healthy lifestyles for youth and improving understanding of traditional culture. In the 2011/2012 financial year the Trust has the resources to invest a total of up to $3 million in grants, scholarships and bursaries to benefit the Gulf region.

16.5.4 Regional significance through exports

The Project will result in a significant increase in the value of mineral exports from the Northern Territory by more than doubling the existing production rate and extending mining operations by nine years from 2027 to 2036 (Table 16-12).

Table 16-12 Additional lead-zinc-silver production attributed to the Project

Factor	Existing Operations	The Project
Product dmtpa (dry metric tonnes per annum)	360,000 dmtpa of lead-zinc-silver concentrate (166,000 tonnes of zinc in concentrate)	800,000 dmtpa of lead-zinc-silver concentrate (368,000 tonnes of zinc in concentrate)
Time	Current until 2027	Proposed from 2014 to 2036

16.6 Costs to Government

16.6.1 Roads

Bulk concentrate will continue to be transported to Bing Bong in covered haulage trucks, as is the current practice. The existing haulage route will be used along the Carpentaria Highway from the Project site to Bing Bong, bypassing Borroloola. Frequency of truck movements will increase from approximately nine trucks per day to 18 trucks per day.

As discussed in Chapter 8 – Transport, there exists a current requirement to upgrade the Carpentaria Highway to a suitable pavement standard to provide adequate safety to all current and future road users. Under *The McArthur River Project Agreement Ratification Act 1992* (MRMAR Act), the roles and responsibilities for the provision of roads, airport and port facilities are clearly defined between MRM and the Northern Territory Government.

Under the MRMAR Act, the Northern Territory Government's responsibility is: 'where necessary construct and maintain all the roads from the intersection of the access road from the HYC (Here's Your Chance) deposit with the Carpentaria Highway to the Mineral Lease on Bing Bong Pastoral Lease No 686'. As such, the Northern Territory Government will be required to undertake a program of works to return the Carpentaria Highway to a suitable safety standard.

16.6.2 Bing Bong concentrate and ship loading facility

A minor extension of the existing concentrate storage shed to increase holding capacity from 60,000 wet metric tonnes (wmt) to 90,000 wmt is planned for 2012, independent of the Project. After these planned works, the current facilities at Bing Bong have sufficient capacity for the additional production from the Project. The average number of return trips taken by the MV Aburri will increase from approximately 110 to 250 per year.

No additional infrastructure investment is required from the Northern Territory Government.

16.6.3 Power

Gas fired power generation already exists on site, generating 24 MW. Existing power generation infrastructure is sufficient to facilitate the construction stage of the Project and will be expanded to 27 MW in 2012.

The operational stage of the Project requires an additional 20 MW to 25 MW of power generation capacity. A range of options are currently been investigated to facilitate additional power generation on-site. Development of additional power generation requirements will be funded by the Project and do not require any additional infrastructure investment from the Northern Territory Government.

16.6.4 Accommodation

Project employees for the operational phase will be accommodated on-site within its existing and expanded purpose built accommodation village. A temporary accommodation camp will be constructed to house the Project's construction workforce. As such, there is no requirement for additional public housing linked to the Project.

16.7 Government Revenues

16.7.1 Royalties

The Northern Territory Government's Mineral Royalty Scheme will be applicable to the Project. The Scheme is a profit-based royalty regime, which takes into account the net value of a mine's annual production, market prices and mining costs in determining royalty calculations. As of 1 July 2010, royalty rates were increased from 18% to 20%, increasing the value of royalties payable.

At present, lead, zinc and silver are omitted from the proposed Commonwealth's Minerals Resource Rent Tax (MRRT) and Petroleum Resource Rent Tax (PRRT).

16.7.2 Payroll Tax

Companies or groups of companies that pay $1.5 million or more a year in wages must pay payroll tax. There are deductions, concessions and exemptions available to eligible entities. As of 1 July 2011, the current payroll tax is 5.5% of total taxable wages (Revenue Circular RC-PRT-006: 2011-2012 Payroll Tax Change, Territory Revenue Office, Northern Territory Treasury).

For the Project's additional employment and associated estimated payroll tax liability, refer to Table 16-13. It has been assumed that all additional staff directly employed by MRM, or contractors, are over and above any exemption or payroll tax deduction levels. Average earnings for additional personnel are estimated conservatively at $85,000 per annum.

Table 16-13 Additional payroll taxes to the Northern Territory Government

Stage	Additional Staffing Levels	Additional payroll taxes to the Northern Territory Government
Stage 1	180	$841,500 per annum
Stage 2	110	$514,250 per annum
Stage 3	355	$1,659,625 per annum
Stage 4	105	$490,875 per annum

Assuming that the full value of Project wages attracts payroll tax, it has been estimated that the Northern Territory Government will receive additional payroll tax revenues of $25.3 million over the life of the Project. Notably, this analysis examines the level of payroll tax generated by the Project staff only. Flow-on jobs created as a result of the Project may also generate significant amounts of payroll taxes for the Northern Territory Government.

16.7.3 Local government revenue

For the BorroloolaCGC/Gulf SLA Region, a proportion of the new employment and new mine expenditure generated by the Project will stimulate housing, commercial and retail development. To the extent that new land is developed or converted into higher value use as rateable land, local government revenues will benefit.

However, an estimate of the likely revenue generated depends on the actual market for residential/commercial development on greenfield sites and the capacity of the local government authority to provide appropriately zoned land to meet demand if required.

16.8 Ecosystem Impacts and Alternative Land Use

16.8.1 Ecosystem impacts

Land surrounding the Project consists of open woodland supporting low density cattle grazing operations. Approximately 706 ha of remnant vegetation requires clearing for the Project. Native bushland species will be established where rehabilitation activities do not return the final landforms to grazing land use.

Vegetation and associated ecosystem provide various goods and services, many of which are both difficult to identify fully and value from an economic perspective. The majority of the land to be cleared is suited only for low density cattle grazing. Land that is disturbed by the Project will be returned to low level grazing land where practicable.

The potential benefits of the Project's ecosystem include:

- provisioning services such as food, water, timber and fibre
- regulating services that affect climate, floods, disease, wastes and water quality
- cultural services that provide recreational, aesthetic and spiritual benefits
- supporting services such as soil formation, photosynthesis and nutrient cycling.

As many of these services and products fall outside the current market system, the full value of the ecosystem is difficult to estimate from an economic perspective.

In valuing the 706 ha of remnant vegetation to be cleared, the economic value of this ecosystem has been assessed using two approaches: the first being a comparison to past studies regarding ecosystem valuation; and the second being the estimated value as a carbon sink.

16.8.2 Comparison to past studies

Curtis (2003) undertook a study to place an economic value of the Wet Tropics World Heritage Area ecosystem of north-east Queensland. A total of 10 ecosystem services were identified and valued, each utilising various methodologies including multiple criteria analysis and Delphi panel discussions. Curtis (2003) identified the value of remnant ecosystems within the Wet Tropics at $210 to $236 per ha per annum, based upon the perceived willingness to pay by various stakeholders.

BushBids is a market based instrument that has been recently introduced to protect native vegetation on private land in the Eastern Mount Lofty Ranges of South Australia, where only 8.4% of the original vegetation remains. Through two rounds of single-sealed bid reverse auctions, stewardship agreements covering 2,256 ha of fragmented native grassland and grassy woodland were awarded to protect vegetation that also contained threatened plant and animal species. The combined result for both round one (2008) and round two (2011) was a bid price of $59.00 per ha per annum (Woodlands BushBids Report 2011, South Australian Murray-Darling Basin Natural Resources Management Board).

The $59 per ha per annum offered by BushBids to maintain highly valued remnant vegetation on private properties within South Australia provides a useful market indicator of the economic value.

Within the environment at MRM in which remnant vegetation dominates the landscape, the likely economic value would be substantially lower than the $59 per ha/pa transaction captured for the BushBids project.

The environment surrounding MRM is assumed to be more similar to the environment assessed in the BushBids project than the Wet Tropics environment assessed in Curtis' study. Consequently, for the purpose of this project, $59 per ha/pa has been applied. The economic value assigned to the 706 ha of remnant vegetation to be cleared is estimated at $41,654 per annum in total.

16.8.3 Carbon sink

A second economic valuation technique considered has been to value the area of remnant vegetation to be cleared for the Project as a carbon sink (sequestration). In some ways, this methodology relies on partial market signals which are easier to validate from an economic perspective. As a carbon sink, the remnant vegetation has two carbon values:

- carbon stored in current state
- an annual sequestration value.

Maraseni et al (2006) provide a useful indication of soil carbon within a spotted gum location in a low rainfall area of South East Queensland. A remnant forest was observed to contain approximately 300 tonnes of soil carbon per hectare, and was able to sequester approximately two to three tonnes per annum.

Assuming a carbon value of $23 per tonne (which is the current price connected to the proposed carbon tax), then the potential value of the 706 ha of remnant vegetation at MRM is calculated as:

- $4.9 million in total carbon currently stored in the soil (300 tonnes per hectare of soil carbon, which is assumed to be totally lost upon clearing)
- $48,714 per annum, being the annual value of carbon sequestered by the remnant vegetation based on carbon sequestered into the soil at three tonnes per annum.

It should be noted that it is difficult to ascertain an accurate carbon value until a carbon emissions trading scheme has been established. In addition, countries with an operational carbon emissions trading scheme do not recognise soil carbon as a claimable source, therefore the $4.9 million is a theoretical value that could never actually be recovered under current systems.

16.8.4 Alternative Land Use

A total of 706 ha of vegetation require clearing for the Project. Although this area is already fenced off to exclude cattle grazing, it has an economic value in terms of supporting cattle grazing operations. To the extent that mining operations reflect a higher economic use of the land, there would be, prima facie, a net economic benefit to be gained from a change in land use.

According to the ABS, a total area of 48,409,584 ha of land was utilised for grazing (mainly beef) activities in 2008-09 across the Northern Territory. At a high level of analysis (and generalising the stocking and production rate across all of the Northern Territory) the average value of production (cattle/calves/buffalo) is $6.33 per ha in 2008-09.

The cattle grazing opportunity cost of the 706 ha of vegetation to be cleared at $6.33 per hectare, is $4,469 per annum. Note that production rates (stocking rates) and market prices vary substantially from year to year, however the $6.33 gross per ha annual grazing value is considered to be representative for the area.