

4.16 Social and Economic Assessment

4.16.1 Introduction

A Baseline Demographic Profile has been developed to statistically profile the socioeconomic status of Bowen and surrounding communities which may be impacted by the Project. The main source of data for the report is the 2001 and 2006 Australian Bureau of Statistics (ABS) Census. Where data was not available from the census to respond to the social and economic indicators used in this report, or if the results required validation, other data was used and appropriately referenced in the text.

The majority of the data represented throughout the report is sourced from ABS census data. As such, the report inherits the various limitation and anomalies that are inherent in this data, including:

- » Statistical area boundaries have changed between 2001 and 2006.
- » ABS data is deliberately varied to prevent the identification of individuals.
- » ABS data for the Bowen LGA from 2001 and 2006 is based on the population residing in the former Bowen Shire. The Bowen Shire was amalgamated with the Shire of Whitsunday to form the Whitsunday Regional Council in March 2008.

The local study area is defined as the Bowen Local Government Area (LGA), a specific ABS data collection district (LGA 30590) which remained a relatively consistent geographical area in both the 2001 and 2006 census. The Bowen LGA delimitation has changed slightly over time, with its 2001 census area being 21,177 square kilometres (km²) and its 2006 census area being 21,185 km².

The Bowen LGA covers the former Bowen Shire a geographical area which was under the responsibility of the Bowen Shire Council at the time of the 2006 Census. The Bowen Shire was amalgamated with the Shire of Whitsunday to form the Whitsunday Regional Council in March 2008.

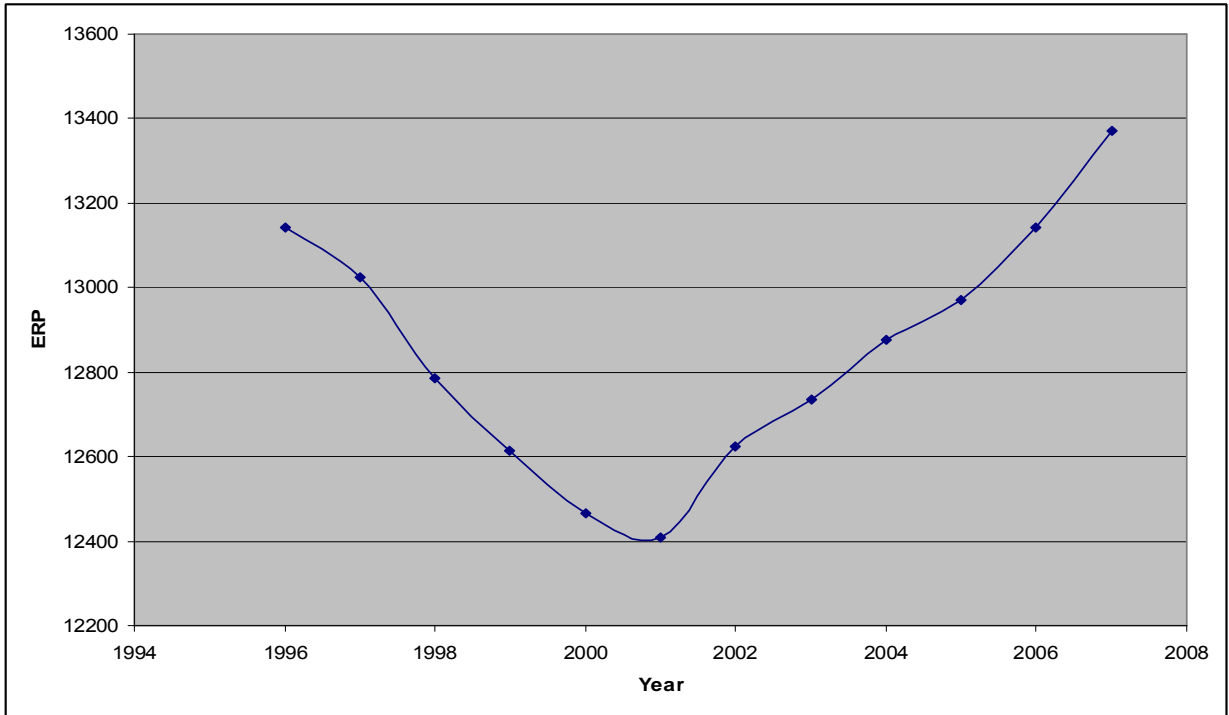
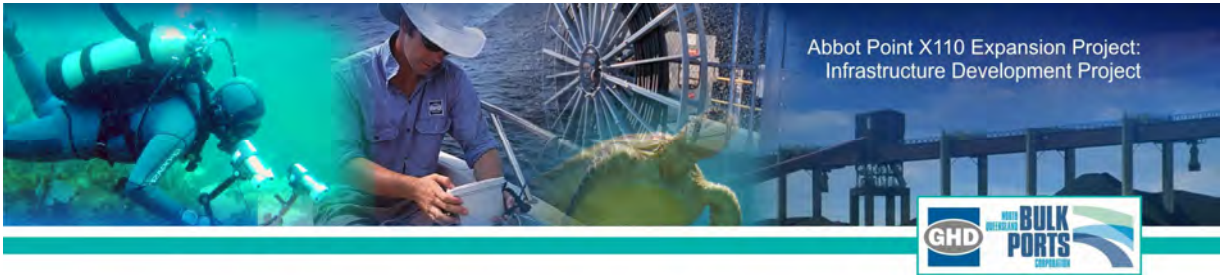
The State study area encompasses the entire State of Queensland. Queensland is defined by the ABS as STE/ STATE 3 for census purposes.

4.16.2 Demographic Characteristics

4.16.2.1 Population

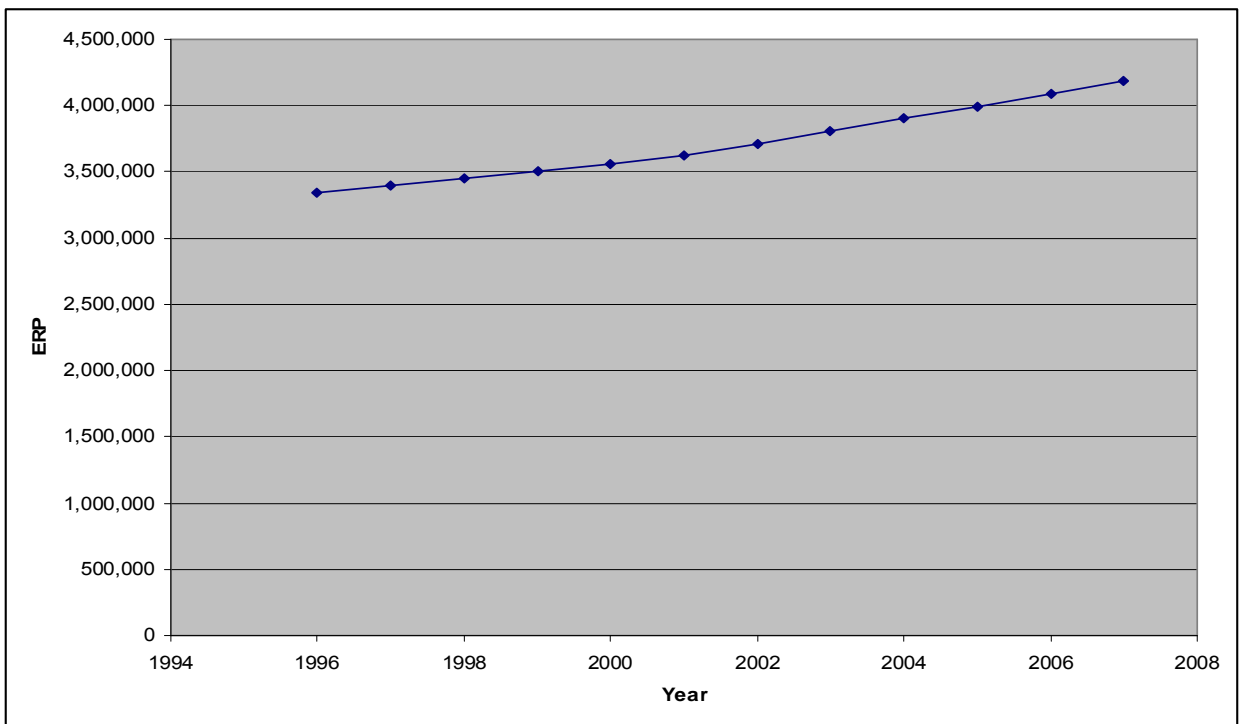
Population Trends

Figure 4-64 and Figure 4-65 show the difference in population trends between the local and State study areas. Between 1996 and 2007, Queensland experienced a steady increase in population, while the local study area experienced substantial population decrease (between 1996 and 2001) followed by an equally dramatic population increase (between 2001 and 2007). Table 4-58 shows the total population recorded by ABS Census in the local and State study areas in 2001 and 2006. These results contradict the previous PIFU data, as they indicate a decreased population in the local study area over this period. Based on this data, the population trends between 2001 and 2006 in the local study are substantially different from those experienced across Queensland.



Source: PIFU (2008a)

Figure 4-64 Population Trends for the Local Study Area (Bowen)



Source: PIFU (2008b)

Figure 4-65 Population Trends for the State Study Area (Queensland)

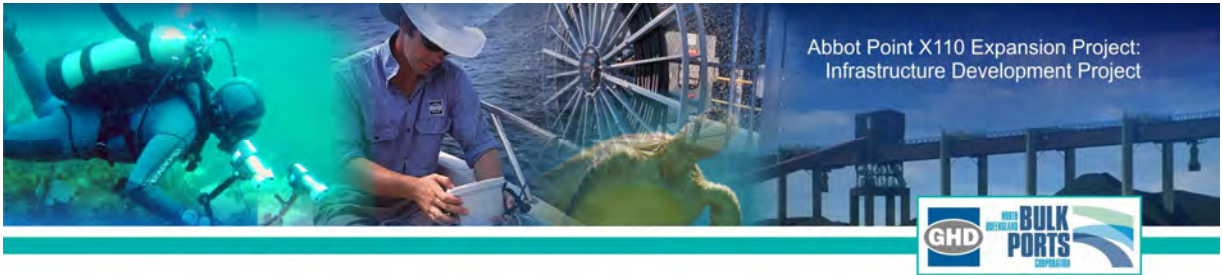


Table 4-58 Total populations and population changes across the local and State study areas

| | Local Study Area | | State Study Area | |
|------------|------------------|---------|------------------|-----------|
| | 2001 | 2006 | 2001 | 2006 |
| Population | 13,698 | 12,379 | 3,655,139* | 3,904,534 |
| % change | | - 9.63% | | 6.82% |

Notes: * Includes overseas visitors.
Source: ABS 2003 -2008.

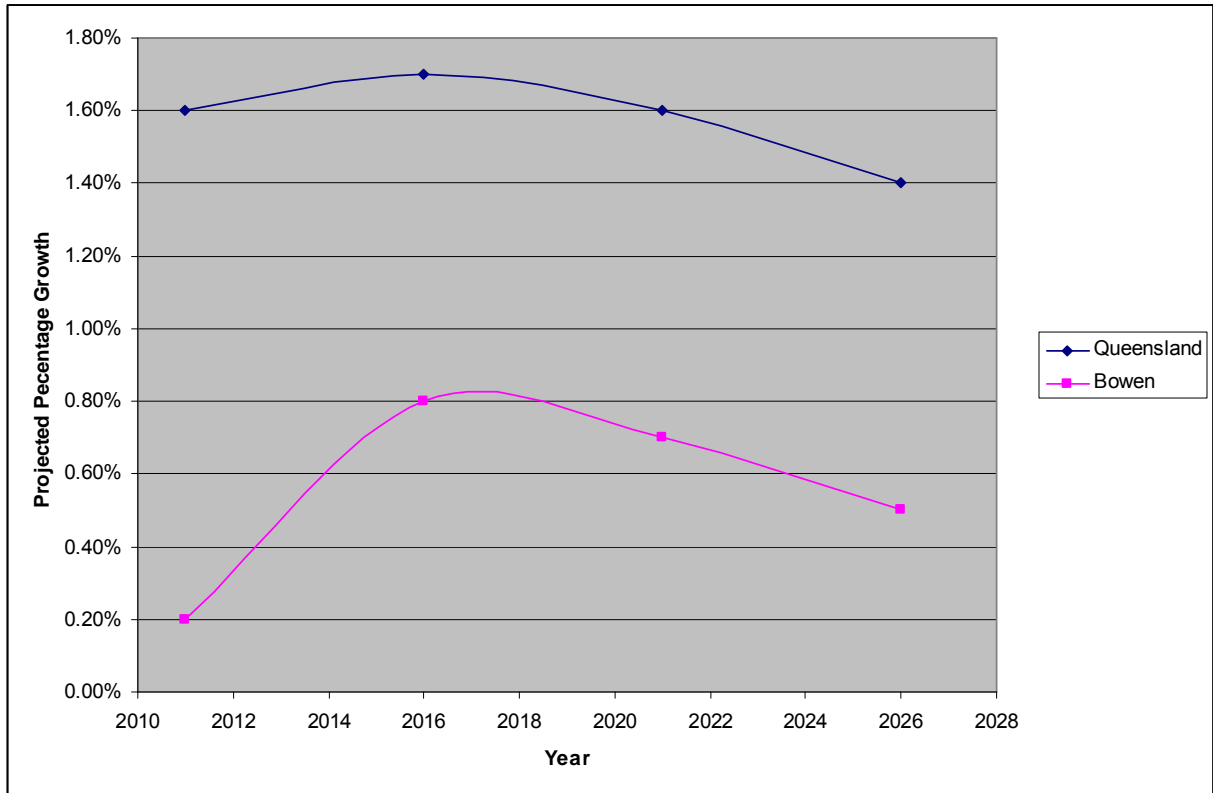
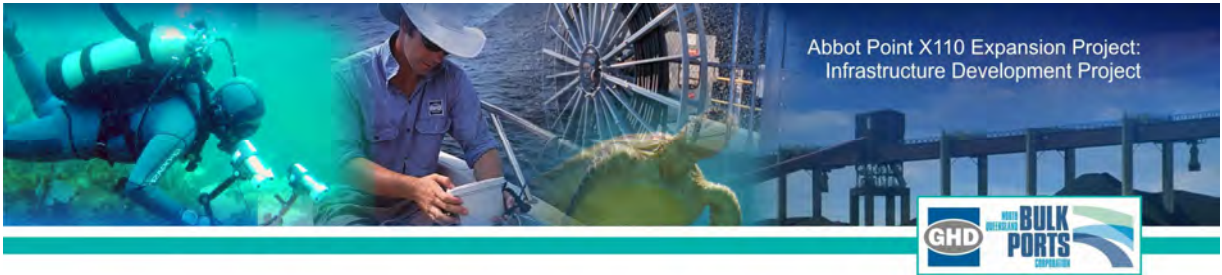
Population Projections

Population projections for the local study area suggest that the recent pattern of growth shown in the PIFU data will continue, with this growth set to slow after 2016. This pattern is consistent with population projections for Queensland, however, the projected average annual change is lower than that projected for Queensland, as represented in Table 4-59 and Figure 4-66. It should be noted that the impact of currently planned projects within the local area have not been factored in the calculation of these figures.

Table 4-59 Population projections for the local and State study areas

| Year | Local Study Area (Bowen) | | State Study Area (Queensland) | |
|---|--------------------------|--------------------|-------------------------------|--------------------|
| | # | Avg. annual change | # | Avg. annual change |
| 2011 | 13,297 | 0.2% | 4,428,138 | 1.6% |
| 2016 | 13,870 | 0.8% | 4,823,408 | 1.7% |
| 2021 | 14,379 | 0.7% | 5,211,995 | 1.6% |
| 2026 | 14,748 | 0.5% | 5,583,956 | 1.4% |
| Projected average annual growth 2011 – 2026 | | 0.6% | | 1.6% |

Notes: Presents medium level projections.
Calculated by averaging the average annual change from 2011 – 2026
Source: PIFU 2008a; PIFU 2008b.



Source: PIFU 2008a; PIFU 2008b

Figure 4-66 Projected percentage population growth of local and State study areas 2011 to 2026

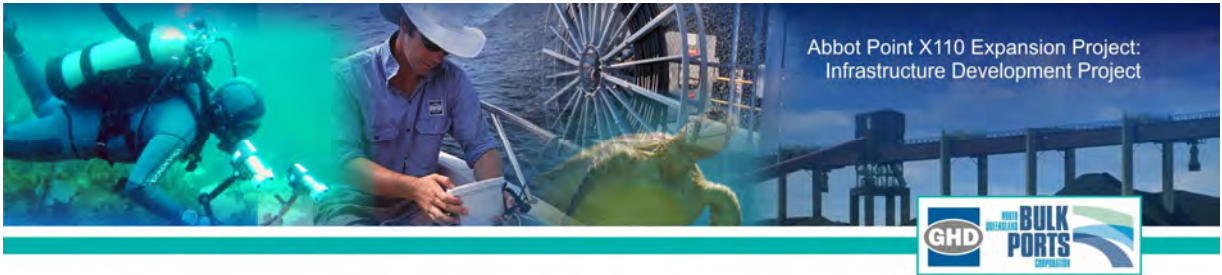
4.16.2.2 Socio-economic Characteristics

Labour Force

Total labour force for the 2006 census in Bowen LGA was 9,968 people. Labour force data for the local study area shows that a very high proportion of the total labour force was employed in 2001 and 2006, with the majority of these people being employed on a full-time basis. Local study area labour force statistic from 2001 and 2006 are generally consistent with the State study area over the same period. However, between 2001 and 2006 there was a greater reduction in the proportion of the population not in the labour force than that seen at the State level. The most recently available unemployment figures for Bowen show that unemployment was 5.6% for the March quarter 2007.

Industry of Employment

In 2001 and 2006, the industry of employment with the highest proportion of the local study population was Agriculture, Forestry and Fishing, followed by Retail Trade. While the proportion of the local study area employed in Agriculture, Forestry and Fishing decreased between 2001 and 2006, it remained substantially higher than employment levels seen in this industry in the State study area. The proportion of the local study area in the mining and manufacturing industries also differed from proportions seen in the State study area. The mining industry accounted for a higher proportion in the local study area in 2001 and 2006, while the manufacturing industry accounted for a lower proportion over the same period.



Median Income

Median individual, family and household weekly income levels in 2001 and 2006 were generally lower in the local study area than the State study area (see Table 4-60). While the method of calculating the medium income levels changed between the 2001 and 2006 census, a general increase in the individual, family and household weekly income levels in the local study area over this period can still be determined.

Table 4-60 Median incomes for 2001 and 2006 for the local and State study areas

| | Local Study Area (Bowen) | | State Study Area (Queensland) | |
|---|--------------------------|-----------|-------------------------------|---------|
| | 2001 | 2006 | 2001 | 2006 |
| Median weekly individual income (\$/weekly) | \$300-\$399 | \$417 | \$300-\$399 | \$476 |
| Median weekly family income (\$/weekly) | \$700 - \$799 | \$1077.30 | \$800-\$999 | \$1,154 |
| Median weekly household income (\$/weekly) | \$600-\$699 | \$825.70 | \$700-\$799 | \$1,033 |

Source: ABS 2003.

4.16.2.3 Community Facilities

Health

The local study area is serviced by Bowen Hospital, which is part of the broader Townsville Health Service District. The hospital offers general medical services including clinics and emergency care and has allied health services including pharmacy, physiotherapy, speech therapy, radiography and dental services. Age care is provided through HACC services (available through Home Help services) and an Aged Care Assessment team (available on a needs basis).

Bowen Hospital community services include discharge liaison, child health, Indigenous and health promotion services in collaboration with the North and West Queensland Primary Health Care team.

Visiting services to the Bowen Hospital include chest physician, endocrinology, women's health and audiology.

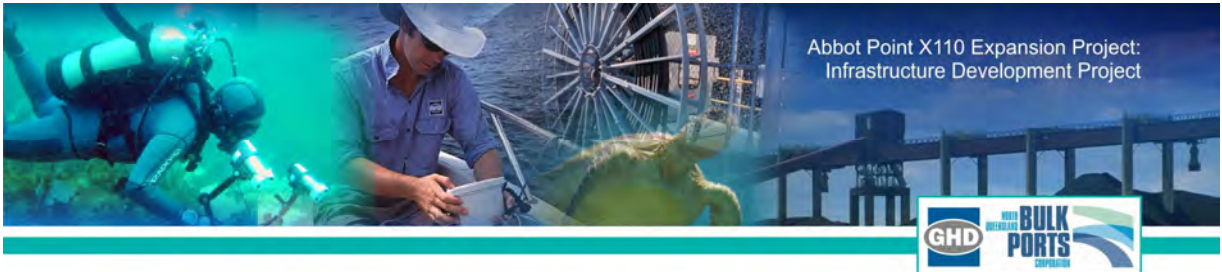
Education

Bowen offers education facilities to tertiary level. There are three State and one Catholic primary schools, a State secondary school and TAFE College operated in Bowen and Merinda.

Recreation Facilities

A recreation and sport plan was recently completed for the former Shire of Bowen, covering the areas of Bowen and Collinsville. A key finding from this study was that:

The existing provision of recreation and sport facilities in both Bowen and Collinsville is currently meeting most community needs. The gaps that do exist relate more to recreation and cultural facilities than to sport facilities. For example, there is a need for more walking and cycling paths and picnic facilities in



both Bowen and Collinsville and a need for a range of cultural facilities in Bowen such as a civic and cultural centre and an outdoor theatre/ performance space (Bowen Shire Council 2000).

The Recreation and Sport Plan identified a number of strategies and actions to be implemented to further improve facilities to meet the needs of current and future populations. It is noted that a number of those actions have been implemented.

4.16.2.4 Housing and Accommodation

Dwelling Structure

In both 2001 and 2006, the housing type accounting for the highest proportion of dwellings in the local study area was separate houses. The proportion of this housing type increased between 2001 and 2006, as did the proportion of semi-detached, row or terrace house, townhouse etc. However, these changes need to be considered in light of the fact that there was a decrease in the total number of dwellings reported for the local study area between 2001 and 2006. This is particularly pertinent when considering changes seen in the separate house category, which actually had a decrease in the number of dwellings recorded between 2001 and 2006.

Tenure

The fully owned tenure type was the most prominent status for dwellings in the local study area in both 2001 and 2006, with the proportion of this tenure type being higher than trends recorded for the State study area over the same period. Accordingly, the 2001 and 2006 proportion of dwellings being purchased in the local study area was substantially lower than proportions seen in the State study area.

Between 2001 and 2006, the local study area experienced a decrease in the proportion of fully owned dwellings and an increase in the proportion of dwellings being purchased. Rented dwellings made up a substantial proportion of the total dwelling tenure types in both 2001 and 2006.

Future Housing Expansion

There is a large amount of proposed housing development within the local study area. This development is mainly focused around the two townships/urban areas of Bowen, and Collinsville. Some of the main residential development application submissions that were approved by the Bowen Shire Council throughout the 2006-07 financial year include⁴:

- » Bowen
 - A 91 residential subdivision that will operate as a community title estate and to include eco sensitive housing, communal park area, swimming pool and tennis courts on Gilbert Street.
 - 36 lot sub division on the corner of Queens and Soldiers roads.
 - 27 residential lot sub division on Mt Nutt Road.
 - Rental accommodation building to house up to 18 guests in Herbert Street.
 - 16 unit building in Gregory Street between Gordon and Poole streets.
 - 47 residential sub division at the end of Crofton Street, bordering Oak Crescent and Stuart Tooth Drive.

⁴ Information sourced from Bowen Shire Council Annual Report 2006-07. Available: http://www.whitsundayrc.qld.gov.au/Page/page.asp?Page_Id=351&h=0. Accessed 22 – 08 - 2008



- 138 residential lot sub division on the Bruce Highway south of Bowen, in the vicinity of Brazils Wrecking Yard.
- 22 unit apartment building in Panorama Place, which is part of the Hospital Hill subdivision.
- Seven two story, three bedroom units at 34 Poole Street.
- Six unit apartment building in Sonoma Street, Collinsville.
- » Collinsville
 - 23 unit motel to be built on Railway Road next to the Workers Club.
 - 200 unit mine workers camp to be built on the Collinsville-Mt Coolan Road.
 - Collinsville Caravan Park has approval to build additional accommodation dwellings.

Housing Issues

There have been a number of reports on the housing issues in Bowen, these include (but are not limited to):

- » The Bowen Housing Group (2008) *2008 and Beyond Housing Needs Assessment for the Bowen-Collinsville Region*.
- » Queensland Government, Private Housing Support (2008) *Bowen Basin Market Report June 2008*.
- » Queensland Department of Housing (2007) *Housing in the Bowen Basin*⁵.
- » Queensland Department of Infrastructure and Planning (2007) *Bowen Basin Population Report, 2007: Full-time equivalent (FTE) population estimates at 31 July 2007*.

These reports highlight the housing issues in Bowen, which are summarised as:

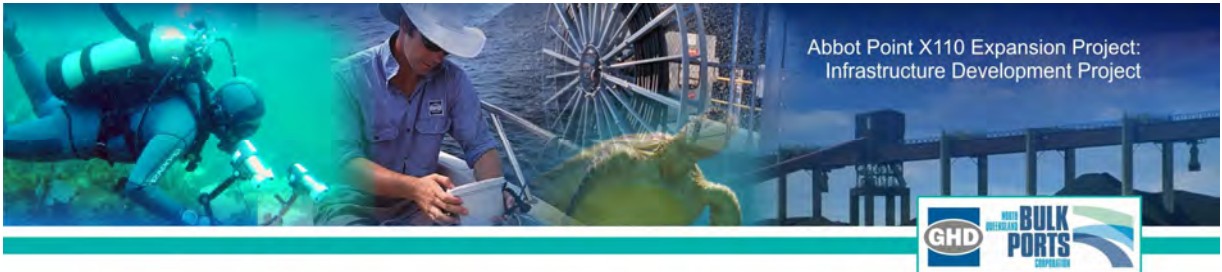
- » Housing shortage caused by the rapid population growth in the Bowen Basin.
- » Shortage of available land for housing.
- » Lack of housing choice based on different incomes and family types.
- » High rental and purchase costs associated with housing, closing both markets to low and middle level income individuals and families.
- » Increased pressure on social housing, including special needs housing.

There are social impacts associated with accommodation camps, these can include⁶ (note: there has been no direct assessment made of the Merinda accommodation facility):

- » Worker separation of families (and flow on family and social impacts);
- » Lost opportunity to participate in the local economy;
- » Focus on work rather than participation in existing communities; and
- » Fatalities associated with travelling “home” after shift.

⁵ Source: http://www.housing.qld.gov.au/partnerships/pdf/housing_bowen_basin.pdf downloaded 05-08-09

⁶ Bowen Basin Mayor’s Group (2006) *The Challenges of Rapid Growth and Influence State Government, A presentation to Key Director General* available from <http://www.chdc.com.au/wwwroot/Reports/Bowen%20Basin%20Mayors%20Group%20-%20Presentation%20-%2009%20October%202006%20-%20FINAL%20VERSION.pdf>



The majority of the construction workforce for the X110 project is planned to be housed at the NQBP accommodation camp, which will be expanded as required, however the operational workforce will be self-accommodated in the Bowen area.

Construction Accommodation

NQBP has a construction accommodation facility located at Merinda. This facility is currently developed to accommodate approximately 200 persons, with approvals in place to expand to 500 persons. The accommodation facility was approved under relevant IDAS processes and has management programs in place for all staff and contractors who stay at the facility.

NQBP intend to further expand the accommodation facility to provide for additional accommodation needs as required for the X110 project. This will depend on the construction schedule for the project. Assessment of the additional accommodation facilities will be subject to a separate development assessment process.

4.16.3 Potential Impacts and Mitigation Measures

4.16.3.1 Construction Phase

The forecast number of employees during the construction phase of the X110 Expansion is expected to peak at 600 persons. The majority of construction workers are likely to be sourced from outside of Bowen and will temporarily relocate during the phase of work. The majority of these employees will be accommodated at the NQBP construction accommodation facility located at Merinda. NQBP as the proponent will, however, work with contractors to maximise local employment opportunities.

To reduce the impact on the Bowen housing market during the construction of X110, local employment will be encouraged as well as outside workers, contractors, and subcontractors will be strongly encouraged to stay at the Merinda Camp. This may be achieved through requirements for contractors employing construction workers being required to limit the provision of accommodation allowances. Accommodation allowances are seen as an encouragement not to stay at provided accommodation and therefore place more strain on local housing. Available accommodation at the Merinda facility will be one of the key drivers for the construction timeframes.

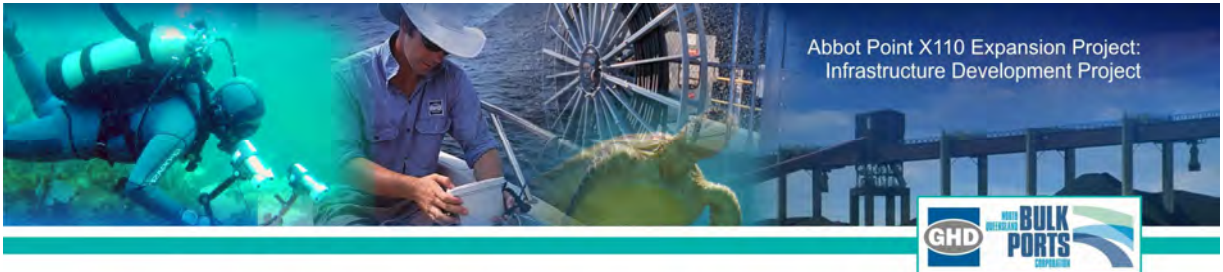
As the peak construction workforce will be approximately 600 over a 5 year period, there is an accommodation gap of 100 people. The housing need of these 100 people is expected to be met through the current and expected future expansion of the Merinda accommodation facility, provision of additional facilities locally and through growth in the local housing market.

To reduce the potential for road safety accidents, workers will be transported from the construction accommodation to the development site by bus, reducing the number of vehicles on the road.

4.16.3.2 Operational Phase

It is expected that a further 100 permanent operating and maintenance workforce will be required for the expansion from X50 to X110. The current terminal workforce is 91 and at completion the X50 expansion (which is currently in construction) will have an operational workforce of 180. The X110 project will take the operational workforce to 280.

Housing need is expected to be met through the current and expected future growth in the housing market.



The Project will provide employment opportunities both directly and in flow-on employment both locally and regionally. It is expected that approximately 2,800 flow-on jobs will be generated. Accommodation for these employees will be addressed by the individual proponents of the X110 users through their approval processes.

4.16.3.3 Recommendations

Previous housing studies undertaken in the Bowen Basin have identified a number of recommendations to address the housing issues in the region. NQBP is not responsible for addressing the broader housing issues in the Bowen Region, however they are responsible for contributing their part to the population growth in the region. From this perspective, NQBP would be able to participate in the following recommendations that have been previously identified:

- » Council to ensure that all new industry present a housing strategy for their staff as part of the EIS (Bowen Working Group recommendation p. 7) - this has been addressed;
- » Participate in the Bowen Housing Working Group (Bowen Housing Group recommendation p.7);
- » To maintain the Merinda Accommodation Facility at a high level, to encourage workers to stay at the facility.

The requirement for workers to stay at the Merinda Accommodation Facility can reduce the local spend of employees. Therefore, NQBP will promote local purchasing and contracting, to 'reduce the gap' between lost local spend from the construction workforce.

NQBP are to monitor the social impacts of the construction and operational phases of the project.



4.17 Regional, State and National Economy

4.17.1 Construction

The estimated economic impacts for the construction of the proposed APCT expansion at Abbot Point have been assessed by EconSearch. A summary of the findings are contained in Table 4-61.

The main impacts are:

- » Approximately \$500 million in direct expenditure in 2008/09 and \$365 million in 2009/10 in Queensland associated with the first stage of the APCT expansion.
- » Annual expenditures of \$1.05 billion in the first two years of the second stage (2011/12 to 2012/13), reducing to \$900 million in 2013/14.
- » Peak expenditure years will generate around \$110 million in GSP (direct and indirect) in the Bowen region, approximately \$70 million in the Northern region and \$170 million in the Mackay region.
- » In Queensland as a whole, the contribution to GSP is expected to be approximately \$500 million in 2008/09 and be around or greater than \$900 million in 2011/12 and 2012/13.
- » Almost 580 direct full-time equivalent (fte) jobs and over 1,480 flow-on jobs are anticipated in Queensland in the first year of the construction period.
- » Although the employment impacts vary considerably from year to year, in 5 of the 6 construction years, there will be more than 400 direct jobs and over 1,000 indirect jobs generated by the construction activity.
- » While the direct expenditures will be felt relatively evenly in the three sub-regions, employment impacts will be greatest in the Bowen region. Of the total jobs generated in Queensland, just under half will be in the Bowen region, 75 per cent of the direct jobs and 35 per cent of the flow-on jobs.
- » Around 8 per cent of the total jobs will occur in both the Northern and Mackay regions and approximately one-third of jobs will be generated elsewhere in Queensland.

Table 4-61 Economic impact of the construction of the proposed APCT expansion

| | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 |
|----------------------------------|---------|---------|---------|---------|---------|---------|
| Construction Expenditure (\$m) | 502 | 365 | 46 | 1,050 | 1,050 | 900 |
| <i>Bowen</i> | | | | | | |
| <i>Gross State Product (\$m)</i> | | | | | | |
| Direct | 35 | 25 | 3 | 66 | 64 | 53 |
| Flow-on | 25 | 17 | 2 | 47 | 45 | 37 |
| Total | 60 | 42 | 5 | 113 | 109 | 90 |
| <i>Employment (fte)</i> | | | | | | |
| Direct | 434 | 314 | 34 | 823 | 794 | 657 |



| | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 |
|----------------------------------|---------|---------|---------|---------|---------|---------|
| Flow-on | 555 | 390 | 47 | 1,043 | 1,007 | 833 |
| Total | 990 | 704 | 81 | 1,866 | 1,801 | 1,490 |
| <i>Queensland</i> | | | | | | |
| <i>Gross State Product (\$m)</i> | | | | | | |
| Direct | 210 | 147 | 18 | 395 | 381 | 315 |
| Flow-on | 295 | 207 | 25 | 554 | 534 | 442 |
| Total | 505 | 354 | 43 | 948 | 915 | 757 |
| <i>Employment (fte)</i> | | | | | | |
| Direct | 579 | 419 | 45 | 1,097 | 1,059 | 876 |
| Flow-on | 1,481 | 1,039 | 125 | 2,782 | 2,685 | 2,221 |
| Total | 2,060 | 1,458 | 170 | 3,879 | 3,744 | 3,097 |

Note: Values in 2007/08 dollars
Source: EconSearch (2008)

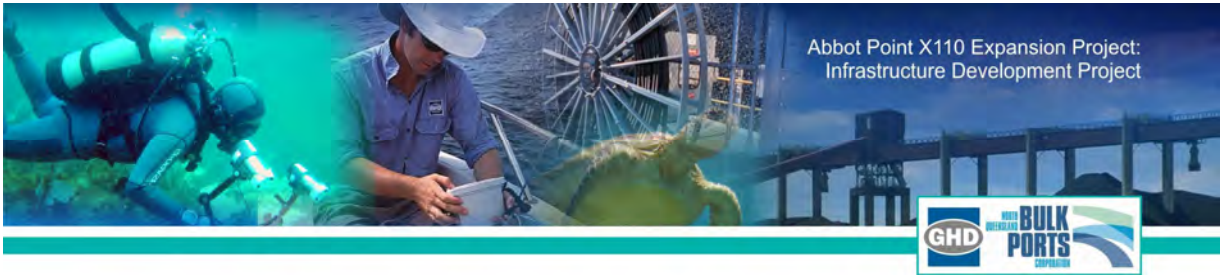
4.17.2 Operation

The expected economic impacts for the operating phase of the proposed APCT expansion have been assessed by EconSearch and are summarised in Table 4-62. The main impacts are as follows:

- » For the expansion to 50 Mtpa capacity, operation of the APCT will contribute \$228 million to Queensland GSP, \$159 million in the Northern-Bowen-Mackay region and \$69 million in the rest of Queensland. This expansion is expected to occur by 2010/11.
- » For growth to 110 Mtpa, steady state operation will contribute a projected \$414 million to Queensland GSP, \$135 million in the Bowen region, \$79 million in the Northern region, \$75 million in the Mackay region and \$125 million in the rest of Queensland.
- » Approximately 580 direct full-time equivalent (fte) jobs are anticipated in the APCT when it reaches its 50 Mtpa capacity, with over 1,000 flow-on jobs expected in Queensland as a whole.
- » When capacity reaches 110 Mtpa, total employment is expected to be around 2,900 fte, almost 1,600 in the Bowen region, more than 250 in the Northern region and over 230 in the Mackay region.

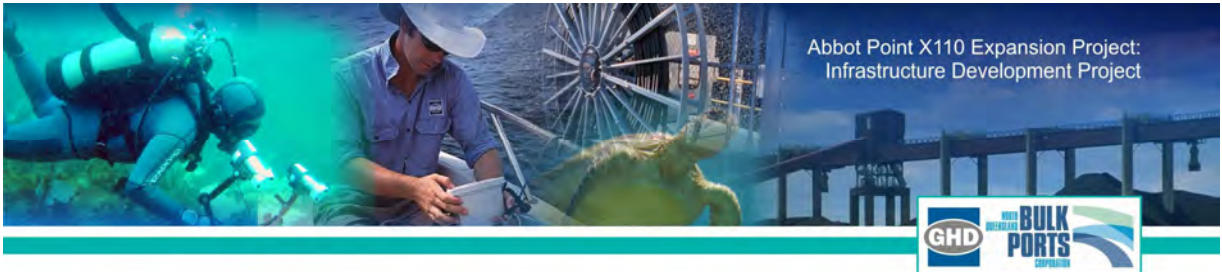
Table 4-62 Economic impact of the operating phase of the proposed APCT expansion

| | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 |
|----------------------------------|---------|---------|---------|---------|---------|---------|---------|
| Forecast Throughput (Mt) | 31 | 40 | 50 | 65 | 80 | 95 | 110 |
| <i>Bowen</i> | | | | | | | |
| <i>Gross State Product (\$m)</i> | | | | | | | |
| Direct | 34 | 42 | 50 | 61 | 71 | 81 | 90 |



| | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 |
|----------------------------------|---------|---------|---------|---------|---------|---------|---------|
| Flow-on | 17 | 21 | 25 | 30 | 36 | 41 | 45 |
| Total | 52 | 63 | 74 | 91 | 107 | 122 | 135 |
| <i>Employment (fte)</i> | | | | | | | |
| Direct | 323 | 397 | 465 | 572 | 671 | 762 | 845 |
| Flow-on | 288 | 353 | 414 | 509 | 596 | 677 | 752 |
| Total | 611 | 750 | 879 | 1,081 | 1,267 | 1,439 | 1,597 |
| <i>Queensland</i> | | | | | | | |
| <i>Gross State Product (\$m)</i> | | | | | | | |
| Direct | 79 | 97 | 114 | 140 | 164 | 187 | 207 |
| Flow-on | 79 | 97 | 114 | 140 | 164 | 187 | 207 |
| Total | 159 | 195 | 228 | 280 | 329 | 373 | 414 |
| <i>Employment (fte)</i> | | | | | | | |
| Direct | 404 | 496 | 582 | 715 | 838 | 952 | 1,057 |
| Flow-on | 719 | 883 | 1,035 | 1,272 | 1,491 | 1,693 | 1,879 |
| Total | 1,123 | 1,379 | 1,616 | 1,987 | 2,329 | 2,645 | 2,936 |

Note: Values in 2007/08 dollars
Source: EconSearch (2008)



4.18 Health, Safety and Emergency Response

4.18.1 Overview

Safe operation is maintained at the APCT and the Port through the implementation of a number of strategies developed by NQBP, terminal operators and MSQ. NQBP has statutory responsibility and powers under the *Transport Infrastructure Act 1994* to maintain the safety and security of the Port. MSQ has statutory responsibility for the safety of shipping across the State and is responsible for the safe pilotage of vessels entering the port and berthing facilities. Commercial and recreational fishing vessels have restricted access to parts of the port where they could affect the safety of shipping or present a security risk. Public access to the APCT is restricted due to security requirements.

4.18.2 Emergency Response

NQBP has in place, an Emergency Response Plan designed to manage emergency events, including cyclones, marine incidents, bomb threats, fire, explosion or fatalities at the Port. Specific procedures referenced under this plan relevant to the proposed works include a Maritime Cyclone Contingency Plan developed and implemented through the MSQ Regional Harbour Master.

Local emergency services capabilities at Bowen include:

- » Police.
- » Ambulance.
- » Rural Fire Brigade.
- » State Emergency Services.

Terminal operators also have site-based emergency response teams to provide immediate response to any emergency.

The proposed X110 expansion includes a consequential increase in emergency response procedures. Additional fire water supplies are included on the on-site water management for the Project.

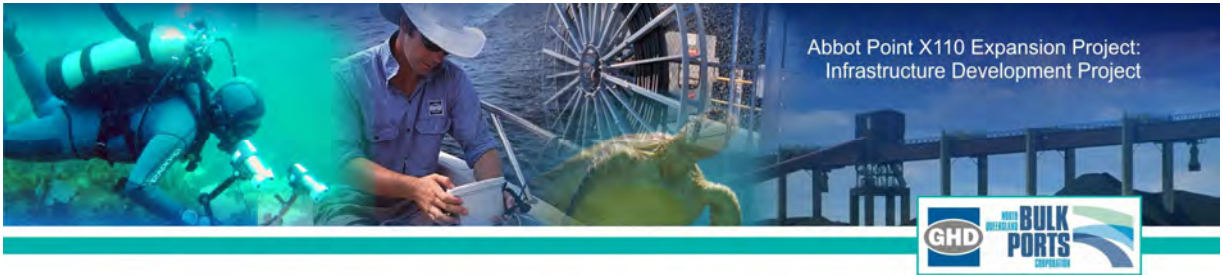
Existing emergency response procedures and emergency infrastructure are considered sufficient for existing demands and will be sufficient to meet future potential demands of the X110 Expansion.

4.18.3 Oil Spill Response

To reduce the risk of oil spills occurring, Queensland Transport ensures the safety of navigation, including the provision of navigation aids. The oil spill response plan for the port has been prepared by MSQ and is documented in the Queensland Coastal Contingency Action Plan (QCCAP). This Plan is complemented at the National Plan to Combat the Pollution of the Sea by Oil and other Noxious and Hazardous Substances (National Plan) for large spills.

The "first strike" oil spill response for the Port is provided by NQBP and APCT staff located at Abbot Point and Bowen. NQBP's oil spill equipment is stored at the Port of Abbot Point.

As the port authority, NQBP provides the first strike response to a local oil spill, providing a local resource for the initial response to a spill. For a larger spill, this provides time for MSQ to transport



personnel and equipment to Abbot Point from other centres. NQBP owns sufficient oil spill equipment for that first strike response.

4.18.4 Maritime Security

The Port of Abbot Point is a security regulated port under the Commonwealth *Maritime Transport Security Act 2003*. Security risk assessments on the port have been carried out and a security plan for the Port has been prepared and approved by the regulator, the Commonwealth Department of Transport and Regional Services. Both internal and external audits of compliance with the plan are carried out annually.

NQBP has established a Port Security Committee involving Maritime Industry Participants in the Port. Meetings are held six monthly to coordinate an effective security response across the Port.

4.18.5 Fire or Explosion

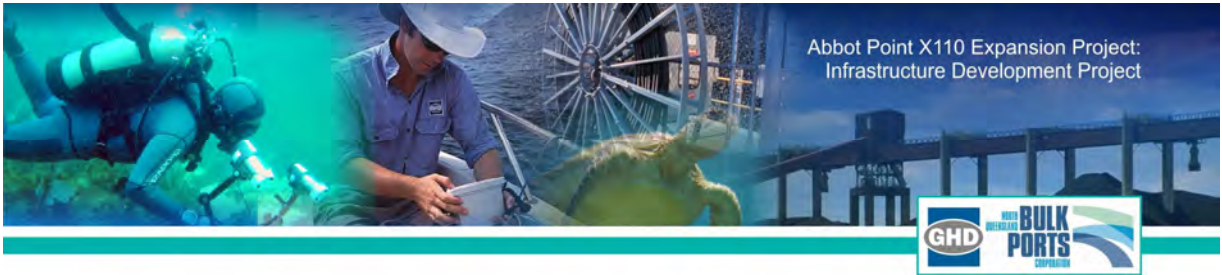
The Queensland Fire and Rescue Service is responsible for responding to and fighting fire or explosion at the Port. Fire fighting infrastructure and equipment for both land and marine fires are maintained at the Port. This includes:

- » Fire hydrants
- » Wharf fire hoses and saltwater pumps
- » Fire fighting foam

In addition, tugs at the Port can be utilised to fight major marine fires.

The proposed additional infrastructure and resources, to respond to a fire or explosion at the Port, proposed as part of the Project are considered sufficient to meet emergency needs.

A separate water storage tank will be installed to provide fire fighting capability to the rail inloader. The existing fire fighting storage tanks (on the hill) are of sufficient capacity to address the remainder of the expanded terminal's fire fighting needs.



4.19 Hazard and Risk

4.19.1 Introduction

A hazard and risk assessment consistent with the *AS/NZS Risk Management Standard 4360:1999* has been conducted for the Project. The objective of a risk assessment is to filter the minor, acceptable risks from the major, non-acceptable risks. It involves consideration of the sources, consequences and probability of occurrence of each risk.

4.19.2 Methodology

Risk analysis may be undertaken to various degrees of refinement, depending upon the risk information and data available. Analysis techniques include:

- » qualitative assessment;
- » semi-quantitative assessment; and
- » quantitative assessment.

In practice, a qualitative analysis is often used to first obtain a general indication of the level of risk and then a more quantitative analysis is applied to refine the risk.

The risk assessment methodology for this VEA uses a semi-quantitative process for determining risk. The semi-quantitative process estimates the degree of the consequence and probability and assigns a score to each. The score allocated “does not have to bear an accurate relationship to the actual magnitude of consequences or likelihood” (as per Section 4.3.4 of Australian Standards 1999). The estimates used in this analysis are based on past records and reports (where available) and specialist professional judgements.

The risk assessment methodology used to analyse and evaluate the risks is described in detail in the following section. The ratings of consequence, probability and resultant risk have been developed using the following risk analysis tables, based on the Standard.

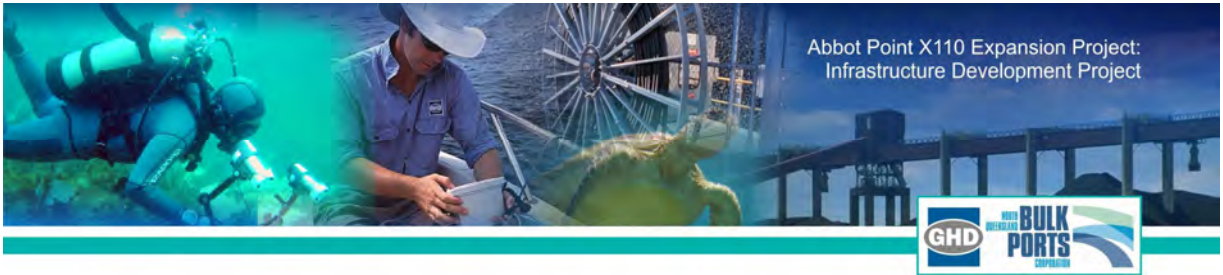
4.19.3 Identify Impacts and Consequences

In order to conduct an initial risk assessment, impacts (actual and potential) have been identified for each aspect of the Project. In this qualitative level of analysis, the magnitude of potential consequences and likelihood of the consequences occurring are described in words.

It is not possible to directly compare the impacts from a diverse range of project aspects (for example, comparing direct habitat loss to air quality impacts). Therefore, relative consequences must be judged according to different criteria, as discussed below.

For example, in the case of air emissions, the relative consequence should be assessed by evaluating such factors as:

- » persistence;
- » concentration;
- » duration of the emissions;



- » proximity to sensitive environments; and
- » taking into account secondary consequences and existing mitigation measures.

The potential consequences must be judged using all available information.

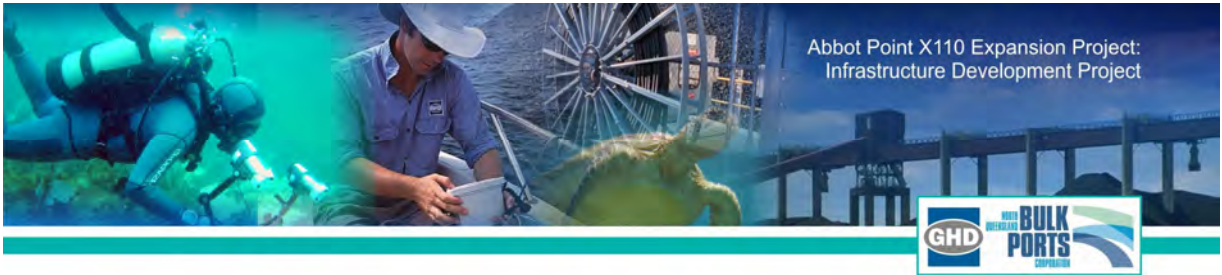
For this risk assessment, five levels of consequences severity have been used – insignificant, minor, moderate, major and catastrophic. The definitions used to assess relative consequences have been adopted from HB 203:2000 *Environmental risk management – Principles and Process*, as shown in Table 4-63. The table provides a consistent method of assessment that can be applied by different personnel and at different times.

Table 4-63 Consequence ratings

| Area impacted (a) | Insignificant consequences (Score = 1) | Minor consequences (Score = 2) | Moderate consequences (Score = 3) | Major consequences (Score = 4) | Catastrophic consequences (Score = 5) |
|---------------------------------------|--|---|--|---|--|
| Flora and fauna | Occasional short-term impact and/or disruption to flora and fauna. | Minor impact on ecosystem, including flora, fauna and habitat. No significant impact on resources. | Significant localised impacts but without longer-term impact on ecosystems, and/or short term impacts on resources. | Significant widespread impact on protected wildlife (eg migratory shorebirds, marine plants or marine ecosystems of moderate duration. | Damage to an extensive portion of ecosystem resulting in severe impacts on populations and habitats and/or long-term impact on resources. |
| Atmosphere/waste/ other | Temporary nuisance from noise, odour, dust, other air emissions, greenhouse gases, vibration, visual impact. Results in the generation of significant quantities of non-hazardous wastes. | Minor environmental impact due to contained release of pollutant (including odour, dust and noise), fire or explosion with no lasting detrimental effects. No outside assistance required. Significant use of water, fuels and energy and other natural resources. | Creation of noise, odour, dust, other controlled/ uncontrolled air emissions, greenhouse gases, vibration, and visual impact at significant nuisance levels. Results in the generation of significant quantities of hazardous wastes. | Major environmental impact due to uncontained release, fire or explosion with detrimental effects. Outside assistance required. | Catastrophic environmental impact due to uncontained release, fire or explosion with detrimental effects. Outside assistance required. Extensive chronic discharge of persistent hazardous pollutant. Results in the generation of significant quantities of intractable wastes. |
| Cultural heritage | Minor repairable damage to areas of little or no cultural significance. | Minor repairable damage to areas / items of cultural significance, or minor infringements of cultural values. | Moderate damage to areas / items of cultural significance, or significant infringement of cultural values/ sacred locations. | Major damage to areas / items of cultural significance, or major infringement of cultural values/ sacred locations. | Irreparable damage to highly valued areas / items of cultural significance or sacred value. |
| Community/media reaction & reputation | Possibility of detrimental local media reports. Minor substantiated complaints from the community. Public concern restricted to local complaints. | Detrimental local media reports. Subject of local government action. Infrequent substantiated complaints from the community. Minor negative impacts on reputation. | Detrimental national or state media reports. Subject of parliamentary questions or ministerials. Systematic substantiated community / Non Government Organisations concerns and complaints. | Numerous detrimental national or state media reports. Subject of a number of parliamentary questions or ministerials. Organised community concern. Mobilisation of significant Non Government Organisations campaign. | Sustained detrimental international, national or state media reports. Subject of parliamentary committee hearing. Sustained community / Non Government Organisation outrage. |

| Area impacted (a) | Insignificant consequences (Score = 1) | Minor consequences (Score = 2) | Moderate consequences (Score = 3) | Major consequences (Score = 4) | Catastrophic consequences (Score = 5) |
|--------------------------|--|---|--|--|--|
| Total cost | Financial loss (compensation, fines, cost to repair) of less than \$5,000. | Financial loss (compensation, fines, cost to repair) of \$5,000 - \$50,000. | Financial loss (compensation, fines, cost to repair) of \$50,000 - \$500,000 | Financial loss (compensation, fines, cost to repair) of \$500,000 - \$10M. | Severe financial penalties or legal liabilities. Financial loss (compensation, fines, cost to repair) of greater than \$10M. |

Source: Standards Australia/ Standards New Zealand "HB 203:2000, Environmental risk management – Principles and process" 2001, Appendix F



4.19.4 Estimated Probability of Occurrence

Following identification of potential impacts and consequences, the probability of occurrence needs to be estimated. Table 4-64 provides likelihood ratings with descriptions for estimating the likelihood of each occurrence.

Table 4-64 Probability of occurrence

| Descriptor | Likely Frequency | Probability |
|------------|--------------------------------------|-------------|
| Frequent | Continuous or will happen frequently | 5 |
| Often | 5 – 12 | 4 |
| Likely | 1 – 5 times | 3 |
| Possible | At least once | 2 |
| Rare | Less than once every | 1 |

The probability of occurrence from any event, mode of occurrence, or failure mechanism is considered.

In addition to evaluating the frequency for normal operating conditions, the following conditions could be considered:

- » abnormal, startup and shutdown operation conditions;
- » incidents, accidents and potential emergency situations; and
- » current activities and planned future activities.

4.19.5 Risk Estimation

The level of risk is calculated by multiplying the Consequence Score and Probability of Occurrence together.

$$\text{Risk} = \text{Consequence Score} \times \text{Probability of Occurrence}$$

The final outcome is in relative point scores, rather than actual risks.

Note that risk estimations were carried out assuming a well-managed construction schedule undertaken under normal conditions. Risk scores do not reflect the highest risks under adverse conditions/ worst case scenarios.

4.19.6 Risk Evaluation

Risk Scoring

The relative risk score estimated above enables definition between those risks that are significant and those that are of a lesser nature. This allows a better understanding of the least probable events with high consequence against the highly probable low consequence events. Having established the comparative risk level applicable to individual impacts, it is possible to rank those risks. Four risk categories have been used as described in Table 4-65. Once the impact has been ranked according to



the relative risk level it poses, it is then possible to target the treatment of the risk exposure, beginning with the highest risks.

Table 4-65 Risk categories

| Likelihood | Consequence | | | | |
|--------------------|-------------------|-----------|--------------|-----------|------------------|
| | Insignificant (1) | Minor (2) | Moderate (3) | Major (4) | Catastrophic (5) |
| Rare (1) | 1 | 2 | 3 | 4 | 5 |
| Unlikely (2) | 2 | 4 | 6 | 8 | 10 |
| Possible (3) | 3 | 6 | 9 | 12 | 15 |
| Likely (4) | 4 | 8 | 12 | 16 | 20 |
| Almost certain (5) | 5 | 10 | 15 | 20 | 25 |

| | | |
|--|----------------------|--|
| | Extreme risk | Requires immediate remedial action. |
| | High risk | Requires remedial planning and action via the Environmental Management Plan. |
| | Moderate risk | Address via new procedures and/or modification of existing practices and training. |
| | Low risk | No formal requirement for further action, unless escalation of risk is possible. |

Limitations

As with any model, the relevance and applicability of the risk model revolves around a number of basic assumptions and limitations. The application of the risk model has been based on subjective ranges of consequences and probabilities.

The assessment has been limited to a selected number of primary risks and the assessment of cumulative risk to the environment from multiple pollution sources, or sources of environmental degradation, has not been addressed.

Although a semi-quantitative methodology was used to conduct the risk assessment, the resulting risk estimation is purely relative. The risk estimations do not imply an absolute scale of risk that can be applied to any other situation or assessment.

Table 4-66 provides a summary of the risks associated with the Project. Each risk is identified and given a preliminary score based on the consequences (C) and likelihood (L) of the risk. Mitigation measures are then applied to the risk and a second score calculated.

Table 4-66 Summary of risks associated with the project

| Risk Aspect | Consequences | Preliminary Risk Assessment (C,L) Score | Mitigation Measures | Risk Rating with Mitigation Measures Adopted (C,L) Score |
|---|---|--|--|---|
| Capture of terrestrial fauna | Potential death of fauna. | (5, 3) 15 | Survey of areas to be cleared prior to commencement of works. Utilise fauna spotter during clearing works. | (5, 1) 5 |
| Impact on marine mega fauna | Disturbance to fauna habitat utilisation | (3, 3) 9 | Monitor for megafauna within close proximity to off-shore construction activities. Cease operations where megafauna are within 50 m or in imminent risk of impact. | (3, 2) 3 |
| Loss of habitat | Potential impact on ecosystems including wetlands and vegetation communities. Potential impact on fauna through loss of habitat. | (4, 5) 20 | Minimisation of duration of habitat loss. Implement EMP measures for minimising vegetation clearing, monitoring and corrective actions. | (2, 5) 10 |
| Effect on water quality from erosion and sediment migration | Potential impact on sensitive environments, including wetlands from erosion and sediment run-off. | (4, 5) 20 | Implement erosion and sediment control measures. Monitoring of water quality and implementation of corrective practices where impacts are identified. | (2, 5) 10 |
| Effect on water quality from hazardous spills. | Potential for moderate impact should a spill occur | (3, 1) 3 | Management measures are in place to minimise likelihood of spill occurring and for expedient clean-up. | (2, 1) 1 |
| Release of wastes to the environment. | Potential moderate impact on the natural environment should waste products be released. | (3, 1) 3 | Management measures are in place to minimise likelihood of wastes being released. | (2, 1) 1 |
| Air and noise pollutants. | Low potential for minor impact should emissions from the dredger exceed acceptable levels. | (3, 3) 9 | Conduct routine maintenance of equipment in accordance with manufacturers requirements. | (3, 1) 3 |
| Disturbance of cultural heritage values through non-compliance with CHMP. | Impact associated with the disturbance of the cultural values beyond those acceptable impacts identified within the VEA or due to non-compliance with CHMP. | (3, 1) 3 | Implementation of the EMP and CHMP. | (1, 1) 1 |

| Risk Aspect | Consequences | Preliminary Risk Assessment (C,L) Score | Mitigation Measures | Risk Rating with Mitigation Measures Adopted (C,L) Score |
|--|---|--|---|---|
| Community or public concerns relating to a vegetation clearance. | Moderate impact relating to media publicity and potential for government agencies to seek investigations. | (3,4) 12 | Community information about the extent of clearing and relative associated impacts. Monitoring of impact on wetland. | (2,2) 4 |
| Project approvals and licensing. | High financial impact relating to lost opportunity for the regional and national economy. | (5,3) 15 | Working with approval agencies to facilitate a cooperative approach to developing the project. Appropriate management measures to minimise potential impacts | (5,2) 10 |

Note: C = Consequence
L = Likelihood

4.19.7 Summary

The existing terminal has been operating for 25 years which allows an accurate identification of potential risks.

The principal risk concerns relate to well defined environmental risks which can be effectively managed through the proposed mitigation strategies outlined within Section 4 and further developed in Section 5. It is expected that short-term impacts will result from the project in relation to vegetation clearing, particularly proximate to the Caley Valley Wetland, the loss of habitat, and possible impacts from water quality degradation. The impact on Caley Valley Wetland is considered an acceptable risk, considering the small area of direct impact and the established practices to be implemented to minimise indirect impacts such as water quality.

Management of potential environmental impacts is reliant on the works being undertaken in accordance with the draft EMP.