10.0 Socio-Economic Effects

10.1 Introduction

This section provides an outline of the socio-economic effects of the project including its demand for and effects on housing in the local area. More detailed reports on the project's socio-economic and housing impacts are provided in Appendices P and Q respectively. This section also addresses the land use and visual aspects of the project.

The objectives of the socio-economic assessment study were to:

- Describe the existing social environment and understand the local and wider community attitudes and values.
- Discuss the impacts on the demographic, social, cultural and economic profiles.
- Identify the social and community impacts to be generated by the proposed development.
- Evaluate the extent of the social effects and the desirability of such changes in terms of their benefits and detrimental nature.
- Develop appropriate measures to minimise potential adverse social and community impacts and enhance positive impacts.
- Assess the overall social, economic and community impacts of the proposed development taking into account the recommended measures for management of impacts.

Issues that have been considered include:

- Geographical extent of the study area.
- Population and demographics.
- Community infrastructure and services, access and mobility.
- Recreational, cultural, leisure and sporting facilities and activities.
- Health, emergency services and educational facilities.
- Housing and land market, including availability and affordability of privately-owned homes, rental properties, welfare and community homes.
- Local community values and vitality.
- Amenity, lifestyle, and community values.

10.2 Methodology

The socio-economic impact assessment has been undertaken to address the social and economic components of the terms of reference, but also in accordance with best-practice guidelines and principles.

The following tasks were undertaken as part of the socio-economic assessment:

- Review of existing information.
- Community and stakeholder consultation.
- Description of the existing socio-economic values.
- Identification and assessment of potential social and economic impacts and effects.

For further information on the methodology refer to Appendix P.

10.3 Existing Demographic Profile

10.3.1 Existing Population

The estimated resident population of the Calliope and Gladstone local government areas (LGAs) as at 30 June 2005 was 45,274. This is comprised of 16,467 people from Calliope Shire and 28,807 from Gladstone City. The population in the immediate area around the refinery and residue storage facility (RSF) was 325 persons as at the 2001 census. Both LGAs have traditionally experienced steady population growth.

The area in the vicinity of the pipeline projects incorporates the following LGAs: Calliope Shire, Gladstone City, Livingstone Shire, Fitzroy Shire, Mount Morgan Shire and Rockhampton City. Most of these LGAs (with the exception of Calliope and Gladstone) have traditionally experienced relatively low population growth. In the twelve months prior to June 2005, all LGAs recorded population growth below 2% which was the average state population growth rate.

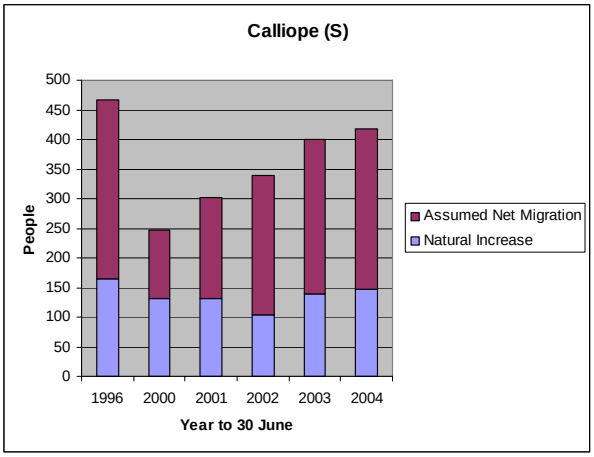
Table 10.3.1 and Figures 10.3.1 and 10.3.2 provide a summary of the population trends in the region. Further details are provided in Appendix P.

Table 10.3.1 Regional Population Trends

LGA	1996	2000	2001	2002	2003	2004	2005
Livingstone	23,156 (3.9%)	25,631 (1.5%)	26,368 (2.9%)	26,888 (2.0%)	27,609 (2.7%)	28,266 (2.4%)	28,745 (1.7%)
Fitzroy	9820 (0.7%)	9937 (0.4%)	9,990 (0.5%)	10,085 (1.0%)	10,185 (1.0%)	10,296 (1.1%)	10,374 (0.8)
Rockhampton	59,857 (0.2%)	59,043 (-0.5%)	59,924 (-0.2%)	59,035 (0.2%)	59,187 (0.3%)	59,755 (1.0%)	60,084 (0.6%)
Mount Morgan	2964 (-1.7%)	2,900 (-0.3%)	2,943 (1.5%)	2,963 (0.7%)	2,987 (0.8%)	3,057 (2.3%)	2974 (-2.7%)
Calliope	13,575 (3.6%)	14,753 (1.7%)	15,054 (2.0%)	15,393 (2.3%)	15,793 (2.6%)	16,235 (2.6%)	16,467 (1.4%)
Gladstone	26,574 (1.4%)	26,631 (0.2%)	26,831 (0.8%)	27,315 (1.8%)	27,807 (1.8%)	28,548 (2.5%)	28,807 (0.9%)
Fitzroy Statistical District	180,815 (2.6%)	183,060 (0.1%)	184,411 (0.7%)	186,143 (0.9%)	187,974 (1.0%)	190,466 (1.3%)	192,377 (0.8%)
Queensland	3,338,690 (2.3%)	3,561,537 (1.7%)	3,628,946 (1.9%)	3,710,972 (2.3%)	3,801,039 (2.4%)	3,888,077 (2.0)	3,963,968 (2.0%)

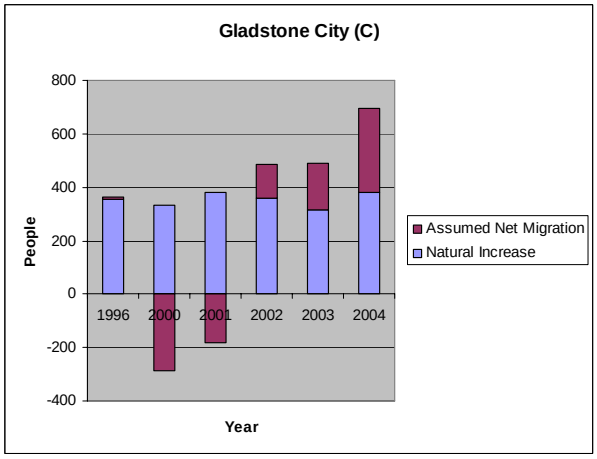
(Source: PIFU 2006 (a-h))

Figure 10.3.1 Components of Population Change – Calliope Shire



Source: PIFU, 2006(b)

Figure 10.3.2 Components of Population Change – Gladstone City



Source: PIFU, 2006(a)

10.3.2 Age Structure

The estimated age structure of residents in LGAs within the region based on preliminary Australian Bureau of Statistics (ABS) data as at 30 June 2005 is shown in Appendix P. For all of the LGAs within the region, the largest proportion of the population is 'working age' between 15 and 64 years of age, with the 25-44 and 45-64 year age groups making up a dominant component of the resident population.

General trends for all LGAs within the region include:

- a decrease in the 0-14 year old age bracket.
- a decrease in the 15-24 and 25-44 year old age brackets.
- an increase in the 45-64 and above 65 year old age brackets.

The trend towards an ageing population is occurring across Australia.

10.3.3 Family Structure

Table 10.3.2 outlines the household and family types in the Calliope, Gladstone, Fitzroy and Queensland communities by households at the 2001 census. Details of household and family type for other LGAs have not been included as most workers for the construction of the project pipelines will be accommodated in temporary workers' villages as single workers, and will not be accompanied by partners or dependents. As at the 2001 census, Calliope had a greater proportion of couple families with children (61%) and a lower proportion of other family types (couple family without children, one parent family, multi-family household, lone person household, group family household) than Gladstone and Queensland (55-50%). Gladstone had a higher proportion of couple family with children households (55%) than the Queensland average, though other family types were fairly representative of the Queensland average.

Household types have remained consistent since the 1991 census for both Calliope and Gladstone, with 91 – 92% of households being single family abodes.

Table 10.3.2 Household Type and Family Type (2001)

Category	Immediate Area		Calliope		Gladstone		Fitzroy SD		Queensland	
	%	Persons	%	Persons	%	Persons	%	Persons	%	Persons
One family household:										
Couple family with children	60%	185	61%	8,189	55%	13,582	54%	85,264	50%	1,617,476
Couple family without children	25%	78	20%	2,733	19%	4,788	20%	32,226	21%	676,855
One parent family	8%	23	9%	1,152	12%	2,871	11%	17,761	12%	381,364
Other family	0%	0	0%	50	1%	152	1%	1,435	1%	34,334
Multi-family household	na	na	1%	145	1%	303	2%	2,398	2%	60,899
Lone person household	6%	17	7%	890	9%	2,144	9%	15,042	10%	315,949
Group household	1%	3	2%	228	3%	718	3%	4,765	4%	134,449
Total	100%	306	100%	13,387	100%	24,558	100%	158,891	100%	3,221,326

Source: ABS, 2002 (j-n) Time Series Profile; ABS, 2002 (a,b,c,h,j) Basic Community Profile)

10.3.4 Residency

The majority of residents (83.7%) within Gladstone and Calliope and 85.9% within the within the wider region, were born in Australia. The most common places of origin for those born overseas were Great Britain and New Zealand.

In 2001, over 95% of residents from the region spoke English only. Other languages spoken at home were Dutch, German and Vietnamese (ABS, 2002b,c).

10.3.5 Indigenous Population

In the 2001 census, 3.1% of residents of the Gladstone and Calliope study area identified themselves as having indigenous ancestry (either of Aboriginal or Torres Strait Islander descent or both). Within the wider region, 4.1% of the resident population identified themselves as indigenous.

10.3.6 Labour Force and Unemployment

Table 10.3.3 shows the estimated labour force as at 31 March 2006. The labour force has increased in all LGAs in the region since 2001.

Table10.3.3 Employment Profiles

Area	Employed 2001	Employed Full Time 2001 (%)	Unemployment Rate 2001 (%)	Labour Force 2001	Estimated Labour Force at 31 March 2006
Livingstone	10,196	61.6	8.5	11,149	14,145
Fitzroy	4,370	64.0	6.9	4,370	5,729
Rockhampton	26,754	63.4	9.3	26,754	33,734
Mt. Morgan	614	57.7	23.3	800	1,073
Calliope	6,357	67.1	7.6	6,878	8,823
Gladstone	12,033	66.9	9.5	13,292	16,433
Queensland	1,568,864	63.9	8.2	1,709,612	2,100,248

Source: Queensland Regional Statistical Information System (QRSIS) 2005

LGAs within the region recording low unemployment rates include Fitzroy Shire (2.6 %), Gladstone City (4.3 %) and Calliope Shire (4.5%), while Mount Morgan recorded the highest unemployment rate at 20%. As indicated in Appendix P, unemployment rates for all LGAs within the region have been steadily declining since 2003 and are considerably lower than the unemployment rates recorded at the 2001 census.

10.3.7 Employment by Industry and Occupation

Table 10.3.4, details the proportion of people employed in selected industries (as of the 2001 census) within the region. Industries shown in Table 10.3.4 represent some of the core industries that will be involved in the construction and operation of the Gladstone Nickel Project (GNP). Further information is given in Appendix P.

The data indicate that a high proportion of the working population in the region are employed as tradespersons and related workers which are similar occupational skills to those the project will require.

It has been noted in discussions with both Calliope Shire and Gladstone City Councils that a significant portion of the resident labour force in the area works outside of the Gladstone region. This is thought to be due in part to better employment opportunities in the mines in the Bowen Basin than in the immediate Gladstone area.

In Calliope Shire, under half of the labour force was employed in jobs locally within the Calliope area. In Gladstone, this proportion was higher with close to 70% of the labour force being employed locally. Council officers believe that a major construction project, such as the GNP, would draw a substantial number of the labour force working outside Gladstone region back to Gladstone.

Table 10.3.4 Key Industries by Employment (%) as at 2001 Census

Location	Key Industries involved in construction and operations for the project			
	Manufacturing	Electricity, Gas, Water Supply	Construction	Transport & Storage
Livingstone	8.2	1.4	7.9	4.4
Fitzroy	9.7	2.1	6.6	8.3
Rockhampton	9.8	2.2	5.9	6.5
Mount Morgan	8.4	1.5	7.1	6.1
Calliope	24.2	1.6	8.8	5.7
Gladstone	18.5	2.7	8.5	8.1
Queensland	10.7	0.8	7.1	4.9

10.3.8 Income

The median weekly individual and family income for Gladstone as at the 2001 census ($376 and $998 respectively) was above the Queensland average ($360 and $871 respectively). Calliope Shire's median family weekly income ($975) was also above the state average. However, its median individual income ($343) was below the state average ($376). Refer to Appendix P for further details.

10.3.9 Education Profile

Appendix P outlines educational qualifications and certificates of residents within the Gladstone and Calliope areas (ABS Census, 2001). Certificates are held by 20.9% of Calliope residents and 20.2% of Gladstone residents. The majority held a qualification in "Engineering and Related Technologies" (ABS, 2002(b,c)). Within the wider region,

certificates were the most common form of educational qualification, with Gladstone and Calliope LGAs having significantly higher rates than the other LGAs.

The proportion of over 15 year-olds with certificate qualifications is higher in Gladstone and Calliope (20% each LGA) than for the Fitzroy District and Queensland. This indicates that a base of workers with trade qualifications could be available for the GNP.

10.3.10 Population Projections

The Planning Information Forecasting Unit (PIFU) from the Department of Local Government, Planning, Sport and Recreation has developed population projections for the LGAs in the GNP's study area. These LGAs are generally expected to have population growth above the forecast Queensland's average growth rate. The only exceptions are Rockhampton which is predicted to have a relatively static population growth and Mount Morgan which is expected to have a declining population. Table 10.3.5, details population projections for the LGAs discussed.

Table 10.3.5 Regional Population Projection

LGA	Year				
	2006	2011	2016	2021	2026
Livingstone	30,471 (2.9%)	34,740 (2.7%)	39,026 (2.4%)	43,286 (2.1%)	47,405 (1.8%)
Fitzroy	10,593 (1.2%)	11,276 (1.3%)	11,923 (1.1%)	12,547 (1.0%)	13,145 (0.9%)
Rockhampton	60,201 (0.4%)	60,311 (0%)	60,410 (0%)	60,506 (0%)	60,605 (0.0%)
Mount Morgan	2964 (0.1%)	2,881 (-0.6%)	2,735 (-1.0%)	2,577 (-1.2%)	2,401 (-1.4%)
Calliope	17,081 (2.6%)	19218 (2.4%)	21256 (2.0%)	23,635 (2.1%)	26,280 (2.1%)
Gladstone	28,604 (1.3%)	31,688 (2.1%)	35,788(2.5%)	40,280 (2.4%)	45,124 (2.3%)
Fitzroy SD	194,236 (1.0)%	204,019 (1.0%)	214,529 (1.0%)	225,627 (1.0%)	237,021 (1.0%)
Queensland	4,015,722(2.0%)	4,354,106(1.6%)	4,677,780(1.4%)	4,989,871(1.3%)	5,289,027(1.2%)

Source: PIFU 2005 (a,b,c,d)

10.4 Existing Housing and Accommodation Facilities

10.4.1 Introduction

This section summarises the relevant information about the existing housing and accommodation facilities in Gladstone City and Calliope Shire including land availability for residential development, availability of rental housing, and houses available for purchase. Further details are found in the housing impact study in Appendix Q.

Housing and accommodation characteristics for other LGAs are not discussed, as the workforce for pipeline construction will have minimal influence on housing in the surrounding area. Pipeline construction is over a relatively short period and the majority of the pipeline construction workforce will be accommodated in temporary workers' villages, including the proposed workers' village for the construction workforce for the refinery and RSF (refer to Section 10.7.2). A mobile workers' village, at locations within the Fitzroy Shire, will be used to accommodate the construction workforce for the pipelines in the northern parts of the Marlborough to Gladstone pipelines. Gladstone Pacific Nickel Limited (GPNL) has had preliminary discussions with staff of the Fitzroy Shire regarding locations and requirements for the mobile workers' village. The small operational workforce for construction of the pipelines will not have a significant impact on local housing and accommodation.

10.4.2 Dwelling Structure

The predominant housing type in the local region is detached housing, accounting for 78% of Calliope's and 75% Gladstone's total housing stock. The vast majority of Calliope residents (91%) and Gladstone residents (89%) resided in detached houses (ABS, 2002(b,c)).

Gladstone has a significantly higher proportion of flats/units/apartments (10%) than Calliope (2%) reflecting the more urbanised form of the inner city area of Gladstone. Also of note is the proportion of "other" dwellings located in Calliope (6%) predominantly consisting of caravans, cabins and houseboats. The proportion of "other" dwellings located in Calliope is significantly higher than that for Gladstone, the Fitzroy Statistical District (SD) and Queensland.

10.4.3 Household Size

The average household size for all housing types has been decreasing steadily in Gladstone and Calliope. The rate of decline is consistent with the decreasing household size across Australia. Household sizes for Calliope and Gladstone have dropped from 2.9 (1991 census) to 2.7 (2001 census) slightly above the average household size of Queensland (2.6).

10.4.4 Home Ownership

Table 10.4.1 summarises the status of home ownership and rental housing in the region in 2001. In Gladstone there was a lower level of home ownership (30.6%) compared with the Fitzroy Statistical Division (Fitzroy SD) (38%) and Queensland (37%). However, the rate of properties being purchased (30%) was above the Fitzroy and Queensland average (25%) and (26%) respectively. There is a relatively high rate of home ownership/purchase (35.3 %) within the immediate area around the refinery and RSF (local collector districts) and low rate of rental (16.4%) compared to the total region and state.

Gladstone had a slightly higher rate of non–public housing properties being rented (28%) than Fitzroy (26%) and Queensland (27%), while the proportion of rental tenure types in Calliope (21%) was significantly lower. The proportion of public housing (6%) was above the proportion of public housing tenures in Queensland (3.5%).

Table 10.4.1 Home Ownership

Tenure Type	Immediate Area	Calliope	Gladstone	Fitzroy	Queensland
Fully Owned	35.3%	38.1%	30.6%	37.5%	36.6%
Being Purchased	35.3%	32.7%	29.8%	24.7%	25.8%
Rented - Housing Authority	0.0%	1.1%	6.4%	3.7%	3.5%
Rented - other	16.4%	20.8%	27.9%	26.1%	26.6%
Other (inc. not stated)	12.9%	7.3%	5.3%	8.0%	7.5%
Total (number)	116	5,219	9,853	65,924	1,355,613

Source: ABS, 2002 (a,b,c,h,i).

10.4.5 Residential Land Supply

Estimates from Gladstone City Council (GCC), Calliope Shire Council (CSC) and the Department of State Development have indicated that there are approximately 1,000 approved residential allotments in Gladstone and

2,000 approved allotments in Calliope (mainly Tannum Sands)[1]. These lots are approved but may not be serviced/constructed/produced. In Gladstone it can take 12 to 18 months for site works to be completed once subdivision is approved.

Table 10.4.2 summarises the rate of allotment approval and production in Gladstone and Calliope over the last nine years.

Table 10.4.2 Rate of Allotment Approval and Production

LGA	Allotment Status	Year								
		1997	1998	1999	2000	2001	2002	2003	2004	2005
Gladstone	Approved	215	176	169	144	80	529	682	129	147
	Produced	152	130	222	81	89	205	261	290	154
Calliope	Approved	119	54	89	55	40	268	470	234	216
	Produced	169	75	30	98	33	46	155	182	174

10.4.6 Approval and Construction of Dwellings

The Gladstone/Calliope area has an active residential construction industry. Builders from Rockhampton also service the area. The Queensland Master Builders Association in Rockhampton has estimated that the local building industry has the capacity to complete around 30–35 houses per month (360+ pa) and has the ability to increase this output to approximately 50 houses per month (600 pa) if required. The main limiting factor in the capacity of the residential construction sector is the shortage of skilled sub-contractors.

Table 10.4.3 summarises the number of building approvals for dwellings in Gladstone and Calliope between 1997 and 2005. The rate of building approvals roughly corresponds with the rate of lot approvals and production for this period. Dwelling approval figures for the March quarter 2006 suggest that the Gladstone residential construction market may be experiencing a surge in demand, with 166 dwellings approved in January and February 2006[2].

Table 10.4.3 Dwelling Approvals

LGA	Year								
	1997	1998	1999	2000	2001	2002	2003	2004	2005
Gladstone	198	215	191	165	95	250	304	205	209
Calliope	135	126	104	107	79	187	213	140	167
Total	333	341	295	272	174	437	517	345	376

10.4.7 Property Prices

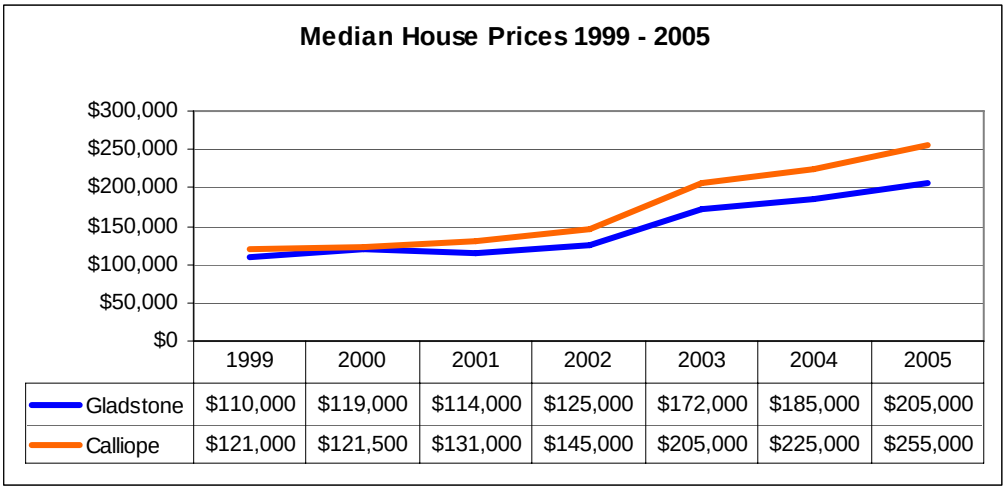
Figure 10.4.1, compares median house prices, based on medians for all house sizes, for Gladstone and Calliope LGAs for the period 1999 to 2005. The data illustrate the surge in prices from 2002 onwards, and the generally

[1] From notes of consultation meetings with Gladstone City Council, Calliope Shire Council and Dept of State Development, 10 May 2006

[2] Gladstone Area Promotion and Development Ltd, Project Status Report March Quarter 2006, based on local government building approval records

higher prices prevailing in Calliope when compared to Gladstone which reflect the higher prices in the beachside suburb of Tannum Sands which is the main growth area in Calliope Shire. The surge in prices from 2002 onwards may have been associated with Comalco Alumina Refinery (CAR) project, but may also reflect the Australia-wide boom in residential property values.

Figure 10.4.1: Gladstone and Calliope Median House Prices



	1999	2000	2001	2002	2003	2004	2005
Gladstone	$110,000	$119,000	$114,000	$125,000	$172,000	$185,000	$205,000
Calliope	$121,000	$121,500	$131,000	$145,000	$205,000	$225,000	$255,000

10.4.8 Rental Property

Availability of rental properties has varied over time. LJ Hooker in Gladstone, the real estate agent with the largest rent roll, estimated a vacancy rate of 2% for their portfolio (May 2006). An informal survey of property managers in Gladstone and Calliope LGAs in May 2006 concluded there were approximately 50 houses and 50 flats/units available for rent at that time[3].

Rent levels have varied over time. These were highest between 2002 and 2003 but median rental prices decreased between 2003 and 2005. However, recent figures indicate rental prices are now increasing. In the March quarter of 2006 rents prices were as follows:

- 4-bedroom house - $270/week.
- 3-bedroom house - $220/week.
- 2-bedroom flat - $160/week.

10.4.9 Public Housing

In July 2006, the Department of Housing (DoH) had 750 rental units in the Gladstone area. DoH's housing is always occupied, except for very short periods between tenancies. It maintains waiting lists for all its accommodation with waiting times varying depending on situation of the applicant and the housing type required. In February 2006 the waiting list for public housing in the Gladstone area reached 600 applications.

The DoH's housing stock is increasing. Two 2-bedroom duplexes were purchased at the beginning of 2006 and construction of 12 more units has been recently completed (October, 2006). There are plans to construct a further 24 units, including 8 seniors units. DoH is now able to buy existing homes and may purchase 1, 2 and 3 bedroom units in the future rather than construct new ones.

[3] Gladstone Tenant Advice and Advocacy Service, 9 May 2006

10.4.10 Hotel and Motel Accommodation

The number of short-term accommodation units in the region has remained at approximately 660 for the last few years. However, there are a number of motel and hotel developments that have gained town planning approval but have not yet been constructed. Two large hotels in the Gladstone central business area are reported to be planning major expansions in the near future, which would increase the pool of short-term accommodation by 10% to 20%. The most recent estimate of the occupancy rate for this type of accommodation (end of 2004) was 64.5%, down slightly from the previous year (GAPDL, 2006(a)).

There are a small number of serviced apartments and boarding houses in Gladstone that can be rented for longer periods. The total number of rooms available is less than 100 and these are generally fully booked.

10.4.11 Caravan Parks

There are presently nine caravan parks in the Gladstone and Calliope, consisting of approximately 860 caravan sites, tent sites, cabins and on-site vans. Demand for caravan park style accommodation is seasonal, with the winter months being the period of highest demand when all parks experience 100% occupancy. During the summer months occupancy is lower. Since the closure of the caravan park at Clinton (the largest and cheapest park in the area) in 2005, the remaining parks have a higher occupancy rate and larger numbers of long-term residents than previously. This has reduced the capacity of all the parks to provide temporary accommodation for construction workers and the seasonal tourist influx.

10.4.12 Workers' Villages

There are no existing workers' villages in the Gladstone/Calliope area at the present time but villages have been proposed in the past as a means to accommodate temporary construction staff working on large scale industrial projects. During consultation with state and local government agencies in Gladstone and Calliope the disposition of those agencies towards workers' villages was explored.

GCC is opposed to workers' villages and would not support such a proposal. There have been widespread objections to proposed villages in the past by potential neighbours and adjacent land owners, and council is alert to this community sentiment. The Gladstone office of the Department of State Development and Innovation indicated that it would not wish to act contrary to the council's attitude and community sentiment, and pointed out that the State Government has previously rejected proposals for villages within the Gladstone State Development Area (GSDA).

Calliope Council staff indicated that their council was willing to consider workers' villages to house single persons, subject to conditions. It would be important that the village was away from residential areas and should be fairly self contained, having good quality recreational facilities including its own wet canteen. The council would prefer that transport between the village and the construction site is by bus, to minimise the traffic impacts on local roads[4].

10.5 Project Workforce

10.5.1 Construction Workforce

Construction of Stage 1 (including the project pipelines) is expected to start in early 2008 and take approximately 2.5 years. The initial workforce will commence at 400 and steadily increase to a peak of approximately 2,600 in April 2009 (the peak six-monthly average will be 2,200). After this, construction numbers will steadily decrease, with the end of construction of Stage 1 anticipated in late 2010.

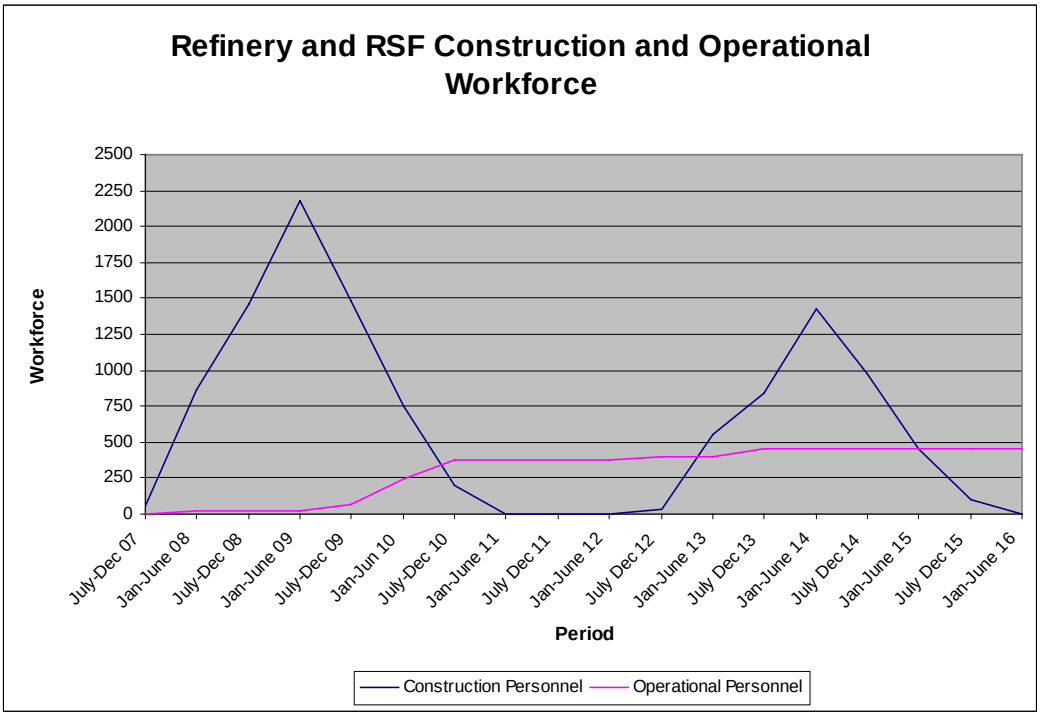
[4] Consultation meetings with Gladstone City Council, Calliope Shire Council and Dept of State Development, 10 May 2006

Depending on market demand, construction for Stage 2 is expected to commence in 2013 and steadily increase to 840 workers in October 2013. The construction workforce will peak at approximately 1,750 persons in April 2014 and decrease to 840 by October 2014. Worker numbers for this construction phase will further decrease and it is expected to be finalised by September 2015.

The construction phase will have a large requirement for skilled trades people, labourers and professionals. The Gladstone/Calliope region has a high proportion of people in these occupations with appropriate trade qualifications, indicating that GNP will be able to recruit locally as well as outside of the region for its skilled workforce needs.

Figure 10.5.1 summarises the construction workforce numbers (six-monthly averages) for Stages 1 and 2 for the refinery, RSF and associated pipelines. As discussed in Section 1.5, a more aggressive project schedule (construction beginning by the end of 2007) had been assumed for the detailed environmental assessments (e.g. traffic, economics, housing etc.). It is this schedule that is shown in Figure 10.5.1 and subsequent sections.

Figure 10.5.1 Construction and Operational Workforce (six-monthly averages)



A construction workforce (excluding construction management, project supervision and GPNL personnel) of approximately 300 personnel is anticipated during the construction of the project pipelines. Table 10.5.1 outlines occupational groups and workforce numbers for the construction of the pipelines.

Table 10.5.1 Pipeline Construction Workforce

Occupational Group	Workforce Numbers
Trades' assistants, labourers, others	130
Trades people	50
Managers, engineers, office staff, surveyors, supervisors & foremen	30
Sub - contractors	60
Operators / drivers	30
Total	300

10.5.2 Operational Workforce

Stage 1 of the operations phase is expected to begin in October 2010. Stage 2 operations involve an increase in production and will begin immediately after the Stage 2 construction phase in October 2015. Figure 10.5.1 details the operational workforce requirements for both Stages 1 and 2.

A small operational workforce will begin employment at the commencement of the Stage 1 construction phase. The main recruitment for operational staffing will begin in early 2009. Once full operations commence in October 2010, around 385 full time equivalent (FTE) staff will be employed. This will increase by approximately 40-50 persons once Stage 2 commences.

The operational workforce will consist of skilled tradespeople along with professionals and administration staff. Table 10.5.2 provides a breakdown of the number of operational staff required for Stage 1. For Stage 2, there will be an approximately 5 to 10% increase in worker numbers across most of these worker categories.

Table 10.5.2 Operational Direct Workforce (Stage 1)

Worker Type	No. of Staff
Processing Refinery Staff	198
Maintenance Personnel	134
General Administration	48
Environmental Officers	5
Total Operational Staff	385

A small operational workforce of four staff will be required for operation and maintenance of the pipelines between Marlborough and the refinery. This workforce will consist of skilled tradespeople who GPNL will aim to source locally or within the region. These workers are likely to be based at the Marlborough mine or Gladstone.

10.5.3 Indirect Workforce

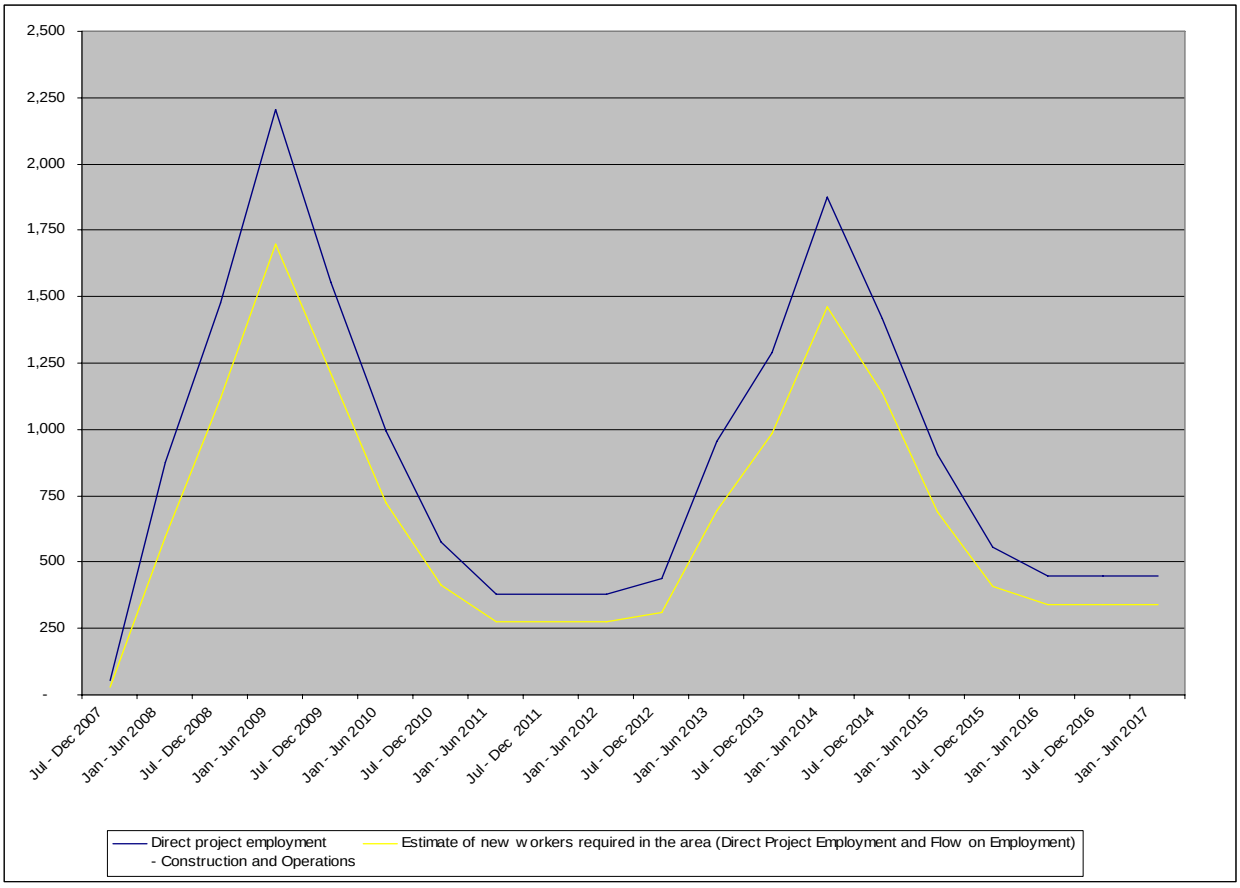
In addition to the direct workforce discussed above, the project will also result in additional (indirect) jobs being generated by supporting industries servicing the project or its workforce. The Coordinator-General (CG) has developed a population model for Gladstone (Gladstone Growth Management Initiative Model – GGMIM, 2002) which predicts indirect or flow-on employment effects associated with projects in Gladstone. The model also provides an estimate of the number of additional workers likely to be imported from outside of the Gladstone/Calliope region to meet the demand for the direct and indirect workforce.

The GGMIM uses six-monthly intervals for its analysis and to achieve this it averages monthly data over each six-monthly interval, January-to-June and July-to-December, for each year assessed in the modelling period. Accordingly, the workforce over the model's six-monthly average will not show any monthly highs within the modelling period. The underlying data on which the GGMIM is based are drawn from the 2001 census. Therefore the results will not reflect any changes to the demographic profile of the Gladstone/Calliope area since 2001.

The results presented in Figure 10.5.2 and Table 10.5.3 show the direct and indirect employment impacts of the GNP. This does not include the employment impacts of the construction of the pipelines between Marlborough and the refinery. The flow-on employment effects of the pipeline's construction will be minimal as the workforce will be small, short-term, and will be fully catered for in mobile construction villages.

The GGMIM results show that indirect employment will be greatest in January to June 2009 when approximately 750 indirect jobs will be created and in January to June 2014 when approximately 850 indirect jobs will be created. Industries set to benefit the most from this increase include support and supply industries, service industries, and property and building industries.

Figure 10.5.2 Workforce Requirements (six-monthly averages)



Source: GGMIM

Table 10.5.3 GNP Direct and Indirect Employment (six-monthly averages)

Year	Year Half	Direct	Flow-On	Total	Recruitment	
					Local	Imported
2007	Dec-07	53	14	67	37	30
2008	Jun-08	878	269	1147	554	593
2008	Dec-08	1478	544	2022	907	1115
2009	Jun-09	2203	753	2956	1258	1698
2009	Dec-09	1553	614	2167	955	1212
2010	Jun-10	995	417	1412	689	723
2010	Dec-10	575	325	900	486	414
2011	Jun-11	380	235	615	340	275
2011	Dec-11	380	235	615	340	275
2012	Jun-12	380	235	615	340	275
2012	Dec-12	438	263	701	393	308
2013	Jun-13	954	501	1455	761	694

Table 10.5.3 GNP Direct and Indirect Employment (six-monthly averages)

Year	Year Half	Direct	Flow-On	Total	Recruitment	
					Local	Imported
2013	Dec-13	1290	670	1960	978	982
2014	Jun-14	1873	846	2719	1260	1459
2014	Dec-14	1418	763	2181	1043	1138
2015	Jun-15	905	506	1411	723	688
2015	Dec-15	555	333	888	479	409
2016	Jun-16	450	295	745	405	340

Source: GGMIM, 2006

Even if the total current unemployed labour force for both Gladstone and Calliope was to be employed on the project, there would be insufficient local workers to meet the total workforce demand. The model results indicate that additional workers will need to be imported into the area to address any labour shortage. The GGMIM has calculated that in the period of January to June 2009 there will need to be approximately 1,700 direct and indirect workers imported into the area. In the period of January to June 2014 approximately 1,500 direct and indirect workers will be required.

10.5.4 Workforce Requirements of Other Projects

There could be additional cumulative demand for labour if other industrial projects proposed for the Gladstone Calliope area proceed at a time overlapping the GNP construction. Other large scale projects proposed in the region include the Wiggins Island Coal Terminal (WICT), the Fisherman's Landing port expansion, Stage 2 of the CAR, and the Australian Nitrogen Project. Mines in the region also have a demand for workers, particularly tradespeople.

Phase 1 of the WICT project is expected to begin construction in July 2007 and is forecast to be completed by December 2010. The proponent has advised that there will be a peak of approximately 650 construction workers between February 2010 and the end of April 2010, with an additional 130 permanent jobs created when operational at completion of Phase 1. Phase 2 for the project is expected to begin construction in June 2013 and is forecast to be completed by November 2015. There will be a peak of approximately 450 construction workers for Phase 2 in January 2015.

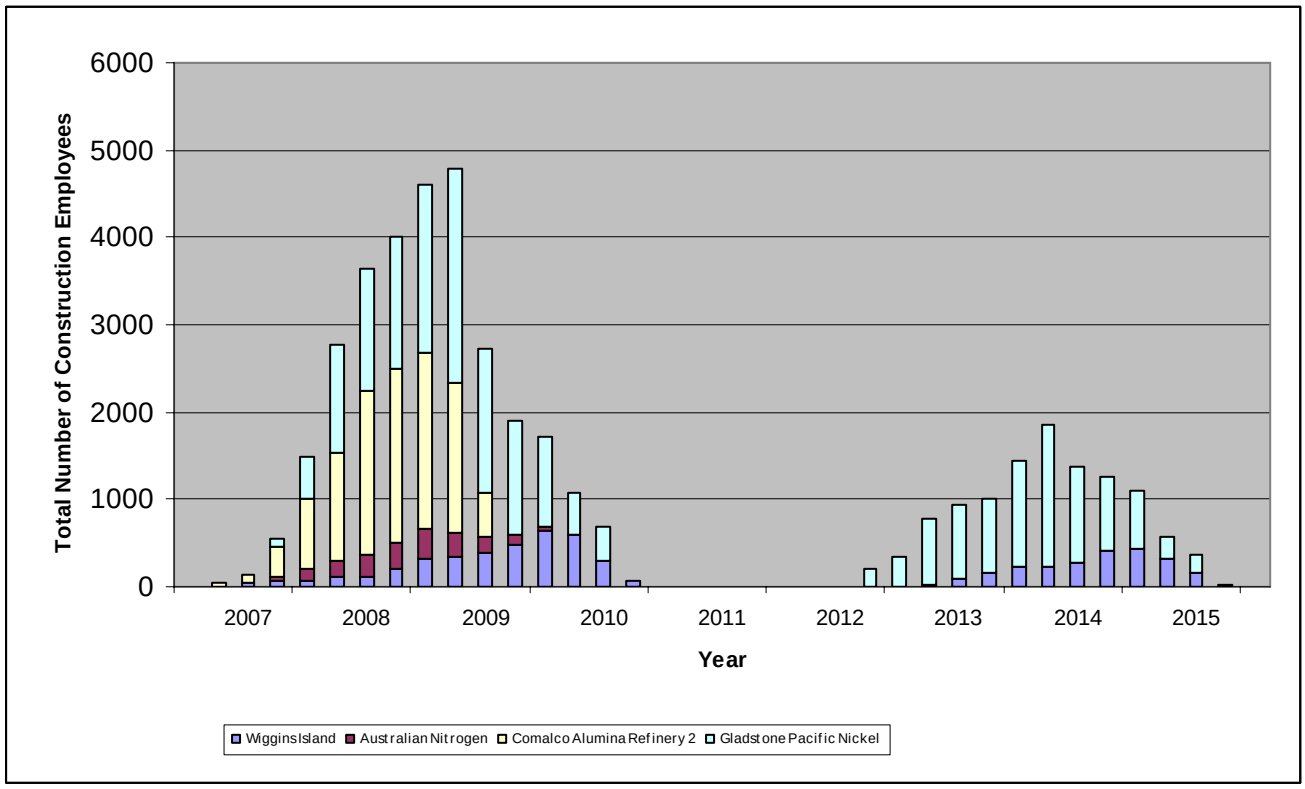
The Central Queensland Ports Authority (CQPA), the proponent for the Fisherman's Landing Project proposes to use its existing workforce to undertake the construction activities (CG, 15 August 2006). Hence there is unlikely to be a significant demand for imported workers for this project.

Workforce estimates for the CAR Stage 2 project indicate that construction could commence in mid-2007 with 50 construction workers building to a peak of 2,000 over 6-9 months in 2008. The total construction period would be approximately 30 months.

Australian Nitrogen has provided estimates for its proposed plant with construction to commence in the fourth quarter 2007 over a 30 month period with a peak of 350 construction workers from approximately the fourth quarter 2008 to the first quarter 2009. The operational workforce is forecast to be 35 and operations are expected to commence in the second quarter 2010.

The cumulative effects of the construction workforce requirements for these projects together with those of the GNP are shown in Figure 10.5.3.

Figure 110.5.3 Construction Workforce Numbers for Proposed Industrial Developments in the Gladstone/Calliope Region



10.5.5 Workforce Availability

The GGMIM workforce modelling suggests that there are not enough construction workers in the local area to meet the required GNP workforce demand. Hence, workers will need to be imported from outside of the local region. The need for imported workers for the GNP will peak in the first half of 2009 and the first half of 2014 for Stages 1 and 2 respectively.

Workforce data analysis and experience from previous large scale development projects such as the CAR indicate that there is a highly mobile workforce, particularly in the construction industry that moves around the country to follow major projects. It is the opinion of some GCC representatives that some skilled workers from the local area who are currently employed elsewhere would return to Gladstone if a development such as the GNP occurred (B.McAlister, GCC, pers. comm. 24.01.06). This may mean that additional housing may not be necessary for the entire imported workforce.

GPNL will engage a specialist employment firm to recruit its construction and operational workforce from both local sources (where possible) and from outside the region. Previous workforce analysis conducted during a similar scale project (the CAR project) noted a large percentage of 'imported workers' were from outside the Fitzroy SD, including a significant component from interstate (PIFU, 2003). Previous analysis also suggests that large projects such as the GNP are likely to attract a higher proportion of older workers and married workers than would smaller and shorter construction projects.

The demand for workers from the GNP and other projects in the region is expected to create additional demand for skilled workers who are already in short supply in the local area. The 2002 Central Queensland Training and Employment Strategy and the 2006 Gladstone Region Skills Report outlined the workforce pressure associated with the proposed large scale industrial developments in the region and the shortage of skilled workers particularly in the following trades:

- Metal fabricators, boilermakers and welders.
- Mechanical fitters, machinists and pipe fitters.
- Electricians and instrument fitters.
- Carpenters and form workers.

The large demand for workers required by the GNP may affect the ability of other businesses in the area to attract and retain staff, particularly smaller businesses. Previous experience suggests that smaller businesses can have difficulty in competing against larger firms to attract and retain staff. This may be attributed to the ability of larger firms to provide more attractive employment conditions than smaller firms.

In a questionnaire conducted as part of the Gladstone Region Skills Survey, 74% of businesses and organisations who responded to the questionnaire had difficulty in attracting and/or retaining staff, with 47% having a great deal of difficulty or find it impossible to do so (GAPDL, 2006(b)). The vast majority of the businesses and organisations (91% of 256 businesses) who responded to the questionnaire were small businesses of 50 workers or less. The top reasons cited by respondents for difficulty in attracting staff included inability to offer competitive salaries; lack of available qualified, experienced people; and difficulty in encouraging people to relocate to a regional area.

GPNL will develop an employment policy which promotes the use of local workforces for the construction phase. An industry participation plan will be developed which will detail the level of local industry participation expected and the benefits that would flow to Queensland in industry development, technology transfer, job creation and skills development.

Within the industry participation plan, GPNL will commit to:

- Ensuring potential local suppliers are provided with information in an equitable and timely manner.
- Adopting design and procurement strategies to maximise local participation.
- Ensuring local suppliers are provided with opportunities to supply under the same terms, standards and conditions as interstate or overseas suppliers.
- Ensuring contracts are awarded on the basis of the most competitive proposal, which includes due consideration of non-cost factors such as reliability, maintainability, servicing etc.
- Incorporating performance measurements and feedback mechanisms.

The plan may include strategies such as GPNL registering its skilled workforce requirements with Rockhampton Regional Development Limited's Central Queensland jobs register (CQ Jobs) which aims primarily at recruiting workers locally but also provides opportunities for regional and interstate workers to apply for positions they are appropriately skilled to fill.

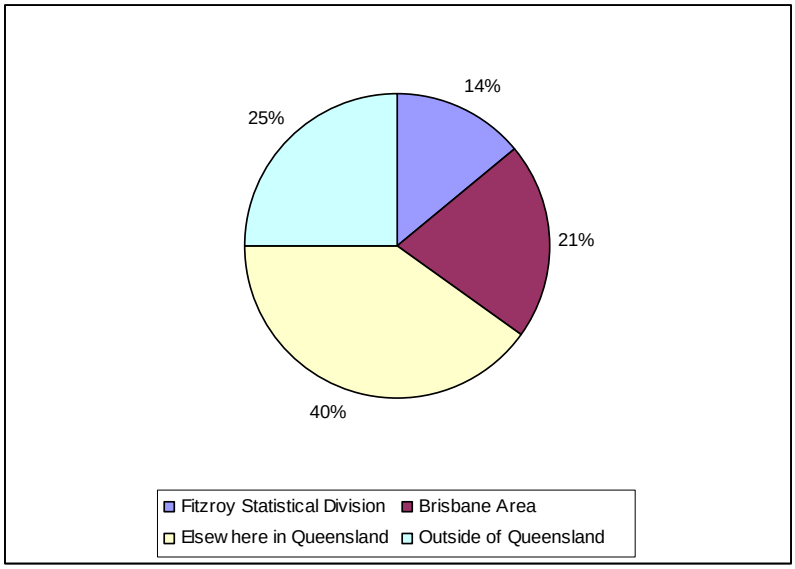
10.6 Demographic Effects

The main demographic influences in the Gladstone/Calliope area from the project will be associated with the imported direct and indirect workforce coming to the area as a result of the project as discussed in Section 10.5.3. The influx of construction workers is likely to bring about short to medium term changes to the demographic profile of the local population. The imported operational workforce will have a longer-term but less significant influence.

10.6.1 Origin of Imported Workers

At the 2001 census, 75% of the workers who moved into the Gladstone/Calliope area in the previous 12 months were from within Queensland, compared to 65% during the 12 month period prior to the 1996 census. Of these, 14% came from within the Fitzroy SD and 61% were from elsewhere in Queensland. Figure 10.6.1 details the origin of imported workers to the area during 2001.

Figure 10.6.1 Origin of Imported Workers to Gladstone/Calliope in 12 Months prior to 2001 Census



Source: PIFU, 2003

Assuming that a similar situation exists for the GNP, it can be expected that the majority of imported workers will be from Queensland. Judging from the current high employment rates of skilled workers in the region, it is likely that a significant proportion of workers will be from outside of the Fitzroy Statistical Division.

10.6.2 Living Arrangements of Imported Workers

Table 10.6.1 shows living arrangements of all workers who arrived in the Gladstone/Calliope area in August 2000 to August 2001. Of these people, 1,218 persons, or 41% of adults (aged 15 or more), had found employment by the time of the 2001 census (August 2001). Table 10.6.1 distinguishes between the imported construction and manufacturing workforce. GPNL's construction workforce fits the definition of an 'imported construction workforce' and the operational workforce fits the classification of an 'imported manufacturing workforce'. The percentage of imported construction workers living alone in 2001 (30%) was considerably higher than the percentage of imported workers living alone (16%) or for residents who have lived in the area for over 12 months (8%) (PIFU, 2003). A large proportion of the imported manufacturing workforce lived with spouses/partners or in a family.

Table 10.6.1 Living Arrangements of Imported Workers

Living Arrangement	Total Imported Workers	Imported Construction Workforce	Imported Manufacturing Workforce
With spouse	40%	39%	52%
With a de-facto partner	17%	19%	10%
With a family	16%	12%	14%
Shared private housing with someone else	11%	0%	9%
Lived alone	16%	30%	15%

Source: PIFU, 2003

Assuming these trends are still relevant, it can be expected that approximately 57% to 60% of newly arrived GNP workers will live with partners only. Only a relatively small percentage (approximately 12% to 16%) will be accompanied by children.

Of the imported construction workforce, up to 30% are expected to live by themselves as opposed to only 15% of manufacturing workers. This is likely because the short duration of construction employment does not warrant bringing partners or families into the area. As such, the potential impacts and social requirements are expected to differ between the operational and construction workforce on matters such as accommodation and community services.

10.6.3 Population Associated with Imported Workers

PIFU has developed a model to estimate the population increase from the imported workforce. Data on living arrangements of workers who moved into the Gladstone/Calliope area during the 12 months prior to the 2001 Census have been used together with average household size (based on persons in private dwellings). Analysis of data indicates that only 27% of workers moving into the Gladstone/Calliope area lived alone or shared a house with an unrelated person (refer to Table 10.6.1). Living arrangements show that approximately 57% of new workers to the area live with a spouse or partner only, and an additional 16% also have dependent children. The average population/worker ratio living as a family unit was 2.6 and for those living with a spouse or partner the average population ratio was 2.0.

The above information has been used to provide an estimate of the overall population increase for the Gladstone/ Calliope area associated with the project.

Table 10.6.2, shows the imported workforce and expected increase in population associated with the GNP workforce based on the PIFU model. Population increases associated with the imported workforce are expected to peak for Stage 1 in the period January to June 2009 with an estimated 3,101 extra persons. There is expected to be a second peak associated with the construction phase of Stage 2 from January to June 2014 when there will be an estimated 2,664 additional persons associated with the imported workforce.

Table 10.6.2 Anticipated Population Increase in Gladstone/Calliope from Direct and Indirect Workforce

Six months to	Imported Workers	Associated Persons			Total Estimated Population Increase
		Single status workers	Workers accompanied by partner	Workers with families	
Dec-07	30	8	17	5	55
Jun-08	593	160	338	95	1,083
Dec-08	1,115	301	635	179	2,036
Jun-09	1,698	458	968	272	3,101
Dec-09	1,212	327	691	194	2,213
Jun-10	723	195	412	116	1321
Dec-10	414	112	236	66	756
Jun-11	275	74	157	44	502
Dec-11	275	74	157	44	502
Jun-12	275	74	157	44	502
Dec-12	308	83	176	49	562
Jun-13	694	187	396	111	1,268

Table 10.6.2 Anticipated Population Increase in Gladstone/Calliope from Direct and Indirect Workforce

Six months to	Imported Workers	Associated Persons			Total Estimated Population Increase
		Single status workers	Workers accompanied by partner	Workers with families	
Dec-13	982	265	560	157	1,793
Jun-14	1,459	394	832	233	2,664
Dec-14	1,138	307	649	182	2,078
Jun-15	688	186	392	110	1,256
Dec-15	409	110	233	65	745
Jun-16	340	92	194	53	618

Note: Imported workers data cover both the construction and operation phases of the GNP. Source: GPNL Data, GGMIM results.

10.7 Effects on Housing and Accommodation Facilities

Full details on the anticipated impacts of the project on housing and accommodation are detailed in the housing impact study in Appendix Q. This section provides a summary of findings only.

10.7.1 Predicted Housing Requirements

Additional demand for housing is attributed to:

- Natural growth (organic growth) of the existing local population.
- Direct workforce and families imported for the GNP.
- Imported indirect workforce and families as a result of the GNP.
- Other projects in the area and their imported workforce requirements.

10.7.1.1 Natural Population Growth

There are projected to be an additional 5,221 residents between 2006 and 2011 in Gladstone and Calliope LGAs based on organic population growth. This growth is based on historic population growth rates for the LGAs and does not consider any large-scale industrial developments, which would bring in additional population. Based on the current Queensland average of 2.6 persons per household, it could be assumed that there will be 2,008 additional units of housing required to meet the natural population growth.

10.7.1.2 Direct and Indirect Workforce

Based on GGMIM modelling (Table 10.6.2), a peak of approximately 1,700 direct and indirect workers (in the first six months of 2009) will be recruited from outside of the local area. It is assumed that each of these workers will require a unit of short-term accommodation in the local area.

During the construction peak for Stage 2 it is estimated that approximately 1,460 units of short-term accommodation will be required- for both direct and indirect works recruited from outside the Gladstone area.

The GGMIM analysis (Table 10.6.2) indicates that the demand for long-term/permanent housing created by the project's direct and indirect imported operational workforce will be for 275 units of housing for Stage 1 (from the first half of 2011) with a further 65 required for Stage 2 (from the first quarter of 2016).

10.7.1.3 Other Projects

Cumulative impacts on housing demand relate to demand generated by other new developments under construction at around the same time as the GNP. Projects proposed in the area include:

- WICT.
- Fisherman's Landing Expansion.
- CAR Stage 2.
- Australian Nitrogen plant.

Details of the likely workforce and timing of these projects are given in Section 10.5.4.

10.7.1.4 Summary of GNP Housing Demand

Permanent Housing – Operation Workforce

Demand for permanent housing originating from organic population growth was estimated in Section 10.7.1.1 at approximately 2,008 units of housing for the five years to 2011. As discussed in Section 10.7.1.2, demand for permanent housing related to the long-term operational workforce is 275 units over the same five-year period. Together these total 2,283 units of housing.

Three scenarios for rates of housing production are shown in Table 10.7.1 along with estimates for total production at those rates over the five years to 2011.

Table 10.7.1 House Production Scenarios

Housing Production	Estimated Annual Production	Total Production 2006-11
Current Rate - 30/mth	360	1,800
Peak Rate for 2003 - 42/mth	504	2,500
Maximum Capacity - 50/mth	600	3,000

Source: PIFU 2005 (a,b), (T McCubin (Master Builders Assoc, Rockhampton) 2006, pers.comm., 10 August 2006).

At the current level of production, i.e. 30/mth, the amount of housing delivered will fall short of the required 2,283. If production can be increased to the equivalent of the rate achieved at the recent peak of production in 2003 (just over 500 units of housing per year) then sufficient new housing can be delivered to meet medium term demand for permanent accommodation.

The Queensland Master Builders Association (Rockhampton) estimates that annual housing production in the Gladstone/Calliope region could expand to 600 units of housing per year. This rate of production would be dependent on attracting builders and trade staff from Rockhampton and surrounding areas, and on the availability of skilled labour in an environment of skilled labour shortage. At this rate of production, a total of approximately 3,000 units of housing might be delivered, providing some new housing that would help meet temporary construction related demand and take pressure off the local rental market.

However, it may be unrealistic to assume that the rate of 600 units of housing per year could be maintained over a five year period. Taking a more conservative approach, there is an historical rate of 500 units of housing per year that has been achieved in recent times and it is this rate that has been used in estimates of future performance.

Short-Term Accommodation – Construction Workforce

As discussed in Section 10.7.1.2, the peak demand for short-term accommodation for Stage 1 construction workers (direct and indirect) has been estimated to be 1,700 units of accommodation (assuming one single accommodation unit per worker). The corresponding peak demand for short-term accommodation in Stage 2 is approximately 1,460.

The characteristics of the demand for construction-related short-term housing (for Stage 1) can be summarised as follows:

- Construction takes place over a three year timeframe (Dec 2007 – Sept 2010).
- 600 to 1,000 units of housing are needed for 2.5 years (June 2008 to Dec 2010).
- 1,100 to 1,200 units of housing are needed for 1 year (Dec 2008 to Dec 2009).
- An additional 500 units are needed to meet construction peak demand of 1,700 for a 6 month period (mid 2009).
- This profile of short-term housing demand will be similar for the construction of Stage 2.

From Table 10.6.2 it can be seen that the GGMIM modelling indicates that approximately 27% of the imported workers will be of single status. This is similar to the findings of PIFU (2003) which, in analysing 2001 census data, found that 30% to 35% of recently-arrived workers in the building and construction industry were living alone or sharing with unrelated individuals or in non-private accommodation (i.e. motel/hotel).

It has been assumed that the single-status workers could be accommodated in a workers' village, and the balance, who will potentially have partners and other family members with them, may be seeking other forms of short-term accommodation.

Based on the GGMIM modelling results in Table 10.6.2, the breakdown of short-term accommodation demand shown in Table 10.7.2 could be expected for the direct and indirect workers associated with the Stage 1 construction phase.

Table 10.7.2 Stage 1 Construction Workforce Accommodation Demand (Direct and Indirect)

Six months to	Workers' Village Units	Short-Term Rental Units	Total Accommodation Units
Dec-07	8	22	30
Jun-08	160	433	593
Dec-08	301	814	1,115
Jun-09	458	1,240	1,698
Dec-09	327	885	1,212
Jun-10	195	528	723
Dec-10	112	302	414

Analysis of the existing rental and real estate sales markets indicates that the major proportion of short-term accommodation demand for the GNP construction phase cannot be readily supplied by the local rental market, or via existing short-term housing sources such as hotels, motels and caravan parks. In order to avoid major disruption to the local housing/accommodation markets, a large part of the supply of short-term rental accommodation will need to be met from some new form of accommodation not already present in the Gladstone region, or from neighbouring areas.

To address this issue GPNL has developed a multi-faceted housing strategy to ensure that the project's housing demand can be met.

10.7.2 Housing Strategy

10.7.2.1 Strategy Rationale

Analysis of the rental and real estate sales markets in Gladstone and Calliope (Section 10.4) indicates that the existing local market will not be able to fully meet the housing demand from the project's direct and indirect construction workforce.

To overcome this shortfall, GPNL will implement a housing strategy with the following three aims:

- To ensure that adequate housing is made available to accommodate the project's construction and operational workforces.
- To stimulate the creation of new housing that will add to the permanent housing stock of the Gladstone/ Calliope area.
- To address concerns related to the impact of a large transient workforce during the construction period of the GNP onto various stakeholders, including lower income households.

The strategy will be multi-faceted and will include active engagement with the local residential development industry and private rental management agents. Existing rental properties and hotel/motel type accommodation will be utilised but are expected to meet only part of the housing requirement. Construction of new housing will also be necessary. Rather than attempt direct provision of housing, the strategy intends to stimulate the private sector to generate construction of new accommodation. A range of incentives will be discussed with the interested developers and investors.

The housing strategy has been designed to meet the needs of the short-term high demand period of project construction as well as the long-term operational period.

Key elements of the strategy include:

- Stimulating construction of new dwellings including houses, townhouses, units and/or permanent villages for short-term accommodation, motels and hotels.
- Coordinated leasing of existing rental properties.
- Promotion of utilising accommodation options and associated transport services in the greater regional area, e.g. Fitzroy Shire.
- Development of a temporary construction workers' village.

These elements together form a coordinated multi-faceted approach, which will have the best chance of achieving the housing requirements for the GNP.

10.7.2.2 New Dwellings

As discussed in Section 10.7, the rate of residential construction will need to increase substantially to generate enough new dwellings to satisfy demand from organic population growth and the long-term operational workforce associated with the GNP. For additional housing to be built above this level, special arrangements with residential construction contractors will be required in an environment where there will be competition for skilled labour.

GPNL is considering strategies such as forming alliances with regional builders and also with housing contractors / manufacturers outside the region to stimulate a much higher rate of housing production. Options such as prefabrication of dwellings outside the region may be one solution. Preliminary discussions with a number of developers with existing projects in Gladstone and Calliope has highlighted that developers working in the region have the capability and commercial arrangements in place with building companies to enable rapid acceleration of the rate of building in the region. Arrangements also include those with building companies located outside of the region in areas where building rates have reduced in recent times.

Preliminary discussions have highlighted that developers have previously utilised modular construction of dwellings outside of the region to assist with reducing the time required to construct, and that further developments of this option are continuing.

A number of opportunities to stimulate residential development have been identified that will assist GPNL in securing the employee housing it needs. These opportunities offer the prospect of contributing to a lasting legacy of needed student and industry housing and tourist accommodation to support a diversification of the local economies of Gladstone and Calliope. The identified opportunities include:

- Approved developments of houses in Gladstone and Calliope Shire.
- Approved developments of townhouses and unit-style accommodation in Gladstone as an alternative to the single-house residential type that dominates Gladstone and Calliope.
- The Central Queensland University (CQU) owns a large site in the Gladstone CBD that is being considered for student housing.
- There are a number of hotel/motel expansions, and two new motels approved for development in the Gladstone CBD.
- Two motels are approved for development in Calliope.
- A relocatable home park and adjacent residential housing development has been approved for the town of Calliope.

Intervention by GPNL to stimulate progress with potential developments will be considered. In most cases some form of secured leasing arrangement will be required including a firm commitment from GPNL. Preliminary discussions with developers have indicated that this type of arrangement would be appropriate for ensuring that development proceeds.

Other strategies for stimulating the construction of new dwellings, such as assistance with securing residential properties for the operational phase workforce, will also be considered by GPNL.

Houses

A number of approved residential developments have been identified through preliminary discussions with developers and real estate agents.

Calliope Shire is experiencing a high level of growth in residential developments. In the town of Calliope alone, as of September 2006, about 300 to 400 housing lots were approved but not built on. Furthermore 400 to 500 lots were being assessed through the shire's approval process. Other significant approved residential developments are located in the Boyne Island/Tannum Sands region.

In the town of Mt Larcom, a developer is preparing an application to develop a large parcel of land as a multiple style residential estate and has earmarked a portion of the land for potential development of village style workers accommodation.

Townhouse and Unit Accommodation

A number of approved developments of townhouse and unit accommodation have been identified through preliminary discussions with developers and real estate agents. This type of housing is not currently common in the region, but research undertaken by developers has indicated that the demographics of the region supports this style of development. For the GNP, this style of accommodation can service the needs of individuals and workers with accompanying families.

Synergy with University Housing

CQU has an immediate need for accommodation in the Gladstone area to house students for short durations. An initial discussion with CQU has indicated agreement on complementary needs for accommodation of students and short-term industry workforce (construction and major plant shutdowns). GPNL will progress this housing option by initiating further discussions with CQU and other major industries in the Gladstone region, focusing on provision of

a multi-user permanent village for short-term accommodation. Options for intervention by GPNL to stimulate this development include securing a number of accommodation units for lease over the term of construction demand.

Relocatable Home Park

GPNL has consulted with the current owner of an approved relocatable home park in Calliope. The approved development is designed to cater for permanent residents. Relocatable homes are of a modular design and are planned to be constructed in a factory on the park site. Each home will be purchased and owned by an individual, who generally requires a permanent home but can regularly be absent for significant periods. GPNL potentially has the option of securing short-term rental arrangement for homes in the park to assist in meeting construction workforce requirements.

10.7.2.3 Rental Property Leasing

GPNL will provide resources to identify and secure leases over existing rental properties in Gladstone and Calliope during the period prior to the commencement of construction and during construction. A co-ordinated approach to securing rental properties and efficient transport of workers to the project sites will be implemented.

Rental properties will be used to accommodate accompanied workers and will also provide shared accommodation for single workers.

10.7.2.4 Regional Accommodation

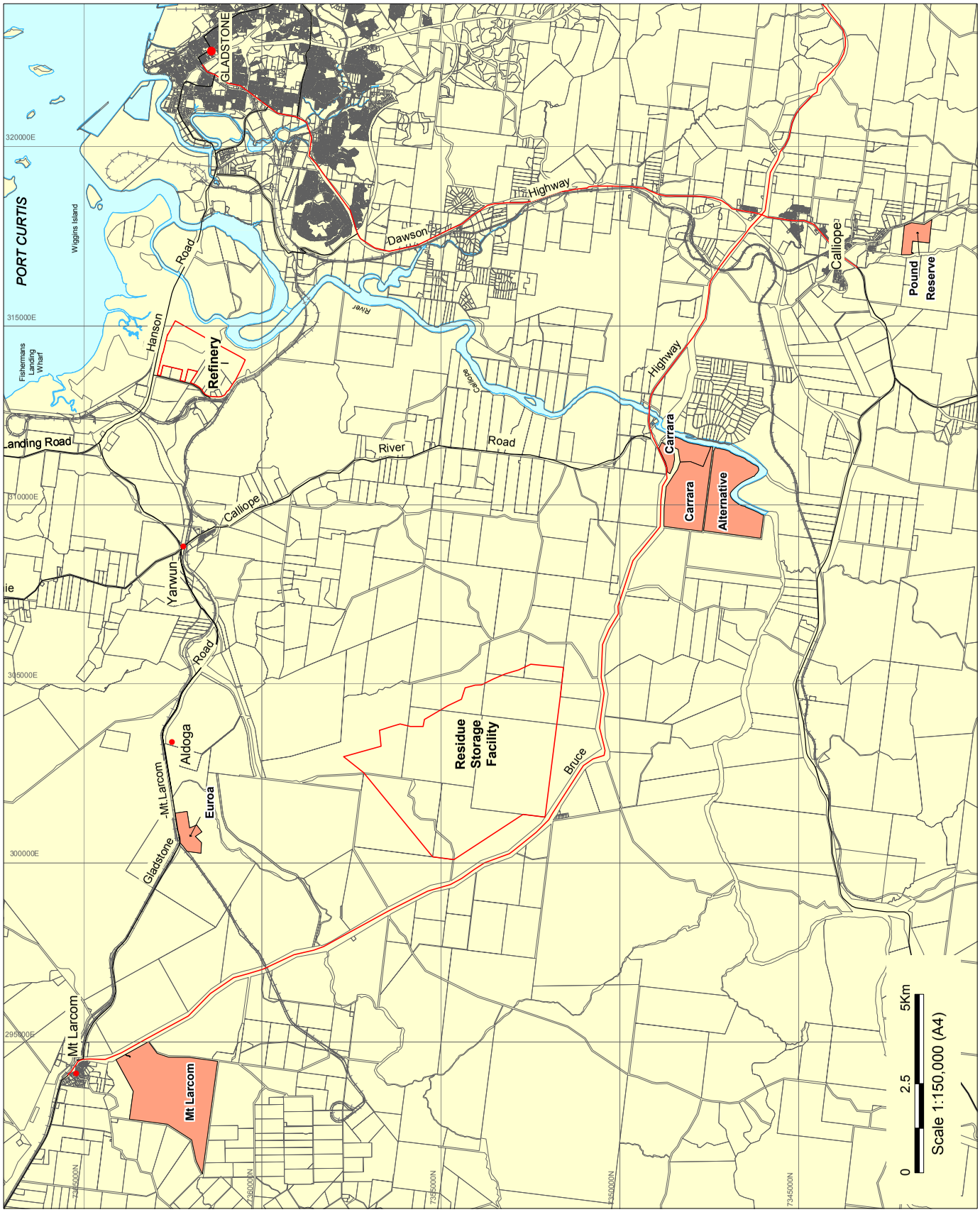
There are a number of benefits for families locating in the Rockhampton area including lower rents, greater availability of employment for spouses, social and recreational opportunities, shopping, heath services and educational choices.

The town of Gracemere in the Fitzroy Shire, located south of Rockhampton and about a one-hour drive from the refinery site, is well serviced due to its proximity to Rockhampton and has local schools. Gracemere is currently experiencing a high level of growth in residential developments. As of September 2006, about 400 residential lots were under construction and in excess of 1,000 lots were being assessed through the shire's approval process. GPNL will consider the option of providing a transport service to/from the project sites and Gracemere during the construction phase to promote Gracemere and surrounds as an option for workforce housing.

10.7.2.5 Workers' Village

GPNL is proposing to use a workers' village, which is assessed as being essential, to ensure that accommodation is provided for the construction workforce peaks for single/unaccompanied workers. As outlined in Section 10.4.12, CSC is willing to consider the establishment of a workers' village under certain conditions. Potential locations for a workers' village have been identified and discussed with CSC. These locations are shown on Figure 10.7.1 and include the following:

- The site investigated for a construction workers' village for the previously proposed Aldoga Aluminium Smelter project on the 'Carrara' property near Calliope (Lot 5 RP616418) or alternatively in combination with adjacent Calliope Shire land fronting the Bruce Highway (Lot 17 CTN1285). Water and sewerage services will need to be provided by GPNL and appropriate arrangements made with the Department of Main Roads (DMR) and CSC for a sealed access road from the Bruce Highway. GPNL has had preliminary discussions with a representative of the owners of the 'Carrara' property and CSC.
- An alternative location on the 'Carrara' property (parts of Lot 6 RP616418 and Lot 260 SP183065). Similarly to the previous mentioned location, water and sewerage services and road access from the Bruce Highway would need to be provided by GPNL.
- A large section of land on the outskirts of Mt Larcom (Lot 2 RP612512 and Lot 2 RP886953) on Wilmott Road, currently being considered by a developer for mixed residential, commercial, light industrial and motor-home park development. Water and sewerage services and access for the motor-home park would be utilised for the workers' village. GPNL has had preliminary discussions with the developer about this option.



Client: Gladstone Pacific Nickel Ltd

URS

Project: GLADSTONE NICKEL PROJECT
ENVIRONMENTAL IMPACT STATEMENT

Title: **ALTERNATIVE SITES FOR WORKERS VILLAGE**

Drawn: TN	Approved: CMP	Date: 28-11-06
Job No: **4262 5791**	File No: 42625791-g-105.wor	

Figure: **10.7.1**

Rev: A

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- A location in the vicinity of Yarwun (specific sites currently not identified). Water and sewerage services and road upgrades would be provided by GPNL.
- A location in Calliope town known as Pound Reserve (Lot 70 CTN1991). Water and sewerage services and road upgradings would be provided by GPNL. GPNL has had preliminary discussions with officers from CSC about locating a workers' village in Calliope town.
- A location in the GSDA e.g. the 'Euroa' homestead lot, to utilise the existing Aldoga sewerage treatment plant (not currently being used). Initial discussions with CG have commenced to determine if this is a viable option.

GPNL will also consider the use of fly-in/fly-out arrangements in conjunction with the workers' village. Entitlements to periodic airfares home to visit family will be considered in conjunction with these arrangements. This will enable single personnel to be appropriately accommodated during the construction period and will help reduce the demand for family housing.

Additional strategies for the provision of short-term rental accommodation may include the provision of larger housing units in the workers' village that could accommodate accompanied workers for short periods of time and the sharing of houses by some personnel.

10.7.3 Mitigation Initiatives

10.7.3.1 Displacement of Low Income Households

Consultation with the GCC's Tenant Advice and Advocacy Service has highlighted the potential impacts of a large construction project on housing availability and pricing in the region. The Service reported that the recent experience of the CAR 1 construction saw rents and house prices increase and some displacement of low income households. For some people it meant moving to Rockhampton, Bundaberg or other lower cost areas.

In recognition that some low-income households may be displaced as a result of demand pressures within the local rental housing market resulting from the GNP, GPNL will consider providing financial support to the Gladstone and Calliope Councils to fund, or help fund, proposed initiatives by the Gladstone and Calliope based housing agencies to assist low-income households seeking accommodation assistance.

GPNL is planning to develop a workers' village for many of the construction personnel to reduce the project's impact on the local housing market. This village, coupled with the other strategies identified for housing requirements, will mitigate the GNP's impact on low-income households.

10.7.3.2 Potential Cumulative Impacts

This housing study has made the assessment that there will not be enough resources available in the Gladstone region's housing market to meet the needs of the GNP. This conclusion means that additional resources will need to be introduced from outside the region.

The prospect of another major construction project occurring at the same time as the GNP would cause additional housing demands. Due to the scale of the GNP, the constraints of the local housing market, and the context of a mining boom in Central Queensland competing for skilled labour and other resources, there are potential impacts if another sizable industrial construction project takes place at the same time as the GNP.

The preferred way to avoid such a conflict is to ensure coordination in the timing of major projects in the coming years where possible. There are advantages for all parties in achieving coordination, in the ability to rationally plan for and utilise temporary housing assets, and in avoiding negative social impacts on the existing communities in Gladstone and Calliope.

In discussions with developers, GPNL is encouraging consideration of a permanent village for short-term accommodation in the Gladstone and Calliope region to service project construction for the GNP and other major projects and industry major shutdown periods, for which a significant temporary workforce can be required. This style of accommodation could also service student and tourist accommodation needs.

10.7.3.3 Modularisation

One major potential initiative that GPNL is considering, which will significantly reduce the Gladstone-based component of the construction workforce, is the modularisation of plant for Stage 1a and 1b construction of the refinery. Pre-assembled modules would be constructed outside of the region and imported through the Port of Gladstone. The construction workforce required to assemble on-site modules made elsewhere would be significantly less than the alternative of building everything on site. An initial engineering study of project modularisation undertaken by GPNL has indicated that the peak construction workforce could be reduced from 2,600 to 1,500. This has the potential to significantly mitigate potential housing and other social impacts.

Adverse impacts from more than one major project being constructed simultaneously would be mitigated if all projects utilised the modular approach. To this end, GPNL is consulting with the CG, CQPA and other industries in the area in regard to a common-user port facility for the unloading of large pre-assembled modules. Should this option proceed, it would be the subject of a separate approval process.

10.8 Community Services, Facilities and Lifestyle

10.8.1 Health Facilities and Services

There is a wide variety of health services in the Gladstone region. The major facilities include:

- Rockhampton Base Hospital: Main referral hospital for the region. The hospital provides many of the specialised services for the region. The hospital is located 110 km from Gladstone.
- Gladstone Hospital: Services include emergency, outpatients, general medicine and surgery, basic orthopaedics, obstetrics and gynaecology, and pathology.
- Gladstone Mater Private Hospital: Services include medical, surgical and obstetric as well as oncology, palliative care and after hours arrangements. In addition, there are a number of facilities for the provision of specialist outpatient's services.
- Yeppoon Hospital: Services include emergency and acute medical care, and post surgical rehabilitation.
- Mount Morgan: Services include general medical provision and outpatient care.

Gladstone Hospital has 80 beds. In 2004/2005 there were 5461 admissions to the hospital and 72,710 non-admission patients treated at Gladstone Hospital. The annual occupancy rate for 2004-2005 at Gladstone Hospital was 46.6%. Gladstone has never had any access blocks[5] in recent times indicating that the hospital has the capacity to hold additional patients (J.Hannan 2006, Gladstone City Hospital, pers. comm., 31.05.06). As at April 2005, there were 17 medical positions (doctors, specialists etc.), 21 professional staff (occupational therapists, physiotherapists, pharmacists, radiographers etc.) and 104 full-time equivalent nursing staff. In addition, Gladstone's Mater Hospital is a private hospital that contains 30 inpatient and 10 day beds.

The Gladstone/Calliope district provides all basic health services including doctors' surgeries, dentists and chiropractors. There are approximately 46 general and specialist medical centres, including ophthalmology, otolaryngology, plastic and reconstructive surgery, physiotherapy, orthopaedic surgery, medical imaging, pathology, and aged care services. There are approximately 10 pharmacies, and 27 dentists in the area.

A community health centre is located in Gladstone and GCC holds immunisation clinics at the Gladstone Entertainment Centre as required. CSC offers school-based immunisation services. Several public and private aged care centres are located in Gladstone as well as a day respite care centre located within the Gladstone Hospital grounds.

[5] Access block - situation where a bed is not available for a patient who requires admission to hospital.

While the Gladstone Hospital has the physical capacity to accommodate additional patients, a hospital representative noted that there is a shortage of doctors and nurses. The shortage of medical practitioners is part of a national problem of attracting and retaining doctors in regional areas. In a regional skills audit survey conducted by Gladstone Area Promotion and Development Limited (GAPDL)[6], six of the nine health organisations that responded reported difficulty in attracting staff (GAPDL, 2006(b)).

The medical facilities in Gladstone are thought to be adequate to meet the forecast increase in population growth (J Hannan, 2006, Gladstone City Hospital, pers. comm.). The main difficulty associated with the forecast population increase is a shortage of nurses and doctors and some specialised medical practitioners such as physicians.

More medical professionals are required however if the shortage of medical professionals persists while the population increases, more health services could be referred to Rockhampton. Travelling doctors and medical specialists, and "telehealth" technology (surgical assistance provided by specialists outside the hospital via remote cameras) may also assist in dealing with medical professional shortages.

First-aid facilities will be provided at the refinery, a nurse or paramedic will be available, and sufficient personnel will receive accredited first-aid training. Non-serious injuries will be treated on-site and more serious injuries will be stabilised prior to transport to the region's medical facilities.

No significant health facility impacts are expected as a consequence of the GNP.

10.8.2 Education and Training

10.8.2.1 Schools

There are 12 primary schools, nine preschools (often located within primary school grounds) and 6 secondary schools located within the Gladstone/Calliope district. Clinton State School and Gladstone State High School provide special education facilities. Five of the schools are private schools. Appendix P lists schools in the area and an estimate of the number of students attending each school.

Most schools in the region are currently below enrolment capacity. Education Queensland's anticipated enrolment rates for 2008 are within current enrolment capacity, indicating that most schools have the ability to handle additional students. Education Queensland's capital works plan, shows additional facilities being built in the area including prep-school facilities (Education Queensland, 2006).

Of the three Catholic schools located in the Gladstone area, the two primary schools are at capacity, while the secondary college has room for additional students. The Diocesan Catholic Education Office is currently investigating the potential future need for more catholic education facilities in the Gladstone region.

A full range of educational services is also available in Rockhampton. Several high schools, both government and private, serve the local region offering boarding facilities for students from outside the immediate area. The area also offers special facilities for handicapped children and other special educational needs and remote-area learning.

The estimated peak in demand for school places from both direct and indirect imported workers with accompanying children due to the GNP will be for approximately 295 students in 2009 for Stage 1 and 250 in 2014 for Stage 2. Education Queensland representatives note that adequate resources would be provided to meet any increased demand (D.Eborn, 2.06.06 pers. comm.).

[6] GAPDL prepared a questionnaire survey as part of a skills audit of the region. 1,900 questionnaires were issued to businesses and organisations across the Fitzroy Statistical Division, and 256 responses were returned.

10.8.2.2 Further Education Institutions

The following further education institutions are accessible in the region:

- CQU, Gladstone and Rockhampton campuses.
- Central Queensland TAFE (Gladstone and Rockhampton).

Some of the courses offered at both the CQU and the Central Queensland College of TAFE are industry specific. This provides for training of the local and regional residents for employment which benefits the local economy.

CQU provides a range of courses including distance education and on-campus education. Gladstone campus has around 400 students at present (August, 2006). Its engineering and technology course is commonly used by students to upgrade from TAFE trade diplomas. CQU also offers some specialised programs which combine university study and industry training as part of the course. The Gladstone CQU campus has capacity to expand enrolments to around 600 students.

Central Queensland TAFE offers a number of courses for trades and skills training including engineering, building and construction, and science. Trades and skills courses available at Central Queensland TAFE are part of the Queensland Government's Training and Employment Strategy. There are presently almost 4,300 students at the Gladstone campus with capacity to handle additional students.

The Rockhampton TAFE offers a wide range of tertiary and vocational education courses in the skilled trades, business and commerce, and hospitality training (RTBI, 2002). The main campus of the CQU is also located in Rockhampton. It offers over 120 courses and has more than 18,000 students.

10.8.2.3 Training

A State Government review of the state's vocational education and training system identified two major deficits in Queensland's labour market - an urgent shortage of trade skills and an underqualified associate professional workforce. The Queensland government has released the Queensland Skills Plan and the Breaking the Unemployment Cycle initiative in June 2006 to address these skills shortages and to meet the changing needs of industry and the economy.

The Queensland Government has committed to investing $53.5 million into the Fitzroy Region in 2006-07 to help create 960 jobs and enable approximately 21,400 students to undertake Government-funded training. Training programs will be held in partnership with Central Queensland TAFE, CQU, schools, private industry and other partners. Incentives and programs include:

- An increase in the number of trades training places, with potential for 960 additional places in the Fitzroy Region.
- An increase in the number of training places available in Certificate IV and above programs, with 840 additional places in the Fitzroy region.
- Central Queensland Training and Employment Strategy – which sets out training initiatives in manufacturing and trade professions.
- Employer subsidies to encourage people to take up apprenticeships.
- Travel subsidies for people travelling long distances to get to training.
- Establishment of the Trade and Technician Skills Institute to provide skills in building, construction, manufacturing, engineering, electronics. This institute will also arrange and coordinate apprenticeship placements.

GPNL will engage a specialist or employment firm(s) to recruit their construction and operational workforce from both local sources (where possible) and otherwise from within the wider region of Central Queensland or the remainder of Australia. During the construction phase, normal industrial training programs will be conducted as required by labour awards, as well as in agreements set out for the construction of the plant and relevant State and Commonwealth legislation. Most of these programs will be the responsibility of the contractors.

During the operation of the refinery, an ongoing program of skills enhancement will be provided. This will be a combination of specific in-plant training plus more generalised skills instructions at off-site locations. In addition, an apprenticeship and/or traineeship program will be implemented by an internal program or in close consultation with existing local and regional technical training institutions.

10.8.3 Community Facilities and Services

A range of community services is available in the region including health support groups, aged person care groups, family planning organisations, crisis assistance and welfare organisations. A full listing of community services available within the refinery/RSF area is provided in Appendix P. It is likely that demand for these services will increase with the GNP.

There are a number of cultural facilities in the area including the Gladstone Entertainment Centre, the Gladstone Regional Art Gallery, the Gladstone Cinema, Rockhampton's Pilbeam theatre, the Rockhampton Art Gallery and Walter Reid Centre. There are a number of cultural festivals and events held through-out the year in the region.

10.8.4 Childcare

There are approximately 22 childcare centres operating in the Gladstone area including kindergartens, day care, and before and after school age care. Appendix P lists childcare centres in the Gladstone/Calliope area and their capacity. There are around 32 childcare and 8 family day care centres in Rockhampton. It is understood that occupancy of kindergartens is high and that childcare centres are full for children under three years of age. The occupancy for children over three is very low and a number of rooms in centres are currently not operating due to insufficient demand for care in this age group (M.Ricks, DOC, pers.comm, 29.05.06).

In 2007, prep-schools will be introduced into the Queensland school system. This voluntary education level is offered for 4½ - 5½ year olds and is expected to absorb a proportion of children in this age group who would otherwise attend child care (J.Kruise, 2006, pers. comm., 11.07.06).

Additional childcare demand can be expected from the project-induced population increase and additional facilities may be required to handle the demand for childcare services in certain age groups.

10.8.5 Sport and Recreation

There are a number of sporting and recreational facilities/groups located in the nearby area surrounding the refinery and RSF. A full list of sporting and recreational groups in the area is given in Appendix P. Recreational facilities including sports are well represented in the greater area including the communities of Yarwun and Mount Larcom.

Most recreational facilities and clubs have capacity for an additional population (J. Black, 26.05.06, pers. comm.). A draft open space and recreation plan has been prepared for GCC which outlines open space and recreation initiatives for the area. It is expected that the additional demand from the increased population due to the GNP will have a positive influence on recreational facilities for Gladstone.

Discussions with Gladstone and Calliope Councils indicate that there are adequate sporting and recreation facilities available to accommodate an expected increase in population.

10.8.6 Shopping Facilities

The major retail and commercial centres within the Calliope/Gladstone area are:

- Gladstone City Centre which offers higher order administrative, business, professional and banking services serving the sub-regional population.

- Stockland Gladstone (formerly Kin Kora Centre) high order retailing, based on three department stores (Big W, K Mart, Target Country) and three substantial supermarkets (Coles, Franklins, Woolworths) serving the sub-regional population.
- Centro Gladstone – includes Woolworths and The Warehouse as the two biggest retailers.
- Gladstone Central - established convenience centre (that includes the Night Owl Centre, with a number of franchises including Dominos Pizza, The Cheesecake Shop, Subway, Nightowl, Civic Video, Sports Scene and Toyworld).
- IGA Express convenience centre.

Major retail and commercial centres within the Rockhampton area include Allenstown Plaza, East Street, City Centre Plaza, Kmart Plaza, Northside Plaza, Rockhampton Shopping Fair.

The existing facilities will adequately cater for the shopping demands of the population increase resulting from the GNP.

10.8.7 Community Vitality, Lifestyle and Values

The number and variety of community groups and social clubs in the area suggests an active and vibrant community in the region. The region is well serviced by health and emergency services, with equitable access to general and specialised services for a diverse population.

The project's community consultation process (Section 12) asked respondents why they liked living in the area. Responses included:

- Lifestyle – including good place for families, recreational opportunities, access to services.
- Employment opportunities.
- Rural nature.
- Tranquillity.
- Lack of pollution.

These values and the concerns raised during the consultation process, and the potential impacts of the project, are summarised below:

- Lifestyle. The project will not significantly affect existing recreational opportunities. There will be an increased demand for existing community services and GPNL will work closely with service providers to ensure adequate planning is undertaken to enable any necessary expansion of service provision so that the additional demand can be met.
- Employment Opportunities. The project will provide a significant increase in both direct and indirect employment opportunities.
- Rural Nature. The existing rural nature of the proposed refinery and RSF site will change to an industrial use. However, this is in accordance with the planning intent of both sites which are included in the GSDA. The rural nature of land beyond the GSDA will not be affected by the project.
- Tranquility. The project will increase noise and traffic levels which will have localised effects on tranquility. However, these effects will generally be limited to the surrounding industrial areas and the arterial roads that serve them. There will be no substantial noise or traffic impacts in the surrounding residential areas.
- Pollution. Air quality studies have shown that air emission from the refinery will not result in ground level concentrations exceeding human health guidelines in any surrounding residential areas. The process selected for the refinery produces less greenhouse gas emissions compared to other alternatives. Noise studies have shown that while noise impacts could be experienced in areas west of the refinery during periods of atmospheric inversion, these are likely to be no greater than those from existing industrial operations in the area.

- Economic Growth. The project will result in a significant boost to local businesses and will further stimulate the economic growth of the region.
- Population Increase. There will be a significant but short-term increase in population associated with the construction phase. Additional services (housing, transport etc.) will be provided to cater for this increase to minimise the impacts on existing residents. The population increase associated with the operational workforce will be much less (1.4% of the existing Gladstone/Calliope population).
- Traffic. The majority of the increased traffic to be generated by the project will be on the major arterial roads that service the GSDA. Allowance has been made to upgrade some key intersections to cater for the additional traffic. Some additional traffic will be generated along Calliope River Road. However, this traffic increase will be relatively small and short term and well within the capacity of the road system.
- Disruption to Farming Activities. The project will result in minimal disruption to farming activities. The only effect will be to the cattle grazing which is currently undertaken on the RSF site. However, this is only an interim use of this land as it is located in the GSDA which is planned to be ultimately used for industrial purposes.

10.9 Economic Effects

10.9.1 Economic Profile

The economy of the Gladstone region is significantly based on heavy industry and mineral processing. It is Queensland's major industrial processing centre and is a major port for the export of coal and minerals from central Queensland. Heavy manufacturing industry has been attracted to Gladstone because of the availability of competitively priced power, excellent port facilities, comprehensive infrastructure, available industrial land, and a skilled workforce. The Queensland Government supports the ongoing industrial development of the region.

Manufacturing is the largest employer by industry in both the Calliope Shire (27%) and Gladstone City (19%). The percentage of workers employed in manufacturing is considerably higher than for Fitzroy Statistical District (11%) and the state (11%). Retail trade constitutes the second largest employer by industry for Calliope Shire (14%) and Gladstone City (16%). Other significant areas of employment include construction, transport and storage, education, and health and community services.

The largest number of businesses in the region is in the agriculture, forestry and fishing sector. However, businesses in this sector employ significantly fewer people than industries in the mining and manufacturing sectors. Table 10.9.1 summarises the number of businesses in the region.

Table 10.9.1 Number of Businesses in the Region

Industry Sector	Number of Businesses	Percentage of Total Businesses
Agriculture, forestry and fishing	476	19.8
Mining	10	0.4
Manufacturing	130	5.4
Electricity, gas and water supply	24	1.0
Construction	301	12.5
Wholesale trade	123	5.1
Retail trade	338	14.0
Accommodation, cafes, restaurants	87	3.6
Transport and storage	179	7.4
Communication services	14	0.6
Finance and insurance	62	2.6

Table 10.9.1 Number of Businesses in the Region

Industry Sector	Number of Businesses	Percentage of Total Businesses
Property and business services	314	13.0
Government and administration	21	0.9
Education	56	2.3
Health and community services	121	5.0
Cultural and recreational services	53	2.2
Personnel and other services	99	4.1
Total	2408	100

Source: ABS (2002,(b))

Gladstone has a broadly based economy which has developed a wide range of providers of goods and services to meet the needs of the local industries as well as the general population. These services are generally provided at locally competitive prices.

Over the last 40 years Gladstone's growth has been stimulated by the establishment of major manufacturing and minerals processing industries which began in 1964 with the establishment of the Queensland Alumina Limited (QAL) alumina refinery. At that time Gladstone's population was 14,000. Since then many other major world-class industries have established in the city and the population has doubled. This development has required a significant expansion of Gladstone's infrastructure facilities to meet the growing demand from the industrial and population expansion. At times this growth has resulted in some social and community issues arising when the necessary infrastructure installation has lagged behind the industrial and population growth.

10.9.2 Economic Impact

The world has a growing need for more nickel, primarily due to the increasing demand for stainless steel (refer to Section 1.7). The GNP is aimed at assisting in filling the widening gap between existing global nickel metal production and worldwide demand. Imported ore will be refined to metal (value-adding) which will be exported, resulting in a positive effect on Australia's balance of trade.

The GNP will have a beneficial economic impact on the local, state and national economy in two phases: the construction phase and the on-going operational phase. An input-output assessment of the project's economic impacts has been measured in terms of the following key indicators:

- Output – the value of total sales.
- Value added – an approximation of the contribution to Gross Domestic Product (GDP), consisting of gross operating surplus and wages/salaries of the employees.
- Household income – the wages/salaries before tax of employees.

All valuations in this economic impact have been carried out in 2006 dollars which should result in a consistent outcome across the time period being considered.

The analysis includes impacts at the local (Gladstone LGA), regional (Fitzroy SD), state and national levels.

The extent to which local, state and Australian goods and services are to be used for the project is shown in Table 10.9.2. This has formed the basis of the economic impact assessment.

Table 10.9.2 Origin of Goods and Services

Location	Construction Phase		Operations Phase	
	Costs	Labour Inputs	Costs & Revenues	Labour Inputs
Local	15%	35%	20%	40%
Region	5%	25%	10%	25%
Queensland	20%	20%	5%	20%
Australia	20%	15%	5%	15%
International (Imports)	40%	5%	60%	0%

Further details on the economic impact assessment are given in Appendix P.

10.9.2.1 Construction Phase Impacts

To quantify the construction impacts, the capital expenditure has been calculated for Stages 1 and 2 to determine the effect of output and value added increases for each stage as well as the effect on household income.

The total (direct and indirect) construction impacts for the Stage 1 construction are shown in Table 10.9.3.

Table 10.9.3 Construction Phase Impacts – Stage 1

Location	Output (per stage) $ m	Value Added (per stage) $ m	Household (per year) $ m
Local	643.8	158.9	60.0
Region	857.8	213.3	119.4
Queensland	2,983.1	513	183.3
Australia	4,802.9	871	249.1

The table highlights that the total value added or GDP effects of Stage 1 of the construction period are $159 million in the local Gladstone area, with the Australian economy receiving a GDP increase of $871 million for this stage. This indicates that a large proportion of GDP contribution from this stage will occur at a national level. The per-year Stage 1 effect on household incomes is $60 million in Gladstone and $119.4 million in the Fitzroy region.

Table 10.9.4 presents the Stage 2 construction impacts.

Table10.9.4 Construction Phase Impacts – Stage 2

Location	Output (per stage) $ m	Value Added (per stage) $ m	Household (per year) $ m
Local	336.7	83.1	50.8
Region	448.6	111.6	101.1
Queensland	1,560.1	268.3	155.2
Australia	2,511.8	455.5	210.9

Table 10.9.4 indicates that the Stage 2 construction impacts are lower than Stage 1, which reflects that the largest proportion of construction expenditure will occur in Stage 1. The total value added effects of Stage 2 of the construction period are $83 million in the Gladstone area, with Australia receiving an increase in GDP of $456 million. The annual effect on household incomes is $51 million in Gladstone and $211 million in Australia.

10.9.2.2 Operational Phase Impacts

The operational phase of the GNP has been evaluated over the two stages of operations. The operational revenues and costs have been calculated on an annual basis to indicate the economic impact of one year of GNP operations. Income effects have also been averaged annually for each stage to represent the likelihood of continuous employment from the project.

The economic impacts for Stage 1 operations are shown in Table 10.9.5.

Table 10.9.5 Operations Phase Impacts – Stage 1

Location	Output (per year) $ m	Value Added (per year) $ m	Household (per year) $ m
Local	444.1	322.5	10.4
Region	665.5	522.2	24.1
Queensland	944	638.1	39
Australia	1119.9	759.9	44.3

Table 10.9.5 above indicates that each year of operations in Stage 1 will generate value added effects to the Gladstone and Fitzroy Region economies that exceed the effects of the construction phase. The largest proportion of GDP contribution occurs in the local Gladstone area. The annual effect on household incomes is $10 million in Gladstone, and $39 million in Queensland.

Table 10.9.6 presets the Stage 2 operations impacts.

Table 10.9.6 Operations Phase Impacts – Stage 2

Location	Output (per year) $ m	Value Added (per year) $ m	Household (per year) $ m
Local	936.8	689.5	20.9
Region	1403.9	1116.5	48.2
Queensland	1991.2	1364.3	78.1
Australia	2632.2	1624.6	88.7

The Stage 2 impacts are significantly greater than Stage 1, as a result of the increased nickel and cobalt outputs. This results in the GNP producing higher economic impacts on a continuous basis from year 9. The total value added effects for each year of Stage 2 operations are $690 million in the local Gladstone area, $1116 million in the Fitzroy region, $1364 million in Queensland, and $1624 million nationally. The annual effect of this increase in employment on household incomes is $21 million in Gladstone, and $48 million in Fitzroy.

10.9.2.3 Government Revenue Implications

The development of the refinery and its ongoing operation will result in an increase in government revenue which is likely to arise in the form of:

- Income taxes due to increases in employment and income levels within the region.
- Company taxes as a result of nickel and cobalt sales and increased business activity in other industries that support project-induced population growth.
- Rates and fees – rates for government/council for provision of services, and local government fees,
- Export income – export of nickel and cobalt product will contribute to Queensland's economic performance.

10.9.3 Other Economic Effects

Other economic effects of the project are discussed below. In some instances these have been addressed elsewhere in this EIS.

- Equity Investment. GPNL is a public company listed on the London Alternative Investment Market in London. Interested parties can undertake the purchase of shares via domestic and/or off-shore brokers. The GNP will require significant equity funds from potential partners or capital markets to enable it to proceed. The nature of the equity raising may result in the privatisation of the company. However, if the company remains public and listed on a share market, it will be possible for local businesses or communities to invest in the project through the purchase of shares.
- Value-adding. The refinery will produce valuable nickel and cobalt metal from local and imported nickel laterite ores. Metals will be exported, resulting in a positive effect on Australia's balance of trade.
- Infrastructure Provision. The refinery is located in the GSDA where the Queensland Government has invested considerable amounts in establishing the infrastructure necessary to attract major new industry developments to the area. The GNP will use some of this infrastructure. The need for additional infrastructure provision is discussed in Section 3.
- Future Development. The GNP will strengthen the industrial nature of the locality and will support some of the existing and proposed common-user facilities servicing industry in the area such as power, port, gas and road facilities. GPNL is also investigating synergies with local industries with respect to the supply of raw materials and waste management. The project will not restrict the future industrial development of the area. The project's implications on land use are discussed more fully in Section 10.11.
- Economic Effects on Fisheries. The effects of the project on the local commercial and recreational fishery are discussed in Section 8.3.
- Property Values.
  - In reinforcing the industrial nature of the GSDA, the project will assist in maintaining the price of industrial land in the area.
  - As discussed in Section 10.8.7 the project will not detrimentally affect the community values and amenity of surrounding residential areas. Hence, no significant impacts on property values are expected.
  - As discussed in Section 10.7, the project's demand for housing during the construction phase has the potential to increase the cost of residential property and rentals and to displace low-income households. To manage this issue, GPNL will implement a strategy to meet its demand for housing by the provision of new accommodation facilities as well as supporting services that provide housing assistance to low-income households.

10.10 Land Tenure

10.10.1 Refinery

The refinery is located on the corner of Reid and Hanson Roads, Yarwun, within the Parish of Calliope, County of Clinton, Calliope Shire, Queensland. The real property description of the refinery site is:

- Lot 2 on SP14789.

- Lot 4 on SP165453 (part).
- Lot 3 on SP165453 (part).
- Lots 21-26 on SP159091.

The tenure details of the site and adjacent properties are shown in Figure 10.10.1. The site is part of the GSDA and is owned in freehold title by the Queensland Government. The area of land to be purchased by GPNL (shown as the area within the refinery site boundary on Figure 10.10.1) is approximately 261 ha.

The refinery stockpiles will be located in an area that is currently inter-tidal wetlands, classified as unallocated state land, which is not currently within the GSDA. This area is situated between an esplanade adjoining the eastern boundary of Lot 2/SP147891 and the anabranch of the Calliope River. The Queensland Government is currently moving to include this area within the GSDA (refer Section 10.12.1).

The area of inter-tidal land to be used for the refinery stockpiles will be reclaimed by CQPA as part of the WICT project reclamation works. The extent of the area to be reclaimed and filled as part of the WICT project is shown on Figure 10.10.1. Thus the stockpiles and conveyors associated with the GNP will be constructed on land that has been reclaimed.

10.10.2 Residue Storage Facility

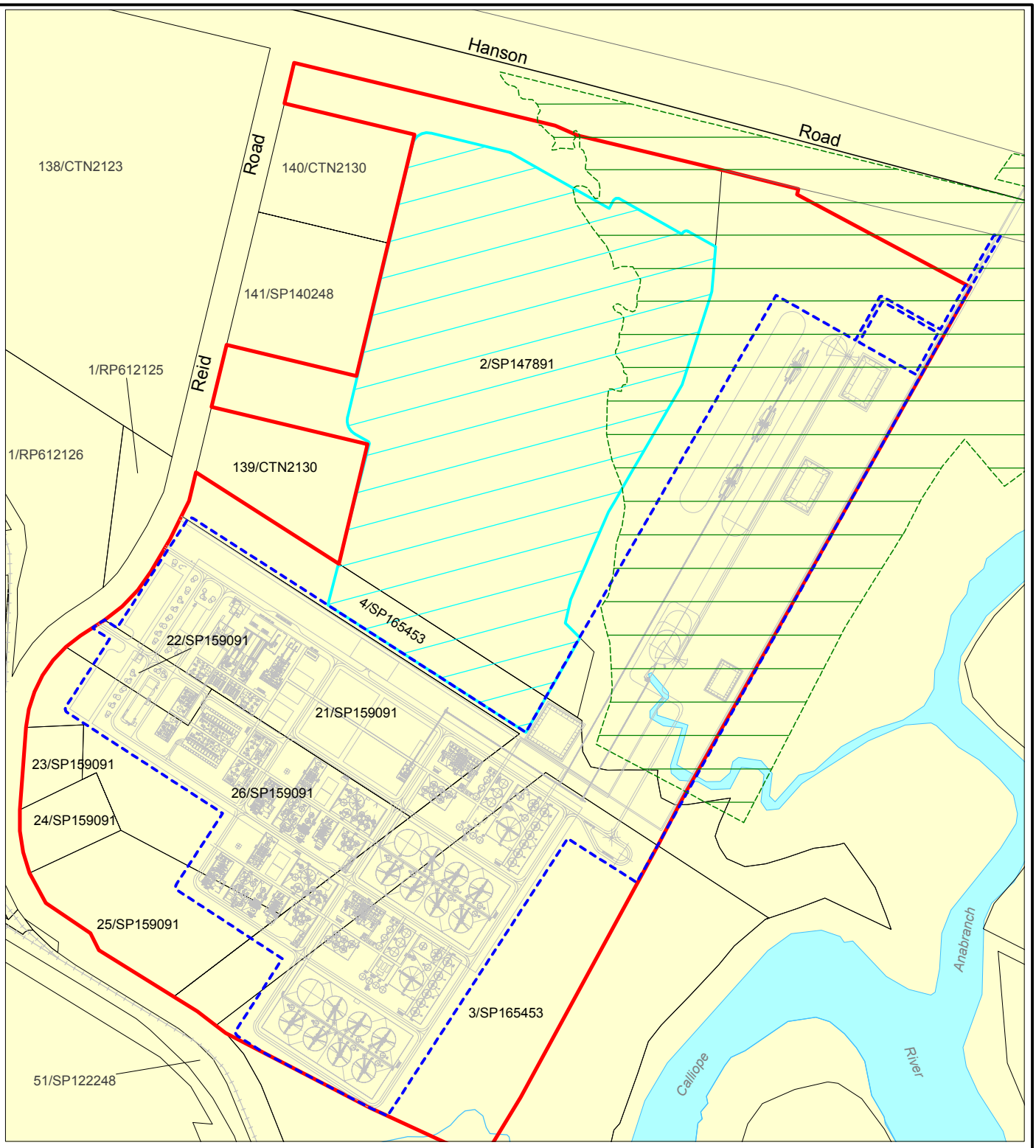
The proposed RSF site is located 14 km south-west of the refinery in the Aldoga Precinct of the GSDA. It is located in the Parish of Mount Larcom, County of Clinton, Calliope Shire. The site includes the following lots or part thereof:

- Lot 24 on CTN105.
- Lot 3 on SP144432.
- Lot 253 on CTN2087.
- Lot 44 on CTN198.
- Lot 49 on CTN198.
- Lot 52 on CTN198.
- Lot 50 on CTN2086.
- Lot 200 on CL4058.
- Lot 10 on CL40348.

The tenure details of the site and adjacent properties are shown in Figure 10.10.2. Most of the site is part of the GSDA which is owned in freehold title by the Queensland Government. The area of land to be purchased by GPNL (shown as the area within the RSF site boundary on Figure 10.10.2) is approximately 1,930 ha. Development areas located outside the GPNL boundary will be accessed through a “licence to operate” issued by the CG. This licence will allow GPNL to undertake construction and operational activities in areas within the GSDA but outside the GPNL boundaries. Consultation with the CG has indicated that access to all development areas will be provided.

Currently Lot 200/CL4058, Lot 10/CL40348, and Lot 24/CTN105 are not within the GSDA. The Queensland Government is moving to include these within the GSDA (refer Section 10.12.1). This is expected to occur by the end of 2006.

Lot 52 on CTN 198 is also not within the GSDA. Actions have commenced to also include this allotment in the GSDA.



0 200 400m

Scale 1:12,500 (A4)

MGA Z56, GDA94

Proposed Refinery Footprint

Refinery Site Boundary

Proposed CQPA reclamation area

Potential construction pad area (Stage 3)

Client: Gladstone Pacific Nickel Ltd

Project: GLADSTONE NICKEL PROJECT
ENVIRONMENTAL IMPACT STATEMENT

Title: **TENURE DETAILS OF REFINERY SITE**

URS

Drawn: TN	Approved: CMP	Date: 06-11-06	Figure: **10.10.1**	Rev:B
Job No: **4262 5791**	File No: 42625791-g-027b.wor			**A4**

0 750 1500m

Scale 1:50,000 (A4)

MGA Z56, GDA94

RSF Site Boundary

Proposed RSF Footprint

Embankment

Slurry pipeline route

Residue and return liquor pipeline route

Client: Gladstone Pacific Nickel Ltd

Project: GLADSTONE NICKEL PROJECT
ENVIRONMENTAL IMPACT STATEMENT

Title: **TENURE DETAILS OF RSF SITE**

URS

Drawn: TN	Approved: CMP	Date: 06-11-06	Figure: **10.10.2**	Rev:B
Job No: **4262 5791**	File No: 42625791-g-028b.wor			**A4**

10.10.3 Pipelines

The majority of the pipeline routes traverse freehold land. However, several leasehold areas and parcels of state land are also located along the alignment. A summary of the land tenure of the proposed route is provided in Table 10.10.1 and is shown on Figure 10.10.3.

Table 10.10.1 Pipeline Routes Land Tenure

Tenure	Location		No. Lots
Freehold	Entire route except for locations detailed below		71
Leasehold	KPs (approx) 57, 83, 101, 101.1, 118, 121, 161, 164, 172, 180.1, 180.2, 180.3		12
State Land	KPs 166.2, 179.4-180		2
Boundary Water Courses	Marlborough Creek KP 9, Fitzroy River KP 11, Ten Mile Creek KP 23.5, Station Creek KP 41.5, Louisa Creek KP 47.4, Black Gin Creek KP 67, Nine Mile Creek KP 80.5,	Four Mile Creek KP 92.3, Midgee Creek KP 97, Bobs Creek KP 104.9, Inkerman Creek KP 120.2, Raglan Creek KP 136.2, Larcom Creek 165.8	13

Note KP – Kilometre Point

Mining and petroleum tenures (including permits to prospect and/or explore as well as licenses, claims and leases for the development of resources) intersected by the pipelines route are outlined in Table 10.10.2 and shown on Figure 10.10 4. GPNL has contacted all mining and petroleum tenure holders to advise them of the location of the proposed route, and requested information regarding existing or proposed infrastructure to identify any potential issues. Marlborough Nickel Pty Ltd (MNPL) is a wholly owned subsidiary of GPNL.

Table 10.10.2 Mining and Petroleum Tenures

Approximate KP	Permit	Owner
0-4	ML 80,063 EPM 11,582	Marlborough Nickel
15-20	EPM 15 067	Queensland Gold and Copper
45	EPM 8 715	Giles, Lloyd William
90-95	EPM 14 221	Lodestone Exploration Ltd
100-105, 115, 120	EPM 13 228	Alcove Investments Pty Ltd
105 -115, 120-125, 125-135	EPM 12,447	Alcove Investments Pty Ltd
180	MDL 225	Southern Pacific Petroleum
180	EPM 3 215	Queensland Energy Resources
45-50, 85-125, 160-180	ATP 716P	Arrow Energy NL

ML = Mining Lease, MDL = Mineral Development Lease and EPM = Exploration Permit – Minerals under the *Mineral Resources Act 1989;* ATP = Authority to Prospect under the *Petroleum and Gas (Production and Safety) Act 2004*

The pipeline alignments also cross two areas which are restricted areas under the *Mineral Resources Act 1989* (refer to Table 10.10.3).

Client: Gladstone Pacific Nickel Ltd

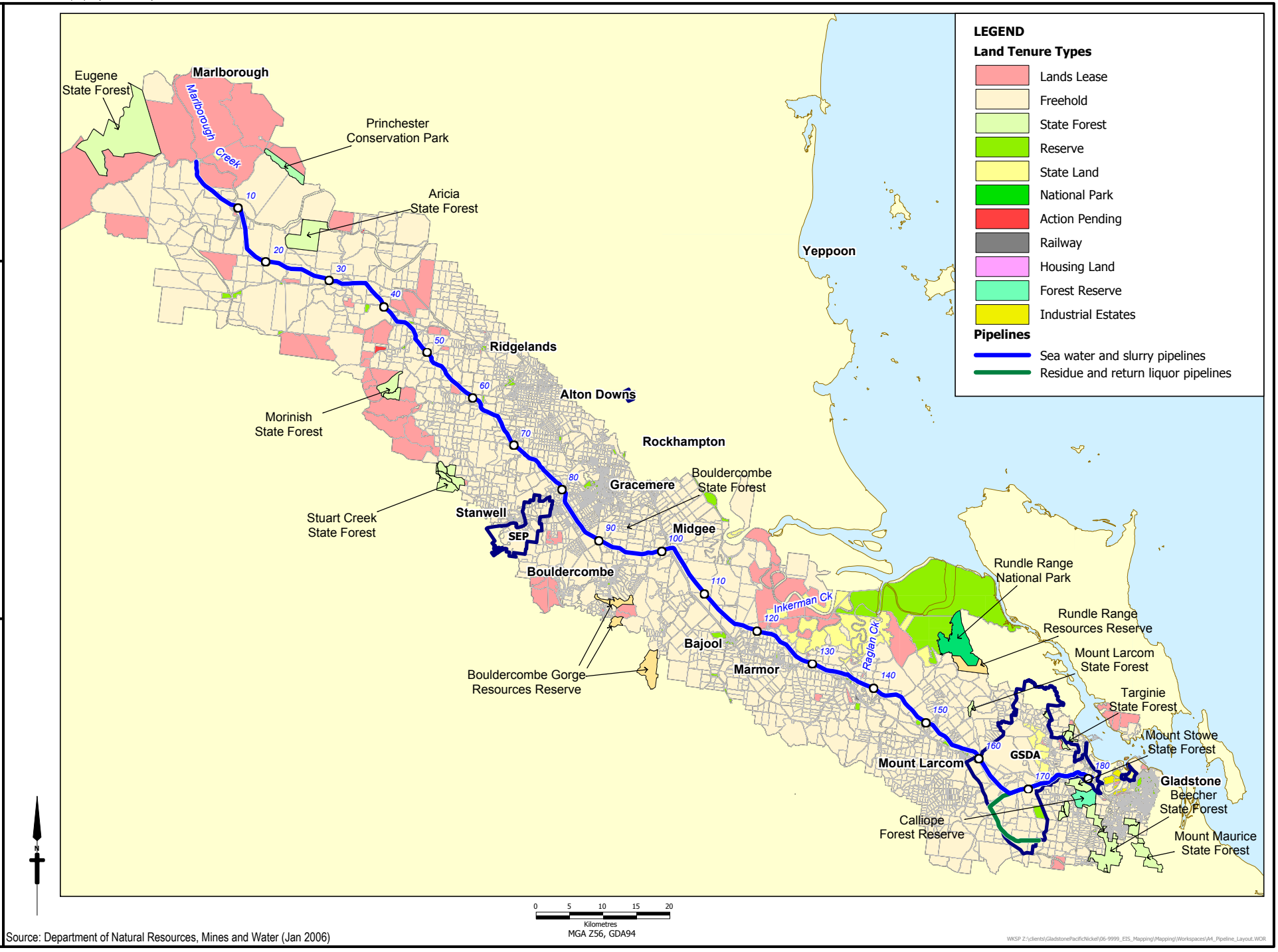
Project: GLADSTONE NICKEL PROJECT
ENVIRONMENTAL IMPACT STATEMENT

Drawn: DBJ | Approved: KD | Date: 12-09-06
Job No: 4262 5791 | File No: A4_Pipeline_Layout.WOR

Figure: 10.10.3

Title: TENURE DETAILS PIPELINE CORRIDOR

A4 | Rev: A



Source: Department of Natural Resources, Mines and Water (Jan 2006)

Client: Gladstone Pacific Nickel Ltd

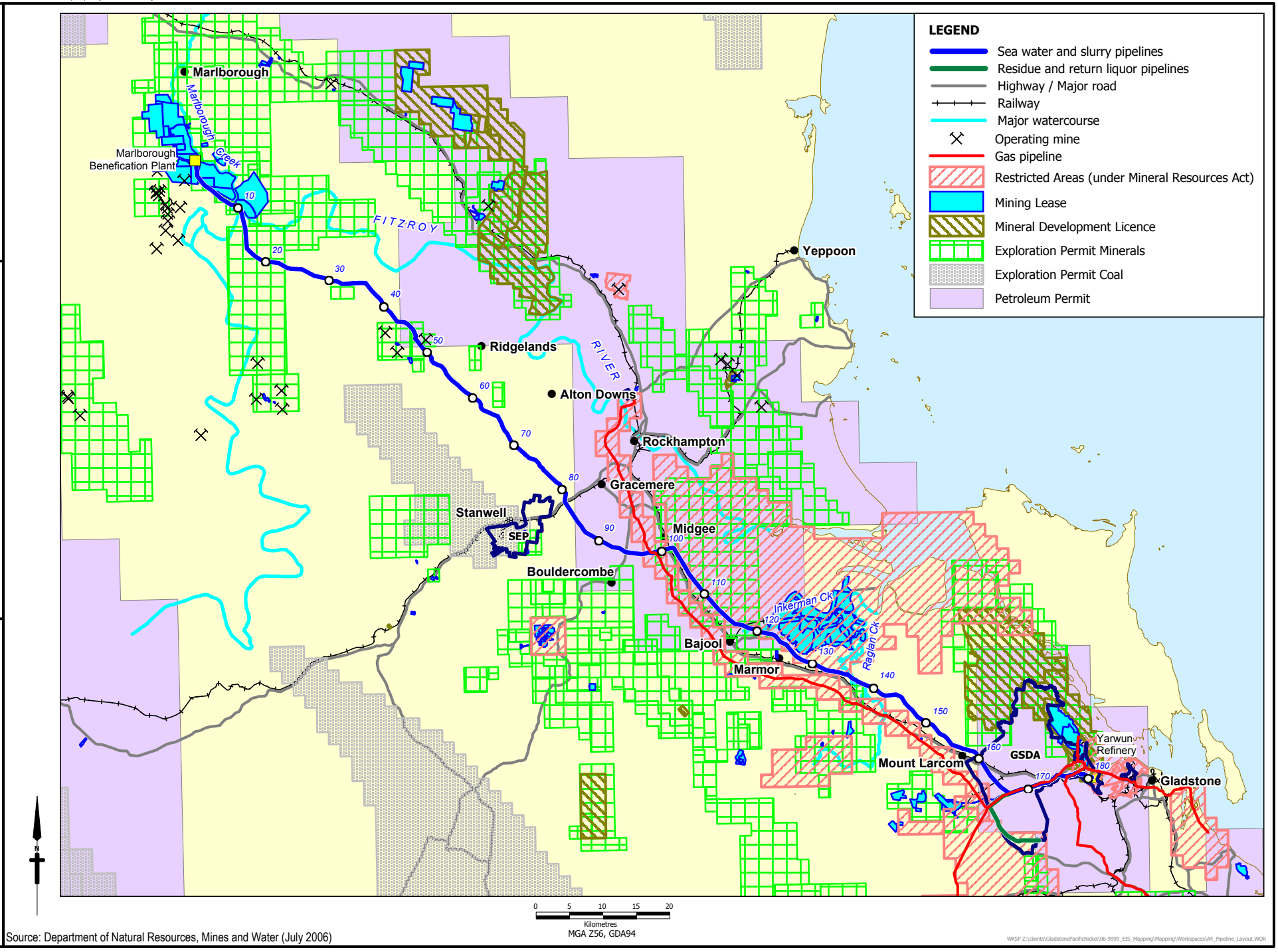
Project: GLADSTONE NICKEL PROJECT
ENVIRONMENTAL IMPACT STATEMENT

Drawn: DBJ | Approved: KD | Date: 12-09-06
Job No: 4262 5791 | File No: A4_Pipeline_Layout.WOR

Title: MINING AND PETROLEUM TENEMENTS

Figure: 10.10.4

Rev: A
A4



Source: Department of Natural Resources, Mines and Water (July 2006)

Table 10.10.3 Restricted Areas under Mineral Resources Act 1989

Approx KP	Restricted Area	Restriction
6 crossings between KP 103 - 134	No. 75 – Brine Fields	All mining tenements, other than an exploration permit, mineral development licence, or mining lease relating to salt, are prohibited mining tenements for the restricted area.
96 – 102 134	No. 143 – Rockhampton to Gladstone Pipeline Route Investigation	Restricted area applies to lot 1 on RP801374, lot 2 on RP801363, lot 23 on RP603515 and land within 50 m of the centre line of the Rockhampton Branch Gas Pipeline between Larcom Creek and Rockhampton Gate. All mining tenements are prohibited for the restricted area.

Note KP – Kilometre Point

GPNL has consulted with the Department of Natural Resources Water (DNRW) in regard to the location of the pipeline route with respect to the restricted areas listed in Table 10.10.3 and has been advised that it will be possible to obtain a mining lease for transportation through these areas, provided certain administrative processes are adhered to during the mining lease application process to enable the temporary lifting of the restricted areas. GPNL will continue to liaise with DNRW to ensure that all issues are appropriately managed such that the mining lease may be granted through these areas.

GPNL has submitted an application for a mining lease and an associated application for an environmental authority for the project pipelines. Under the *Mineral Resources Act 1989*, applicants for a mining lease are required to enter into compensation agreements with the individual landholders impacted by the mining lease. GPNL is presently in the process of developing draft compensation agreements for landowners in the application area.

10.10.4 Conveyor and Seawater Pipelines

Bulk material storage areas for both imported ore and sulphur will be located at the north-eastern end of the refinery site where the conveyor to/from Wiggins Island Wharves (WIW) leaves/enters the site. Sulphur and imported ore will be transported between the WIW wharf and the refinery by conveyor. Two seawater pipelines (one for Stage 1 and a second for Stage 2) which will provide cooling and process water to the refinery will also be located in this area.

The routes for the conveyor and seawater pipelines are situated on un-allocated state land which is to be reclaimed and developed as part of the WICT project. The conveyor will run alongside the railway which provides access to WIW. The alignments of the conveyor and seawater pipelines are shown on Figure 2.2.2.

10.10.5 Native Title

Registered native title claims exist over the land intersected by the proposed slurry pipeline route and these are detailed in Table 10.10.4 and shown on Figure 11.4.1.

Table 10.10.4 Native Title Claimants

NNTT File No.	Application Name	Application Type
QC97/021	Darumbal People	Registered
QC01/029	Port Curtis Coral Coast	Registered

In 1999, MNPL negotiated a project agreement between the Darumbal and Barada, Barna, Kabalbarra and Yetimarla (BBKY) People, which sets out the basis upon which the Darumbal and BBKY Peoples agreed to the grant of the MNPL mining leases and other future acts to take place within the 'Region'. The 'Region' includes the northern 30

km of the pipelines. The project agreement also included the provision for negotiating and registering an Indigenous Land Use Agreement (ILUA) for the project area.

The agreement is between the Darumbal People and the BBKY Peoples, collectively referred to as the Traditional Owners (TOs), the State of Queensland and MNPL. The four mining leases which are the subject of the agreement are ML 80056, ML 80057, ML 80058 and ML 80059.

Due legal processes were followed during 1998/1999 under the *Native Title Act 1993* in finalising the agreement, enabling the TOs to consent to the granting of the four mining leases.

Pursuant to the agreement, the parties have agreed an ILUA relating to the project area (subject to certain exclusions). It is intended to register the ILUA with the Native Title Tribunal. Management of the agreement occurs via quarterly liaison committee meetings. The agreement includes cultural heritage obligations over the project area. Additional information regarding the development of Cultural Heritage Management Plans (CHMP) for the project is discussed in Section 11.

Native title rights and interests are extinguished on certain land such as freehold property or impaired, for example, on some pastoral leases. The extent of land subject to native title intersected by the refinery, the RSF, pipelines and associated infrastructure is being investigated by GPNL and is subject to legal advice. However, GPNL understands that all land associated with the pipelines contained within the GSDA is free from native title.

The native title process for the remainder of the land impacted by the project will be undertaken in accordance with all legislative requirements under the *Native Title Act 1993*, in full consultation with the relevant native title claimants.

10.11 Land Use

10.11.1 Refinery

The refinery site is vacant land with no current land use but was previously used as a source of fill for the CQPA.

The land uses surrounding the refinery site are shown in Figure 10.11.1. These include:

- North – Hanson Road and the inter-tidal wetlands.
- South – North Coast Railway Line.
- East – Calliope River and its anabranch.
- West - GAWB Water Treatment Plant, Calliope Shire sewerage treatment plant, and Reid Road.

A rail connection is to be constructed along the eastern boundary of the site by Queensland Rail (QR) as part of the to the proposed WICT project.

There are two transmission line easements located within the refinery site connecting to the Gladstone Power Station (GPS) located east of the site.

The predominant land use surrounding the refinery is industrial. Major industries in the vicinity include a chemicals manufacturing plant (Orica Chemical Plant) and a minerals processing plant (CAR). The Orica plant is located on Reid Road opposite the refinery site. The CAR is located further west off Hanson Road.

Facilities on Reid Road adjacent to the refinery site include the Calliope Shire sewerage treatment plant and the GAWB water treatment plant. Australian Nitrogen is proposing to construct an ammonia production facility on Lot 141/SP140248 the site previously used for the Australian Magnesium Corporation pilot plant which has since been decommissioned.

A services corridor, which contains gas, wastewater and potable water pipelines is located along Reid Road. The pipelines associated with the GNP will be incorporated into the services corridor. This will include the residue

Client: Gladstone Pacific Nickel Ltd

Project: GLADSTONE NICKEL PROJECT ENVIRONMENTAL IMPACT STATEMENT

Title: LAND USE

Drawn: TN	Approved: CMP	Date: 08-01-07
Job No: 4262 5791	File No: 42625791-g-095b.wor	

Figure: 10.11.1

Rev: B

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pipelines between the refinery and the RSF, and the slurry and seawater pipelines between the Marlborough Mine and the refinery. Details of utilities servicing the site are provided in Section 3.

The North Coast Railway borders the refinery site to the south. Multi-track railway lines are proposed between the eastern boundary of the refinery site and Calliope River as part of the WICT project. The WICT is located approximately 2.5 km north-east of the refinery site.

The Calliope River forms the jurisdictional boundary between Calliope Shire and Gladstone City. Industries adjacent to the Calliope River in Gladstone City include the GPS and the Clinton Coal Terminal.

There are no residential properties within the Yarwun precinct of the GSDA. The nearest rural residential zone is along Calliope River Road, approximately 4 km south-west of the refinery. The village of Yarwun is approximately 5 km west of the refinery site.

The Mount Stowe State Forest and Calliope Conservation Park are approximately 500 m south-west of the refinery site.

10.11.2 Residue Storage Facility

The RSF is to be located within a natural valley, bounded on the east and west by low-lying hills with a maximum elevation of approximately 160 m Australian Height Datum (AHD). There are a number of small ephemeral tributary creeks that flow across the site. Police Creek is located in the northern part of the RSF and runs in a northerly direction into Larcom Creek. Gravel Creek runs near the eastern boundary of the RSF site (refer Figure 10.10.2). The southern section of the site drains to Farmer Creek which discharges into the Calliope River.

Historically, the site has been used for grazing and therefore the landscape is relatively clear with small areas of open forest with low shrub undergrowth. The RSF site supports a variety of vegetation communities, all of which have been disturbed or modified by grazing practices to some degree. The west and south of the RSF has been cleared for grazing and is now dominated by grassland. The centre of the site supports open *Eucalyptus* woodlands which have been highly modified by grazing and selective clearing.

Grazing activities will be displaced by the construction and operation of the RSF. This is not anticipated to be a significant issue as there is extensive availability of suitable grazing land in the region.

To the west of the site is the Bruce Highway and the CAR residue management area is located to the north-east. South of the CAR area is an Environmental Reserve on Lot 87/CTN428 (refer to Figure 10.10.2).

There are two rural residential zones in the vicinity of the RSF. One is a dwelling on the corner of Koncina Road and Bruce Highway south of the RSF and the other is on the eastern side of the Bruce Highway approximately 2 km north of the Framer Creek crossing.

The cleared and partially cleared land with improved or native pastures in and surrounding the RSF site is currently used for grazing cattle. No dry-land (rain-fed) cropping has been undertaken due to constraints with respect to topography and the presence of shallow rocky/gravelly soils.

10.11.3 Pipelines

10.11.3.1 Existing Land Uses

The slurry and seawater pipelines route passes through Fitzroy Shire, Calliope Shire and a very small portion of Livingstone Shire.

The route for the pipelines generally traverses pastoral and agricultural properties, with the majority of the pipeline route being dominated by cattle grazing and some areas of intensive cattle pasture. Other land uses include industrial areas, mining and petroleum leases and infrastructure corridors. A summary of the key land uses along the pipeline route is provided in Table 10.11.1 and is shown on Figure 10.11.2.

Client: Gladstone Pacific Nickel Ltd

Project: GLADSTONE NICKEL PROJECT
ENVIRONMENTAL IMPACT STATEMENT

Title: LAND USE PIPELINE ROUTE

Drawn: DBJ	Approved: KD	Date: 22-09-06
Job No: 4262 5791	File No: A4_Pipeline_Layout.WOR	

Figure: 10.11.2

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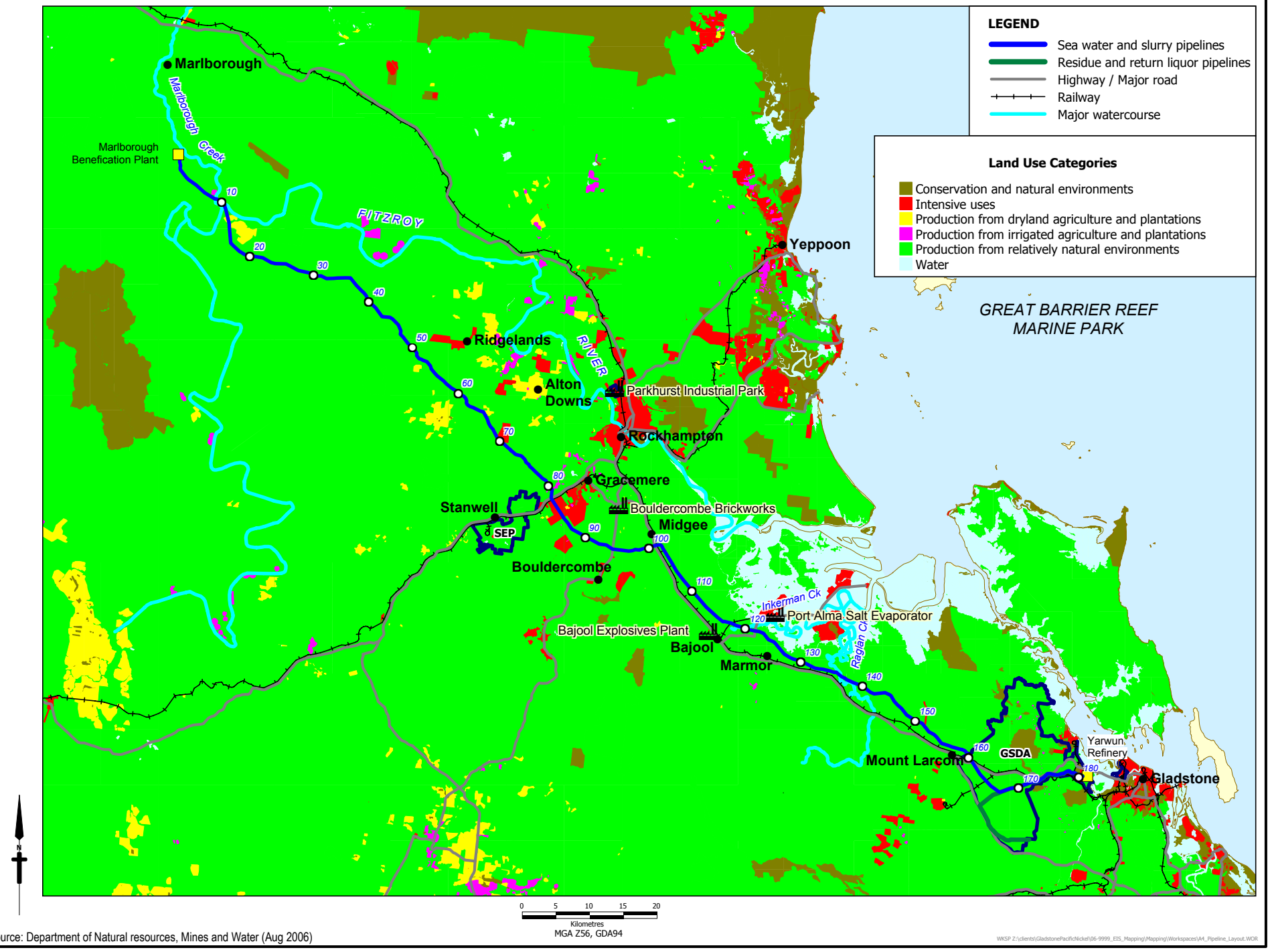

Source: Department of Natural resources, Mines and Water (Aug 2006)

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Table 10.11.1 Existing Land Use

KP	Existing Land Use	KP	Existing Land Use
0-11	Extensive grazing and mining activities	101-104	Pasture and water harvesting with extensive levee bank system
11-18	Intensive cattle management, professionally managed pastures	104-153	Pasture & packets of remnant vegetation
18-47	Extensive cattle grazing	153-158	Property development; 10-20 ha subdivisions
47-82	Cattle grazing with areas of remnant vegetation	158-159	Pasture with tracts of remnant vegetation
82.2	Capricorn Highway	159-180	GSDA
82.3	Central Rail Line	160 & 173	North Coast Rail Line
83 - 93	Pasture	164	East End Mine branch rail line
93-101	Cropping and grazing	168-178	GSDA Infrastructure Services Corridor
101	North Coast Rail Line		

Note KP – Kilometre Point

Levee banks and contours have been installed by landholders along parts of the pipeline route to control water flow across the properties. These occur primarily at KP 31-33, KP 60-67 and KP 100-120. While the route has been selected to avoid the contour and levee banks as far as possible, it has not been possible to avoid all of these.

Towns and settlements located within the vicinity of the pipeline include Rockhampton, Gracemere, Boulder combe, Mt Larcom and Yarwun (refer Figure 1.1.2). The pipelines route avoids areas of closely settled residential developments, but traverses areas of rural residential properties and medium sized rural living areas, which generally occur between Rockhampton and Stanwell and the area surrounding Mt Larcom.

10.11.3.2 Potential Impacts

Agricultural Uses

GPNL proposes to obtain access to the land for construction and operation of the pipelines via a mining lease for those areas outside of the GSDA. Surface rights will remain with the landowner and compensation for the mining lease and for disturbance will be negotiated with each landowner.

The main potential impact of the pipeline on agricultural land uses will occur during construction when agricultural and grazing activities will be temporarily restricted over the construction right-of-way (ROW). Land use can generally recommence following construction with landholders retaining full access to and use of the surface area above the pipelines, with minor restrictions to preclude activities that would threaten pipeline security or significantly impede access to the pipe (e.g. construction above the pipelines or installation of subsurface infrastructure).

The pipeline trench will be left open for a minimum amount of time and should not pose a long-term hazard or barrier to stock. Temporary provisions such as fencing or access to water will be discussed with the landholder and any fences that are crossed will be repaired to at least the original condition.

Additional tracks may be required in some areas to provide access to the construction ROW. The location and rehabilitation of the access tracks will be conducted in consultation with the landholder.

Mining and Industrial Land Uses

The only mining leases intersected by the alignment of the proposed pipelines are those held by MNPL. The proposed pipelines have generally been located close to existing major infrastructure and it is not considered that the construction of the pipelines will adversely impact on any mining or petroleum tenure held within the area.

Industrial activities will not be directly impacted by the construction and operation of the proposed pipelines.

Infrastructure Uses

The location of the various types of infrastructure (e.g. roads, powerlines, railways, other pipelines) intersected by the routes of the pipelines are summarised in Table 2.3.9. Secondary, minor and local roads and farm access tracks will also be crossed by the pipeline route or used by vehicles associated with pipeline construction activities.

Roads

Minor disruptions to local roads may occur during the construction of the pipelines. GPNL has contacted the relevant local authorities with respect to local road usage and will continue to liaise with the relevant local councils regarding the scheduling of activities to minimise disruption.

Crossing of the roads will be carried out in consultation with the DMR and the relevant Council (if any) in such a way as to minimise disturbance to traffic. GPNL has made initial contact with authorities regarding the proposed crossing locations and crossing methods. The design of the crossings will be finalised during the detailed design phase of the project. During this phase, GPNL will liaise with the relevant regulators regarding the design of the crossing and obtain the necessary consents/approvals.

Pipelines

The construction of the proposed pipelines has the potential to cause accidental damage to existing underground pipelines at crossing points which could result in rupture of the existing pipeline and unplanned release of water or gas. Secondary impacts include the risk of fire, and increased safety risk to construction personnel and other third parties. This is considered an unlikely event and measures will be taken to identify the exact location of any underground pipelines prior to any construction activities.

Powerlines

The construction of the pipelines will not have a direct impact on overhead powerlines or electricity supply. The corridor will be disturbed where pipelines traverse or run parallel to existing powerlines. Pipeline construction activities at a particular location will preclude scheduled any powerline maintenance activities (e.g. vegetation management, weed control etc) during construction.

The appropriate authorities will be consulted prior to construction to ensure that any potential disturbance to the scheduled powerline maintenance activities are minimised.

Railway

Construction of the proposed pipelines will not directly impact on the operation of the railway. Where the pipelines cross the rail, the crossings will either be bored or directionally drilled. Minor service disturbances may occur while the crossings are being constructed as a result of recommended safety protocols e.g. trains reducing speeds near the construction zone.

Generally, the presence of the pipelines will not impact railway operations. However, should a pipeline operational fault occur at a location which may affect the safe operation of the railway or personnel, temporary closure of the railway section may be required. The potential for this to occur is extremely unlikely.

10.11.3.3 Mitigation Measures

The pipeline route has been selected to avoid or minimise adverse impacts to land uses and infrastructure. Mitigation measures will follow the procedures outlined below. Further information is provided in the draft environmental management plans contained in Section 14.

To mitigate potential impacts, GPNL will:

- Maintain on-going landholder negotiations with the aim of achieving a mutually agreed pipeline route and a fair and reasonable compensation for any disruptions.
- Avoid disturbance to pre-existing soil conservation measures (e.g. levee/contour banks) as far as possible. Where disturbance is required, the banks/levees will be reinstated as soon as practicable, in consultation with the relevant landholder.
- Install temporary fences where required along the route to protect humans and livestock.
- Clearly locate existing fences and install temporary gates at locations where the pipelines cross fences.
- Reinstate fences following construction.
- Work with infrastructure holders in regard to:
  - Accurately determine the location of existing underground infrastructure.
  - Design the crossings, taking into account the specific requirements of the infrastructure holders.
  - Develop agreed safety protocols for the purpose of constructing crossings.
  - Obtain the relevant consent/licence agreements for crossings.
  - Agree a schedule for construction of crossings.
  - Develop agreed protocols for any operational activities associated with the pipelines where an infrastructure crossing exists.
  - Design crossings in accordance with AS 2885 to maintain the integrity of the existing infrastructure and public safety.

10.11.4 Regional Land Uses

The Gladstone region is centred on the port and industrial city of Gladstone. There are a number of different land uses within the Gladstone region (refer to Figure 10.11.1) including:

- Industrial.
- Residential.
- Primary industry and tourism.
- Infrastructure.

10.11.4.1 Industrial

The Queensland Government has been actively encouraging industrial development in the Gladstone region through the GSDA. A number of major international industries have developed within Gladstone as it is perceived to be the ideal investment partner (GEIDB, 2006). These include:

- QAL alumina refinery. QAL is one of the world's largest alumina refineries. Current production is more than 3.65 Mt/y of alumina.
- Boyne Smelters Limited (BSL). BSL is the country's largest aluminium smelter, producing 500,000 t/y of aluminium. It converts alumina into aluminium in an electrolytic reduction process.

- GPS. GPS is one of Queensland's largest coal-fired power stations and supplies electricity to the surrounding industrial and residential users.
- RG Tanna Coal Terminal. This coal terminal has a capacity of approximately 45 Mt/y and exports coal from a number of central Queensland coal mines.
- Cement Australia. The plant processes limestone, clay, silica and ironstone to produce 1.6 MT/y of cement.
- Orica Australia. The Orica chemical plant produces 9,000 tonnes of chlor-alkali, 220,000 t/y of explosive grade ammonium nitrate, and 34,000 t/y of sodium cyanide.
- CAR. Stage 1 of CAR has the capacity to produce 1.4 MT/y of smelter grade alumina.
- Stuart Oil Shale. The Stuart Oil Shale project is located within the Stuart Oil Shale Reserve Preservation Area of the GSDA. This is currently a pilot project including a mine and a processing plant.

There are no major industrial use areas in the vicinity of the pipelines route with the exception of the Stanwell Energy Park (SEP). The SEP is approximately 2 km to the west of the pipelines route when it crosses the Capricorn Highway (refer to Figure 7.2.1). The Stanwell Power Station is located in the SEP.

10.11.4.2 Residential

Gladstone is the main residential area in the region. Smaller settlements are located in Calliope, Mount Larcom, Boyne Island, Tannum Sands, and Yarwun. The longest established residential areas of Gladstone include Barney Point and South Gladstone. Gladstone has progressively radiated out to incorporate more residential areas including in the suburbs of West Gladstone, Kin Kora and Sun Valley. Further residential development potential in these areas consist predominantly of in-fill or higher density dwelling development. Newer Gladstone suburbs include Clinton, New Auckland and Glen Eden on the western and southern outskirts providing opportunity for lower density residential development.

Calliope Shire has a number of small townships and rural communities but the shire's main residential development is concentrated in the two coastal townships of Boyne Island and Tannum Sands to the south-east of Gladstone. These two townships offer coastal residential living generally unavailable in Gladstone, since the majority of Gladstone's coastal land is utilised for industrial and port developments. The town of Calliope (15 km) to the south-west of Gladstone) is the shire's administrative centre.

10.11.4.3 Primary Industry and Tourism

The region has had a strong association with the rural sector including crops, livestock, fishing and forestry. Agricultural activities dominate the land use in the region (particularly beef cattle production) covering 85% of the land area.

The region's main fishing fleet and marine recreational activities operate out of Gladstone Harbour and Roslyn Bay Harbour. The commercial fishing industry in the region is valued at over $150 million per year in catches.

Much of the forestry industry exists in the Boyne Valley and Miriam Vale Shire (GAPDL, 2004).

Tourism is perceived as a growth industry in the region, with tourist visitation steadily increasing over the years (GAPDL, 2004). Gladstone is a gateway to the Great Barrier Reef Marine Park and several tourist attractions including Lady Elliot Island, Heron Island, Lady Musgrave Island, Fitzroy Reef and Wilson Island.

10.11.4.4 Regional Infrastructure

The Gladstone region has an extensive infrastructure network. The infrastructure facilities available within the region include transport (port, rail, road and air), energy, water, natural resources, education, training and research and development opportunities.

Gladstone is a major transport hub for the region. Gladstone Port is the state's largest multi-commodity port, and permits a wide range of shipping operations including bulk carrier loading and unloading, fuel loading facilities and a dedicated container terminal (GEIDB, 2006). It is operated by the CQPA. The Port, which allows for vessels of up to 220,000 dry weight tonnes, has six wharves that can simultaneously berth 13 vessels along a 20 km foreshore. The Gladstone Port moves over 30% of the State's exports, with coal representing over 70% of total export cargo.

As a significant coal exporting centre, the region is an operations hub for QR. Transport links integrate mine, road, rail and port logistics into a world-class system with strategies in place to meet future demands (GEIDB, 2006). The rail system uses a combination of both electrified and non-electrified rail links. Electrified rail links Gladstone to Brisbane, Rockhampton and the coal mines in the Bowen Basin, with trains more than 1.5 km long carrying in excess of 5,500 tonnes of coal to Gladstone's coal terminals. Non-electrified rail extends the network to encompass agriculture and other mineral resources. QR has established a dangerous cargo spur line with direct access to the Port of Gladstone and the Port's container facility (GEIDB, 2006).

The regional road network is principally serviced by the Bruce and Dawson Highways (GAPDL, 2004). The DMR oversees and maintains the major highways and declared roads in the region.

The Gladstone Airport provides regular services to Brisbane, Mackay, Rockhampton, Townsville, and Cairns.

Road passenger travel within the district is predominantly private vehicle based. Limited bus services operate in Gladstone and the surrounding district. At present, Buslink Queensland operates in Gladstone City as well as between Gladstone and Boyne Island, Tannum Sands, Awoonga Dam, Calliope and Benaraby.

Within 100 km of Gladstone there are three base-load power stations located at Gladstone, Stanwell, and Callide, establishing a reliable state transmission network. The Gladstone region is also well serviced with natural gas (via the Queensland Gas Pipeline owned by Alinta Ltd (GEIDB, 2006)). The GPS is located east of the refinery site on the opposite side of the Calliope River towards Gladstone.

The Gladstone Area Water Board provides both raw and treated water for residential and industrial use within the Gladstone region, from nearby Lake Awoonga.

Local councils provide water and sewerage infrastructure in urban areas and maintenance of local roads in the region. Local councils have zoned land suitable for service industries to support the region's heavy industry projects.

A range of mineral resources are found in the Gladstone region and surrounds including coal, oil shale, natural gas, limestone, magnesite, silica, mineral sands and salt. These natural resources are within transporting distance.

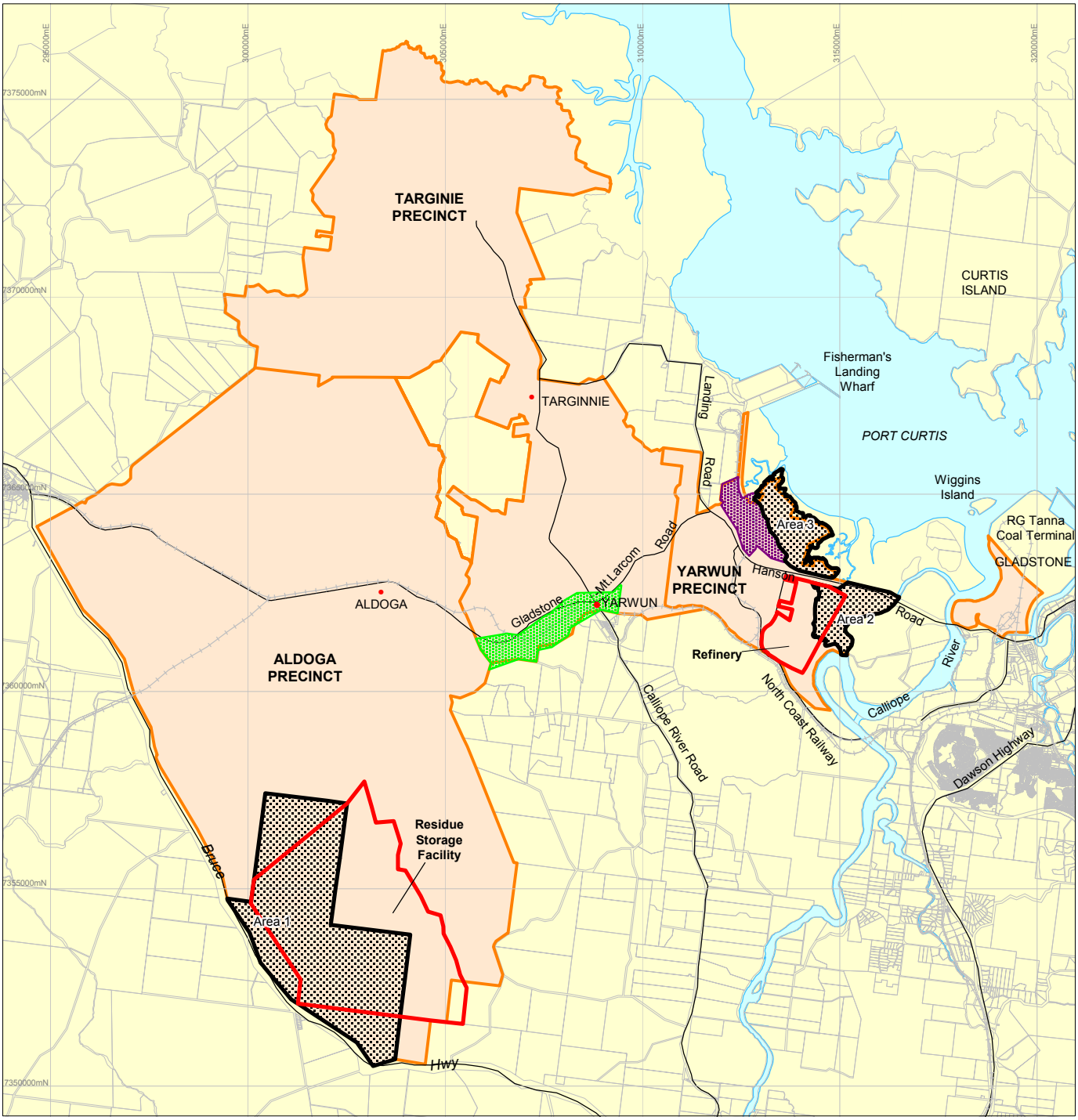
10.12 Land Use Planning

10.12.1 Gladstone State Development Area

The GSDA is an area of approximately 21,000 ha located to the west of Gladstone that has been designated by the Queensland Government for industrial use and development. The location of the GSDA is shown on Figure 10.12.1.

The GSDA was established in 1993 as a 'State Development Area' for large-scale industrial development under the *State Development and Public Works Organisation Act 1971* (SDPWO Act). The GSDA is controlled by the CG and is subject to land use and planning controls set out in the GSDA Development Scheme. The Queensland Government holds all land within the GSDA in freehold title. The Gladstone Economic and Industry Development Board (GEIDB) is the Queensland Government authority established to facilitate investment attraction and project development within the GSDA. The aim of the GSDA is to provide land for industrial development and associated infrastructure services within the precincts of the GSDA that are of national, state and regional significance.

The CG is currently working to expand the GSDA area pursuant to Part 6, Division 1 of the SDPWO Act. The proposed expansion areas, which are shown on Figure 10.12.1, include the following:



Gladstone State Development Area

GSDA Expansion Areas

Stuart Oil Shale Reserve Preservation Area

Materials Transportation and Service Corridor

Project Site Boundary

0 2.5 5km

Scale 1: 150,000 (A4)

MGA Z56, GDA94

Client: Gladstone Pacific Nickel Ltd

URS

Project: GLADSTONE NICKEL PROJECT ENVIRONMENTAL IMPACT STATEMENT

Title: **GLADSTONE STATE DEVELOPMENT AREA**

Drawn: TN	Approved: CMP	Date: 06-11-06	Figure: **10.12.1**	Rev:B
Job No: **4262 5791**	File No: 42625791-g-026b.wor			**A4**

- Area 1 - Lot 200/CL4058, Lot 10/CL40348 and Lot 24/CTN105, parish of Calliope and situated at 52254 Bruce Highway, Mt Larcom. This land comprises 1,562 ha and is currently owned by the Minister for Industrial Development of Queensland.

- Area 2 - An area comprising part of Hanson Road, an area of unnamed road and unallocated state land situated between the esplanade adjoining the eastern boundary of Lot 2/SP147891 and the anabranch of the Calliope River. This area comprises approximately 205 ha.

- Area 3 - Lots 1 and 3 on SP157699 and the esplanade on SP157699, Parish of Calliope and situated at Hanson Road. This land comprises approximately 263 ha. Lots 1 and 3 are currently owned by the Minister for Industrial Development of Queensland.

In addition, enquiries have commenced into the purchase of Lot 52 /CTN198, and it is planned to also include this lot in the Aldoga Precinct of the GSDA.

The addition of the above areas will promote and facilitate effective planning and management of the GSDA for existing operations and in the future. The public submission period regarding the GSDA variation closed on 7 July 2006. The inclusion of the above three areas into the GSDA is expected to occur by the end of 2006.

The GSDA consists of a number of precincts. The refinery site is located within the Yarwun Precinct and the RSF site within the Aldoga Precinct. Sections of the pipelines are located within the Yarwun and Aldoga Precincts, which are designated for industrial development of regional, state and national importance. The remaining sections of the pipelines located within the GSDA are located within the Materials Transportation and Services Corridor Precincti which links the Yarwun and Aldoga Precincts (refer Figure 10.12.1). The other precincts within the GSDA are Targinie Precinct, Corridor Buffer Area, Clinton Precinct and the Stuart Oil Shale Reserve Preservation Area. The proposed land uses within each of these precincts are described in Table 10.12.1.

Table 10.12.1 GSDA Precinct Land Uses

GSDA Precinct	Use
Aldoga	Industrial development of regional, state and national importance.
Yarwun	Industrial development of regional, state and national importance.
Corridor Buffer Area Precinct	A physical separation between the activities in the Materials Transportation and Services Corridor and areas where sensitive land uses may occur.
Targinie	Industrial uses that support other industrial activities.
Materials Transportation and Services Corridor	Materials transportation infrastructure and utility and service infrastructure.
Clinton Precinct	Port related activities and infrastructure.
Stuart Oil Shale Reserve Preservation Area	Mining within the Stuart Oil Shale Resource.

The GSDA Development Scheme outlines the land use planning approval process for all projects located within the GSDA. It sets out the objectives and guidelines for future land use in the area as well as establishing procedures for assessment of applications within acceptable timeframes and referrals to relevant agencies, including CSC and GCC. The Development Scheme applies for development applications that would otherwise require a material change of use application under *the Integrated Planning Act 1997* (IPA).

The refinery site, the RSF and sections of the pipelines are located within the Yarwun and Aldoga Precincts of the GSDA. The remaining sections of the pipelines within the GSDA are located within the Materials Transportation and Services Corridor Precinct.

Under the GSDA Development Scheme:

- Proposed operations at the refinery fit the definition of “industry”.

- The RSF fits the description of "waste disposal".
- The pipelines fit the description of "materials transport infrastructure".

Under Schedule 1 of the Development Scheme, "industry", "waste disposal" and "materials transport infrastructure" are considered uses "highly likely to meet the purpose of the land use designation" within the Yarwun and Aldoga Precincts. Under Schedule 2 of the Scheme "materials transport infrastructure" is also a use considered "highly likely to meet the purpose of the land use designation" within the Materials Transportation and Services Corridor Precinct. On this basis the GNP can be considered to be consistent with the intent of the GSDA Development Scheme.

Four policies dealing with specific development issues have been prepared to support the GSDA Development Scheme. These policies are intended to assist proponents in the management and development of projects in the GSDA. The relevance of these policies is discussed below.

- Policy 1 - Information Collection for the Gladstone State Development Area

  This policy is to support the Development Scheme and to assist in the distribution of information prepared regarding the GSDA. The CG will collect, retain and make available studies and other relevant information about the GSDA. This information may then be used in the preparation of planning reports, environmental impact assessments and other related studies.

- Policy 2 - Environmental Management in the Gladstone State Development Area

  The aim of this policy is to promote best practice environmental management and to encourage ecologically sustainable development. Thus the main objective is to ensure that the negative environmental effects created by developments within the GSDA are minimised and that environmental harm (as defined in the *Environmental Protection Act 1994*) is avoided. Environmental impacts can be kept within the accepted state and national environmental parameters and guidelines through the implementation of best practice environmental management.

  GPNL will adopt the goals, standards and guidelines for environmental management under the GSDA development scheme. The environmental management strategies to be implemented for the project are outlined in Section 14. An environmental management system (EMS) will also be prepared and implemented for the GNP. The EMS will be prepared in accordance with the requirements of ISO 14000 Series: Environmental Management Systems, and the Environmental Protection Authority's (EPA's) guidelines for preparing an integrated EMS.

- Policy 3 - Public Notification

  This policy outlines the requirements of public notification under the scheme. The CG is to consider whether further notification is required for the material change of use application, given the prior public advertising and consultation undertaken in respect of the EIS. It is expected that the public notification provided for the EIS process for the GNP will be sufficient and that no further public notification will be required.

- Policy 4 - Ecologically Valuable Land

  This policy requires a detailed assessment of all land in the GSDA to determine its ecological value and to identify ecologically valuable land within the GSDA that is to be subject to the requirements of this policy. The ecological assessment undertaken as part of this EIS has been prepared with reference to this planning policy (refer to Sections 8 and 9 for further details).

10.12.2 Calliope Shire Council

The refinery, the RSF, and sections of the pipelines are located within Calliope Shire.

CSC prepared a new draft town planning scheme to replace the transitional planning scheme (Local Law 42). The Department of Local Government Planning and Sport and Recreation (DLGPSR) has provided recommendations to

Council on the draft planning scheme. The public review and submission stage for the draft plan closed 10 October 2006. The draft planning scheme has been developed as framework for managing development that advances the purposes of the IPA.

The GSDA Development Scheme is used to manage land use within the GSDA even though it is within the Calliope Shire. Land use outside of the GSDA is managed by the Calliope Shire's town planning scheme. The land use zones for both the areas surrounding refinery and RSF sites are shown on Figures 10.12.2 and 10.12.3 respectively.

Any project component outside of the GSDA which require planning approval (e.g. workforce housing) will be assessed under the draft planning scheme and IPA. The provision of Part 8 of the draft planning scheme will apply to the project including requirements relating to access and car parking, landscaping, and building setbacks, area and heights. Other approvals requiring a development application to be made to Calliope Shire Council under the Integrated Development Approval System (IDAS) provisions of IPA include:

- Operational works.
- Building works.
- Plumbing and drainage works.

The sections of the slurry and seawater pipelines that will be subject to a mining lease will be exempt from assessment under local government planning schemes under the IPA. The remaining sections of the pipelines, not subject to a mining lease, will be located within the GSDA and will require development approval in respect to a material change of use under the provisions of the GSDA Development Scheme.

Nevertheless, the relevant provisions of the Calliope Shire planning schemes have been reviewed as these relate to the alignment of the pipelines. The alignment of the pipelines passes through the northern rural zoned section of Calliope Shire from KP 136-160. Under the current planning scheme, land zoned Rural within the shire is land used or is suitable for use for rural production. Under the Draft CSC Planning Scheme, which was released for public comment in July 2006, the overall outcomes sought for the Calliope Rural Locality (KP 136 – KP 160) also include the retention of the predominantly rural character, protection of good quality agricultural land, and promotion of the continuation of primary industries free from the intrusion of incompatible land uses. It is considered that the pipelines are consistent with the aims of the planning schemes within these areas.

10.12.3 Fitzroy Shire

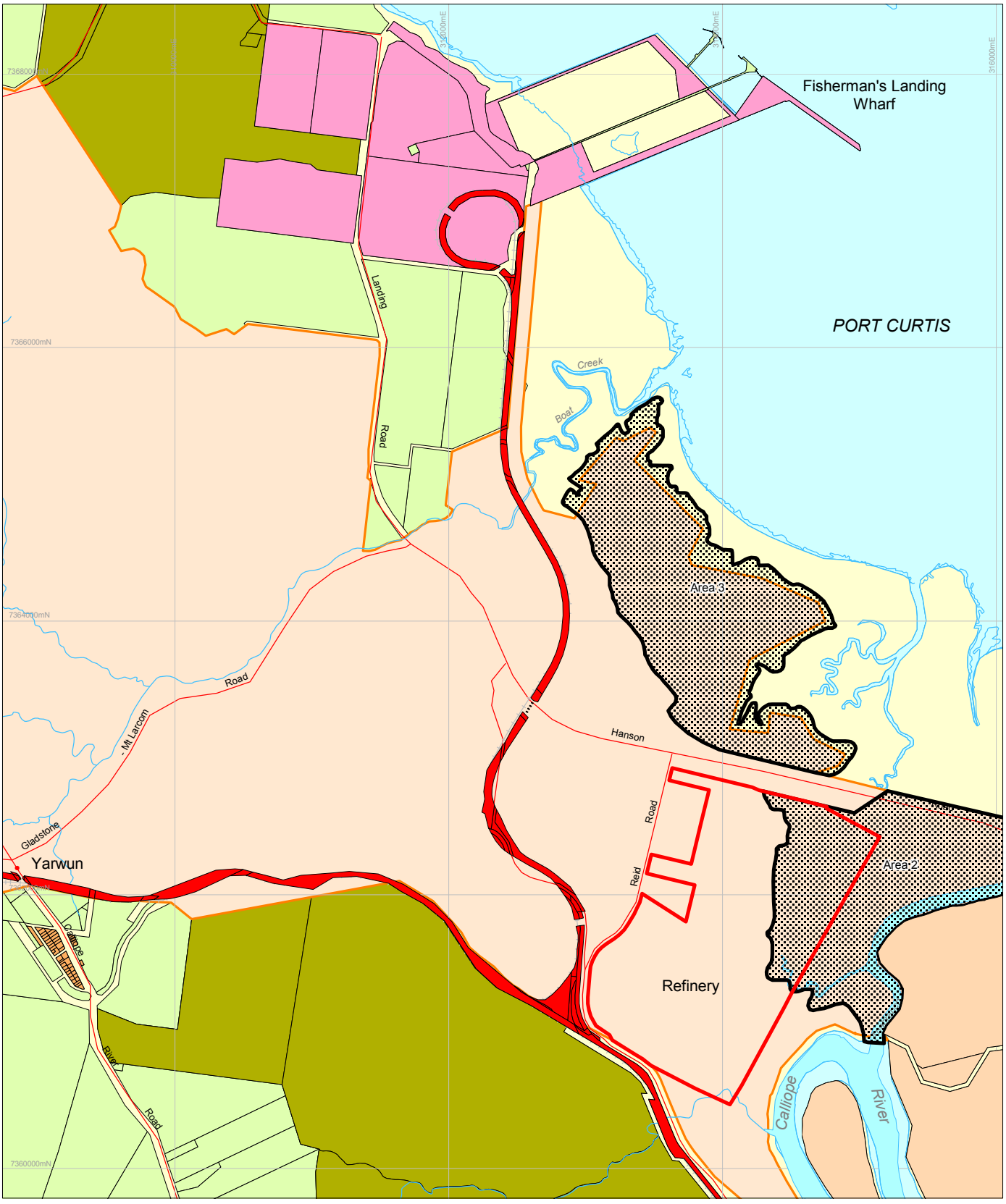
Parts of the slurry and seawater pipelines also pass through the Fitzroy Shire. Fitzroy Shire's planning scheme indicates that the majority of the pipelines within the shire are in the rural zone. Other zones include the Alton Downs Zone Precinct 2 (KP 60-75 approximately) and the Stanwell-Gracemere Zone (KP 80-85 approximately). The Stanwell - Gracemere Zone is subdivided into precincts A-K. The proposed route passes through General Industry Precinct D and Precinct K – Rural/Village Balance.

The general purpose of the Rural Zone is to protect the rural character of the zone, maintain the dominant land use of agriculture and grazing purposes, maintain water quality through the protection of natural features and allow for other non-rural uses provided specific outcomes stated within the planning scheme are met.

The aims of the Alton Downs Zone Precinct 2 are to retain a rural character in the zone with emphasis on retention of large land parcels, vegetation along ridgelines and watercourses, low population densities and basic services. Subdivision and/or development for purposes not associated with rural development will not be encouraged.

The aims of the General Industry Precinct are to provide infrastructure servicing in the medium term future for industrial land use. The overall outcomes for the Rural Village Balance Precinct allows for some industrial development where other options are limited and provision is made for mitigating any adverse impacts on nearby residential and rural land uses.

It is considered that the pipelines are consistent with the aims of the planning schemes within these areas.



Source: CALLIOPE SHIRE COUNCIL and GLADSTONE CITY COUNCIL.

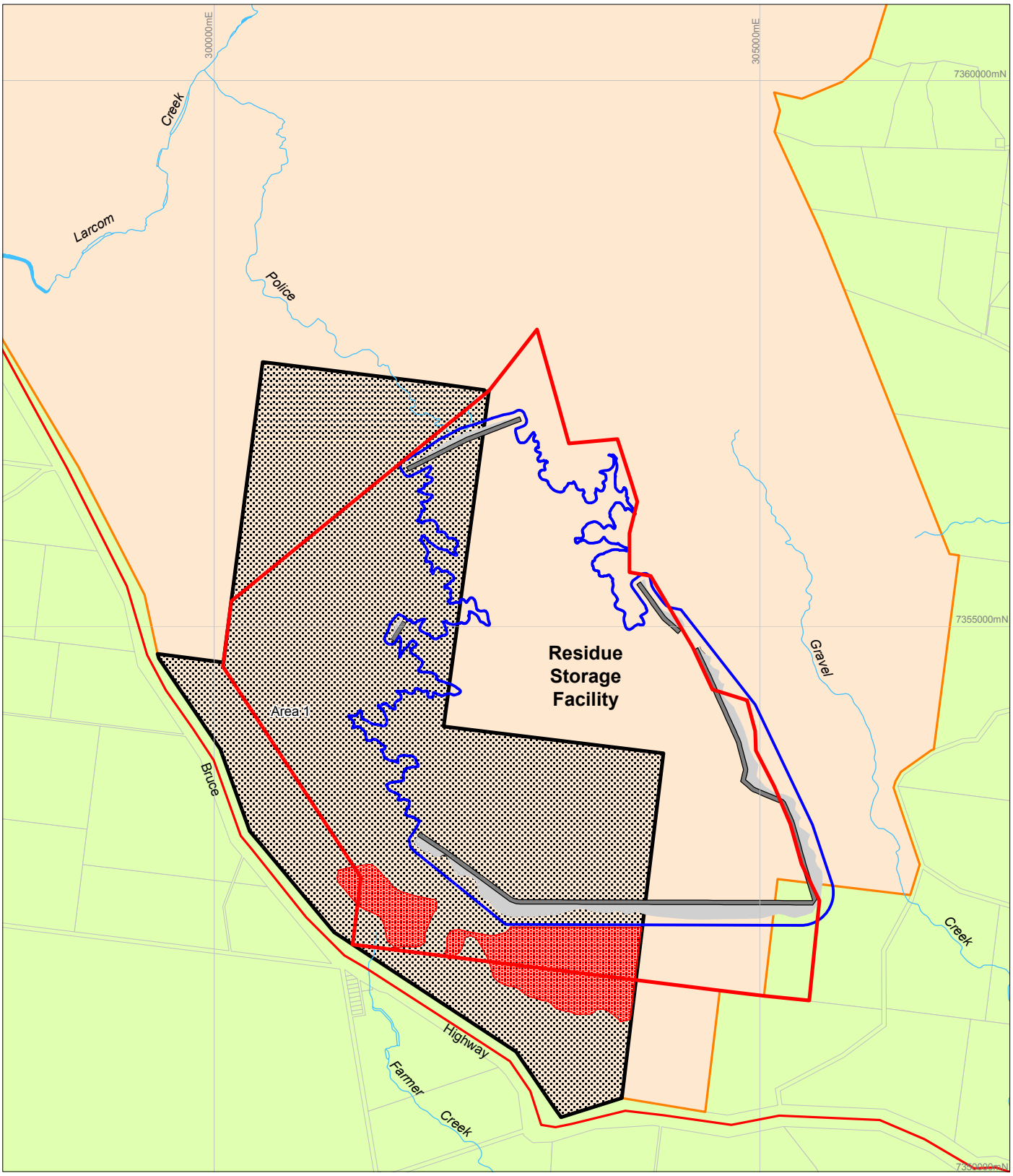
Client: Gladstone Pacific Nickel Ltd

URS

Project: GLADSTONE NICKEL PROJECT
ENVIRONMENTAL IMPACT STATEMENT

Title: **LAND USE ZONES OF SURROUNDING AREA REFINERY SITE**

Drawn: TN	Approved: CMP	Date: 26-10-06	Figure: **10.12.2**	Rev: A
Job No: **4262 5791**	File No: 42625791-g-080.wor			**A4**



Source: CALLIOPE SHIRE COUNCIL.

Client: Gladstone Pacific Nickel Ltd	Project: GLADSTONE NICKEL PROJECT ENVIRONMENTAL IMPACT STATEMENT	Title: **LAND USE ZONES OF SURROUNDING AREA RESIDUE STORAGE FACILITY**
URS	Drawn: TN; Approved: CMP; Date: 06-11-06; Job No: **4262 5791**; File No: 42625791-g-081b.wor	Figure: **10.12.3**; Rev: B; **A4**

10.12.4 Central Queensland Regional Growth Management Framework

The Central Queensland Regional Growth Management Framework (CQRGMF) is the principal, long term, broad-based, integrated regional planning strategy to guide the management, growth and development in the region over the next 20 years (DLGP, 2002). The CQRGMF advances the purpose and role of the state planning policies under the IPA which is to promote ecological sustainability at a regional level.

The CQRGMF emphasises the importance of the region's natural resources and states that appropriate planning and management of land should be carried out to protect natural resources from inappropriate or incompatible land uses. The refinery and RSF sites are identified as "major industrial growth areas" under the CQRGMF (DLGP 2002). The project's compliance with the policy framework is detailed in Table 10.12.2.

Table 110.12.2 Project Compliance with Policy Outcomes of Central Queensland Regional Growth Management Framework

Land Use Planning and Management

Policy Outcome: The promotion of, and adherence to, best practice land management for sustainable and profitable land use.

Project Compliance:

- A monitoring program will be established to provide information about the condition and trend of land resources.
- The project will not affect the region's natural resource assets.
- Native title interests have been considered in the project development.
- Proposed industrial land use is consistent with the land use planning strategy,
- The proposed industrial use will result in a higher-order profitable use of the land,
- The project will comply with relevant environmental approvals, conditions and strategies to minimise adverse impacts on the natural environment.

Pest and Diseases

Policy Outcome: The economic prosperity, competitive advantage and biodiversity of the region are protected from introduced and endemic pests and diseases.

Project Compliance:

- A weed and pest management strategy will be developed as part of the EMP to control weeds and pests.

Water Use Planning and Management

Policy Outcome: The promotion of, and adherence to, sustainable use of water resources while maintaining and enhancing environmental values.

Project Compliance:

- Sufficient mitigation measures will be established to ensure water quality of surrounding waterways will not be affected by the project.
- Water is re-used by containing stormwater and recycling through the process in addition to re-using return liquor from the RSF.
- Water efficient practices will be utilised as part of the operations, including the use of seawater for cooling and transporting ore as slurry to the refinery rather than using fresh water

Waste Management

Policy Outcome: Socio-economic and environmentally sustainable waste management practices are adopted within the region.

Project Compliance:

- Waste products will be recycled or reused where possible as outlined in the EMP.

Table 110.12.2 Project Compliance with Policy Outcomes of Central Queensland Regional Growth Management Framework

Air Quality Policy Outcome: Air quality is maintained at levels which ensure sustainable regional communities, protection of the natural environment and opportunities for continuing economic growth. Project Compliance: • A detailed air quality analysis of the project has been prepared. The refinery will operate to meet the EPA requirements on air quality.
Climate Change and Greenhouse Policy Outcome: Development takes place with a focus on efficiency to achieve economic progress with minimisation of greenhouse emissions and with an understanding of the potential impact of climatic conditions. Project Compliance: • GPNL will adopt greenhouse friendly practices and technologies to minimise greenhouse gas emissions.
Coastal Planning and Management Policy Outcome: The region supports existing and emerging industries and encourages diversification ensuring growth and a viable and ecologically sustainable economy in the region. Project Compliance: • The project will provide significant economic growth into the local, regional and state economy and promote economic growth for a range of support industries and associated industries.
Existing and Emerging Industries Policy Outcome: The region supports existing and emerging industries and encourages diversification ensuring growth and a viable and ecologically sustainable economy in the region. Project Compliance: • The project will provide significant economic growth into the local, regional and state economies and promote economic growth for a range of support industries and associated industries.
Investment and Capital Markets Policy Outcome: There is a measurable increase in the understanding and the flow of capital within the local and regional economies and how this applies to the state, national and international economies. Project Compliance: • GPNL will implement a comprehensive workforce training program
Labour Market Policy Outcome: The provision of a flexible and skilled workforce meeting industry requirements which is capable of responding to both industry and personal changes. Project Compliance: • There is an existing skilled workforce in the region which will assist in meeting the workforce demands of the project. • The project will provide significant input into the local, regional and state economies. • Additional skilled workers will be imported into the region
Export Development Policy Outcome: It is recognised there is an increased capacity of the region to engage directly with international markets which increases our global perspective and enhances the viability of organisations based in the region. Project Compliance: • GPNL will produce and export nickel and cobalt to supply the demands of the world market.

Table 110.12.2 Project Compliance with Policy Outcomes of Central Queensland Regional Growth Management Framework

Mining, Mineral Processing/Metal Manufacturing and Chemical Processing

Policy Outcome: The existence of mineral processing/metal manufacturing activities that build on the extensive mineral and resource deposits in the region that meet existing and emerging markets. The existence of chemical processing industries supported by mining and mineral processing.

Project Compliance:

- The project will be value adding to the existing nickel mineral deposits found in Marlborough.

10.12.5 Curtis Coast Regional Management Plan

The Curtis Coast Regional Coastal Management Plan (Curtis Coastal Plan) is a mechanism for implementing coastal zone management within the Curtis Coast region, within the policy framework established by the State Coastal Management Plan — Queensland's Coastal Policy (State Coastal Plan) and the *Coastal Protection and Management Act 1995* (Coastal Act).

As a statutory instrument under the Coastal Act, the Curtis Coastal Plan guides decisions by state and local governments. The State Government is required to consider the Curtis Coastal Plan when making planning, development and management decisions within the Curtis Coast region. The Curtis Coastal Plan has the effect of state planning policies under the IPA. The Curtis Coastal Plan provides direction and guidance for decision-makers (including state and local government and land managers) on coastal management issues of international, national, state and regional significance. The Coastal Act gives regional coastal management plans the status of statutory instruments and government is required by law to consider the state coastal plans and regional coastal plans when making relevant decisions about coastal management.

The Curtis Coastal Plan applies to the coastal zone as defined in the Coastal Act under Section 11 as: *"coastal waters and all areas to the landward side of coastal waters in which there are physical features, ecological or natural processes or human activities that affect, or potentially affect, the coast or coastal resources."* (Coastal Act). This definition includes all rivers and their catchments, mudflats, and the foreshore. Thus the Calliope River and some of the area surrounding the refinery site are within the Curtis Coast region and applicable to the Curtis Coastal Plan.

The Curtis Coastal Plan has a number of regional policies to implement the State Coastal Plan and, where regional issues require, a specific regional policy. Additional regional policies (linked to State Coastal Plan coastal management outcomes and principles) have also been developed to address regional issues with state and national significance. The objectives of the many regional policies are to:

- Identify regionally specific coastal management issues.
- Provide direction that implements the State Coastal Plan in the region.

The Curtis Coastal Plan regional policy 2.1.1 'areas of state significance (social and economic)' is applicable to the project. It relates to development and activity occurring within the GSDA. This policy states that all planning and decision making in relation to the GSDA will be in accordance with the GSDA Development Scheme and the policy objectives for the sustainable development of the area as a key industrial site of state and national importance.

Regional policy 2.1.1 also states that management and development of the GSDA will have regard for established environmental management practices and social values held by the Gladstone community. The project will have regard to these practices and values by complying with the objectives of the GSDA Development Scheme.

The Curtis Coastal Plan has identified 13 key coastal sites that contain coastal and other resources that require special coastal management. The refinery site falls within the Calliope River/Flying Fox Creek (known as KCS7) coastal site. The desired coastal outcomes for this coastal site and the extent to which the GNP will be consistent with these are summarised in Table 10.12.3.

Table 10.12.3 Project Compliance with Desired Coastal Outcomes for the Calliope River/Flying Fox Creek Coastal Site

Desired Coastal Outcomes for the Calliope River/Flying Fox Creek Coastal Site	Compliance of the GNP
Protection of the Calliope River's coastal habitat value, including its importance in contributing freshwater flows that sustain coastal ecosystems within Gladstone Harbour and its importance in maintaining regional fisheries.	The refinery's discharge to Port Curtis will comply with relevant water quality objectives and hence not deleterious impacts on coastal habitat value are expected. Construction of the refinery will not significantly on freshwater flows into the coastal ecosystem.
Continued development of the Port of Gladstone in an ecologically sustainable manner.	The refinery will operate in a sustainable manner. Examples of this include: • Because, nickel is "used" and not "consumed", it is available for re-use without degradation. At the end of their service lives, nickel containing products can be collected and recycled to a higher degree than most materials. • Use of 4th generation HPAL technology recovers greater levels of nickel from lateritic deposits. • Recovery and re-use of off-spec products and HPAL and MSP autoclave descale within the process. • Recovery and re-use of multimedia filters from the water treatment plant. • Continued investigations into synergies of the GPNL refinery's acidic residues with alkaline residues at existing alumina refineries in Gladstone • Use of sea water rather than fresh water for process water and cooling water. • Re-use of decant water from the RSF as process water within the refinery where appropriate • On-site generation of the bulk of the refinery's power and steam requirements from the exothermic reaction of burning sulphur to manufacture sulphuric acid
Monitoring to determine any adverse impacts from hot-water discharge on marine biodiversity, fishing practices (both commercial and recreational) and ongoing reclamation activities.	The refinery will implement a comprehensive marine water monitoring program which will include: • Monitoring and control to ensure that the process and discharge water quality is controlled to acceptable levels based on water quality objectives. GPNL will have this monitoring independently verified. • Participation in the Port Curtis Integrate Monitoring Program's ongoing ambient monitoring of Port Curtis.
Maintenance of natural hydrological flows associated with coastal wetlands, particularly in regards to the development of infrastructure.	The GNP will be located on land that will have been filled as part of works to be undertaken by the Central Queensland Ports Authority. Approval for this filling has already been obtained.
Maintenance of water quality to a standard that supports coastal habitat values.	The GPNL refinery will only discharge water in accordance with the conditions of its environmental authority which will be established to ensure that there will be no deleterious effects on coastal habitat values.

For any works proposed to be undertaken within the Curtis Coast Coastal Management District, detailed concept plans of these works will be provided as part of the development application process in accordance with the EPA's Operational Work on State Coastal Land guideline.

10.13 Visual Impacts

10.13.1 Visual Features

10.13.1.1 Refinery Site

The key visual features of the refinery site are as follows:

- Consists of a mixture of visual characters; namely woodland/open forest, exposed soils, an exposed quarry on a central hill and tidal flats.
- The area of the site containing existing woodland/open forest vegetation will be progressively cleared and re-graded to allow development of the proposed refinery and associated infrastructure.
- The hill located at the southern extent of refinery site, which has previously been quarried, will be further quarried to provide fill for the proposed WICT project. The current height of the hill is approximately 74 m AHD. It will be quarried to create a series of flat platforms ranging from 16 m to 20 m AHD.
- Quarried material will be utilised for re-grading of Stage 1 of the GNP. The tidal mud flat area will be filled to approximately 7 m AHD as part of the proposed WICT project.
- If the WICT project does not proceed or there is a surplus of fill during construction, the remaining fill will be utilised to develop a construction pad for Stage 3 of the GNP. This will result in additional vegetation being cleared over the Stage 3 footprint. The construction pad will be designed such that natural vegetation buffers are maintained where possible.
- Sections of the high voltage powerlines that currently run through the site, including the refinery hill and the area between the Stage 1 and Stage 3 footprint will be realigned. Both powerlines will be realigned to the eastern edge of the refinery site on an alignment where the elevation is approximately 14 m RL. The existing powerline easement between the Stage 1 and 2 footprint will also be relocated along this alignment.

Views to the refinery site from the adjoining public roads (Hanson Road and Reid Road) are currently screened by existing woodland vegetation. The removal of vegetation to enable the refinery to be constructed will increase the potential for views of the refinery. The height of some refinery components will extend above the tops of the existing tree canopy, which will result in the upper portions of these structures being visible from surrounding areas. This visual assessment identifies the extent to which the major components of the refinery will potentially be visible.

The refinery will consist of a combination of mostly low rise structures and buildings that will be below the height of trees that surround the site. These trees range in height from between 10 to 20 m. The refinery will also include a number of tall stacks that will extend above the existing tree canopy. A perspective view of the refinery is illustrated in Figure 10.13.1. The major elements of the refinery that are expected to be visible above the tree canopy are listed below together with their heights:

- Hydrogen sulphide incinerator stack – 25 m
- Hydrogen plant stacks – 40 m
- Power plant stacks – 40 m
- Sulphuric acid plant stacks – 60 m
- Leach plant stacks – 40 and 25 m

In addition to the low rise structures and buildings, there will be bulk material storage areas for ore and sulphur. These stockpiles will be located at the north-eastern extent of the refinery site where the proposed conveyor from the WIW will enter the site. These bulk storage areas will be visible from Hanson Road.

Car parks will be located off Reid Road, adjacent to the site entry provided for refinery employees and visitors. Truck access will be via a separate road access located off Reid Road. The main site weighbridges will also be located here. The car parks may be visible from Reid Road during the construction of the refinery due to the clearing

Client: Gladstone Pacific Nickel Ltd

Project: GLADSTONE NICKEL PROJECT
ENVIRONMENTAL IMPACT STATEMENT

Title: **PERSPECTIVE VIEW OF REFINERY**

URS

Drawn: VH	Approved: CMP	Date: 15/12/2006	Figure: **10.13.1**	Rev. A
Job No.: **4262 5791**	File No. 42625791-g-108.cdr			A4

of vegetation. Landscaping works will be undertaken at the western perimeter of the refinery site to minimise the long term visual impacts of the refinery from Reid Road.

Overland conveyors will be installed from the WIW to allow delivery of bulk materials such as sulphur and imported ore. Seawater pipelines will also be constructed parallel to the conveyor route. A rail loop will be installed to the east of the conveyor as part of the WICT project. The overland conveyor will travel south towards the refinery site, running parallel to the rail line and will pass under Hanson Road which is proposed to be raised as part of the WICT project.

The conveyor and rail loop will be visible from Hanson Road as there is an open view from the road towards the refinery site across the adjacent mud flats. Natural vegetation buffers will be maintained between the roads on the northern and western perimeters of the refinery site where possible. This will aid in decreasing visual impact of the refinery, conveyors and seawater pipelines.

The footprint for Stage 3 may need to be cleared to build a construction pad. If the construction pad is required, it will be planned such that these natural vegetation buffers will be maintained.

10.13.1.2 Residue Storage Facility

Residue wastes generated by the refinery will be transported by pipeline to the RSF. The RSF area comprises an open valley that is separated from the Bruce Highway by a series of ridges and hills.

Potential views of the proposed RSF from the Bruce Highway will be generally blocked by a combination of roadside vegetation and a series of ridges and hills located between the RSF and the highway. The ultimate height of the RSF embankment will be approximately 100-105 m AHD, thus there is a potential for the top of the RSF to be viewed above the tree canopy where there is no prominent ridge line and associated vegetation. Views will be possible north from the highway to the main RSF embankment due to the lack of a prominent ridge line and limited vegetation cover between the RSF and the highway in this area.

The RSF will be formed by constructing cross-valley and saddle containment embankments. The containment embankments will be constructed from a combination of processed native clayey soils and rockfill campaigned from within the impoundment basin.

During construction of the RSF, soil will be stockpiled to the south of the RSF between the RSF embankment and Bruce Highway. Soil will be stockpiled to a depth of approximately 3 m and subsequently revegetated. Views of the stockpiles are unlikely due to their low height and distance from the highway.

10.13.2 Existing Landscape Character

10.13.2.1 Refinery Site

The visual character of the refinery site results primarily from the extensive natural woodland cover together with a prominent hill that is visible from surrounding areas. The visibility of this hill is increased by the areas of exposed soil resulting from previous quarrying operations that contrast strongly with the dark colours of the predominantly eucalypt tree canopies. High voltage powerlines, which are supported by steel lattice structures, run east-west across the central portion of the site as well as north-south over the quarried portion of the hill. The eastern portion of the site that adjoins the Calliope River and the northern portion that includes an area of tidal mud flats are both relatively level. Views into the site from adjoining areas are generally screened by the woodland vegetation cover. However, some areas within the tidal mud flats can be viewed from sections of Hanson Road.

The existing industrial plants in the general vicinity of the site have significantly changed the original landscape character. These plants visually appear as discrete industrial structures set within a tree-covered landscape. Views of the plants from public roads are generally limited to the upper portions of structures with potential views into the ground level of the plants screened by vegetation around the perimeter of each site. When viewed from elevated areas within Gladstone, these existing industrial plants and high voltage powerlines are seen against a backdrop of the visually prominent tree-covered hills to the west of the city. Emissions from some of the stacks in the industrial

plants create a dynamic and visually prominent element in the landscape. At night, lighting on these existing plants creates a strong contrast with the dark outline of the tree-covered hills to the west and south.

10.13.2.2 Residue Storage Facility

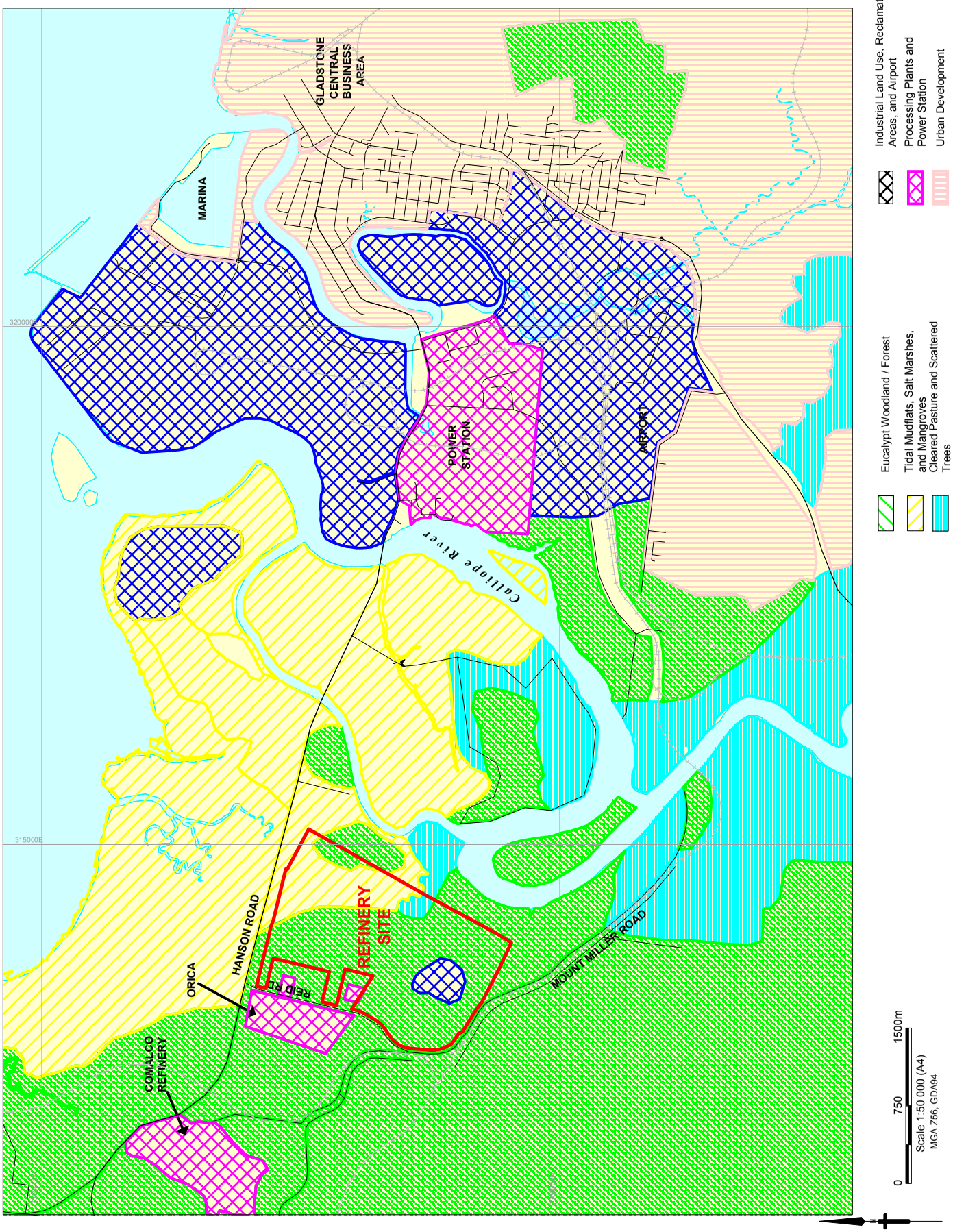
The proposed site for the RSF is located west of the main tree-covered hills. The RSF will be created by construction of an embankment across the headwaters of a natural drainage line. The landscape of the proposed RSF is rural in character, containing undulating landforms with hills and ridges forming the skyline. The extensive natural tree cover is interrupted where clearing has been carried out to create grazing areas. Views from the Bruce Highway, to the west of the proposed RSF site, are generally blocked by roadside vegetation with views towards the proposed RSF limited to glimpses from sections of the highway. Views are more likely from the south of the proposed RSF site due to the lack of a prominent ridge line and limited vegetation cover between the RSF and the highway.

10.13.3 Landscape Character Zones

The landscape analysis identified a series of landscape character zones (LCZ) for the refinery that are shown on Figure 10.13.2 and described in Table 10.13.1. These LCZs represent areas that are relatively consistent in terms of the combination of landform, vegetation and land use. While these incorporate substantial visual variations, they provide a broad baseline landscape context in which the proposed refinery will be located.

Table 10.13.1 Landscape Character Zones

Landscape Character Zones	Description
1. Eucalypt woodland/forest	▪ Undulating to hilly landform ▪ Woodland and forest with indigenous (predominantly eucalypt) species ▪ Visually enclosed with views limited to short distances by tree and understorey vegetation 



Client: Gladstone Pacific Nickel Ltd

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Project: GLADSTONE NICKEL PROJECT
ENVIRONMENTAL IMPACT STATEMENT

Title: **LANDSCAPE CHARACTER ZONES**

Drawn: BH/VH	Approved: CP	Date: 26-10-06
Job No: **4262 5791**	File No: 42625791-g-063.wor	

Figure: **10.13.2**

Rev: A

A4

Table 10.13.1 Landscape Character Zones

Landscape Character Zones	Description
2. Tidal mud-flats, salt marsh, mangroves	▪ Flat landform at sea level ▪ Visually distinctive landscape character created by tidal inundation covering the lowest elevation areas with water during high tide ▪ Open views across mud-flat and salt marsh areas extend to tree-covered hills to the west ▪ Stands of mangroves are visually enclosed and provide limited visual screening to views from surrounding areas 

Table 10.13.1 Landscape Character Zones

Landscape Character Zones	Description
3. Cleared pasture/ scattered trees	▪ Gently undulating landform ▪ Open views across pastures with limited screening by scattered trees in paddocks 
4. Industrial land uses, reclamation & airport	▪ Flat to gently undulating landform including former areas of tidal flat that have been filled behind levees as well as areas where the original landform has been significantly altered, such as the Gladstone Airport ▪ Limited patches of remnant vegetation including mangroves along water front and woodland on higher ground, as well as extensive bare areas 

Table 10.13.1 Landscape Character Zones

Landscape Character Zones	Description
5. Industrial processing plants & power station	▪ Visually prominent Gladstone Power Station located on a flat site adjoining the Calliope River with associated high voltage power lines crossing the river and following multiple routes to the west ▪ Orica plant located north-west of the refinery site includes a number of structures that extend above the surrounding tree cover and are visible from sections of Hanson Road as well as elevated sites within Gladstone urban area ▪ Comalco Alumina Refinery located further along Hanson Road north-west of the refinery site, which has a number of structures that extend above the surrounding forest cover and are visible from the adjoining road as well as from elevated sites within Gladstone  
6. Urban development	▪ Urban development is generally located on undulating landform as well as flat low elevation areas adjoining waterfront ▪ The central commercial area is located along a ridge that provides views to the north, east and west 

10.13.4 Landscape Quality

The landscape quality of the refinery site has been reduced by the quarrying operations that have been carried out on the eastern portion of the hill to the south of the site. The areas of exposed red soil are visible in views of the site from surrounding areas, particularly locations to the east and within the Gladstone urban area. The scarred hill top is visible due to the strong visual contrast with surrounding areas of tree-covered slopes. The landscape quality is further reduced by the high voltage powerlines that run across the site. The steel lattice pylons located on the hill top

and slopes are visible as a structural element surrounded by tree-covered slopes. Clearing of trees and construction of high voltage power lines across the central portion of the site has also reduced the visual quality of the site by introducing an industrial element into an area that generally has a natural landscape character. The combined visual impact of the prominent quarrying operations on top of the hill and of the high voltage power lines has reduced the natural landscape quality of the refinery site.

10.13.5 Scenic Quality Rating

The United States Bureau of Land Management (BLM, 2003) has developed a rating system for assessing the scenic quality of an area based on a number of defined criteria. A summary of these criteria is provided below in Table 10.13.2.

Table 10.13.2 Scenic Quality Rating Criteria

Landform
Topography becomes more interesting as it gets steeper or more massive, or more severely or universally sculptured. Outstanding landforms may be monumental, or these may be exceedingly artistic and subtle as certain badlands, pinnacles, arches, and other extraordinary formations.
Vegetation
Give primary consideration to the variety of patterns, forms, and textures created by plant life. Consider short-lived displays when these are known to be recurring or spectacular. Consider also smaller scale vegetation features which add striking and intriguing detail elements to the landscape.
Water
That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score.
Colour
Consider the overall colour(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) as these appear during seasons or periods of high use. Key factors to use when rating "colour" are variety, contrast, and harmony.
Adjacent Scenery
Degree to which scenery outside the scenery unit being rated enhances the overall impression of the scenery within the rating unit. The distance which adjacent scenery will influence scenery within the rating unit will normally range from 0-8 km, depending upon the characteristics of the topography, the vegetative cover, and other such factors. This factor is generally applied to units which would normally rate very low in score, but the influence of the adjacent unit would enhance the visual quality and raise the score.
Scarcity
This factor provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery - the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.
Cultural Modifications
Cultural modifications in the landform/water, vegetation, and addition of structures should be considered and may detract from the scenery in the form of a negative intrusion or complement or improve the scenic quality of a unit. Rate accordingly.

Overall scenic quality values calculated from Table 10.13.3 below can be described as follows:

- > 19 – High scenic quality values.
- 12-18 – Moderate scenic quality values.
- < 11 – Low scenic quality values.

Table 10.13.3 Scenic Quality Ratings

Key Factors	Rating Criteria			GNP Site Score
Landform	High vertical relief as expressed in public lives, spires or massive rock outcrops or severe surface variation or highly eroded formations including major badlands were due in systems; or detailed features, dominant and exceptionally striking and intriguing such as glaciers. **(5)**	Steep canyons, mesas, buttes, volcanic cones, and drumlins; or interesting erosion patterns or variety in size and shape of landforms; or detailed features which are interesting though not dominant or exceptional. **(3)**	Low rolling hills, foothills or flat valley bottoms or few or no interesting landscape features. **(1)**	**1**
Vegetation	A variety of vegetative types has expressed in interesting forms, textures and patterns. **(5)**	Some variety of vegetation, but only one or two major types. **(3)**	Little or no variety or contrast to vegetation. **(1)**	**3**
Water	Clear & clean appearing, still or cascading white water & any of which are a dominant factor in the landscape. **(5)**	Flowing or still, but not dominant in the landscape. **(3)**	Absent or present, but not noticeable. **(0)**	**0**
Colour	Rich colour combinations, variety or vivid colour; all pleasing contrast in the soil, rock, vegetation, water or snowfields. **(5)**	Some intensity of variety in colours & contrast of soil, rock & vegetation, but not a dominant scenic element. **(3)**	Subtle colour variations, contrast or interest; generally mute tones. **(1)**	**3**
Influence of adjacent scenery	Adjacent scenery, greatly enhances visual quality. **(5)**	Adjacent scenery moderately enhances overall visual quality. **(3)**	Adjacent scenery has little or no influence on overall visual quality. **(0)**	**3**
Scarcity	One-of-a-kind or unusually memorable, or very rare within the region. Consistent chance for viewing exceptional wildlife or wildflowers. **(5)**	Distinctive, though somewhat similar to others within the region. **(3)**	Interesting within its setting, but fairly common within the region. **(1)**	**1**
Cultural modifications	Modifications add favourably to visual variety while promoting visual harmony. **(2)**	Modifications add little or no visual variety to the area and introduced no discordant elements. **(0)**	Modifications add variety, but are very discordant and promote strong disharmony. **(-4)**	**-4**
Total				**7**

Source: BLM, 2003

The overall scenic quality value of 7 in Table 10.13.3 indicates that the site has low scenic qualities. On this basis, development of the refinery and the RSF will not result in the loss of a high or medium scenic quality area within the regional context. However, the proposed development will result in a significant change to the visual landscape character of the site at the local level and has the potential to produce undesirable visual impacts. Measures to mitigate these potential impacts will therefore be incorporated into the site planning and design of the development.

10.13.6 Visual Assessment Methodology

The potential visual impact at particular viewing situations will be strongly dependent on the level of visibility from the location. Visibility is a measure of the extent to which particular components of the proposed development (refinery and RSF) may be visible from surrounding areas, the relative number of viewers, the period of the view, view distance, and context of the view.

The potential visual impact of the proposed development will primarily be influenced by the following two major factors:

- The level of visibility or extent to which the development will be visible from surrounding areas.
- The degree of visual contrast between the visible portions of the development and the landscape against which these will be viewed from surrounding areas.

Table 10.13.2 lists the criteria that influence visibility and Table 10.13.3 illustrates how these criteria combine to create a visual impact rating. The underlying rationale for the visual impact ratings is that, if a portion of the development is not visible from a particular viewing situation then the potential visual impact will be zero. Similarly, if the number of people who would potentially see the development is low, then the relative visual impact will be low compared to a situation in which a large number of people have the same view. Distance provides a strong influence on potential visual impact because the proportion of the total view cone occupied by the development decreases with distance. In addition, the visual contrast between components of the development, such as visible emissions from stacks and the surrounding landscape, will decrease due to atmospheric effects associated with distance.

The visual assessment undertaken for the GNP included:

- A field inspection to determine the extent to which the site is generally visible.
- Identification of the various viewing situations from which components of the development could potentially be visible from surrounding areas

Particular attention was given to potential views of the development from public roads in the surrounding areas. In addition, the visibility assessment gave detailed consideration to potential views from public lookouts located within the Gladstone urban area.

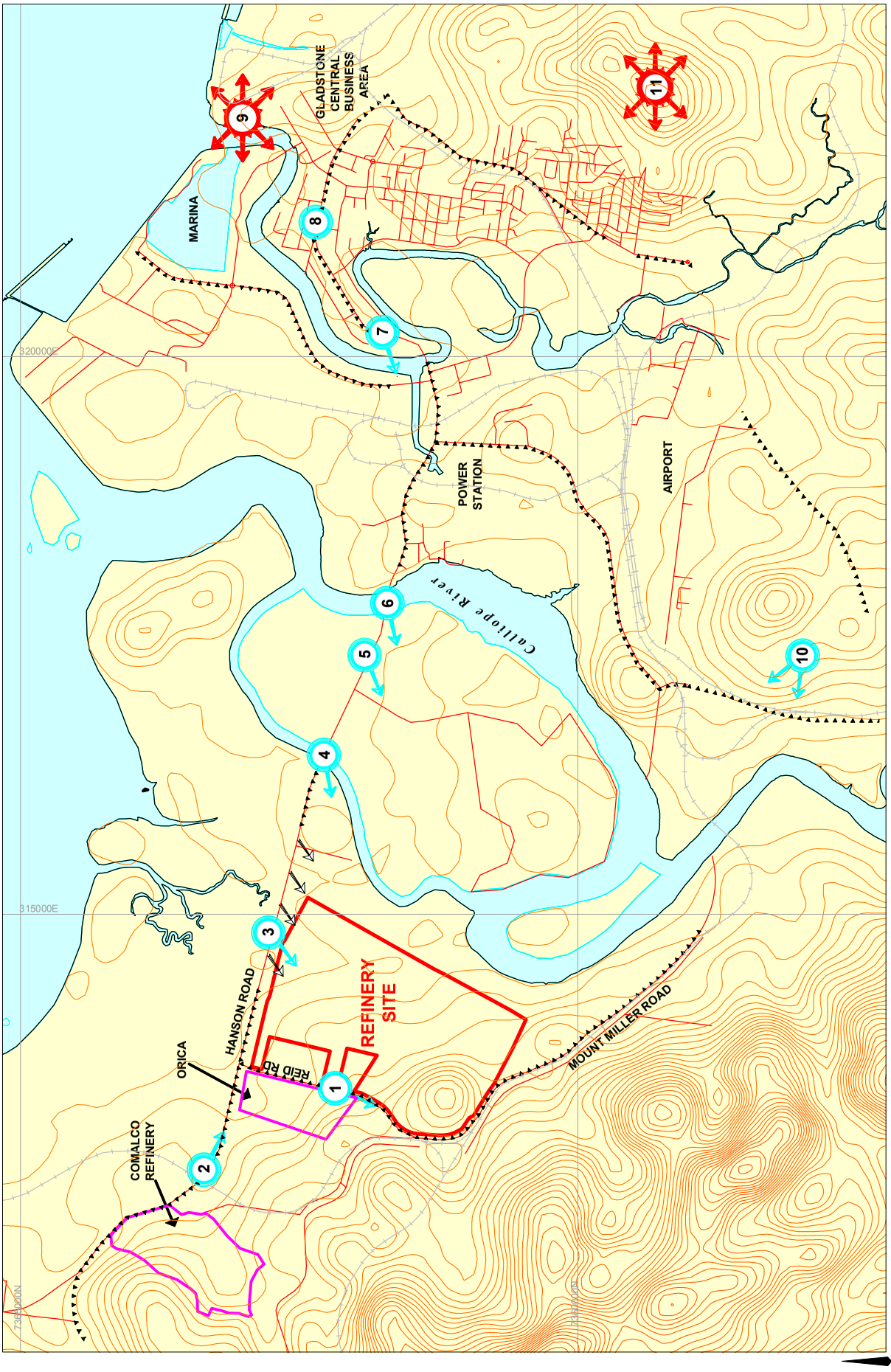
10.13.7 Viewing Situations Descriptions

10.13.7.1 Refinery Site

The results of the visibility assessment of the refinery site are illustrated in Figure 10.13.3 and key aspects are summarised by the following points:

- The broad visual catchment of the refinery site is defined to the east by the ridge along which the central business centre of Gladstone is located, and a series of tree-covered hills to the west and south.
- The woodland vegetation that generally covers the refinery site creates some visual screening to potential views from adjoining public roads. Any construction pad that is developed for Stage 3 will be planned so that this screening vegetation is maintained.
- The upper slopes and top of the hill on the refinery site are visible from sections of Hanson Road and the two bridges over the Calliope River, as well as the public lookouts located in the urban areas of Gladstone.

The visual assessment identified the various viewing situations from which the hill on the refinery site could potentially be visible. The viewing situations are shown on Figure 10.13.3 and descriptions given in Table 10.13.4.



Client: Gladstone Pacific Nickel Ltd

URS

Project: GLADSTONE NICKEL PROJECT
ENVIRONMENTAL IMPACT STATEMENT

Title: **REFINERY -
VISUAL ASSESSMENT LOCATIONS**

Drawn: BH/VH	Approved: CP	Date: 26-10-06
Job No: **4262 5791**	File No: 42625791-g-064.wor	

Figure: **10.13.3**

Rev: A

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Table 10.13.4 Existing Viewing Situation Assessment – Refinery Site

Viewing Situation	Comments
1. Reid Road 	• Views from the road along the western and southern boundaries are generally blocked by existing tree and shrub vegetation • Views are available down access roads to existing facilities east of the road as well as along the high voltage power line easement where it crosses the southern boundary of the site • Views of the proposed car parks and adjacent low-rise refinery buildings are likely as vegetation clearing will occur adjacent to the refinery and Reid Road
2. Hanson Rd west of Reid Rd intersection 	• Potential views of the site are generally blocked by roadside tree and shrub vegetation • Tops of some structures within the nearby Orica site are visible above tree canopies • It is unlikely that the upper portions of structures in the refinery would be visible from this section of Hanson road.
3. Hanson Rd adjoining mud flats 	• Views across mud flats extend to a tree-covered ridge on the skyline • Trees along the edge of mud flats generally block views of the site but top of hill is visible above tree canopies • There is potential for views of the highest stacks at the refinery and the bulk storage area containing stockpiles of ore and sulphur • The overland conveyor and seawater pipelines connecting the refinery to WIW will be visible. This view is likely to be for a short period when travelling by vehicle along Hanson Road

Table 10.13.4 Existing Viewing Situation Assessment – Refinery Site

4. Bridge over Calliope River Anabranch 	• Elevation of bridge allows views to south-west over mangroves to top of hill on the proposed refinery site with bare red soil of quarry area contrasting with dark green tree canopies • Forest-covered slopes and skyline form backdrop to visible portion of the site • Galvanised steel pylons of various high voltage powerlines are visible against the dark tone of the tree canopies • This view is for a short period when travelling by vehicle across the bridge
5. Hanson Rd adjoining mangroves 	• Mangrove trees block views of lower portion of site with exposed red soil on top of hill visible against the tree-covered slopes and ridge forming the skyline
6. Bridge over Calliope River 	• Views from bridge extend across tops of mangroves to main range of hills to the south west

Table 10.13.4 Existing Viewing Situation Assessment – Refinery Site

7. Hanson Rd adjoining Gladstone Power Station 	• Very large scale of the power station makes it a visually prominent structure in the area • Tall stacks extend well into the sky above the distant skyline of hills • Views are blocked by the power station
8. Section of Hanson Rd through industrial development	• Views from road towards the site are generally blocked by industrial buildings
9. Public lookout adjoining Gladstone port 	• Popular lookout on western edge of public park with easy road and pedestrian access • Red soil created by quarrying on top of hill on the site is visible in centre of photo with backdrop of tree-covered slopes and ridge on skyline • Site forms a small portion of the image due the long distance between the lookout and the site • Large industrial development buildings and other structures are visible together with high voltage powerlines and Comalco Alumina Refinery and Orica plant in right hand side of photo
10. Residential development 	• View from western edge of urban development in Gladstone looking north-west with Calliope River visible in left hand side of photo • Red soil exposed by quarrying on top of hill on site is visible to the right of centre • Forest covered hills and mountains for visually prominent backdrop to the site • Stack and white storage tanks at Comalco Refinery are visible in right hand portion of the photo

Table 10.13.4 Existing Viewing Situation Assessment – Refinery Site

11. Public lookout on reservoir hill 	• Lookout accessed by steep road and separated from residential development • Gladstone airport on left side of photo and power station on right side of photo behind tree • Proposed refinery site is located near centre of photo but is difficult to identify due to long view distance • Tree-covered hills form a natural landscape backdrop to urban and industrial development in western sector of Gladstone

10.13.7.2 Residue Storage Facility

The RSF site is located in a broad valley surrounded by hills and ridge lines to the east of the Bruce Highway. The RSF embankment could be at an elevation of up to 106 m AHD which would make it up to 60-70 m above ground level. At this height it could be viewed above the tree canopy. Views to the east from the Bruce Highway towards the RSF are generally blocked by roadside vegetation. Along those sections of highway where the roadside vegetation has been cleared, the potential views of the RSF site are blocked by the hills and ridges located west of the RSF. Consequently the potential visual impact of the proposed RSF on motorists using the Bruce Highway is expected to be minor due to the intervening hills, ridges and vegetation. However, there is potential for the RSF embankment to be viewed from the Bruce Highway to the south of the site. This is due to the height of the embankment and a lack of intervening ridges and hills in that area to provide a visual barrier.

Some portions of the RSF will be visible from locations on the rural properties on which they are located. There is one residence on Koncina Road approximately 1.5 km to the south of the RSF. The RSF embankment will be visible from that residence. There is another residence to the west adjacent to the Bruce Highway but an intervening ridge will prevent views of the RSF being obtained from that location.

Design of the earthworks associated with the RSF will include revegetation of exposed soil areas to prevent soil erosion. Revegetation will also minimise the visual impact of the embankment and other earthworks.

Topsoil will be stockpiled to a depth of approximately 3 m and subsequently revegetated. The stockpiles will be located to the south-west of the RSF. Views of the stockpiles from surrounding viewpoints will be generally blocked due to their low height and the intervening roadside vegetation. However, there may be some locations along the highway in the vicinity of the Farmer Creek crossing from where the stockpiles may be visible. However, once the stockpiles have been revegetated, these will blend in with the surrounding countryside and will no longer be noticeable.

The visual assessment identified various viewing situations from which the RSF site could be visible. The viewing situations are shown on Figure 10.13.4 and descriptions presented in Table 10.13.5.

Client

Gladstone Pacific Nickel Ltd

URS

Project

GLADSTONE NICKEL PROJECT
ENVIRONMENTAL IMPACT STATEMENT

Drawn: HC/TN | Approved: CMP | Date: 06-11-06

Job No: 4262 5791 | File No: 42625791-g-065b.wor

Title

RESIDUE STORAGE FACILITY
VISUAL ASSESSMENT LOCATION

Figure: 10.13.4

Rev: B

A4

Mount Larcom Township

ALDOGA

YARWUN

Hanson Road

Refinery

Comalco Residue Management Area

Residue Storage Facility

WEST STOWE

Calliope River

7360000mN

7350000mN

300000mE

310000mE

12

13

14

15

16

17

18

19

20

0 1.25 2.5km

Scale 1:100,000 (A4)

MGA Z56, GDA94

Proposed RSF Footprint

Embankment

Ridgeline

12 View SITUATION

Soil stockpile

View towards site generally blocked by road vegetation in landform

Table 10.13.5 Existing Viewing Situation Assessment – RSF Site

Viewing Situation	Comments
12. Bruce Highway at Larcom Creek crossing 	• Views from road blocked by roadside vegetation
13. Bruce Highway 	• View from property entrance looking towards the proposed RSF is blocked by trees and low ridge in mid distance • The top of the RSF has the potential to be viewed above the tree canopy.
14. Bruce Highway at Calliope Station turn off 	• Views from road blocked by roadside vegetation

Table 10.13.5 Existing Viewing Situation Assessment – RSF Site

Viewing Situation	Comments
15. Bruce Highway south of Calliope Station turn off 	• Views from road blocked by roadside vegetation
16. Bruce Highway 2.5 km north of Farmer Creek 	• Views east towards the RSF are generally blocked by open woodland with a tree canopy of 20 m and ridge between the RSF and the tree canopy.
17. Bruce Highway 2 km north of Farmer Creek 	• Views to proposed RSF generally blocked by ridge in mid distance

Table 10.13.5 Existing Viewing Situation Assessment – RSF Site

Viewing Situation	Comments
18 Bruce Highway just north of the Farmer Creek crossing 	• There is a 200m wide strip of vegetation adjacent to the road reserve. The vegetation acts as visual barrier for the RSF. The tree canopy is 18-20 m high. • The ridgeline is not as prominent here, so there is the potential for views of the RSF. • Topsoil stockpiles may be visible from this location.
19. Bruce highway 2 km north of Gravel Creek at the road entrance to a property off the highway 	• There is a slope of a hill between the road and RSF. • The vegetation is thinner on the hill compared to the surrounding area. • Potential for glimpses of the RSF by vehicles passing this location
20. Bruce Highway 1 km south of Gravel Creek 	• There is a very limited view beyond the dense vegetation adjacent to the road reserve.

10.13.8 Visual Impact Assessment Criteria

The various criteria that contribute to the potential visual impact of the refinery and RSF are defined in Table 10.13.6.

Table 10.13.6 View Situation Assessment Criteria

Criteria	Definition
Category of Viewer	
• Static	• Houses, shops, offices
• Dynamic	• Travelling along public road
Number of Viewers	
• High	• >10,000 people per day
• Moderate	• 1,000-10,000 people per day
• Low	• 100-1,000 people per day
• Very low	• <100 people per day
View Distance	
• Long	• >5 km
• Medium	• 1-5 km
• Short	• 200-1000 m
• Very short	• <200 m
Period of View	
• Long term	• >120 minutes
• Medium term	• 1-120 minutes
• Short term	• <1 minute

The levels of potential visual impact resulting for the various combinations of criteria are presented in Table 10.13.7.

Table 10.13.7 Visibility Matrix

	Long Distance			Medium Distance			Short Distance			Very Short Distance		
Period of View	**L**	**M**	**S**	**L**	**M**	**S**	**L**	**M**	**S**	**L**	**M**	**S**
High No. of Viewers	M	L	L	H	M	M	H	H	M	H	H	H
Moderate No. of Viewers	L	L	L	M	M	L	H	M	M	H	H	M
Low No. of Viewers	L	L	L	M	L	L	M	M	L	H	M	M

The following categories of Period of View include; L=long, M=medium, S=short and the Levels of Visibility include; L=low, M=medium, H=high

Viewer criteria refer to the ways in which the view situation is likely to be experienced. Views of components of the GNP will generally be experienced by motorists, residents and visitors to the area. Table 10.13.8 presents the results of the visibility assessment of the proposed refinery and RSF from the various viewing situations identified during the field inspection and located on Figures 10.13.3 and 10.13.4.

Table 10.13.8 Visual Impact Assessment of Refinery and RSF

View Situation	Approximate Distance To Site	Category Of Viewer	Approx. Period Of View	Relative No. Of Viewers	Level Of Visibility	Visual Impact Rating
Refinery						
1. Reid Road	Very Short <0.2 km	Motorists accessing industrial facilities	Short term	Low	Potential views of the proposed refinery from the road would be confined to views along the access roads into the refinery site. These views would generally be screened by existing trees to be retained alongside the road and additional tree planting as part of the long-term landscape works Views of the car parks are likely as vegetation clearing will occur adjacent to the refinery and Reid Road.	Medium
2. Hanson Rd west of Reid Rd intersection	Medium 2.0 km	Motorists travelling east towards Gladstone	Short term	Moderate	Views towards the site are blocked by roadside trees	Low
3. Hanson Rd adjoining mud flats	Medium 1.5 km	Motorists travelling west	Short term	Moderate	Lack of vegetation on the mud flats allows views to extend to the top of the hill on the refinery site. Mud flats will allow views of the overland conveyors towards the refinery and of imported ore and sulphur stockpiles.	Low
4. Bridge over Calliope River tributary	Medium 4.5 km	Motorists	Short term	Moderate	Elevation of bridge allows views to south-west over mangroves to top of hill on the proposed refinery site.	Low
5. Hanson Rd adjoining mangroves	Medium 3.5 - 4.0 km	Motorists	Short term	Moderate	Mangrove trees block views of lower portion of site with exposed red soil on top of hill visible against the tree-covered slopes and ridge forming the skyline	Low
6. Bridge over Calliope River	Medium 3.0 km	Motorists	Short term	Moderate	Views from bridge extend across tops of mangroves to main range of hills to the south west	Low
7 Section of Hanson Rd between industrial development and	Long 5.5 km	Motorists Industries	Short to medium	Moderate	Views are blocked by the power station	Low

Table 10.13.8 Visual Impact Assessment of Refinery and RSF

View Situation	Approximate Distance To Site	Category Of Viewer	Approx. Period Of View	Relative No. Of Viewers	Level Of Visibility	Visual Impact Rating
power station						
8. Light industrial area	Long 7 km	Motorists Industries	Short	Moderate	Views from road towards the site are generally blocked by industrial buildings	Low
9. Public lookout adjoining Auckland Point	Long 9 km	Visitors to park & lookout	Medium	Moderate	Red soil on top of hill on the site is visible in centre of photo but difficult to identify due to long view distance	Low
10. Residential development western edge of Gladstone	Long 5.5 km	Residents	Medium	Moderate	Site visible in view from western edge of urban development looking north west over the Calliope River	Low
11. Public lookout on reservoir hill	Long 9 km	Visitors to lookout	Medium	Moderate	Site is visible but difficult to identify due to long view distance	Low
Residue Storage Facility						
12 - 18 and 20. Bruce Hwy between Larcom Ck and Farmers Ck	Medium 2-6 km	Motorists	Short	Moderate	Views of RSF from highway are generally blocked by roadside vegetation, ridges and hills. Some glimpses possible. Limited views of topsoil stockpiles are likely in the short term until revegetation is established.	Low
19. Bruce Hwy, directly South of RSF	Medium 2 km	Motorists	Medium	Moderate	Potential for views of the RSF where vegetation has thinned and ridgeline less prominent. Potential for some glimpses of the soil stockpile located immediately South of the RSF.	Medium

10.13.9 Summary

10.13.9.1 Refinery Site

The construction of the refinery will result in a fundamental change to the existing landscape character of the site due to the removal of existing woodland vegetation, excavation of the existing hill to create a series of flat platforms.. However, the cumulative visual impact of the visible portions of the refinery, which will generally be seen in the context of other industrial development in the vicinity, is assessed as being low to medium due the combination of the following factors:

- Potential views to the majority of structures within the refinery from viewing situations in surrounding areas will generally be blocked by the tree cover in the vicinity. Where possible, natural vegetation buffers will be maintained during construction of the refinery.

- The removal of vegetation adjacent to Reid Road will increase the potential for views of the refinery and car parks. The height of some components of the refinery will extend above the tops of the existing tree canopies, which will result in the upper portions of these structures being visible from surrounding areas.
- The closest residential development is approximately 5.5 km from the site and views of the site are limited to a portion of the western edge of the Gladstone urban development.
- Views of the site from the two main lookouts in Gladstone, which are approximately 9 km from the refinery site, will constitute a small portion of the total view and will be seen together with existing industrial development in the vicinity.
- Only the upper portions of the stacks and taller structures will be visible from lookouts as the lower portion of the site will be screened by adjoining tree cover and the refinery will be seen in the context of other existing industrial development including the Orica and Comalco plants which are located in the vicinity of the refinery site. GPS, high voltage power lines and other industrial developments are located in the middle distance between the lookouts and the refinery. Landscaping works will also be undertaken at the western perimeter of the refinery site to further minimise the visual impact of the refinery and car parks from Reid Road.
- The only major road in the vicinity of the site is Hanson Road and views from the section west of the Reid Road intersection are likely to be shielded by a buffer of vegetation.
- Views of the site from Hanson Road near the bridges over the Calliope River for motorists travelling west will be partly screened by mangroves and stands of other trees located between the road and the site. These views could change over time if construction of the proposed WICT railway loop and other industrial development takes place, in which case views of the refinery site will be blocked by other development adjoining the southern side of Hanson Road.
- Closer to the site, most of the refinery will be visible across the salt-flat for motorists travelling west along Hanson Road. The overland conveyor and the seawater pipelines will also be visible for a short period of time.
- Those portions of the refinery that may be visible from surrounding areas will be seen against a backdrop of the tree-covered hills that form the western visual catchment of Gladstone.
- Refinery stacks will be visible but will be seen in the context of other industrial plants in the vicinity and generally at distances of more than 1.5 km from sections of Hanson Road and more than 5 km from the nearest residential development in western Gladstone.
- Lighting will make the refinery visible at night but the visual impact is predicted to be low because the refinery will be more than 5 km from residential areas, directional lighting will be used, and because of the presence of other industrial plants in the vicinity that are also lit at night time.
- There will be no requirements for flood lighting during the construction process, but low-level lighting to allow safe access for personnel and some security lighting will be required during the winter months where daylight hours are limited. Such lighting will be installed on structures where necessary to provide lighting to adjoining outdoor areas. The potential visual impact of this lighting will be negligible due to the low level of lighting involved and the presence of other industrial plants in the vicinity.

The cumulative visual impact of the visible portions of the refinery, which will generally be seen in the context of other industrial development in the vicinity, is assessed as low to medium. Potential views into the site from the adjoining sections of Reid Road and Hanson Road will result in localised medium visual impact. However, this could be reduced over time with tree and shrub planting along the road frontage to supplement the existing natural vegetation that is to be retained.

10.13.9.2 Residue Storage Facility

The overall visual impact associated with the RSF is assessed as being generally low. The RSF may be visible for very short periods of time by motorists on the Bruce Highway. The majority of the views from the Bruce Highway to the RSF site are screened by roadside vegetation combined with a series of intervening ridges and hills.

During construction of the RSF, topsoil will be stockpiled to the south of the RSF between the RSF and Bruce Highway. Soil will be stockpiled to a height of approximately 3 m and subsequently revegetated. Limited views of the stockpiles are likely in the short term until revegetation is established.

There is potential for greater views of the RSF from the highway directly south of the RSF. In this area there is open vegetation with a low canopy and no ridgeline between the road and the RSF. Visual impacts associated with these areas are classified as low to medium level impacts. Visual impacts will be at their greatest when the RSF has been raised to its ultimate capacity and embankment height of up to 60-70 m.

10.13.10 Mitigation Measures

While the overall potential visual impact of the refinery has been assessed as low to medium, the following mitigations measures will be undertaken to further limit the potential impact.

- Where possible, natural vegetation buffers will be retained along the frontages of Reid Road and Hanson Road to provide visual screening of views from the road with additional tree and shrub planting carried out where necessary to supplement the remnant vegetation retained.
- Detailed design of the earthworks around the perimeter of the refinery will contribute where possible to visual screening through the use of earth mounding or use of existing natural landforms.
- The removal of vegetation adjacent to Reid Road will increase the potential for views of the refinery and car parks. Landscaping works will be undertaken at the western perimeter of the refinery site to minimise the long term visual impacts of the refinery from Reid Road.
- Selection of cladding will avoid highly reflective materials and the upper portion of stacks will be in the mid grey range to minimise the visual contrast with the backdrop of tree-covered hills when seen from sections of Hanson Road, as well as the lookouts and western edge of residential development in Gladstone.
- The colour of cladding materials for the lower structures will be in the mid tones of grey/green with lighter greys used instead of white to achieve visual variation. A detailed colour scheme will be prepared as part of the detailed design process with input from a landscape architect in relation to the visual impact from surrounding areas.
- Lighting design will avoid as much as possible direct views of lights from outside the refinery by controlling their direction and using hoods where necessary. An assessment of the lighting design will be carried out during the detailed design stage to ensure light spillage is avoided.
- Areas of bare soil created by RSF activities and soil stockpiling will be revegetated after completion as part of the soil and water management plan procedures for the works.

10.13.11 Conclusion

Overall, this visual impact assessment concludes that the refinery will generally have a low to medium visual impact on surrounding areas, but this may increase to medium for some situations adjoining the sites. The overall visual impact results from a combination of the following factors:

- The removal of vegetation adjacent to Reid Road will increase the potential for views of the refinery and car parks. The height of some components of the refinery will extend above the tops of the existing tree canopies, which will result in the upper portions of these structures being visible from surrounding areas.
- The car parks will be visible until the landscaping works are undertaken at the western perimeter of the refinery site to further minimise the visual impact over the long term.
- The closest residential development to the refinery is approximately 5.5 km from the site and views of the site are limited to a portion of the western edge of the urban development.
- The area of exposed red soil on top of the 74 m high hill at the southern extent of the refinery will be removed by excavation works that will create platforms at much lower elevations (16 m to 20 m RL).
- Infrastructure associated with bulk storage, including imported ore and sulphur stockpiles, conveyors and seawater pipelines will be prominent when viewed from sections of Hanson Road east of the site.

- The refinery will be visible from the lookouts and elevated areas in Gladstone. However, these will be distant views and will be seen in the context of other existing industrial development including the Orica and Comalco plants. The GPS, high voltage power lines and other industrial development are located in the mid distance between the lookouts and the refinery. The car parks are on the western side of the refinery and thus would be screened from view from the Gladstone lookouts.
- The only major road in the vicinity of the site is Hanson Road and views from the section west of the Reid Road intersection are blocked by road side trees.
- Views of the refinery from the section of Hanson Road east of the Reid Road intersection for motorists travelling west will be partly screened by mangroves and stands of other trees located between the road and the site. However, the upper portions of the taller structures including stacks will be visible from some sections of Hanson Road. These views could change over time if construction of the proposed WICT rail loop and other industrial developments take place, in which case views of the refinery will be blocked by other development adjoining the southern side of Hanson Road.
- Potential localised views from the sections of Reid Road adjoining the site will generally be screened by a buffer strip of existing vegetation to be retained and supplemented where necessary by planting of trees and shrubs.
- Those portions of the refinery that may be visible from surrounding areas would be seen against a backdrop of the forest-covered hills that form the western visual catchment of Gladstone.
- Use of mid grey colours on the stacks and other tall structures combined with avoidance of highly reflective materials will minimise the visual prominence of visible portions of the refinery.
- Lighting will make the refinery visible at night but the visual impact is predicted to be low due to the distance from residential areas of more than 5.5 km and the presence of other industrial plants in the vicinity.
- Limited views of the topsoil stockpiles from a small length of the Bruce Highway are likely in the short term until revegetation is established.
- The proposed RSF has the potential to be visible for short periods of time by motorists on the Bruce Highway. The majority of the RSF site is screened by roadside vegetation combined with a screen of ridges and hills between the highway and the RSF site.
- There is potential for low to medium impact views of the RSF from the Bruce Highway south of the RSF. In this area there is open vegetation with a low canopy and no intervening ridgeline. The views of the RSF will be of the embankments constructed from a combination of processed native clayey soils and rockfill to a height of up to 60-70 m.