Scientific Inquiry into Hydraulic Fracturing in the Northern Territory

Beetaloo sub-basin Social Impact Assessment Case Study

17 January 2018

When you think with a global mind problems get smaller

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Scientific Inquiry into Hydraulic Fracturing in the Northern Territory

Prepared for
Scientific Inquiry into Hydraulic Fracturing in the Northern Territory

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Executive summary

The independent scientific panel (the Panel) undertaking the Scientific Inquiry into Hydraulic Fracturing of Onshore Unconventional Reservoirs and Associated Activities in the Northern Territory (the Inquiry) commissioned a two-part scope of work to assist its deliberations on the social impacts of an unconventional gas industry in the Northern Territory. The scope of work comprised:

Part A Social Impact Assessment

- Develop a leading practice framework for the identification, assessment and management of the social impacts associated with the development of onshore unconventional gas in the Northern Territory.
- Undertake a high-level social impact assessment (SIA) that describes 'the type of potential social impacts, issues, concerns, risks and benefits that may arise from the development of the unconventional gas industry in the Beetaloo sub-basin on the Affected Communities'.

Part B Social Licence to Operate

- Describe and assess the concept, elements and issues surrounding a 'social licence to operate' (SLO), as it applies to the onshore unconventional gas industry in the Northern Territory.

A leading practice SIA framework was developed by The Centre for Social Responsibility in Mining (CSRM) of the University of Queensland (CSRM, 2017). The framework was used to undertake a high-level SIA case study (SIA case study) to assist the Panel to identify and assess the potential impacts on affected communities of an indicative scenario for development of an unconventional gas industry, including their likely significance and ability to be managed.

The CSIRO prepared a report on 'social licence to operate' (CSIRO, 2017) that provides the Panel with the key attributes of a community engagement program that will lead to a shale gas development company obtaining a social licence to operate in the Northern Territory.

Social impact assessment method

CSRM (2017) recommended strategic environmental (and social) impact assessment informed by project-independent baseline studies that are based on an adaptive participatory management approach. The strategic assessment would provide the framework for project-level assessments with project-level monitoring providing information to facilitate review and update of the strategic assessment.

CSRM identified the phases and activities of SIA, and how they relate to an adaptive participatory management approach. The typical phases and adaptive participatory management approach would typically take several years and involve extensive community and stakeholder engagement to understand social values, identify and explain potential impacts, and develop, explain, refine and reach agreement on appropriate responses, management measures and initiatives. This was not possible for the SIA case study which was conducted over a period of six months.

Adopting key elements of the approaches proposed by CSRM (2017), an approach that accounted for the limited time available for the SIA case study and limited information gathering was developed. The approach comprises three stages:

1. Compile social baseline (identify affected communities, define social catchments, identify social values and compile social profiles).

2. Identify and assess threats and potential impacts to social values.
3. Propose mitigation and identify opportunities for enhancing social values.

The Panel required the SIA case study to assess social impacts on '*the people or groups of people that are most likely to be impacted by the development of unconventional gas resources in and around the Beetaloo sub-basin… which may include, without limitation, community members, pastoralists, Aboriginal organisations and local businesses*'.

The geographical scale of the Beetaloo sub-basin necessitated grouping potentially affected communities into social catchments to reflect their relationship to the conceptual development, aid stakeholder engagement and enable an appropriate assessment of the social impacts of unconventional gas development. The following factors were used to define the social catchments:

- **Location and community links**: Centres with a population level that may indicate some potential for providing 'local employment' should sub-basin development proceed. Generally these communities are located outside of, but in proximity to, the Beetaloo sub-basin. Consideration of potential physical and cultural links are also important factors influencing grouping and the potential to experience shared perceptions of impact.
- **Logistics or support industry potential**: It is assumed that the development of an unconventional gas industry would require at least a moderate level of logistical and maintenance support. This could be a purpose-built area within the gas field or a facility located in the existing large towns north and south of the sub-basin that currently support industrial activity, for example Katherine, which currently provides support to the mining industry and RAAF Base Tindal and/or Tennant Creek, which provides support to the mining industry.
- **Dominant economic activity**: Pastoral operations constitute the principal economic activity within the Beetaloo sub-basin, with the Stuart Highway and to a lesser extent the Carpentaria Highway facilitating economic activity associated with tourism.

The affected communities and social catchments to which they were assigned are:

- Affected communities (urban): Katherine (town) and Tennant Creek.
- Affected communities (north): Barunga, Beswick, Mataranka, Jilkminggan, Minyerri and Ngukurr.
- Affected communities (central): Larrimah, Daly Waters, Dunmarra, Newcastle Waters and Elliott.
- Affected communities (east): Borroloola and Robinson River.

Social values of the affected communities were identified and verified through stakeholder engagement that involved two rounds of consultation. A total of 69 meetings were held with stakeholders. Table E1 categorises the stakeholders into key groups. Figure E1 provides the results of an analysis of the frequency of issues raised by stakeholders.

Table E1 Stakeholder consultation effort

Stakeholder category	No. of meetings	%
Government agencies and statutory authorities	7	10
Businesses and peak business organisations	11	16
Local Governments	6	9
Non-government organisations	6	9
Community organisations and residents	39	56

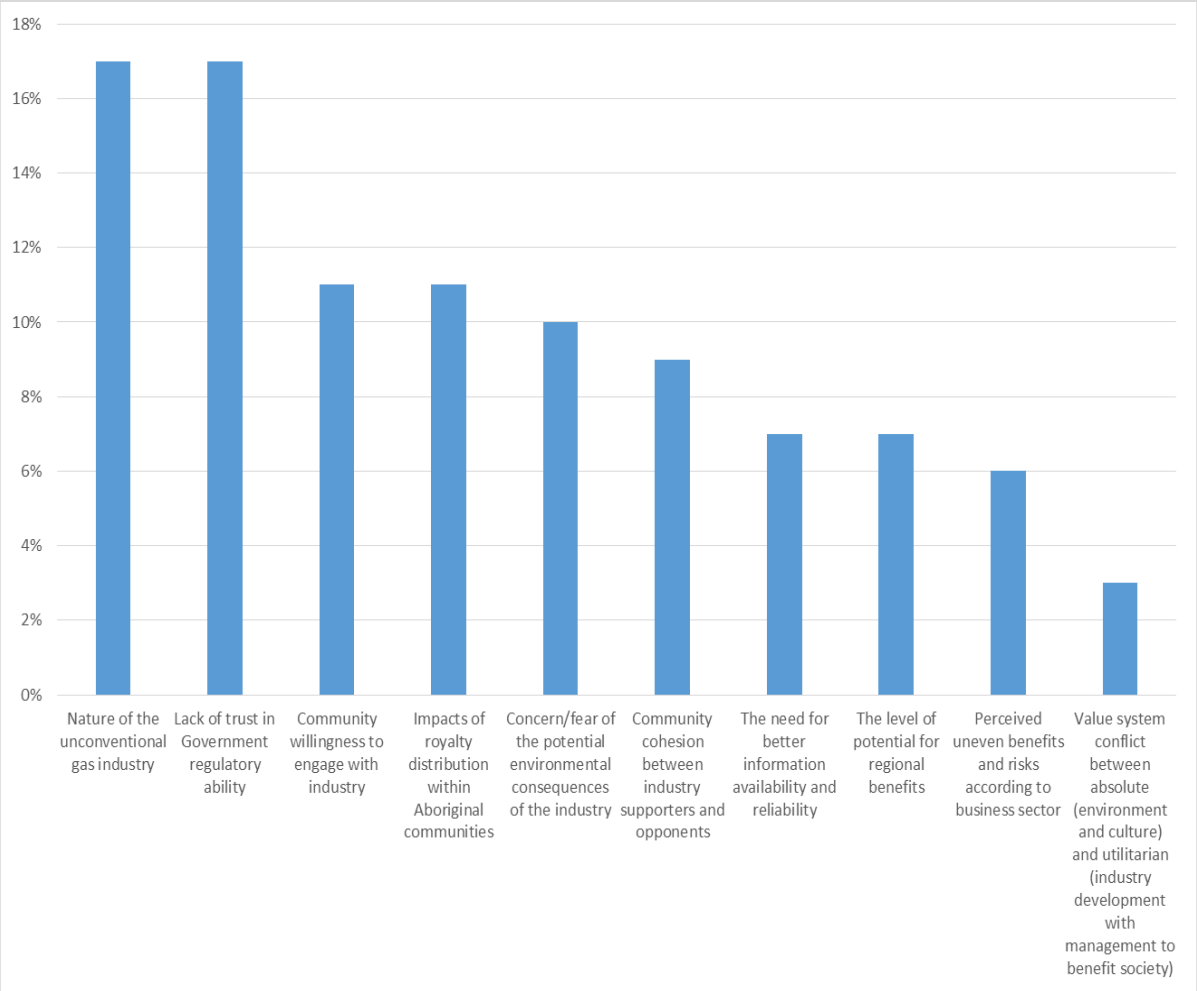


Figure E1 Ranking of issues expressed during stakeholder consultation

The issue – Nature of the unconventional gas industry – relates to community concerns that:

- The resources industries are short-term rather than long-term, and cyclical in nature.
- The impacts associated with development of a shale gas industry in the Northern Territory will be similar to those experienced with the development of the coal seam gas industry in Queensland.
- Industry is aloof from community concerns and has disregard for the social outcomes of their operations.

The identified social values, threats (or impact drivers) and potential impacts associated with unconventional gas development are set out in Table E2.

Threats to and impacts on the social values were assessed using the approach to risk management involving the assessment of likelihood of the threat occurring and the resulting consequence or impact on the social values. A risk matrix was used to determine the significance of the threats (and impacts) on the social values.

Table E2 Identified Beetaloo sub-basin social values, threats and potential impacts

Social value	Threat or impact driver (ID)	Potential impact
SV1 Liveable community	ID1A Rapid workforce influx to urban areas	Impaired community amenity
	ID1B Increase in heavy vehicle traffic on local roads	Reduced amenity, road accidents and increased vehicle maintenance costs
	ID1C Conflict between supporters and opponents of unconventional gas industry development	Conflict between community members
	ID1D Receipt of royalties by a subset of community members	Conflict between community members
	ID1E Concern over potential risk to groundwater quality	Anxiety about availability, access to and quality of water resources
SV2 Affordable lifestyle	ID2A Housing supply unable to meet spike in demand	Decreased housing availability and affordability
	ID2B Increased short-term rental costs	Decreased housing availability and affordability
SV2 Affordable lifestyle	ID3A Significant change in land use and industry development	Loss of 'outback' identity
	ID3B Perception of industry development heralding an era of 'industrialisation' of the landscape	Loss of 'outback' identity
	ID3C Perception that industry development approval is against majority community wishes	Decreased community engagement with local governance
	ID3D Concern with increased access to, and development risks on traditional country	Increased sense of cultural loss
SV4 Capacity for sustainable economic activity	ID4A Concern that long-term access to quality groundwater may be restricted due to industry development	Decreased investment in pastoral and horticultural enterprises
	ID4B Perception that 'outback' identity is compromised by 'major industrialisation' of the region	Decrease in tourist visitation
	ID4C Higher gas industry wage rates available to local residents drives competition for employees	Increased cost of labour for local businesses
	ID4D Industry demand attracts external specialist enterprises to establish and draw business from local businesses	Local business closures

Socioeconomic context of Beetaloo sub-basin

The Beetaloo sub-basin is located between Katherine and Tennant Creek and covers an area of approximately 7,000 km^2. Land use in the Beetaloo sub-basin comprises Aboriginal land, pastoral leases, horticultural enterprises, oil and gas transmission infrastructure, a railway, and highway towns, cattle stations and remote Aboriginal communities. The Australian Defence Force operates RAAF Base Tindal located near Katherine.

Larrimah, Daly Waters, Newcastle Waters and Elliott border or are located in the sub-basin. The adjacent towns and communities of Katherine, Mataranka, Minyerri, Ngukkur, Borroloola, Robinson River and Tennant Creek are located outside the sub-basin. Figure E2 shows the location and extent of the Beetaloo sub-basin and location of affected communities.

The Beetaloo sub-basin has been explored since the 1980s. Figure 6.2 of the Panel's Interim Report shows the extent of unconventional shale gas exploration in the Beetaloo sub-basin which has comprised hydraulically fractured and non-fractured wells.

The Beetaloo sub-basin has seen almost no industrial development. Some affected communities have experience with development. For example, experience with mining development south of Ngukurr (iron ore) and at McArthur River (large-scale underground and open pit mining of lead and zinc). The installation of gas transmission and lateral pipelines through the sub-basin (Amadeus Basin to Darwin Pipeline in 1986; the Elliott Spur Pipeline in 1989, and the McArthur River Pipeline in 1995) that occurred 20 to 30 years ago is not readily recalled by community members. The current installation of the Northern Gas Pipeline from just north of Tennant Creek to Mount Isa is in an early stage of development, and a significant distance south of the Beetaloo sub-basin communities.

Economic activity is centred on agriculture development (pastoral operations throughout the sub-basin, horticulture south of Katherine and along the Roper Highway) together with Defense activity at RAAF Base Tindal, and tourism activity mainly servicing self-drive visitors. Regional service townships (Katherine and Tennant Creek) are located outside the sub-basin.

Obvious significant disparities in social status and living conditions between remote Aboriginal communities and regional service townships are evident. This has a significant influence on the potential for community members to capture potential benefits from industry development should it occur.

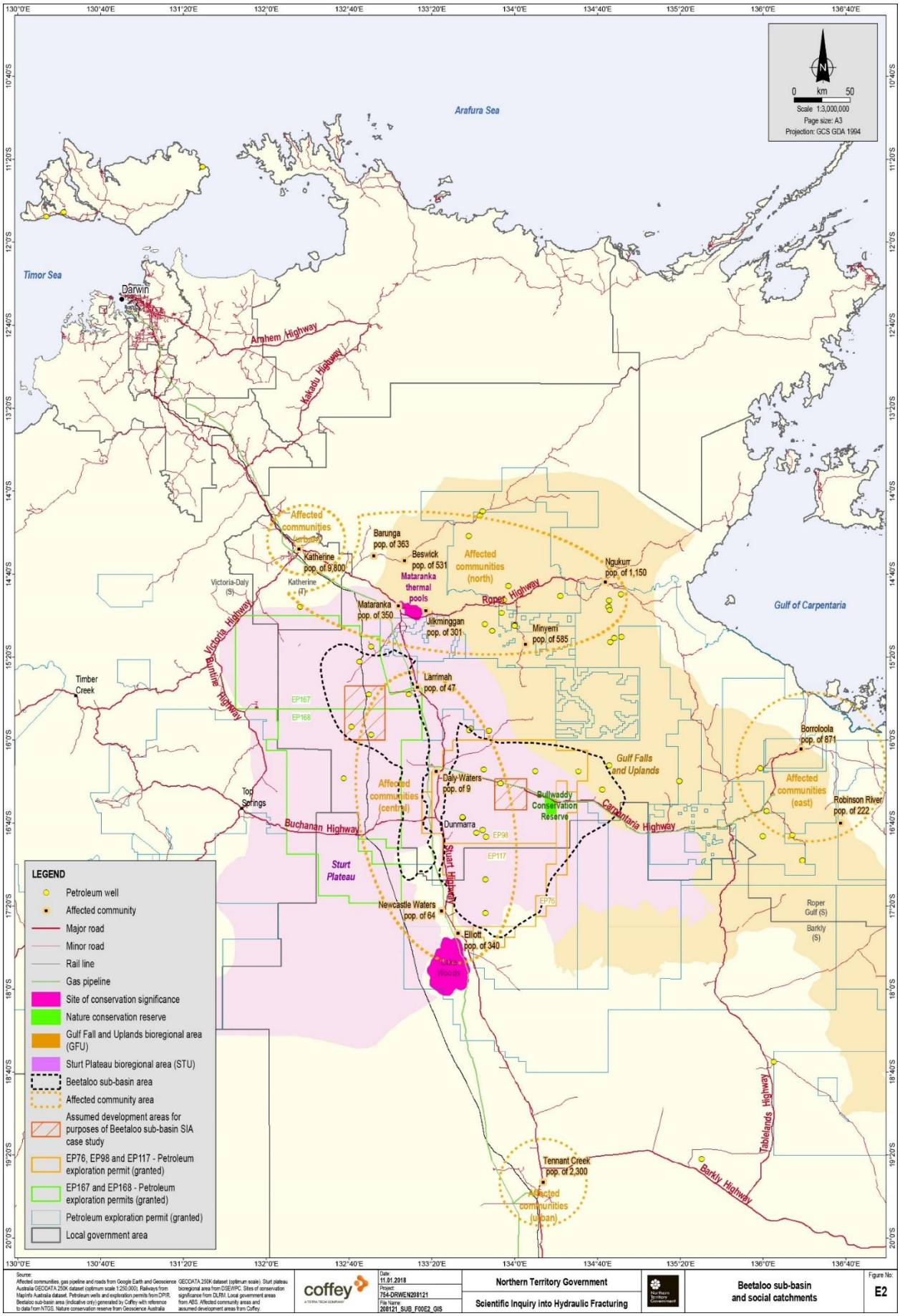
Community members have a reasonably high level of awareness (due to the activities of groups opposed to industry development) of historical issues surrounding the development of unconventional gas resources in other jurisdictions but not of the potential unconventional gas industry in the Northern Territory. The Inquiry's Interim Report (Inquiry, 2017b) acknowledged that levels of knowledge in Aboriginal communities about future development is inadequate.

Conceptual Beetaloo sub-basin development

A conceptual development was defined based on ACIL Allen's (2017) Shale WIND scenario which assumes a 260 well development with a 25 year production life.

The conceptual development assumes the moratorium on hydraulic fracturing will be fully lifted in 2018, allowing exploration, appraisal and pilot testing to proceed for a period of three to five years. Appraisal and pilot testing activities will confirm the technical and commercial parameters for development (e.g., gas availability and volume, cost of extraction, cost of gas processing, compression and transport, demand and wholesale price for gas, etc).

During the appraisal and pilot testing period environmental and planning approvals would be progressed with detailed design and construction of the gas fields and associated gas processing facilities commencing on receipt of territory and federal approvals. Shale gas production is assumed to occur for 25 years after which the production facilities and gas field infrastructure would be decommissioned.


Arafura Sea
Timor Sea
Gulf of Carpentaria
Darwin
Arnhem Highway
Kakadu Highway
Victoria Highway
Buntine Highway
Roper Highway
Carpentaria Highway
Buchanan Highway
Stuart Highway
Tablelands Highway
Barkly Highway
Affected communities (north)
Affected communities (central)
Affected communities (east)
Affected communities (urban)
Katherine pop. of 9,800
Barunga pop. of 363
Beswick pop. of 531
Mataranka thermal pools
Mataranka pop. of 350
Jilkminggan pop. of 301
Ngukurr pop. of 1,150
Minyerri pop. of 585
Larrimah pop. of 47
Timber Creek
Top Springs
Daly Waters pop. of 9
Dunmarra
Bullwaddy Conservation Reserve
Gulf Falls and Uplands
Borroloola pop. of 871
Robinson River pop. of 222
Sturt Plateau
Newcastle Waters pop. of 64
Elliott pop. of 340
Tennant Creek pop. of 2,300
Roper Gulf (S)
Barkly (S)
Victoria-Daly (S)
Katherine (T)
EP167
EP168
EP76
EP98
EP117
LEGEND
Petroleum well
Affected community
Major road
Minor road
Rail line
Gas pipeline
Site of conservation significance
Nature conservation reserve
Gulf Fall and Uplands bioregional area (GFU)
Sturt Plateau bioregional area (STU)
Beetaloo sub-basin area
Affected community area
Assumed development areas for purposes of Beetaloo sub-basin SIA case study
EP76, EP98 and EP117 - Petroleum exploration permit (granted)
EP167 and EP168 - Petroleum exploration permits (granted)
Petroleum exploration permit (granted)
Local government area
N
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coffey
Northern Territory Government
Scientific Inquiry into Hydraulic Fracturing
Beetaloo sub-basin and social catchments
Figure No: E2

It was assumed that each project area would require gas field access roads, production wells and gas gathering lines, a gas processing and compression facility, export pipeline connection to the Amadeus to Darwin Gas Pipeline, accommodation facilities and an airstrip for FIFO worker transport during the construction phase for major facilities, such as the gas processing and compression facility.

Table E3 lists the key parameters for the conceptual development scenario adopted for the SIA case study. An indicative development timeframe is presented in Figure E3.

Table E3 Indicative project scenario parameters

Element	Scale
Approximate number of wells drilled per annum	10
Maximum number of wells in operation	257 (in 2042)
Number of well pads (8 wells/pad)	32
Length of gas field roads	55 km (1.7 km for each pad)
Length of gathering pipes	32 km
Area of disturbance (for pads, roads, gathering pipes and camps)	10.9 square kilometres (1,090 ha)
Area of disturbance for pipelines (Armadeus tie-in 50 km; Armadeus duplication 300 km; Northern Gas Pipeline duplication 622 km). It is assumed that the pipeline duplications are on similar alignments to existing pipelines)	Approximately 116 square kilometres (11,600 ha)
Average level of employment for well pad construction and field operations (including camp operations x 2)	250 to 300 persons
Estimated indicative level of local employment	Darwin: 65 persons Katherine: 70 persons Regional Northern Territory: 25 persons
Logistics support facility in Katherine industrial area	5 to 10 persons

It was assumed the peak construction workforce would be approximately 450 persons with 250 persons required for operation and maintenance of the gas field, gas processing and compression facilities and ancillary facilities. The workforce was assumed to be a combination of FIFO (from Darwin) and drive-in drive-out (DIDO) from Katherine and rural communities. Gas field workers were assumed to be housed in accommodation facilities located near transport hubs or at the gas fields while on shift. The accommodation facilities were assumed to be self-contained with medical and recreational facilities.

Construction workers who require specialist skills were assumed to be non-local, with the Northern Territory-sourced workforce drawn from the communities shown in Table E3. It was assumed approximately 70 persons would be locally sourced from the Katherine area, and that one third of these people (approximately 25) will have relocated to live in the area. This will result in a small population increase in the order of 80 persons (assuming 15 families of 4 persons and 10 couples with no children).

Figure E3 Indicative development timeframe

Social impact assessment

The affected community profiles revealed two groups of communities – regional centres with good levels of community infrastructure and services and those reliant on regional centres for such services. Katherine and Tennant Creek are regional service centres and were grouped for the purposes of impact assessment, as despite some differences they have similar characteristics in relation to the other affected communities. The outlying communities were grouped together as rural communities, as their size and remoteness from regional service centres is a key factor in their response to the identified threats.

Threats to social values where the significance is assessed as high or higher are shown in Tables E4 and E5.

Table E4 Summary of high and higher threat significance for urban communities

	Potential threat	Likelihood	Consequence	Assessed risk
ID1E	Concern over potential risk to groundwater quality	Almost certain	Moderate	High

Table E5 Summary of high and higher threat significance for rural communities

	Potential Threat (Rural)	Likelihood	Consequence	Assessed risk
ID1D	Receipt of royalties by a sub-set of community members	Certain	Major	Very High

	Potential Threat (Rural)	Likelihood	Consequence	Assessed risk
ID1E	Concern over potential risk to groundwater quality	Certain	Major	Very High
ID4A	Concern that long-term access to quality groundwater may be restricted due to industry development	Likely	Major	High

For urban communities, the key concern is the risk of impacts on groundwater resources (social value SV1) on which they rely wholly or partially for drinking water. This is likely heightened by the concerns regarding PFAS contamination of water resources in Katherine town and surrounding area. The potential for community discord due to divergent attitudes to risk held by supporters and opponents of unconventional gas development is considered material, particularly as the townships have relatively low populations.

For rural Aboriginal communities, including pastoral properties in the Beetaloo sub-basin area, the key threats are to social values SV1 and SV4, primarily due to the perceived environmental risk to both quantity and quality of groundwater due to hydraulic fracturing required to extract gas from the shale. Receipt of royalties in remote Aboriginal communities also has the potential to induce income disparity that may negatively affect relations between different traditional owner groups.

The remoteness of communities (influencing the time available to consult effectively) and the cultural diversity and differing world views of the major stakeholder groups – Aboriginal communities and pastoral leaseholders – were identified as particular challenges when undertaking both strategic and project-level SIA in the Beetaloo sub-basin.

The limited understanding of the nature of the unconventional gas industry, and of the technologies that would be deployed to extract gas and manage potential environmental and social impacts, as well as the distrust of governments and their capacity to regulate the industry effectively on behalf of all community members, amplify these challenges.

Notwithstanding, the identified threats were considered manageable, as evidenced by experience in existing onshore unconventional gas developments. Close collaboration between various industry groups and project proponents, government and the community will be required to ensure that responsibility for management and reporting on sub-basin level impacts is clear. Mechanisms for community feedback and response will need to be widely-known and effective as community knowledge with respect to the effective management of identified impacts will be an important component of an industry social licence to operate.

Social impact management programs are expected to include the following components, with additional components and activities likely to be identified when more detailed project descriptions are available and subject to a comprehensive project-level SIA.

Community

Key factors to be considered in the development of a community engagement strategy include:

- The need for community industry awareness campaigns, particularly for Aboriginal communities. This needs to be an ongoing process, as the development and deployment of improved technology is proceeding at a rapid rate.
- The requirement for implementation of robust land access protocols.

- The need to provide regular environmental monitoring results to communities in a transparent manner that builds community confidence and trust in the monitoring process.
- Participation in regular community forums with government and other industry participants to discuss industry issues. Responsibility for the design and leadership of these forums may rest with government and peak bodies, however to be successful they will require the participation of industry at a senior level.
- The implementation of a Grievance Management Program, including community access to an independent advocate if necessary.
- The need for monitoring of community and visitor sentiment on a structured basis to ensure that the views of all sectors are heard and considered.
- The development and implementation of a workforce cultural awareness program and a workforce code of conduct to contribute to ongoing positive and supportive community relations.
- The development and implementation, in consultation with government, of local content policies and programs to maximise opportunity for Northern Territory business input and development.

Workforce and housing

The management of potential housing issues needs considerable care to ensure that housing market distortions are avoided. Local planning needs to be based on realistic long-term employment levels. Factors to consider when developing local workforce recruitment and housing strategies include:

- The need to develop and implement a Workforce Accommodation Strategy with Local Government, with a view to integration with local procurement and logistics support strategies.
- The need for compliance with the Local Government planning scheme if considering the development of accommodation initiatives in urban areas.
- The need for ongoing monitoring of rental housing supply and vacancy levels to identify project-induced demand.
- The merits of implementing a rental support program for periods of high rental housing demand to ensure that low-income people are not priced out of the rental market.

Traffic

Project traffic management plans are generally effective in managing risks involved in the transport of personnel and materials required to develop projects provided that they:

- Identify risks to be managed on low-traffic local roads utilised by local community members.
- Ensure that there is a high level of traffic awareness and safe driver-behaviour requirements imparted to local community members.
- Provide for the training of project drivers and the monitoring and policing of driver behaviour.

Opportunities to enhance social values

The development of unconventional gas extraction in the Beetaloo sub-basin is expected to be gradual under the conceptual development scenario. A number of opportunities for the enhancement of social values, both in urban as well as rural communities, are likely under this scenario. These could include:

- The development of an increased capacity in logistics operations, and the establishment of an unconventional gas industry support base, initially in Katherine but potentially in other towns such as Tennant Creek if favourable conditions eventuate. This would lead to increased employment, training and a broadening of the skills base of the local workforce, and potentially a modest population increase should workers see Katherine or Tennant Creek as a desirable place to live.
- An opportunity, through local procurement of inputs for gas field development, to diversify the economic base of regional support towns through the attraction of new business ventures and the expansion of existing business ventures in construction, mechanical maintenance and industrial supplies.
- Collaboration between industry proponents may also provide an opportunity to establish regional support facilities, such as a worker accommodation village or an upgraded airstrip to handle FIFO transport, in proximity to a rural location (such as Daly Waters) where the opportunity for multi-use of the facility (such as for tourist accommodation) may expand and strengthen the economic base of the town.
- An opportunity, through gas industry supported activity, to deliver training and employment opportunity to residents of Aboriginal communities in the areas surrounding the Beetaloo sub-basin, building on employment and training activity that has been implemented as part of exploration work (undertaken by Pangaea and Origin Energy). This opportunity need not rely solely on the existence of Aboriginal Land Use Agreements (ILUAs) with TO groups, but be a product of a direct government policy to deliver benefits to rural communities. It must also be recognised that the poor housing conditions, in particular over-crowding, in remote communities is a particular barrier to employment retention and the ability to be fit-for-work at the commencement of a roster for community-based employees.
- Community input to gas field development plans provide an opportunity to plan infrastructure development such that communities may benefit (e.g., through improved access to particular sites of importance), as landholders could use gas field infrastructure to benefit property operations.
- Community involvement in regional environmental monitoring associated with industry development, through participation by natural resource management groups and Aboriginal ranger groups who already have demonstrated capacity. As well as providing employment opportunities, this could also act to increase community confidence in the transparency of company environmental management and monitoring programs.

The ability to capture these opportunities will require a collaborative approach to industry development by the Northern Territory Government, project proponents and representatives of the community, which aligns with the industry development approach outlined in the Northern Territory Government's Economic Development Framework[1] released on 20 June 2017. It would also be expected that initiatives aimed at enhancing community capacity to take advantage of opportunities that may be available through industry development would be developed and implemented during the strategic assessment phase, as recommended in the SIA Framework report (CSRM, 2017).

[1] See https://edf.nt.gov.au/growth-sectors/energy-and-minerals

Issues to be considered in implementing the SIA Framework

CSRM (2017) identified leading practice SIA as comprising:

- Strategic, adaptive approach throughout lifecycle of development that addresses cumulative impacts.
- Communication, coordination and collaboration between industry participants.
- Independently-led, participatory social baseline assessment.
- Independently-led community engagement.
- Participatory, ongoing monitoring of social indicators and transparent reporting of results.

The SIA case study found that Aboriginal and other community members were highly sensitised to the potential impacts of an unconventional gas industry, particularly bio-physical impacts on surface water and groundwater, and impacts on their communities and values. Their concerns arise, in part, from a lack of detailed information about the potential unconventional gas industry and actual project proposals.

The Panel noted in its Interim Report (Inquiry, 2017b) that '*current knowledge by the Aboriginal community is inadequate, and as a consequence, this points to an emerging social risk with Aboriginal people becoming enmeshed in conflict between pro and anti-fracking groups'*. This was evident in the consultation undertaken for the SIA case study, where some Aboriginal communities expressed concerns that they were only getting one side of the story – from opponents to an unconventional gas industry – and not facts from technical experts who were not biased.

Engagement with Aboriginal communities must adopt a structured approach that incorporates the following activities:

- **Preparatory meeting(s)** (as done in the second consultation round) that identifies the Aboriginal community members who should be consulted, their needs to participate in the consultation, the issues to be discussed, and appropriate dates and times for the meeting(s).
- **Social values meetings** during which the Aboriginal communities' social values are identified and documented. Sufficient time must be allowed for the complex issues relating to Aboriginal communities to be explored and understood.
- **Awareness meeting(s)** in which the Aboriginal communities are provided with information about unconventional gas development in sufficient detail to enable them to understand how development activities relate to, and might impact on their communities and their values. This engagement should include discussion of what is, and is not negotiable with respect to engineering and technical aspects of unconventional gas development.
- **Project-specific meetings** in which Aboriginal communities are presented with a development proposal and detailed information about its environmental and social impacts. This engagement should allow sufficient opportunity and time for community members to have input to the development concept and management of its impacts.
- **Implementation meetings** in which Aboriginal communities are invited to participate in environmental review or other similar committees that provide ongoing forums for managing project-community relations, monitoring of environmental and social impacts, and implementation of environmental and social programs.

This framework, with refinement, will be equally effective with pastoral and regional service centre communities, noting that preparatory meetings may not be required where the stakeholder groups are well-known and accessible. Pastoralist interests must be considered in conjunction with the broader land management priorities and requirements of the Northern Territory Government due to the nature of their tenure.

Project proponents must have a relationship with the communities in which they operate or who they may affect. The relationship will be most successful where it is developed over time through the staged approach outlined above. The conduct of community engagement must therefore balance the need for independently-led consultation (to build confidence in the process and veracity of data) with company ownership of the relationship (to build credibility, a working relationship and ensure accountability). To be effective, community engagement must incorporate the project proponent, engineering and technical experts, community members and their representative bodies, and independent stakeholder engagement consultants.

Conclusion

Despite heightened sensitivity to the impacts of unconventional gas development due to a concerted campaign by opponents of industry development, information provided to communities in the second round of consultation was well received, confirming that awareness and education are key factors in working towards a 'social licence to operate'.

Significant disparity exists between the regional service centres and remote Aboriginal communities due to their remoteness affecting access to services, their poor state of housing, limited access to a functioning labour market, and differences in health and education status. A key issue will be how affected communities realise opportunities from unconventional gas development when they are expected to be distant from the projects (and the impacts).

Affected communities' key concerns are impacts on surface water and groundwater resources and the distribution of benefits. Concerns about water resources are likely heightened by the PFAS contamination in and around RAAF Base Tindal near Katherine and incorrect assumptions about water management based on coal seam gas development in Queensland. Community cohesion and wellbeing underlie Aboriginal community concerns about the equitable distribution of benefits.

Experience and lessons learned in unconventional gas development in other jurisdictions will enable identified threats and impacts to be managed using proven methods and strategies.

The SIA Framework and CSIRO's guidelines for achieving a 'social licence to operate' will assist in overcoming community perceptions that an unconventional shale gas industry is:

- Short-term and cyclical in nature.
- Similar to the coal seam gas industry in Queensland, with similar impacts.
- Aloof to community concerns and has disregard for the social outcomes of development.

The strategic approach to compiling a social baseline proposed by CSRM (2017) will assist in identifying and managing cumulative impacts on the geographically dispersed and diverse communities.

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1. Introduction

The independent scientific panel (the Panel) undertaking the Scientific Inquiry into Hydraulic Fracturing of Onshore Unconventional Reservoirs and Associated Activities in the Northern Territory (the Inquiry) identified risks associated with hydraulic fracturing in its Background and Issues Paper (Inquiry, 2017a). They are: water, land, air, public health, impacts on Aboriginal people and their culture, social impacts, economic impacts, land access, and the regulatory framework. The Panel is required by its Terms of Reference to:

1. determine and assess the impacts and risks associated with hydraulic fracturing of unconventional reservoirs and the associated activities;
2. determine whether additional work or research is required to make that determination;
3. for each risk that is identified, advise the level of impact or risk that is acceptable in the Northern Territory context;
4. describe the methods, standards or strategies that can be used to reduce the impact and risk to acceptable levels;
5. identify what government can do, including implementing any policy, regulatory or legislative changes, to ensure that the impacts and risks are reduced to the required levels; and
6. identify priority areas for 'no go' zones.

The Panel commissioned a two-part scope of work (Appendix B) to assist its deliberations on the social impacts of an unconventional gas industry in the Northern Territory. The scope of work comprised:

Part A Social Impact Assessment

- Develop a leading practice framework for the identification, assessment and management of the social impacts associated with the development of onshore unconventional gas in the Northern Territory.
- Undertake a high-level social impact assessment (SIA) that describes 'the type of potential social impacts, issues, concerns, risks and benefits that may arise from the development of the unconventional gas industry in the Beetaloo sub-basin on the Affected Communities'.

Part B Social Licence to Operate

- Describe and assess the concept, elements and issues surrounding a 'social licence to operate' (SLO), as it applies to the onshore unconventional gas industry in the Northern Territory.

1.1. Purpose of the case study

The preparation of a high-level SIA case study (SIA case study) aims to provide information that will assist the Panel to:

- Identify and assess the potential impacts on affected communities of an indicative scenario for development of an unconventional gas industry, including their likely significance and ability to be managed.
- Identify key issues to guide the approach to any future project-level SIA for inclusion in the SIA Framework methodology.

1.2. Purpose of this report

The Centre for Social Responsibility in Mining (CSRM) of the University of Queensland has proposed a leading practice SIA Framework (CSRM, 2017) for future development of an unconventional gas industry in the Northern Territory.

The SIA Framework proposes project-level SIA are guided by a strategic assessment informed by sub-basin wide baseline studies and monitoring programs. In the absence of sub-basin wide baseline studies and a strategic assessment, the SIA case study is a high-level project-level SIA of a conceptual development scenario.

This report documents the approach to and outcomes of the SIA case study of a conceptual unconventional gas development in the Beetaloo sub-basin using relevant aspects of the SIA Framework proposed by CSRM (2017).

2. Social impact assessment method

CSRM (2017) has proposed a leading practice SIA Framework for future development of an unconventional gas industry in the Northern Territory.

The key recommendations are strategic environmental (and social) impact assessment informed by project-independent baseline studies that are based on an adaptive participatory management approach. The strategic assessment would provide the framework for project-level assessments with project-level monitoring providing information to facilitate review and update of the strategic assessment.

CSRM identified the phases of SIA within an adaptive participatory management approach in Figure 2 of CSRM (2017) which is presented below as Figure 2.1.

The SIA case study is a discrete high-level assessment of a conceptual development and is therefore unable to implement the adaptive participatory management approach identified by CSRM (2017).

CSRM identified the phases and activities of SIA in Figure 1 of CSRM (2017) which are presented below as Figure 2.2.

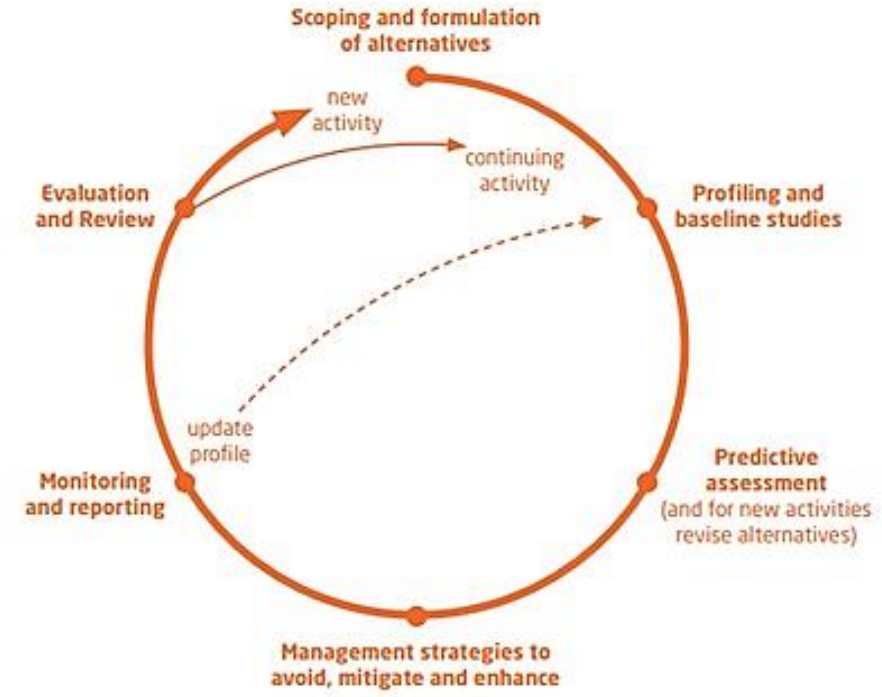


Figure 2.1 The phases of SIA within an adaptive participatory management approach (CSRM, 2017)

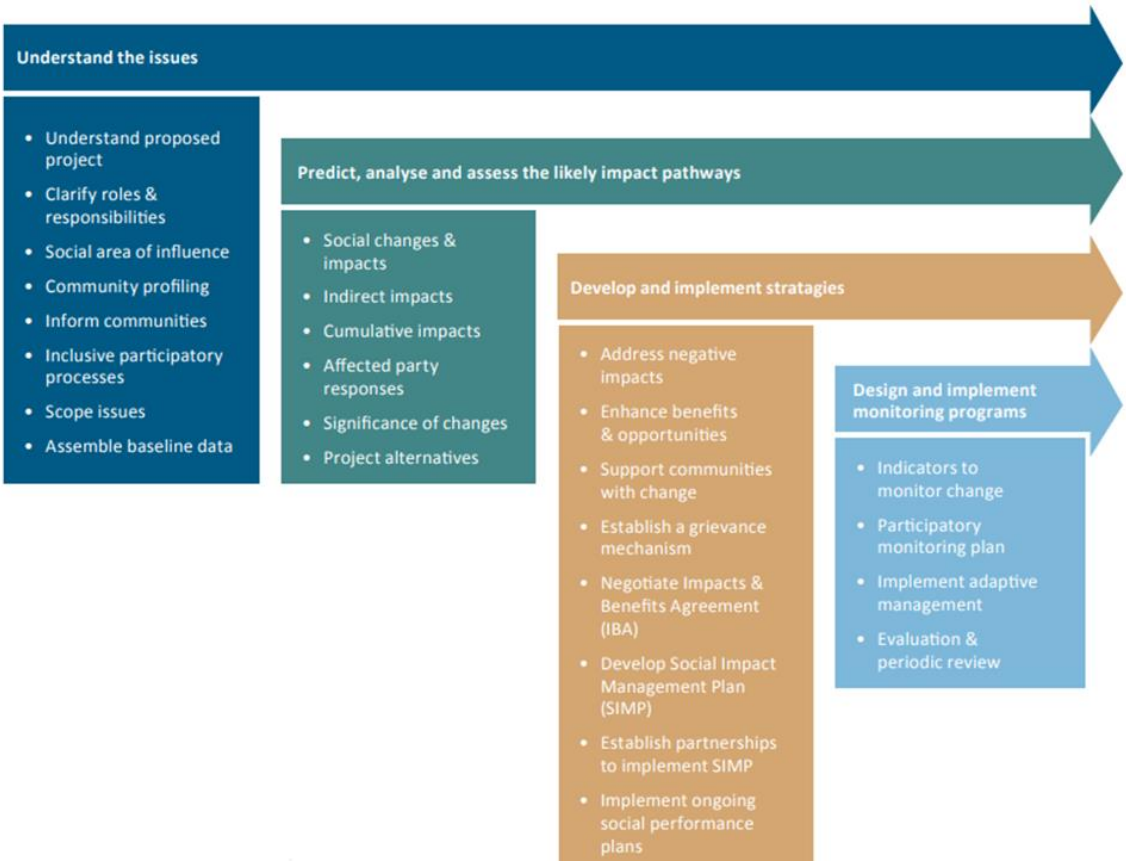


Figure 2.2 The phases and activities of SIA (CSRM, 2017)

A project-level SIA would typically take several years and involve extensive community and stakeholder engagement to understand social values, identify and explain potential impacts, and develop, explain, refine and reach agreement on appropriate responses, management measures and initiatives. This is not possible for the SIA case study which was conducted over a period of six months. The approaches identified in figures 2.1 and 2.2 were revised for the purposes of the SIA case study. The SIA case study was conducted in three stages. The relationship between this approach and those proposed by CSRM (2017) is set out in Table 2.1.

Table 2.1 Relationship of adopted and proposed SIA methods

Adaptive participatory management approach (CSRM)	SIA phases and activities (CSRM)	Beetaloo sub-basin SIA case study
Scoping and formulation of alternatives	Understand the issues	Conceptual development project description
Profiling and baseline studies		Compile social baseline
Predictive assessment	Predict, analyse and assess the likely impact pathways	Identify and assess threats and potential impacts to social values
Management strategies to avoid, manage and enhance	Development and implement strategies	Propose mitigation and identify opportunities for enhancing social values
Monitoring and reporting	Design and implement monitoring programs	Not applicable for case study
Evaluation and review		

The three stages adopted for the Beetaloo sub-basin SIA case study are:

1. Compile social baseline:
   - Identify affected communities based on conceptual development.
   - Compile social profiles on affected communities.
   - Define social catchments based on affected community profiles.
   - Identify social values held by communities and social indicators.
2. Identify and assess threats and potential impacts to social values:
   - Identify and describe threats to social values.
   - Assess risk of threats (and impacts on social values).
   - Describe impacts on social values.
3. Propose mitigation and identify opportunities for enhancing social values:
   - Propose strategies and measures for managing the identified impacts.
   - Identify and describe opportunities for enhancing social values.

The approach taken to each of these stages is described in the following sections.

2.1. Compile social baseline (Stage 1)

Affected communities were defined by the Panel as including community members, pastoralists, Aboriginal organisations and local businesses. Section 2.1.2 describes how the affected communities were identified. Section 2.1.2 describes how the affected communities' values were identified and

Section 2.1.3 describes the communities and stakeholders consulted to confirm the social values and understand potential social and economic impacts of unconventional gas development. Social profiles for a representative sample of the affected communities are presented in Appendix A.

2.1.1. Identify affected communities and define social catchments

Appendix A provides a detailed description of the rationale for categorisation of 'affected communities' which were grouped into social catchments, and the development of social profiles through a structured approach to assembling and assessing existing quantitative and qualitative information. The SIA case study identified four clusters (or social catchments) of 'affected communities' based on the following factors:

- **Location and community links**: Centres with a population level that may indicate some potential for providing 'local employment' should sub-basin development proceed. Generally these communities are located outside of, but in proximity to, the Beetaloo sub-basin. Consideration of potential physical and cultural links are also important factors influencing grouping and the potential to experience shared perceptions of impact.
- **Logistics or support industry potential**: It is assumed that the development of an unconventional gas industry would require at least a moderate level of logistical and maintenance support. This could be a purpose-built area within gas field or a facility located in the existing large towns north and south of the sub-basin that currently support industrial activity, for example Katherine, which currently provides support to the mining industry and RAAF Base Tindal and/or Tennant Creek, which provides support to the mining industry.
- **Dominant economic activity**: Pastoral operations constitute the principal economic activity within the Beetaloo sub-basin, with the Stuart Highway and to a lesser extent the Carpentaria Highway facilitating economic activity associated with tourism.

The four social catchments containing the affected communities (see Appendix A) are:

- Affected communities (urban): Katherine (town) and Tennant Creek.
- Affected communities (north): Barunga, Beswick, Mataranka, Jilkminggan, Minyerri and Ngukurr.
- Affected communities (central): Larrimah, Daly Waters, Dunmarra, Newcastle Waters and Elliott.
- Affected communities (east): Borroloola and Robinson River.

2.1.2. Identify social values

CSRM (2017) recommends using the community capitals framework (CCF) to understand baseline conditions and aspirations in affected communities. While this method is useful where there is a substantial body of secondary data to draw upon, experience in consultations with affected communities in rural areas has shown that dialogue with local people in relation to conditions and aspirations is enhanced when the discussion has centered on values, rather than capitals.

A social value is regarded as a quality of the area, potentially subject to project effects, for which community members have high regard, and that is conducive to individual or community well-being into the future. Community members generally consider and aggregate a number of community capital attributes and indicators when describing the status of a social value.

Diverse community interests require an approach that is understandable to the average community member, is capable of capturing their expressed needs, concerns and aspirations (integrating the

various dimensions of their livelihoods) and promoting dialogue around the inevitable 'trade-offs' involved in seeking the betterment of life for individuals and the community.

Experience in other jurisdictions and in Aboriginal communities in the Northern Territory has found that the following four indicative social values are core values held by people in regional and remote communities:

- SV1 Liveable community.
- SV2 Affordable lifestyle.
- SV3 Community identity and spirit.
- SV4 Capacity for sustainable economic activity.

These values encapsulate the community capitals (CSRM, 2017) and the 'values' set out in IAIA's International Principles of Social Impact Assessment (IAIA, 2003). The indicative social values guided interviews and engagement with local communities.

Their use supports a dialogue that becomes progressively broader when discussing the characteristics or indicators of the values with community members. Table 2.2 shows how these social values capture relevant information about the community capitals put forward in the SIA Framework, while Table 2.3 and Table 2.4 list key stakeholders expected to subscribe to or hold those values strongly, and tentative respective indicators of the values for urban and rural communities. In a participative baseline assessment process, dialogue with stakeholders and communities would refine the list of indicators, and identify the relevant importance of the social values.

The scope of work made specific reference to the list of values put forward by the International Association for Impact Assessment (IAIA). While all of these values have an overlap or relevance to the social values adopted for this case study, Table 2.5 indicates where the IAIA value may have a higher level of relevance to the case study social value.

Urban communities (Katherine and Tennant Creek) are townships with identifiable residential areas and business centres. Rural communities in this instance include Aboriginal communities and small open townships generally administered by a Regional Council.

Secondary baseline information and information and opinion sourced during community consultation was assessed to describe the characteristics of broad social values in communities, and the robustness or vulnerability of these social values to project-induced change. Community consultation also endeavored to elicit stakeholder receptivity and attitudes toward the development scenario proposed.

Table 2.2 Community capital relevance to social values

Social value	Community capitals							
	Natural	Social	Human	Cultural	Political	Financial	Built	Institutional
SV1 Liveable community	✓	✓			✓		✓	✓
SV2 Affordable lifestyle						✓	✓	✓
SV3 Community identity and spirit	✓	✓	✓	✓	✓	✓	✓	✓
SV4 Capacity for sustainable economic activity	✓	✓	✓	✓	✓	✓	✓	✓

Table 2.3 Urban community indicative social values

Social value	Key stakeholder	Possible indicators
SV1 Liveable community	• Community members • Local Government • Service providers (e.g. health, education, police, emergency services etc) • Civic organisations (e.g. service organisations, local community groups)	• Access to, and proximity of, quality services (health, education, aged care, childcare, retail etc) • Balanced demographic profile • Harmonious relationships, lack of conflict • Respect for law by community members • Adequate infrastructure that is well-maintained (housing, roads, airport, power, water & sewerage, telephone, internet) • Effective local governance • Opportunity for recreational, cultural and sporting pursuits • Safe social and physical environment
SV2 Affordable lifestyle	• Community members • Local Government • Business sector	• Cost of land and housing • Local Government charges • Income levels • Cost of food, power and other essential items
SV3 Community identity and spirit	• Community members • Community organisations (including churches and non-government organisations) • Local Government	• Level of volunteering and availability of assistance • Local celebrations • Recognition, preservation and promotion of heritage • Capacity to accommodate visitors • Perceptions of being able to influence community destiny • Employment share by industry
SV4 Capacity for sustainable economic activity	• Retail businesses • Service industries • Agricultural producers • Recreational and tourism businesses (including accommodation providers) • Producer organisations (e.g. NT Cattleman's Association; NT Tourism) • Regional development organisations • Local Government	• Viability, vitality and diversity of local industry • Workforce participation and employment • Job creation and retention of young people • Supportive business environment (e.g. availability of serviced industrial land, adequate zoning, provision of information on opportunities) • On-going environmental integrity (e.g. surface and groundwater, land degradation) • Willingness of business to invest

Table 2.4 Rural community indicative social values

Social value	Key stakeholder	Possible indicators
SV1 Liveable community	• Community elders and members, in particular women • Aboriginal organisations providing services • Local Government • Mainstream service providers (e.g. health, education, police, emergency services etc)	• Proximity and access to traditional country • Degree of satisfaction with management of traditional country • Respectful and harmonious relationships within and between communities (both Aboriginal and non-Aboriginal) • Access to service delivery (in particular health and education) that acknowledges and respects culture • Ability for extended family residence • Respect for law by community members • Adequate infrastructure that is well-maintained (roads, airport, power, water & sewerage, telephone, internet) • Effective local governance • Opportunity for recreational, cultural and sporting pursuits • Safe social and physical environment
SV2 Affordable lifestyle	• Community elders and members, in particular women • Aboriginal organisations providing services • Local Government • NT and Commonwealth Government	• Availability of adequate housing • Cost of housing • Income levels • Cost of food, power and other essential items
SV3 Community identity and spirit	• Community elders, members and affiliates • Aboriginal organisations • Local Government • Community organisations	• Recognition and promotion of cultural heritage • Perceptions of being able to influence community destiny • Existence of viable enterprise activity • Number and strength of Aboriginal organisations • Status of reconciliation with non-Aboriginal community • Level of volunteering and availability of assistance • Local celebrations
SV4 Capacity for sustainable economic activity	• Community elders and members • Aboriginal enterprises and organisations • NT and Commonwealth Government • Training providers	• Availability of employment opportunities • Aboriginal workforce participation and employment • Aboriginal business start-ups and ownership • Level of education achievement, including retention to Year 12 and post-school destinations

Table 2.5 Mapping of relevance of IAIA values to social values adopted for the Beetaloo sub-basin SIA case study

	IAIA value							
Adopted Social Value	**Way of life**	**Culture**	**Community**	**Political systems**	**Relationship to environment**	**Health and well-being**	**Personal and property rights**	**Fears and aspirations**
SV1 Livable community	✓✓✓	✓✓	✓✓✓	✓✓	✓✓	✓✓	✓	✓✓
SV2 Affordable lifestyle	✓	✓	✓✓	✓	✓✓	✓	✓✓	✓
SV3 Community identity and spirit	✓✓	✓✓✓	✓✓	✓✓✓	✓	✓✓✓	✓✓	✓✓✓
SV4 Capacity for sustainable economic activity	✓✓	✓	✓✓	✓	✓✓✓	✓	✓✓	✓

✓ ⇨ ✓✓✓ indicates increasing level of relevance

2.1.3. Stakeholder engagement

A targeted program of community consultation was undertaken to gain initial insights into the nature and status of social values (to consider whether this 'values approach' had merit for incorporation in the SIA Framework), and to assess community sentiment toward development (in relation to the potential impacts as well as opportunities that may manifest through industry activity).

Two rounds of consultation were done to inform the SIA. The first round comprised a semi-structured interview approach with individuals and small focus groups to establish an initial dialogue around baseline community attributes, the effects of implementation of the development scenario, social baseline research required for future project-level SIAs, and the concept of a Social Licence to Operate (SLO) as a measure of a community's acceptance of the industry's right to operate.

The second round of consultation comprised two meetings – a preparatory meeting and a consultation meeting to discuss the Beetaloo sub-basin case study. The preparatory meeting sought community advice on who should be consulted and an appropriate date and time, and explained what would be discussed. The consulted communities requested a list of questions/issues for which comment was sought. A list of questions was provided to the communities in advance of the consultation meeting. A formal presentation was prepared and given to the communities. It contained information about unconventional gas development, hydraulic fracturing and associated risks, potential impacts of unconventional gas development and the conceptual Beetaloo sub-basin development. A key focus of the consultation was providing communities with sufficient information to enable informed discussion of the social and economic issues and impacts associated with the conceptual development.

Consultation was undertaken with members of the following communities:

Affected communities (urban)

- Katherine
- Tennant Creek

Affected communities (north)

- Mataranka
- Minyerri
- Ngukurr

Affected communities (central)

- Elliott
- Daly Waters

Affected communities (east)

- Borroloola
- Robinson River

Northern Territory Government, local government, Beetaloo sub-basin exploration permit holders, primary producer and industry organisations, local businesses, community support organisations, and environmental groups were also consulted, including:

- Northern Territory Department of Business
- Northern Territory Environment Protection Authority
- Roper Gulf Regional Council
- Victoria Daly Regional Council
- Katherine Town Council
- Santos Limited
- Origin Energy
- Pangaea Resources
- APPEA
- Northern Territory Cattlemen's Association
- Katherine Mining Services Association
- Sunrise Health
- Katherine Landcare
- Northern Territory Environment Centre
- Lock the Gate
- Frack Free NT Alliance

In total, 69 engagement meetings were undertaken, as indicated in the Table 2.6 which categorises the stakeholders into key groups.

Table 2.6 Stakeholder consultation effort

Stakeholder category	No. of meetings	%
Government agencies and statutory authorities	7	10
Businesses and peak business organisations	11	16
Local Governments	6	9
Non-government organisations	6	9
Community organisations and residents	39	56

The key themes that emerged during consultation on the potential social and economic impacts of the conceptual development scenario substantially mirrored those that were evidenced during the Panel's public consultation. Analysis of the frequency of comments indicates a ranking of issues as shown in Figure 2.3.

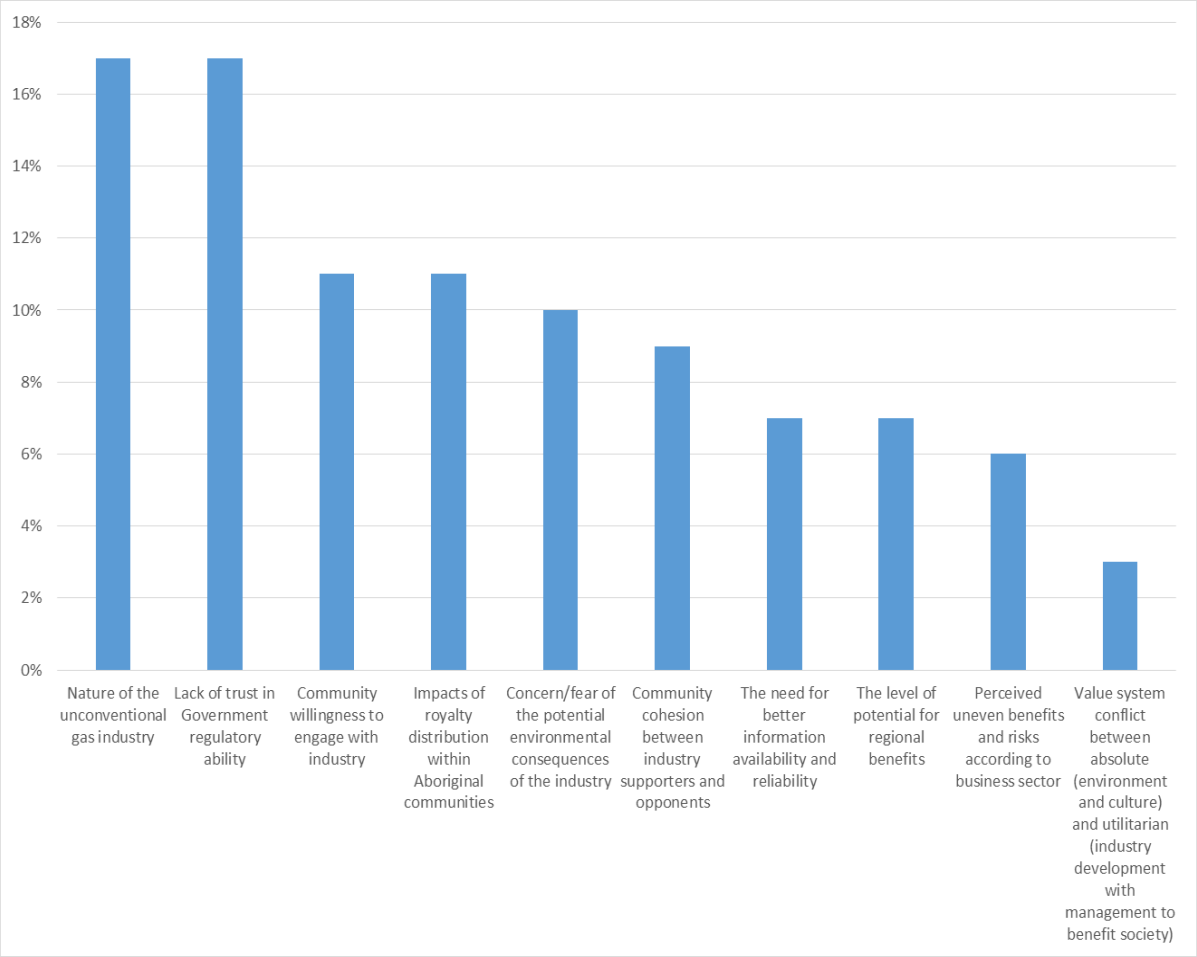


Figure 2.3 Ranking of issues expressed during stakeholder consultation

Factors contributing to the identification of these issues include:

- A perception that the resources industries are short-term rather than long-term, and cyclical in nature.
- Concern that the industry would dominate rather than co-exist with pastoralism and tourism.
- Assumptions about impacts drawing upon issues associated with the coal seam gas industry in Queensland.
- A view that industry was aloof from community concerns with a disregard for social outcomes of their operations.
- A perception that government regulators consistently place industry concerns above community concerns.
- Either a lack of interest or capacity for community to engage with industry.
- Negative observations of past distribution and expenditure of royalty income by some traditional owner (TO) groups.
- A high level of concern for the on-going integrity of groundwater sources, with the need for independent monitoring to ensure transparency.
- Awareness of past environmental issues in other jurisdictions through the activity of activists opposed to industry development.
- Minimal exposure to the views of, and dialogue with, technical experts, and concern that most information was only coming from groups opposed to industry development.
- An awareness of the occupational skills needed by the industry, and a perception that that would preclude a reasonable level of local industry involvement (and consequent community benefit).
- A belief in some quarters that measured consideration of the issues was not possible, with mainly the 'loudest' voices being heard and alternate views not being promoted.
- A belief that some industry sectors (e.g., construction and maintenance) would benefit at the expense of existing sectors (e.g., tourism services).

These views have been considered when assessing the significance of potential risks to social values.

2.2. Identify and assess potential impacts (Stage 2)

Team member's knowledge of Northern Territory communities and of the typical activities involved in onshore unconventional gas development and operation were used in a brainstorming exercise to identify potential threats to social values and opportunities for enhancement of the identified social values.

This exercise considered the views of stakeholders expressed during consultation, the experience of impacts from other major development in the region, as well as the experience of projects in other environments with characteristics similar to the Beetaloo sub-basin communities. Potential threats to values and consequent impacts are shown in Table 2.7, with a description of the nature of threats presented in Table 2.8. Potential opportunities for benefits are discussed in Section 3.5.

The case study assumes a conceptual Beetaloo sub-basin development largely dependent on a skilled workforce sourced from outside the area and residing in project-supplied accommodation, which has medical and recreational facilities and services. Impacts on health services, education and

as a result of crime in sub-basin communities are unlikely as a result of this development scenario and are not considered further in the SIA. These particular risks will not always be absent, as their existence will depend on the particular nature of the projects that advance to development.

Following the identification of threats to social values, the likelihood of the threat occurring and its consequence on the values were determined using risk assessment based on AS/NZS 31000:2009 Risk management – Principles and guidelines. Likelihood and consequence criteria used in the assessment are listed in Table 2.9 and Table 2.10 respectively, with the risk matrix shown in Table 2.11.

Table 2.7 Identified Beetaloo sub-basin community values, threats and potential impacts

Social value	Threat or impact driver (ID)	Potential impact
SV1 Liveable community	ID1A Rapid workforce influx to urban areas	Impaired community amenity
	ID1B Increase in heavy vehicle traffic on local roads	Reduced amenity, road accidents and increased vehicle maintenance costs
	ID1C Conflict between supporters and opponents of unconventional gas industry development	Conflict between community members
	ID1D Receipt of royalties by a subset of community members	Conflict between community members
	ID1E Concern over potential risk to groundwater quality	Anxiety about availability, access to and quality of water resources
SV2 Affordable lifestyle	ID2A Housing supply unable to meet spike in demand	Decreased housing availability and affordability
	ID2B Increased short-term rental costs	Decreased housing availability and affordability
SV2 Affordable lifestyle	ID3A Significant change in land use and industry development	Loss of ‘outback’ identity
	ID3B Perception of industry development heralding an era of ‘industrialisation’ of the landscape	Loss of ‘outback’ identity
	ID3C Perception that industry development approval is against majority community wishes	Decreased community engagement with local governance
	ID3D Concern with increased access to, and development risks on traditional country	Increased sense of cultural loss
SV4 Capacity for sustainable economic activity	ID4A Concern that long-term access to quality groundwater may be restricted due to industry development	Decreased investment in pastoral and horticultural enterprises
	ID4B Perception that ‘outback’ identity is compromised by ‘major industrialisation’ of the region	Decrease in tourist visitation
	ID4C Higher gas industry wage rates available to local residents drives competition for employees	Increased cost of labour for local businesses
	ID4D Industry demand attracts external specialist enterprises to establish and draw business from local businesses	Local business closures

Table 2.8 Threat description

Threat (impact driver)	Description
SV1 Liveable community	
ID1A Rapid workforce influx to urban areas	The early construction phase of projects in rural areas is often characterised by a rapid workforce influx into urban areas of regional service townships. The size of this influx tends to decrease over time as construction accommodation camps are established closer to the building sites in the gas fields. In the early stages it can lead to effects such as a restriction on the availability of rooms in visitor accommodation, increased traffic on local streets, increased 'visibility' of industry workers in local venues, and local resident disturbance due to unfamiliar work hours (e.g., the early morning 'reverse warning beeper' issue in residential areas).
ID1B Increase in heavy vehicle traffic on local roads	Increases in the level of heavy vehicle traffic, on highways and through township areas, may impair amenity through the generation of noise and dust, as well as increase the number of traffic incidents leading to perceptions of compromised road safety. These perceptions will be reinforced should any need for increased road maintenance not be met in a timely manner.
ID1C Conflict between supporters and opponents of unconventional gas industry development	Polarised communities, characterised by strong feelings for and against industry development, subject to the influence of external advocacy groups, and where livelihoods are at stake, may be at increased risk of conflict between members. This could lead to avoidance behaviour between opposing groups, and potentially conflict in venues such as schools and sporting events. The effects may be felt particularly in smaller communities.
ID1D Receipt of royalties by a sub-set of community members	Within Aboriginal communities, the receipt of royalties by traditional owners can lead to increased tension, particularly if it results from an activity that does not have widespread support, and if the behaviour of recipients is not in accord with community norms (emphasising community rather than personal benefit).
ID1E Concern over potential risk to groundwater quality	Reliance on groundwater for domestic and agricultural use is widespread in the Northern Territory, and any activity that may potentially impair the quality or quantity of the resource is likely to evoke a high level of concern in communities, both urban and rural. This effect has been demonstrated through the community response to groundwater contamination with PFAS in the vicinity of Defence Force bases. This concern has the potential to influence water use behaviour (such as opting to consume bottled water only) that may compromise community liveability.
SV2 Affordable lifestyle	
ID2A Housing supply unable to meet spike in demand	A decision to base a workforce residentially (in lieu of a fly-in fly-out (FIFO) arrangement) may result in a spike in demand for housing. A lag in supply (either due to the rate of construction or a shortage of serviced land) to meet this increased demand may result in price rises in the short to medium term limiting the availability and inhibiting the affordability of housing for lower income local community members.
ID2B Increased short-term rental costs	A decision to implement a residential operation rather than FIFO may also increase demand for rental accommodation that may also result in increased costs in the absence of adequate supply. These increased costs may not be affordable to persons on lower incomes.
SV3 Community identity and spirit	
ID3A Significant change in land use and industry development	Extensive change in land-use may result in a change to community self-identification, which could have an effect on community spirit until the change is socialised or accepted. As an example, the community of Katherine underwent a step-change in identity with the re-development of RAAF Base Tindal together with the development of the Katherine East residential area, resulting in a threefold increase in population since the mid-1980s.

Threat (impact driver)	Description
ID3B Perception of industry development heralding an era of 'industrialisation' of the landscape	Highly visible land-use change to residents traversing a project area, associated with a single or multiple projects, may support a perception that the landscape is being 'industrialised'. This type of perception, if strongly held or persistent, may contribute to a change in community identity that is not welcomed by either long-term residents or businesses that depend on a particular perception (e.g., outback spirit or land of the 'never never') for sale of their services (e.g., tourism operators).
ID3C Perception that industry development approval is against majority community wishes	Where communities have a majority strongly-held position on the desirability or otherwise of industry development, the issue of a government approval that is not in accord with the majority position may have an adverse effect on community spirit due to the fostering of feelings that community wishes are being ignored, and that community control of their destiny, in which they have a significant stake, is being weakened.
ID3D Concern with increased access to, and development risks on traditional country	Aboriginal people continue to exercise traditions connected to sites across the landscape, notwithstanding that many of these sites are contained within pastoral leasehold land. Increased access by machinery and the development of infrastructure required for a gas project is likely to promote concern that inadvertent interference or damage to sites does not occur and create or add to a sense of 'cultural loss'.
SV4 Capacity for sustainable economic activity	
ID4A Concern that long-term access to quality groundwater may be restricted due to industry development	As an essential industry input, any threat, real or perceived, to the long-term sustainability of groundwater supply (either in quality or quantity) may have a detrimental effect on pastoral or horticultural property owners willingness to invest due to the uncertainty created by unconventional gas industry development.
ID4B Perception that 'outback' identity is compromised by 'major industrialisation' of the region	The development of an unconventional gas industry may be interpreted as the commencement of regional 'industrialisation', detracting from the image of the Northern Territory as 'Outback Australia', which in turn may act as a disincentive for tourists to visit the region.
ID4C Higher gas industry wage rates available to local residents drives competition for employees	Local employees with appropriate skills may be attracted to work for gas development companies where wages are typically higher. This may result in local businesses having to offer higher wages to compete, potentially driving up the cost of services to local customers who may have limited ability to pass on costs.
ID4D Industry demand attracts external specialist enterprises to establish and draw business from local businesses	Increased gas industry demand for goods and services may not be able to be met by smaller local businesses, or may act to attract larger businesses to establish in the area. These businesses may establish a permanent presence, or may withdraw following a high demand construction period, and may out-compete local businesses affecting their ability to survive and grow.

Table 2.9 Likelihood criteria

Likelihood	Description
Almost certain (common)	Very likely to occur or be an opportunity at either a specific stage of the project lifecycle or more broadly
Likely (has occurred in recent history)	Likely to occur or be an opportunity at either a specific stage of the project lifecycle or more broadly
Possible (could happen, has occurred in the past, but not common)	Possible to occur or be an opportunity at either a specific stage of the project lifecycle or more broadly
Unlikely (not likely or uncommon)	Unlikely to occur or be an opportunity at either a specific stage of the project lifecycle or more broadly
Remote (rare or practically impossible)	Very unlikely to occur or be an opportunity at either a specific stage of the project lifecycle or more broadly

Table 2.10 Consequence criteria

Consequence category	Description
Critical (severe, widespread long-term effect)	Irreversible changes to social values of communities of interest or community has no capacity to adapt and cope with change.
Major (widespread moderate to long-term effect)	Long-term recoverable changes to social values of communities of interest or community has limited capacity to adapt and cope with change. Long-term opportunities emanating from the project.
Moderate (localised, short-term to moderate effect)	Medium-term recoverable changes to social values of communities of interest or community has some capacity to adapt and cope with change. Medium-term opportunities emanating from the project.
Minor (localised short-term effect)	Short-term recoverable changes to social values of communities of interest or community has substantial capacity to adapt and cope with change. Short-term opportunities emanating from the project.
Negligible (minimal impact or no lasting effect)	Local, small scale, easily reversible change on social values of communities of interest or communities can easily adapt or cope with change. Local small-scale opportunities emanating from the project that the community can readily pursue and capitalise upon.

Table 2.11 Risk matrix

	Likelihood				
Consequence	**Remote**	**Unlikely**	**Possible**	**Likely**	**Almost Certain**
Critical	Medium	High	High	Very High	Very High
Major	Medium	Medium	High	High	Very High
Moderate	Low	Medium	Medium	Medium	High
Minor	Very Low	Low	Low	Medium	Medium
Negligible	Very Low	Very Low	Low	Low	Medium

2.3. Manage impacts and enhance opportunities (Stage 3)

The third stage of the approach considers how and to what extent potential impacts can be managed and how opportunities for enhancing social values may be realised, recognising that remote Aboriginal communities in particular often face significant barriers to workforce participation and the development of commercial enterprises. Strategies for managing impacts are presented in Section 5.3 and opportunities for enhancing social values in Section 5.4.

3. Socioeconomic context of Beetaloo sub-basin

The Beetaloo sub-basin is located between Katherine and Tennant Creek and covers an area of approximately 7,000 km^2 (Figure 3.1).

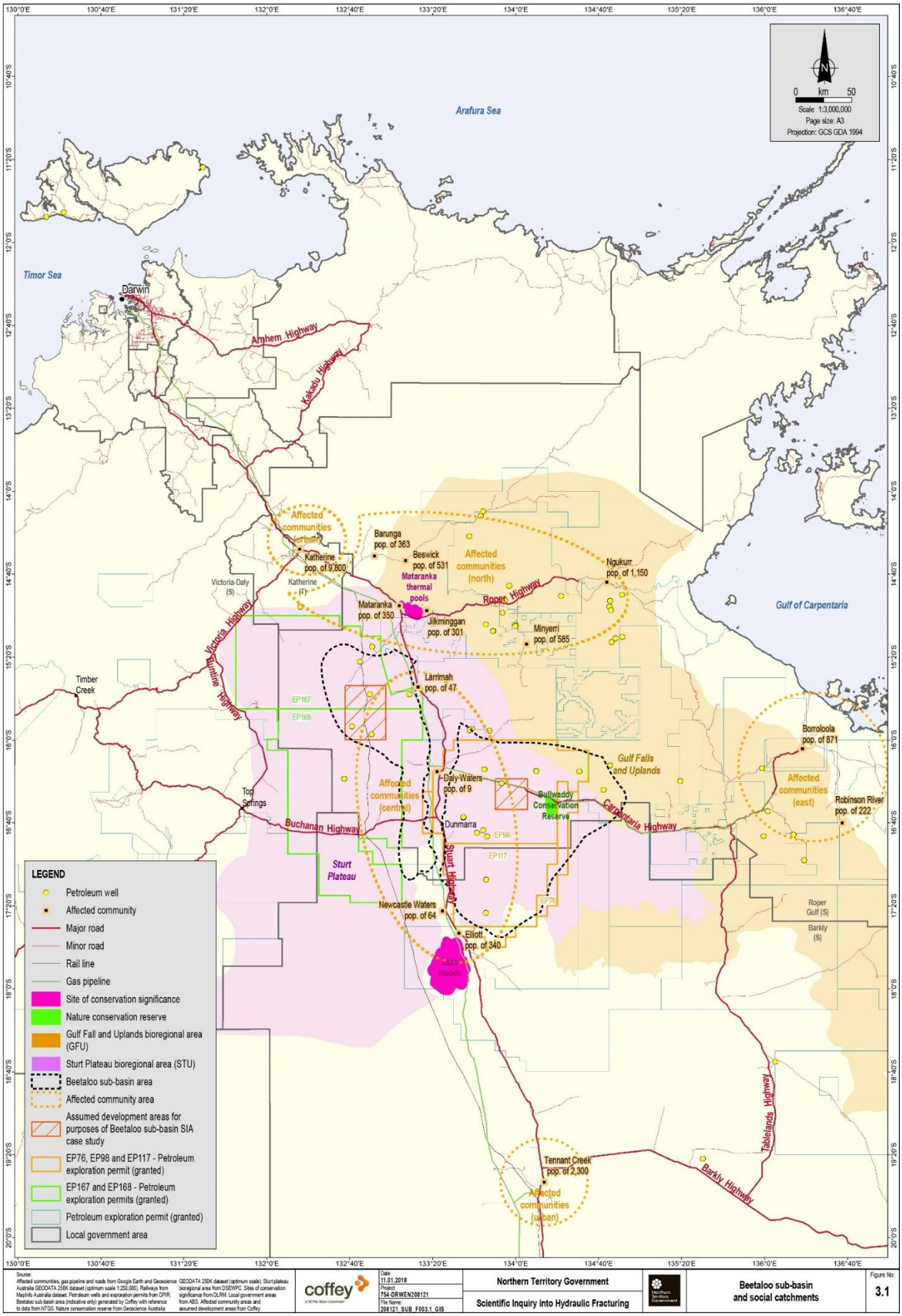
Land use in the Beetaloo sub-basin comprises Aboriginal land, pastoral leases, horticultural enterprises, oil and gas transmission infrastructure, a railway, and highway towns, cattle stations and remote Aboriginal communities. The Australian Defence Force operates RAAF Base Tindal located near Katherine.

The region is accessed by the Stuart, Roper and Carpentaria highways and community and station access roads. The Stuart Highway is a sealed dual-lane road. The Roper and Carpentaria highways comprise sealed and unsealed sections. All other roads and tracks are unsealed and may be subject to temporary closure during the wet season when rivers and creeks can flood. The Ghan Railway passes through the sub-basin, with The Ghan tourist train stopping at Katherine.

Larrimah, Daly Waters, Newcastle Waters and Elliott border or are located in the sub-basin. The adjacent towns and communities of Katherine, Mataranka, Minyerri, Ngukkur, Borroloola, Robinson River and Tennant Creek are located outside the sub-basin.

The Beetaloo sub-basin has been explored since the 1980s. Figure 6.2 of the Panel's Interim Report shows the extent of unconventional shale gas exploration in the Beetaloo sub-basin which has comprised hydraulically fractured and non-fractured wells.

Roper Gulf Regional Council is the local government authority for the northern part of the sub-basin. The southern part of the sub-basin is administered by the Barkly Regional Council, with Katherine administered by the Katherine Town Council. The Northern Land Council, an independent statutory authority established under the *Aboriginal Land Rights (Northern Territory) Act 1976* (Cwlth), represents Aboriginal communities within and adjacent to the sub-basin.


Arafura Sea
Timor Sea
Gulf of Carpentaria
Darwin
Arnhem Highway
Kakadu Highway
Victoria Highway
Buntine Highway
Roper Highway
Carpentaria Highway
Buchanan Highway
Stuart Highway
Tablelands Highway
Barkly Highway
Timber Creek
Top Springs
Katherine pop. of 9,800
Barunga pop. of 363
Beswick pop. of 531
Mataranka thermal pools
Mataranka pop. of 350
Jilkminggan pop. of 301
Ngukurr pop. of 1,150
Minyerri pop. of 585
Larrimah pop. of 47
Daly Waters pop. of 9
Dunmarra
Newcastle Waters pop. of 64
Elliott pop. of 340
Tennant Creek pop. of 2,300
Borroloola pop. of 871
Robinson River pop. of 222
Affected communities (north)
Affected communities (central)
Affected communities (east)
Affected communities (urban)
Gulf Falls and Uplands
Sturt Plateau
Bullwaddy Conservation Reserve
EP167
EP168
EP98
EP117
EP76
Roper Gulf (S)
Barkly (S)
Victoria-Daly (S)
Katherine (T)
0 km 50
Scale 1:3,000,000
Page size: A3
Projection: GCS GDA 1994
LEGEND
Petroleum well
Affected community
Major road
Minor road
Rail line
Gas pipeline
Site of conservation significance
Nature conservation reserve
Gulf Fall and Uplands bioregional area (GFU)
Sturt Plateau bioregional area (STU)
Beetaloo sub-basin area
Affected community area
Assumed development areas for purposes of Beetaloo sub-basin SIA case study
EP76, EP98 and EP117 - Petroleum exploration permit (granted)
EP167 and EP168 - Petroleum exploration permits (granted)
Petroleum exploration permit (granted)
Local government area
coffey
Northern Territory Government
Scientific Inquiry into Hydraulic Fracturing
Beetaloo sub-basin and social catchments
Figure No: 3.1

The socioeconomic context for undertaking the SIA case study of the conceptual development in the Beetaloo sub-basin is characterised as follows:

- The Beetaloo sub-basin has seen almost no industrial development. Some affected communities have experience with development. For example, experience with mining development south of Ngukurr (iron ore) and at McArthur River (large-scale underground and open pit mining of lead and zinc). The installation of gas transmission and lateral pipelines through the sub-basin (Amadeus Basin to Darwin Pipeline in 1986; the Elliott Spur Pipeline in 1989, and the McArthur River Pipeline in 1995) that occurred 20 to 30 years ago is not readily recalled by community members. The current installation of the Northern Gas Pipeline from just north of Tennant Creek to Mount Isa is in an early stage of development, and a significant distance south of the Beetaloo sub-basin communities.
- Economic activity is centred on agriculture development (pastoral operations throughout the sub-basin, horticulture south of Katherine and along the Roper Highway) together with Defense activity at RAAF Base Tindal, and tourism activity mainly servicing self-drive visitors. Regional service townships (Katherine and Tennant Creek) are located outside the sub-basin.
- Obvious significant disparities in social status and living conditions between remote Aboriginal communities and regional service townships. This has a significant influence on the potential for community members to capture potential benefits from industry development should it occur.
- Community members have a reasonably high level of awareness (due to the activities of groups opposed to industry development) of historical issues surrounding the development of unconventional gas resources in other jurisdictions but not of the potential unconventional gas industry in the Northern Territory. The Inquiry's Interim Report (Inquiry, 2017b) acknowledged that levels of knowledge in Aboriginal communities about future development is inadequate.

4. Conceptual Beetaloo sub-basin development scenario

There are no firm development scenarios for the Beetaloo sub-basin. Several companies holding exploration permits in the area have expressed views on possible development pathways in their written submissions to the Inquiry. While there remain significant technical and commercial uncertainties to address prior to committing to development, for the purposes of the case study it has been assumed that initial development would occur to the west of Larrimah and to the east of Daly Waters, in the areas that have shown favourable exploration results, as shown in Figure 3.1. It is assumed the projects would be offset by three years.

ACIL Allen Consulting prepared a report, *The Economic Impacts of a Potential Shale Gas Development in the Northern Territory, Final Report to the Scientific Inquiry into Hydraulic Fracturing in the Northern Territory*, October 2017 (ACIL Allen, 2017) that assesses the potential economic impacts of several development scenarios. The scenarios range from no shale gas production (baseline scenario) to accelerated production (shale gale scenario) under partial lifting of the moratorium on hydraulic fracturing and full lifting of the moratorium. The Shale WIND scenario assumes the moratorium is lifted and exploration and appraisal activities proceed, and lead to a moderate scale development. Based on industry submissions to the Inquiry this represents the most probable scenario if development was to occur and was adopted for the case study.

Using the information provided in ACIL Allen (2017) a number of assumptions were made regarding the scale and composition of the conceptual development. They are described in the following sections.

4.1. Conceptual development

The conceptual development assumes the moratorium on hydraulic fracturing will be fully lifted in 2018, allowing exploration, appraisal and pilot testing to proceed for a period of three to five years. Appraisal and pilot testing activities will confirm the technical and commercial parameters for development (e.g., gas availability and volume, cost of extraction, cost of gas processing, compression and transport, demand and wholesale price for gas, etc).

During the appraisal and pilot testing period environmental and planning approvals would be progressed with detailed design and construction of the gas fields and associated gas processing facilities commencing on receipt of territory and federal approvals. Shale gas production is assumed to occur for 25 years after which the production facilities and gas field infrastructure would be decommissioned. ACIL Allen's (2017) Shale WIND scenario assumes an approximately 260 well development.

It is assumed that each project area would require gas field access roads, production wells and gas gathering lines, a gas processing and compression facility, export pipeline connection to the Amadeus to Darwin Gas Pipeline, accommodation facilities and an airstrip for FIFO worker transport during the construction phase for major facilities, such as the gas processing and compression facility.

Table 4.1 lists the key parameters for the conceptual development scenario adopted for the SIA case study. An indicative development timeframe is presented in Figure 4.1.

Table 4.1 Indicative project scenario parameters

Element	Scale
Approximate number of wells drilled per annum	10
Maximum number of wells in operation	257 (in 2042)
Number of well pads (8 wells/pad)	32
Length of gas field roads	55 km (1.7 km for each pad)
Length of gathering pipes	32 km
Area of disturbance (for pads, roads, gathering pipes and camps)	10.9 square kilometres (1,090 ha)
Area of disturbance for pipelines (Armadeus tie-in 50 km; Armadeus duplication 300 km; Northern Gas Pipeline duplication 622 km). It is assumed that the pipeline duplications are on similar alignments to existing pipelines)	Approximately 116 square kilometres (11,600 ha)
Average level of employment for well pad construction and field operations (including camp operations x 2)	250 to 300 persons
Estimated indicative level of local employment	Darwin: 65 persons Katherine: 70 persons Regional Northern Territory: 25 persons
Logistics support facility in Katherine industrial area	5 to 10 persons

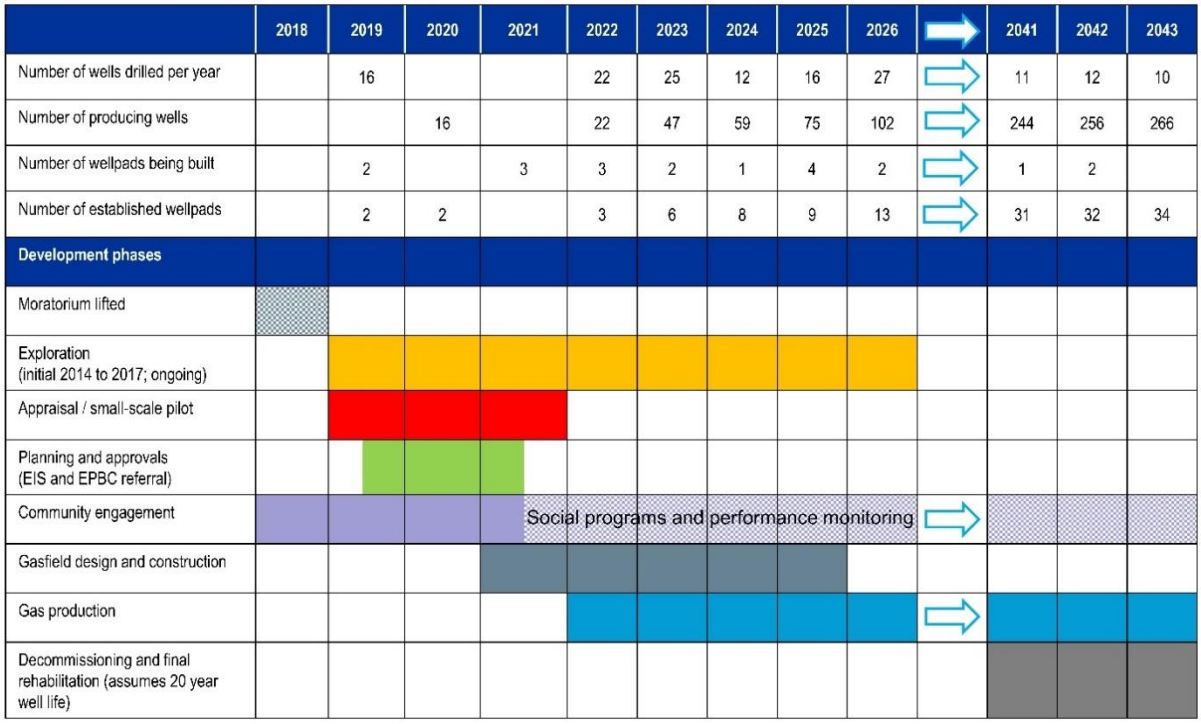


Figure 4.1 Indicative development timeframe

4.2. Transport and traffic

The most visible project activity for residents of rural communities will be transport to and from work sites. A number of assumptions were made regarding transport routes and traffic, as a detailed trip generation model is not available for the SIA case study.

The Stuart Highway will be used to access the gas fields in the Beetaloo sub-basin, most likely from the north but also from the south. The Carpentaria Highway will be used to access the eastern conceptual development. Regional roads such as Sunday Creek Road to the west of Larrimah and the Daly Waters to Cox River Road will be used to access the gas fields.

Heavy vehicles and light vehicles will be used to construct and operate the gas fields and gas processing and compression facilities. Heavy vehicle use will peak in construction when the major facilities are established. Light vehicles, buses and aircraft will be the predominant transport used in operation. Some heavy vehicle use will be required in operation to install new wells and maintain existing wells, and to service accommodation facilities and maintenance depots.

4.3. Workforce

The peak construction workforce is estimated at 450. The additional workers over that presented in Table 4.1 relate to the construction of gas processing and compression facilities.

The operation and maintenance workforce is estimated at 250. These workers will be engaged in drilling wells, installing gas gathering lines and constructing and maintaining civil works such as roads and well pads.

It is assumed that the workforce will use a combination of FIFO (from Darwin) and drive-in drive-out (DIDO) from Katherine and rural communities, and will stay in an accommodation facility while on shift. The accommodation facilities could be located close to a community near a transport hub (e.g., Daly Waters' airstrip) or collocated with gas processing and compression facility. The accommodation facilities will provide 24-hour medical facilities and support staff, as well as recreational facilities such as a swimming pool and gymnasium.

In order to consider local employment and population growth impacts, it has also been assumed that all gas processing and compression facility construction workers are non-local, with the Northern Territory-sourced workforce drawn from the communities shown in Table 4.2.

It is assumed approximately 70 persons would be locally sourced from the Katherine area, and that one third of these people (approximately 25) will have relocated to live in the area. This will result in a small population increase in the order of 80 persons (assuming 15 families of 4 persons and 10 couples with no children).

Table 4.2 Assumed workforce hire points

Workforce	Darwin sourced	Katherine sourced	Rural community sourced	Sourced in NT	Sourced outside NT
Pad construction (civil works, roads, etc)	50%	30%	20%	100%	-
Field operations (gas field technicians)	50%	50%	-	50%	50%
Camp operations (camp management, catering, accommodation support)	10%	50%	40%	100%	-
Annual average employment	65	70	25		

5. Social impact assessment

Unconventional gas development affects communities differently, with the differences relating to their capacity to absorb and adapt to the changes or impacts. Larger towns with more diverse communities and businesses have greater capacity than small and remote communities.

The SIA case study assessed the impacts of the conceptual development at two scales – the larger or urban communities and the small or rural communities, as follows:

- Urban communities comprises the Affected communities (Urban) catchment and the towns of Katherine and Tennant Creek.
- Rural communities comprises the Affected communities (North, Central and East) catchments and towns:
  - Affected communities (North): Barunga, Beswick, Mataranka, Jilkminggan, Minyerri and Ngukurr.
  - Affected communities (Central): Larrimah, Daly Waters, Dunmarra, Newcastle Waters and Elliott.
  - Affected communities (East): Borroloola and Robinson River.

This grouping is appropriate given the high-level assessment possible under the case study, where detailed information about specific communities is limited and extensive consultation over a period of years has not been possible.

5.1. Urban communities

A summary of the social values of urban communities is presented in this section along with an assessment of the potential threats to social values within those communities.

5.1.1. Social values

Table 5.1 summarises the social values identified for the urban communities of Katherine and Tennant Creek.

Table 5.1 Urban communities' social values

Social value	Indicator	Social value baseline summary
SV1 Liveable community	Access to, and proximity of, quality services (health, education, aged care, childcare, retail, etc) Balanced demographic profile Harmonious relationships, lack of conflict Respect for law by community members Adequate infrastructure that is well-maintained (housing, roads, airport, power, water and sewerage, telephone, internet) Effective local governance Opportunity for recreational, cultural and sporting pursuits Safe social and physical environment	Katherine town has a population of approximately 10,000. The Aboriginal population comprises approximately 28 per cent and migrates to and from the hinterland regions of Victoria-Daly and Roper-Gulf, while the non-Aboriginal residents tend to migrate to and from interstate (possibly heavily influenced by postings to RAAF Base Tindal). It is well-serviced by education facilities (five primary and two high schools), with adequate health facilities based at the Katherine Hospital (60 beds and 24-hour emergency) and Aboriginal health services (such as Sunrise Health and Katherine West Health) that support urban and rural clinics. There is a significant level of community services and residents have access to a broad range of community social and recreational groups. Infrastructure is adequate and well-maintained, and crime is generally not a major issue, though the itinerant nature of a segment of the population possibly contributes to higher levels of crime against persons and property from time to time. There are opportunities for sporting and recreational pursuits. Tennant Creek has a population of approximately 3,000 (2016 Census), indicating a slight contraction (2.2 %) from the 2011 Census counts, with a median age of 33. Aboriginal residents (51%) comprise the largest proportion of the younger age cohorts.
SV2 Affordable lifestyle	Cost of land and housing Local Government charges Income levels Cost of food, power and other essential items	The price of housing in Katherine and Tennant Creek is generally affordable, with 4% and 1.5% respectively of households with a mortgage where repayments are 30% or greater than household income, and with approximately 9% of households with rent payments greater than 30% of household income for both communities. House prices in Katherine appear to have peaked around the middle of 2015. Food prices at local supermarkets are in line with

Social value	Indicator	Social value baseline summary
		levels expected in remote areas where there is a significant freight impost.
SV3 Community identity and spirit	Level of volunteering and availability of assistance Local celebrations Recognition, preservation and promotion of heritage Capacity to accommodate visitors Perceptions of being able to influence community destiny Employment share by industry	Both Katherine and Tennant Creek have a strong sense of community identity. Katherine's identity is based around tourism and the nearby Katherine Gorge (Nitmuluk) landscape, as well as being seen as a vibrant regional centre providing pastoral and horticultural industry services and hosting a forward operational Defence base (RAAF Base Tindal). There are active arts and sports communities, with celebrations for NAIDOC Week and the nearby Barunga Festival in June each year. Tennant Creek has a long history of mining and a strong identification with large historic cattle stations on the extensive Mitchell grass plains of the Barkly Tablelands. There are an ongoing range of community events based on activities such as camp drafts and bush races, and the desert environment. Both Katherine and Tennant have volunteer rates, equivalent to the Northern territory average, at 17% and 16.8% respectively.
SV4 Capacity for sustainable economic activity	Viability, vitality and diversity of local industry Workforce participation and employment Job creation and retention of young people Supportive business environment (e.g. availability of serviced industrial land, adequate zoning, provision of information on opportunities) On-going environmental integrity (e.g. surface and groundwater, land degradation) Willingness of business to invest	Katherine has a developing and diverse economic base with vibrant sectors based on services to Defence, tourism, agriculture including horticulture, mining and logistics. Significant employment areas are public administration and safety, health care and social assistance and education and training reflecting the town's role as regional centre for public services. There is a supportive business environment with strong business development advocacy groups. Public investment (e.g., Defence) is strong and acts to even out the highs and lows of cyclical enterprises (e.g., mining). There is a seasonal labour market for tourism and pastoral enterprises, and some indication that there is a shortage of labour in the horticultural sector due to interest shown in Commonwealth Government supported guest worker schemes. With high numbers of people recorded as not in the labour force, this may indicate that further work could be done to strengthen links to the population in the hinterland areas. Attention would also need to be maintained on schooling performance, as the high school attendance rate appears to have dropped by 14% over the last three years. Key sectors of tourism, agriculture and horticulture depend on the confidence of operators in the integrity of the environment, and the ability for this to be monitored and measured. Principal industries serviced by Tennant Creek include mining, pastoralism and tourism. Important employment sectors are similar to Katherine, with public administration and safety showing a significant expansion in numbers over the last decade

5.1.2. Potential threats and their significance

Potential impacts to the identified social values are discussed in the following sections for each social value and threat (impact driver). The risk of the threats occurring and the associated consequences are assessed to provide an indication of the impacts that are likely to be significant should unconventional gas development proceed in a manner consistent with the conceptual development. The assessment is summarised in Table 5.2.

SV1 Liveable community

Impaired community amenity

ID1A Rapid workforce influx to urban areas

Given the location of the Beetaloo sub-basin project areas, a rapid influx of substantial numbers of workers to either Katherine or Tennant Creek is unlikely, though either community may be required to accommodate transiting workers, or any new workers associated with logistics support facilities that may be established there. Approximately 25 workers, with 55 dependents moving to Katherine is estimated. This may place some pressure on to existing accommodation providers, however there are well-developed measures that could be incorporated into a workforce accommodation strategy to mitigate any adverse effects.

Reduced amenity, road accidents and increased vehicle maintenance costs

ID1B Increase in heavy vehicle traffic on local roads

Should development of unconventional gas in the Beetaloo sub-basin occur it is certain that there will be an increase in the number of heavy vehicles on the Stuart Highway through Katherine if the logistics route is via Darwin. There may be some increase in traffic in Tennant Creek should a portion of supplies be sourced from southern states. While the increase in traffic (and associated noise and dust increases) is likely to be modest, there is some uncertainty in the absence of traffic models at this stage of development. The assessment of traffic for a redevelopment of the Mt Todd Gold Mine[2] provides some insights to transport and traffic impacts. The traffic study (2013) determined that there was substantial spare capacity in the road network, with the Stuart Highway operating at the highest Level of Service standard. The construction phase of the project was considered to possibly have 'short-term adverse effects through the addition of construction related traffic' which could appropriately be mitigated through the implementation of measures, such as a Traffic Management Plan'. The capacity of the Stuart Highway is expected to be sufficient to accommodate the conceptual development and infrastructure upgrades to accommodate gas development transport activity in urban areas would not be expected.

[2] Vista Gold Australia Pty Ltd, Mt Todd Gold Project, Traffic and Transport Impact Assessment, GHD June 2013

Conflict between community members

ID1C Conflict between supporters and opponents of unconventional gas industry development

Development of an unconventional gas industry is a highly emotive issue in the Northern Territory, as evidenced by press reports of community concerns and positions expressed during stakeholder consultation. The likelihood of conflict is considered possible (as it has occurred in other jurisdictions) and the consequences could be moderate in smaller communities, leading to a weakening of social capital and negative perceptions of the community, as being a supportive and welcoming environment for both new and existing residents.

ID1D Receipt of royalties by a sub-set of community members

While Traditional Owners (TOs) may live in Katherine or Tennant Creek, and certainly use the centres for accessing services, there is unlikely to be a level of conflict or strained relationships that may affect liveability in townships of this size, unlike the potential situation in smaller remote communities.

Anxiety about availability, access to and quality of water resources

ID1E Concern over potential risk to groundwater quality

Regardless of the actual location of projects in the Beetaloo sub-basin, there is likely to be concern in urban areas in regard to future groundwater quantity and quality in the event of industry development, as the towns themselves, and the industry that they support, depend on groundwater to a significant extent. Evidence through stakeholder engagement and submissions to the Inquiry indicates a likelihood of almost certain and a consequence of moderate based on the perceived effects on industry, indicating a high risk rating. The distance of towns from the project areas and the ability to source further information through various methods (ranging from direct engagement with experts to use of the internet) warrants a consequence level of moderate rather than major.

SV2 Affordable lifestyle

Decreased housing availability and affordability

ID2A Housing supply unable to meet spike in demand

ID2B Increased short-term rental costs

While there could be expected to be some increase in demand for housing, the distance of the project areas from urban centres most likely will act to minimise the level and duration of any increased demand in the short term, and perhaps smooth demand over the longer term. Workforce sourcing assumptions indicate a relatively small population increase in Katherine. It is also the case that uncertainty surrounding industry development and its timing make it hard determine the likelihood of a market supply response to housing demand at this stage. There must be close collaboration between industry and Local Government in the development of a workforce accommodation strategy to ensure that decisions on housing investment account for a timeframe based on a sound understanding of workforce levels required during project development (construction) and operation and maintenance phases. There is a medium potential for impact of the affordability of urban lifestyles.

SV3 Community identity and spirit

Loss of 'outback' identity

ID3A Significant change in land use and industry development

ID3B Perception of industry development heralding an era of 'industrialisation' of the landscape

The involvement of urban communities in supporting unconventional gas industry development is likely to involve some level of workforce accommodation, and potentially the hosting of a logistics and support facility, both of which are within their existing capacity, and for which existing industry groups are working to attract. The location of these facilities, in existing relevantly zoned areas, is not likely to change the visible nature of the community, or convey impressions of heavy industrialisation of the landscape, as their appearance will be consistent with existing industrial support facilities. For these residents, travel on highways is also not likely to reveal landscape changes likely to evoke concern. Hence the significance of these potential changes on community identity is considered low.

Decreased community engagement with local governance

ID3C Perception that industry development approval is against majority community wishes

The highly sensitised nature of the community with respect to development of unconventional gas resources indicates that this perception is likely, with potentially moderate consequences where 'community' is seen to be a local entity rather than a more Territory-wide grouping. This may have a moderate effect on community identity and spirit where the 'local' community may see themselves as having impacts imposed on them for the sole benefit of the broader community. This sentiment was evident during a community consultation engagement where it was asserted that the remote communities were the only ones that 'paid the price'.

Increased sense of cultural loss

ID3D Concern with increased access to, and development risks on, traditional country

While there will undoubtedly be some stakeholders in urban communities who identify strongly with maintaining the integrity of traditional country, the plural nature of the community and size of the Aboriginal population indicates that these concerns are unlikely to have a significant impact on the community identity and spirit of urban communities, particularly if development is remote from iconic natural areas and sites of historic or Aboriginal significance.

SV4 Capacity for sustainable economic activity

Decreased investment in pastoral and horticultural enterprises

ID4A Concern that long-term access to quality groundwater may be restricted due to industry development

This threat has widespread currency in the current environment, where there is a high level of uncertainty and lack of detailed knowledge of the broader nature of aquifers, and linkages in the

groundwater system. The concern is exacerbated due to the ongoing investigation into PFAS contamination of groundwater in the Tindal/Katherine area. The limited information on the scope of potential development at this stage, and the awareness of the volumes of water required for the hydraulic fracturing process, promotes concerns about the long-term availability of water for pastoral and other agricultural purposes. The significance is assessed as moderate for residents of urban areas which service the pastoral and horticulture industry.

Decrease in tourist visitation

ID4B Perception that 'outback' identity is compromised by 'major industrialisation' of the region

Urban residents and visitors to Katherine in particular, are not likely to perceive the loss of 'outback' identity which is an integral component of the tourism experience. The significant development of mining operations in locations such as Broken Hill and north-west Queensland has not detracted from the 'outback experience', and the areas within the Beetaloo sub-basin proposed for development will have limited visibility to highway travellers. In time, the existence of unconventional gas industry operations may provide opportunity for enhancing the outback tourist experience, as happens in Roma in western Queensland. Hence the significance of this threat is considered low.

Increased cost of labour for local businesses

ID4C Higher gas industry wage rates available to local residents drives competition for employees

While this threat has been manifest in other gas development areas, it has been driven by the scale and rate of project development. Workers with specific gas industry skills will largely be drawn from other locations, and have remuneration determined by industry norms rather than by local conditions. Support workers in civil works occupations already largely work remotely from urban areas, and any shortages in labour supply are likely to be addressed through training programs as currently occurs. The significance of the threat is considered medium and amenable to capacity development programs.

Local business closures

ID4D Industry demand attracts external specialist enterprises to establish and draw business from local businesses

The manifestation of this threat is possible, dependent of the scale and timing of development. In the Surat Basin, Queensland there were instances of specialist suppliers of goods (such as safety equipment and tools) establishing in existing premises in local towns for the intensive construction phase, and then withdrawing once that phase (where there was a high level of procurement) was complete. That mode of operation was largely driven by the scale of the gas-field and infrastructure construction effort occurring at that time in the Surat Basin, where multiple projects proceeded concurrently. The potential impact significance is moderate in small remote towns, and should be recognised and addressed through the local procurement policies of project developers.

Table 5.2 Urban communities' social value threat assessment

	Potential threat	Pre-mitigated assessment			Mitigation
		Likelihood	Consequence	Assessed risk	
	Social value: SV1 Liveable community ***Impact: Impaired community amenity***				
ID1A	Rapid workforce influx to urban areas	Possible	Moderate	Medium	• Develop and implement a Workforce Accommodation Strategy with Local Government • Develop and implement a Workforce Code of Conduct • Monitor community and visitor sentiment in urban communities
	Social value: SV1 Liveable community ***Impact: Reduced amenity, road accidents and increased vehicle maintenance costs***				
ID1B	Increase in heavy vehicle traffic on local roads	Likely	Minor	Medium	• Project Traffic Management Plans • Community awareness campaigns, particularly for Aboriginal communities
	Social value: SV1 Liveable community ***Impact: Conflict between community members***				
ID1C	Conflict between supporters and opponents of unconventional gas industry development	Possible	Moderate	Medium	• Provide regular environmental and social monitoring results to communities • Implement regular community forums • Implement Grievance Management Program
ID1D	Receipt of royalties by a sub-set of community members	Unlikely	Negligible	Very Low	• Monitor community and visitor sentiment in urban communities

	Potential threat	Pre-mitigated assessment			Mitigation
		Likelihood	Consequence	Assessed risk	
	Social value: SV1 Liveable community ***Impact: Anxiety about availability, access to and quality of water resources***				
ID1E	Concern over potential risk to groundwater quality	Almost certain	Moderate	High	• Provide regular environmental and social monitoring results to communities • Implement regular community forums • Implement Grievance Management Program
	Social Value: SV2 Affordable lifestyle ***Impact: Decreased housing availability and affordability***				
ID2A	Housing supply unable to meet spike in demand	Possible	Moderate	Medium	• Develop and implement a Workforce Accommodation Strategy with Local Government
ID2B	Increased short-term rental costs	Possible	Moderate	Medium	• Monitor rental housing supply and vacancy • Implement rental support program for period of high rental housing demand
	Social Value: SV3 Community identity and spirit ***Impacts: Loss of 'Outback' identity***				
ID3A	Significant change in land use and industry development	Unlikely	Minor	Low	• Comply with Local Government Planning Scheme
ID3B	Perception of industry development heralding an era of 'industrialisation' of the landscape	Unlikely	Minor	Low	• Comply with Local Government Planning Scheme
	Social Value: SV3 Community identity and spirit ***Impacts: Decreased community engagement with local governance***				
ID3C	Perception that industry development approval is against majority community wishes	Likely	Moderate	Medium	• Implement regular community forums • Implement Grievance Management Program

	Potential threat	Pre-mitigated assessment			Mitigation
		Likelihood	Consequence	Assessed risk	
	Social Value: SV3 Community identity and spirit ***Impacts: Increased sense of cultural loss***				
ID3D	Concern with increased access to, and development risks on, traditional country	Unlikely	Negligible	Very Low	• Implement robust land access protocols • Monitor community and visitor sentiment • Implement regular community forums
	Social Value: SV4 Capacity for sustainable economic activity ***Impacts: Decreased investment in pastoral and horticultural enterprises***				
ID4A	Concern that long-term access to quality groundwater may be restricted due to industry development	Possible	Moderate	Medium	• Provision of regular monitoring results to communities • Implementing regular community forums
	Social Value: SV4 Capacity for sustainable economic activity ***Impacts: Decrease in tourism visitation***				
ID4B	Perception that 'outback' identity is compromised by 'major industrialisation' of the region	Unlikely	Minor	Low	• Monitoring of community and visitor sentiment • Implementing regular community forums
	Social Value: SV4 Capacity for sustainable economic activity ***Impacts: Increased cost of labour for local businesses***				
ID4C	Higher gas industry wage rates available to local residents drives competition for employees	Likely	Moderate	Medium	• Implementing regular community forums • Implement Grievance Management Program
	Social Value: SV4 Capacity for sustainable economic activity ***Impacts: Local business closures***				
ID4D	Industry demand attracts external specialist enterprises to establish and draw business from local businesses	Possible	Moderate	Medium	• Implementing regular community forums • Development and implementation of Local Content Policies and programs • Implement Grievance Management Program

5.2. Rural communities

Rural communities include the 'affected communities' in the north, east and central areas of the Beetaloo sub-basin (see Appendix A), where there is a majority of Aboriginal residents in townships. This section presents a summary of indicative social values associated with these communities and an assessment of the significance of the threats to social values.

5.2.1. Social values

Table 5.3 summarises the social values identified for the rural communities in the three catchments.

Table 5.3 Rural communities' social values

Social value	Indicator	Social value baseline summary
SV1 Liveable community	Proximity and access to traditional country Degree of satisfaction with management of traditional country Respectful and harmonious relationships within and between communities (both Aboriginal and non-Aboriginal) Access to service delivery (in particular health and education) that acknowledges and respects culture Ability for extended family residence Respect for law by community members Adequate infrastructure that is well-maintained (roads, airport, power, water and sewerage, telephone, internet) Effective local governance Opportunity for recreational, cultural and sporting pursuits Safe social and physical environment	Rural communities comprise a predominantly Aboriginal population characterised by a young age profile (median age ranging from 21 to 26). The exceptions are Mataranka, the area surrounding Borroloola and the pastoral properties within the Beetaloo sub-basin area which have higher numbers of non-Aboriginal persons involved in tourism and pastoral enterprises. Communities are generally harmonious places, and have high levels of one-parent families. The activities of young persons in larger communities such as Ngukurr contribute to inter-family tension from time to time (through disregard for elders, substance abuse, general behaviours not consistent with traditional social norms etc). Community members are mostly close to traditional country, though often restricted in mobility which limits activity on country. A Territory-wide survey of community wellbeing in 2011 indicated that while a majority of individuals felt their life was improving, there was less support for the notion that communities were improving (or on the 'way up'). While services in health are generally adequate by rural standards, population health can be poor, characterised by low life expectancy for men, high child morbidity due to inadequate environmental health standards, and chronic circulatory and respiratory illnesses and diabetes in middle age. Despite this, people often self-report health as being good, due to a worldview that includes other factors such as being close to family. Road access is reasonable, but often subject to seasonal restrictions. The Roper Highway is gradually being upgraded with high-level crossings of the Roper and Wilton Rivers being installed. Most communities have an adequate level of community facilities. Local governance is functional,

Social value	Indicator	Social value baseline summary
		but often budget constrained due to the inability to raise rate income. The formation of larger Councils initially fostered a perception that there had been a diminution of local community control and local leadership.
SV2 Affordable lifestyle	Availability of adequate housing Income levels Cost of housing Cost of food, power and other essential items	The availability of housing continues to be a major problem in Aboriginal communities with shortage and overcrowding common (together with associated problems such as occupant tensions and accelerated deterioration). High population growth rates in Aboriginal communities indicate that this situation is unlikely to be resolved in the near to medium term. The adequacy of income levels are uncertain. Census data indicates that Aboriginal and Torres Strait Islander (ATSI) household median income ranges from 75% to 140% of the Roper Gulf Regional Council median household income, but is around 50% of the NT median household income. Some living expenses are low (e.g., housing rents), however food costs are in the order of 30 to 40% above costs in regional centres. While lifestyles may be affordable, there may be little room for external shocks (e.g., due to serious illness), and lifestyles are subject to low accommodation standards.
SV3 Community identity and spirit	Recognition and promotion of cultural heritage Perceptions of being able to influence community destiny Existence of viable enterprise activity Number and strength of Aboriginal organisations Status of reconciliation with non-Aboriginal community Level of volunteering and availability of assistance Local celebrations	Aboriginal people's residence in rural communities close to traditional country contributes markedly to community identity and spirit, particularly with smaller communities. Challenges are more significant in larger communities that contain residents from a diversity of clans. Consequently the protection of sites is a general concern of all community members. Voluntary work is noted as being higher in smaller communities. Art and Craft Centres and Aboriginal Ranger Groups are also evidence of a significant level of community spirit, in contrast to the often negative portrayal of community life in mainstream media. There are a number of festivals and other community events (such as rodeos and NAIDOC Week celebrations) and investment in local pastoral enterprises (such as at Minyerri) which contributes to pride in moving from welfare dependence. All communities express pride in the number of members who are able to secure jobs in the mainstream labour market, or establish a commercial enterprise as an alternative to dependence on welfare payments.
SV4 Capacity for sustainable economic activity	Availability of employment opportunities Aboriginal workforce participation and employment	Rural communities are characterised by an extremely limited range of economic activity and associated employment opportunities. Most formal employment is in the provision of government services (education,

Social value	Indicator	Social value baseline summary
	Aboriginal business start-ups and ownership Level of education achievement, including retention to Year 12 and post-school destinations	health and government administration) though continual effort is made to engage with private sector economic activity through seasonal pastoral and mining work where available, and through the pursuit of flexible labour hire initiatives that depend on worker mobility. The employment participation rate is low, and the numbers not in the labour force have been steadily increasing. This situation presents youth with little to no incentive to put effort into education which often means leaving the familiar surrounds of community and family.

5.2.2. Potential threats and their significance

Potential impacts to the identified social values are discussed in the following sections for each social value and threat (impact driver). The risk of the threats occurring and the associated consequences are assessed to provide an indication of the impacts that are likely to be significant should unconventional gas development proceed in a manner consistent with the conceptual development. The assessment is summarised in Table 5.5.

SV1 Liveable community

Impaired community amenity

ID1A Rapid workforce influx to urban areas

The conceptual development includes accommodation facilities near transport hubs where they are located within commuting distance to the gas fields or accommodation facilities located at the gas fields, with the workforce working rosters on a FIFO or DIDO basis. Small and Aboriginal communities do not have the capacity or infrastructure to accommodate gas field construction and operation workforces and are unlikely to be considered for accommodation. Consequently, the risks associated with this threat were not assessed for rural communities.

Reduced amenity, road accidents and increased vehicle maintenance costs

ID1B Increase in heavy vehicle traffic on local roads

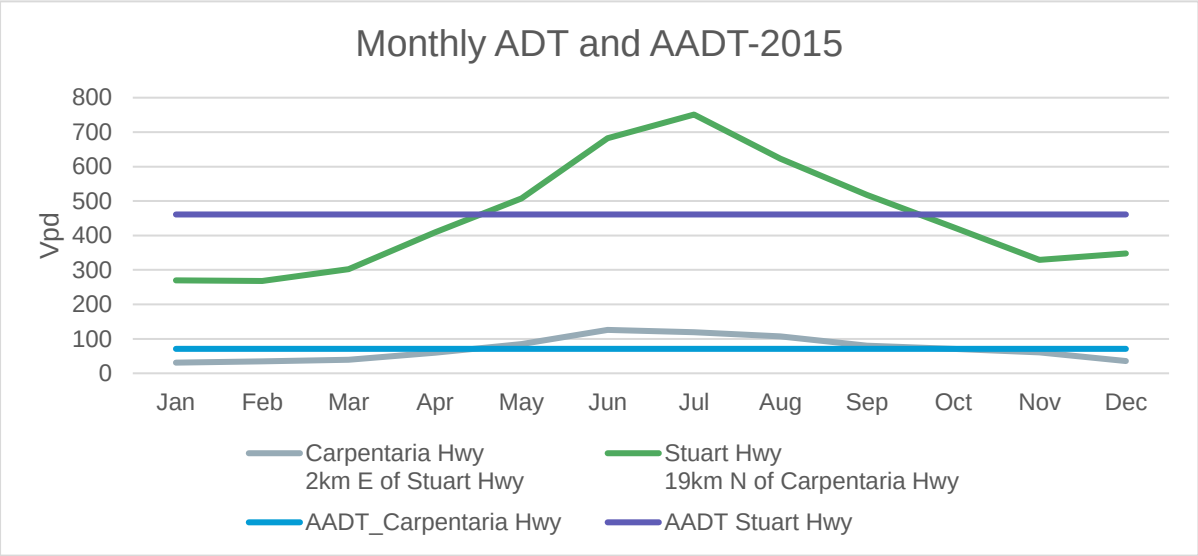
An increase in heavy vehicle traffic on highways is certain, particularly during the construction phase for a gas processing and compression facility or when pipe for a new pipeline is being delivered. The use of local roads, such as the Daly Waters to Cox River Road by heavy vehicles will be contingent on the location of major facilities. Light vehicle traffic associated with construction or operations will be present on highways as well as on local roads. The most important generators of traffic associated with a project will be workforce accommodation and construction hubs.

A summary of the Average Annual Daily Traffic Volumes (AADT) and the percentage of heavy vehicles in 2015 for the Stuart and Carpentaria highways are provided in Table 5.4. Figure 5.1 indicates the seasonal variability in traffic volumes on these highways.

Table 5.4 Traffic volumes from 2015 vehicle count

Highway	Description	AADT	% Heavy vehicles*
Carpentaria Highway	Tablelands Highway to Stuart Highway 2 km east of Stuart Highway	71	21.6% (~13% triple road trains)
Stuart Highway	Carpentaria Highway to Roper Highway 19 km north of Carpentaria Highway	461	22.2% (~12% triple road trains)
	Roper Highway to Victoria Highway 6 km south of Cutta Cutta Caves	890	14.5% (~7% triple road trains)

* AUSTROADS Class 6 to 12, Long, Medium and Large Combinations
Source: NT Government, Department of Transport, Annual Traffic Report, 2015



Source: NT Government, Department of Transport, Annual Traffic Report, 2015

Figure 5.1 Highway traffic variability - 2015

The consequences of any increase in traffic are expected to be minor. The capacity of both the Stuart and Carpentaria highways is such that increased traffic levels will be well below the levels requiring any road upgrade works. The capacity of the Carpentaria Highway is estimated at 9,000 vehicles per day between the Stuart Highway and the McArthur River Mine access road[3]. As background traffic volumes are very low (with a 3% growth rate, AADT in 2024 without the project is in the order of 95 vehicles per day (vpd)), traffic volumes are expected to remain significantly below the existing road capacity of 9,000 vpd requiring no upgrade works to accommodate future year traffic volumes on the Carpentaria Highway. The same situation is likely to prevail on the Stuart Highway.

Local residents have an existing awareness of the presence and effects of heavy vehicles on local roads, and it is assumed that maintenance will be delivered on time, and that Traffic Management Plans governing speed and use of approved routes only and driver behaviour are in place and enforced.

[3] McArthur River Mine Stage 3 EIS https://ntepa.nt.gov.au/__data/assets/pdf_file/0004/287788/Chapter-8-Traffic-and-Transport.pdf

Conflict between community members

ID1C Conflict between supporters and opponents of unconventional gas industry development

Development of an unconventional gas industry is a highly emotive issue in the Northern Territory, as evidenced by press reports of community concerns and positions expressed during stakeholder consultation. There appears to have been a significant level of anti-industry advocacy, and the likelihood of conflict is considered possible (as it has occurred in other jurisdictions) and the consequences could be moderate in smaller communities, leading to a weakening of social capital and negative perceptions of the community as being a supportive and welcoming environment for both new and existing residents.

ID1D Receipt of royalties by a sub-set of community members

Traditional owners (TOs) are entitled to and will receive royalties linked to gas production. These TOs will almost certainly live in small communities across and beyond the Beetaloo sub-basin, where the potential for strained relations with other community members not in receipt of royalties will be high. As well, the impacts of gas development are perceived to occur on a regional scale (e.g., ground and surface water effects), even though the actual areal footprint of development will be relatively limited (and hence, result in a limited or tightly targeted distribution of royalties). This may have major consequences for intra-community and TO inter-group relationships.

Anxiety about availability, access to and quality of water resources

ID1E-Concern over potential risk to groundwater quality

Regardless of the actual location of projects in the Beetaloo sub-basin, there is likely to be concern in regard to future groundwater quantity and quality in the event of industry development. Evidence through stakeholder engagement and submissions to the Inquiry indicates a likelihood of almost certain and a consequence of major based on anxiety about the perceived effects on human health and cultural integrity, indicating a very high risk rating.

SV2 Affordable lifestyle

Decreased housing availability and affordability

ID2A Housing supply unable to meet spike in demand

ID2B Increased short-term rental costs

The nature of development in the Beetaloo sub-basin (where workers are likely to be based on site in accommodation facilities due to remoteness) is not likely to affect housing in rural communities where there is a limited housing market, or where communities are located on Aboriginal land where there is a predominance of social housing allocated to Aboriginal people and not available for lease. It is possible that Mataranka could see some effect through a limited stimulation for increased supply. Hence the significance of the above threats are categorised as low and very low respectively.

SV3 Community identity and spirit

Loss of 'outback' identity

ID3A Significant change in land use and industry development

ID3B Perception of industry development heralding an era of 'industrialisation' of the landscape

Decreased community engagement with local governance

ID3C Perception that industry development approval is against majority community wishes

Increased sense of cultural loss

ID3D Concern with increased access to, and development risks on, traditional country

Two potential threats to this value (ID3A and ID3B) are assessed as possible, depending on the scale and location of development and its potential to generate significant visual effects that may influence perceptions. As development will coexist with pastoral operations and not involve highly visible large-scale infrastructure or landscape change (such as overburden dumps) the consequences are assessed as minor indicating low significance. Travellers or tourists who may seek out an 'outback' experience often expect to see resource development in remote areas (for example, in the Cooper Basin and in the Mount Isa area).

Threats ID3C and ID3D are assessed as likely with minor and moderate consequences for small communities in the absence of any concerted program of education and awareness in regard to the impacts and benefits of industry development based on realistic scenarios of industry/project development, together with proposed measures for the management of impacts. While threat ID3C is difficult to ameliorate (either the decision is against community wishes or it isn't), threat ID3D consequences may diminish over time should participation in the identification and management of cultural heritage sites and impacts be demonstrated to be effective.

SV4 Capacity for sustainable economic activity

Decreased investment in pastoral and horticultural enterprises

ID4A Concern that long-term access to quality groundwater may be restricted due to industry development

Decrease in tourist visitation

ID4B Perception that 'outback' identity is compromised by 'major industrialisation' of the region

Increased cost of labour for local businesses

ID4C Higher gas industry wage rates available to local residents drives competition for employees

Local business closures

ID4D Industry demand attracts external specialist enterprises to establish and draw business from local businesses

Threat ID4A is currently felt strongly, prior to any detailed project proposal being advanced, and is likely to remain for the foreseeable future with the potential to restrict investment in pastoral or tourism enterprises, or impair their future sale value. The significance of the threat is assessed as high. The significance of the additional three threats are rated as low or very low for rural communities. Apart from small highway communities, it is not envisaged that development would occur in the immediate vicinity of communities which may induce perceptions of ‘major industrialisation’, and there is little to no evidence of this occurring in other gas development areas, such as the Surat Basin, where some communities have accommodated such development and built tourist attractions on its presence (e.g., Roma). The limited skills in small community populations, where labour markets are very thin, means that labour competition is a remote possibility.

Table 5.5 Rural communities' social value threat assessment

	Potential threat	Pre-mitigation assessment			Mitigation
		Likelihood	Consequence	Assessed risk	
	Social Value: SV1 Liveable community ***Impact: Impaired community amenity***				
ID1B	Increase in heavy vehicle traffic on local roads	Almost certain	Minor	Medium	• Project Traffic Management Plans • Community awareness campaigns, particularly for Aboriginal communities
	Social Value: SV1 Liveable community ***Impact: Impaired community amenity***				
ID1C	Conflict between supporters and opponents of unconventional gas industry development	Possible	Moderate	Medium	• Provide regular environmental and social monitoring results to communities • Implement regular community forums • Implement Grievance Management Program
	Social Value: SV1 Liveable community ***Impact: Impaired community amenity***				
ID1D	Receipt of royalties by a sub-set of community members	Almost certain	Major	Very High	• Provide financial management and investment support
	Social Value: SV1 Liveable community ***Impact: Impaired community amenity***				
ID1E	Concern over potential risk to groundwater quality	Almost certain	Major	Very High	• Provide regular environmental and social monitoring results to communities • Implement regular community forums • Implement Grievance Management Program

	Potential threat	Pre-mitigation assessment			Mitigation
		Likelihood	Consequence	Assessed risk	
	Social Value: SV2 Affordable lifestyle ***Impact: Decreased housing affordability***				
ID2A	Housing supply unable to meet spike in demand	Unlikely	Minor	Low	• Regular monitoring of housing affordability
ID2B	Increased short-term rental costs	Remote	Minor	Very Low	• Regular monitoring of housing affordability
	Social Value: SV3 Community identity and spirit ***Impacts: Loss of 'Outback' identity, Decreased community engagement with local governance, Increased sense of cultural loss***				
ID3A	Significant change in land use and industry development	Possible	Minor	Low	• Monitor community and visitor sentiment in rural communities
	Social Value: SV3 Community identity and spirit ***Impacts: Loss of 'Outback' identity, Decreased community engagement with local governance, Increased sense of cultural loss***				
ID3B	Perception of industry development heralding an era of 'industrialisation' of the landscape	Possible	Minor	Low	• Monitor community and visitor sentiment in rural communities
	Social Value: SV3 Community identity and spirit ***Impacts: Loss of 'Outback' identity, Decreased community engagement with local governance, Increased sense of cultural loss***				
ID3C	Perception that industry development approval is against majority community wishes	Likely	Moderate	Medium	• Implement regular community forums • Implement Grievance Management Program
	Social Value: SV3 Community identity and spirit ***Impacts: Loss of 'Outback' identity, Decreased community engagement with local governance, Increased sense of cultural loss***				
ID3D	Concern with increased access to, and development risks on, traditional country	Likely	Moderate	Medium	• Regular visitation and feedback to TOs on effectiveness of management measures • Implement robust land access protocols

	Potential threat	Pre-mitigation assessment			Mitigation
		Likelihood	Consequence	Assessed risk	
	Social Value: SV4 Capacity for sustainable economic activity ***Impacts: Decreased investment in pastoral and horticultural enterprises***				
ID4A	Concern that long-term access to quality groundwater may be restricted due to industry development	Likely	Major	High	• Provide regular environmental and social monitoring results to communities • Implement regular community forums • Implement Grievance Management Program
	Social Value: SV4 Capacity for sustainable economic activity ***Impacts: Decrease in tourism visitation***				
ID4B	Perception that 'outback' identity is compromised by 'major industrialisation' of the region	Possible	Minor	Low	• Monitor community and visitor sentiment in rural communities
	Social Value: SV4 Capacity for sustainable economic activity ***Impacts: Increased cost of labour for local businesses***				
ID4C	Higher gas industry wage rates available to local residents drives competition for employees	Remote	Negligible	Very Low	• Implement regular community forums • Implement Grievance Management Program
	Social Value: SV4 Capacity for sustainable economic activity ***Impacts: Local business closures***				
ID4D	Industry demand attracts external specialist enterprises to establish and draw business from local businesses	Remote	Negligible	Very Low	• Implement regular community forums • Implement Grievance Management Program

5.3. Impact summary and mitigation strategies

Table 5.6 and Table 5.7 list the threats for urban and rural communities respectively where the assessed risk of the threat occurring is medium or higher.

For urban communities, there is a medium level of threat to social values SV1, SV2 and SV4, primarily due to the potential for population increase and the concern for groundwater sustainability. The potential for community discord due to divergent attitudes to risk held by supporters and opponents of unconventional gas development is considered material, particularly as the townships have relatively low populations.

For rural Aboriginal communities, including pastoral properties in the Beetaloo sub-basin area, the key threats are to social values SV1 and SV4, primarily due to the perceived environmental risk to both quantity and quality of groundwater due to hydraulic fracturing required to extract gas from the shale. Receipt of royalties in remote Aboriginal communities also has the potential to induce income disparity that may negatively affect relations between different TO groups.

Table 5.6 Summary of medium and higher threat significance for urban communities

	Potential threat	Likelihood	Consequence	Assessed risk
ID1A	Rapid workforce influx to urban areas	Possible	Moderate	Medium
ID1B	Increase in heavy vehicle traffic on local roads	Likely	Minor	Medium
ID1C	Conflict between supporters and opponents of unconventional gas industry development	Possible	Moderate	Medium
ID1E	Concern over potential risk to groundwater quality	Almost certain	Moderate	High
ID2A	Housing supply unable to meet spike in demand	Possible	Moderate	Medium
ID2B	Increased short-term rental costs	Possible	Moderate	Medium
ID3C	Perception that industry development approval is against majority community wishes	Likely	Moderate	Medium
ID4A	Concern that long-term access to quality groundwater may be restricted due to industry development	Possible	Moderate	Medium
ID4C	Higher gas industry wage rates available to local residents drives competition for employees	Likely	Moderate	Medium
ID4D	Industry demand attracts external specialist enterprises to establish and draw business from local businesses	Possible	Moderate	Medium

Table 5.7 Summary of medium and higher threat significance for rural communities

	Potential Threat (Rural)	Likelihood	Consequence	Assessed risk
ID1B	Increase in heavy vehicle traffic on local roads	Certain	Minor	Medium
ID1C	Conflict between supporters and opponents of unconventional gas industry development	Possible	Moderate	Medium

	Potential Threat (Rural)	Likelihood	Consequence	Assessed risk
ID1D	Receipt of royalties by a sub-set of community members	Almost certain	Major	Very High
ID1E	Concern over potential risk to groundwater quality	Almost certain	Major	Very High
ID3C	Perception that industry development approval is against majority community wishes	Likely	Moderate	Medium
ID3D	Concern with increased access to, and development risks on, traditional country	Likely	Moderate	Medium
ID4A	Concern that long-term access to quality groundwater may be restricted due to industry development	Likely	Major	High

Particular challenges when undertaking both strategic and project-level SIA in the Beetaloo sub-basin include the remoteness of communities (influencing the time available to consult effectively), and the cultural diversity and differing world views of the major stakeholder groups – Aboriginal communities and pastoral leaseholders. The significance of these challenges is amplified due to the limited understanding of the nature of the unconventional gas industry, and of the technologies that would be deployed to extract gas and manage potential environmental and social impacts, as well as the distrust of governments and their capacity to regulate the industry effectively on behalf of all community members.

Despite these challenges, none of the identified threats are considered to be incapable of being mitigated and managed, as they are being managed in other onshore gas development areas currently. Effective management would require close collaboration between various industry groups and project proponents, government and the community to ensure that responsibility for management and reporting on sub-basin level impacts is clear, and that mechanisms for community feedback and response are widely-known and effective.

Indicative components of a social impact management program, based on the level of impact definition available from the high-level assessment, are outlined below. Additional activities would likely be identified when a more detailed project description is subject to a comprehensive project-level SIA.

5.3.1. Community

Ongoing effective community and stakeholder engagement is fundamental to the effective management of impacts and the maintenance of a ‘social licence to operate’. Key factors to consider in the development of a community engagement strategy include:

- The need for community industry awareness campaigns, particularly for Aboriginal communities. This needs to be an ongoing process, as the development and deployment of improved technology is proceeding at a rapid rate.
- The requirement for implementation of robust land access protocols.
- The need to provide regular environmental monitoring results to communities in a transparent manner that builds community confidence and trust in the monitoring process.

- Participation in regular community forums with government and other industry participants to discuss industry issues. Responsibility for the design and leadership of these forums may rest with government and peak bodies, however to be successful they will require the participation of industry at a senior level.
- The implementation of a Grievance Management Program, including community access to an independent advocate if necessary.
- The need for monitoring of community and visitor sentiment on a structured basis to ensure that the views of all sectors are heard and considered.
- The development and implementation of a workforce cultural awareness program and a workforce code of conduct to contribute to ongoing positive and supportive community relations.
- The development and implementation, in consultation with government, of local content policies and programs to maximise opportunity for Northern Territory business input and development.

5.3.2. Workforce and housing

The management of potential housing issues needs considerable care to ensure that housing market distortions are avoided. While communities generally do not favour FIFO practices, due consideration needs to be given to planning factors such as local availability of skills, and the sometimes limited period of time for which particular employment levels are required, such as the construction phase for a gas processing and compression plant where a high level of employment may only last around 18 months. Local planning needs to be based on realistic long-term employment levels. Factors to consider when developing local workforce recruitment and housing strategies include:

- The need to develop and implement a Workforce Accommodation Strategy with Local Government, with a view to integration with local procurement and logistics support strategies.
- The need for compliance with the Local Government planning scheme if considering the development of accommodation initiatives in urban areas.
- The need for ongoing monitoring of rental housing supply and vacancy levels to identify project-induced demand.
- The merits of implementing a rental support program for periods of high rental housing demand to ensure that low-income people are not priced out of the rental market.

5.3.3. Traffic

Project traffic management plans are generally effective in managing risks involved in the transport of personnel and materials required to develop projects provided that they:

- Identify risks to be managed on low-traffic local roads utilised by local community members.
- Ensure that there is a high level of traffic awareness and safe driver-behaviour requirements imparted to local community members.
- Provide for the training of project drivers and the monitoring and policing of driver behaviour.

5.4. Potential opportunities for enhancement of social values

While the development of unconventional gas extraction in the Beetaloo sub-basin is expected to be gradual under the conceptual development scenario and not schedule-driven as witnessed with coal seam gas development in the Surat Basin, there are likely to be a number of opportunities for the enhancement of social values, both in urban as well as rural communities. These could include:

- The development of an increased capacity in logistics operations, and the establishment of an unconventional gas industry support base, initially in Katherine but potentially in other towns such as Tennant Creek if favourable conditions eventuate. This would lead to increased employment, training and a broadening of the skills base of the local workforce, and potentially a modest population increase should workers see Katherine or Tennant Creek, as a desirable places to live.
- An opportunity, through local procurement of inputs for gas field development, to diversify the economic base of regional support towns through the attraction of new business ventures and the expansion of existing business ventures in construction, mechanical maintenance and industrial supplies.
- Collaboration between industry proponents may also provide an opportunity to establish regional support facilities, such as a worker accommodation village or an upgraded airstrip to handle FIFO transport, in proximity to a rural location (such as Daly Waters) where the opportunity for multi-use of the facility (such as for tourist accommodation) may expand and strengthen the economic base of the town.
- An opportunity, through gas industry supported activity, to deliver training and employment opportunity to residents of Aboriginal communities in the areas surrounding the Beetaloo sub-basin, building on employment and training activity that has been implemented as part of exploration work (undertaken by Pangaea and Origin Energy). This opportunity need not rely solely on the existence of Aboriginal Land Use Agreements (ILUAs) with TO groups, but be a product of a direct government policy to deliver benefits to rural communities. It must also be recognised that the poor housing conditions, in particular over-crowding, in remote communities is a particular barrier to employment retention and the ability to be fit-for-work at the commencement of a roster for community-based employees.
- Community input to gas field development plans provide an opportunity to plan infrastructure development such that communities may benefit (e.g., through improved access to particular sites of importance), as landholders could use gas field infrastructure to benefit property operations.
- Community involvement in regional environmental monitoring associated with industry development, through participation by natural resource management groups and Aboriginal ranger groups who already have demonstrated capacity. As well as providing employment opportunities, this could also act to increase community confidence in the transparency of company environmental management and monitoring programs.

The ability to capture these opportunities will require a collaborative approach to industry development by the Northern Territory Government, project proponents and representatives of the community, which aligns with the industry development approach outlined in the Northern Territory Government's Economic Development Framework[4] released on 20 June 2017. It would also be expected that initiatives aimed at enhancing community capacity to take advantage of opportunities

[4] See https://edf.nt.gov.au/growth-sectors/energy-and-minerals

that may be available through industry development would be developed and implemented during the strategic assessment phase, as recommended in the SIA Framework report (CSRM, 2017).

6. Issues to be considered in implementing the SIA Framework

CSRM (2017) identified leading practice SIA as comprising:

- Strategic, adaptive approach throughout lifecycle of development that addresses cumulative impacts.
- Communication, coordination and collaboration between industry participants.
- Independently-led, participatory social baseline assessment.
- Independently-led community engagement.
- Participatory, ongoing monitoring of social indicators and transparent reporting of results.

The SIA case study found that Aboriginal and other community members are highly sensitised to the potential impacts of an unconventional gas industry, particularly bio-physical impacts on surface water and groundwater, and impacts on their communities and values. Their concerns arise, in part, from a lack of detailed information about the potential unconventional gas industry and actual project proposals.

The Panel noted in its Interim Report (Inquiry, 2017b) that '*current knowledge by the Aboriginal community is inadequate, and as a consequence, this points to an emerging social risk with Aboriginal people becoming enmeshed in conflict between pro and anti-fracking groups'*.

This was evident in the consultation undertaken for the SIA case study.

The Panel also noted that '*it is imperative that accurate information is provided to the Aboriginal groups likely to be directly affected by hydraulic fracturing as soon as practicable, and that the peak bodies with responsibility for carrying out this work give the highest priority to ensuring this occurs well in advance of requirements for decision-making'*.

Information about unconventional shale gas development and hydraulic fracturing was provided to the Aboriginal and urban communities in the second consultation round and was generally well received, indicating that with appropriate planning and care, the knowledge base of Aboriginal communities can be raised sufficiently to enable them to make informed decisions and provide informed comment and input on potential impacts of unconventional gas development and their management.

Engagement with Aboriginal communities must adopt a structured approach that incorporates the following activities:

- **Preparatory meeting(s)** (as done in the second consultation round) that identifies the community members who should be consulted, their needs to participate in the consultation, the issues to be discussed, and appropriate dates and times for the meeting(s).
- **Social values meetings** during which the communities' social values are identified and documented. Sufficient time must be allowed for the complex issues relating to Aboriginal communities to be explored and understood.

- **Awareness meeting(s)** in which the communities are provided with information about unconventional gas development in sufficient detail to enable them to understand how development activities relate to, and might impact on their communities and their values. This engagement should include discussion of what is, and is not negotiable with respect to engineering and technical aspects of unconventional gas development.
- **Project-specific meetings** in which Aboriginal and other communities are presented with a development proposal and detailed information about its environmental and social impacts. This engagement should allow sufficient opportunity and time for community members to have input to the development concept and management of its impacts.
- **Implementation meetings** in which Aboriginal and other communities are invited to participate in environmental review or other similar committees that provide ongoing forums for managing project-community relations, monitoring of environmental and social impacts, and implementation of environmental and social programs.

Project proponents must have a relationship with the communities in which they operate or who they affect. The relationship will be most successful where it is developed over time through the staged approach outlined above. The conduct of community engagement must therefore balance the need for independently-led consultation (to build confidence in the process and veracity of data) with company ownership of the relationship (to build credibility, a working relationship and ensure accountability).

Project proponents are the most qualified to talk about their projects and the engineering and technical aspects of their proposed development, including how impacts will be managed. Technical experts are most qualified to talk about potential impacts and the effectiveness of proposed management measures. Community engagement must incorporate the following participants throughout the lifecycle of the project:

- Project proponent.
- Engineering and technical experts.
- Community members and their representative bodies.
- Independent stakeholder engagement consultants.

7. Conclusion

The Beetaloo sub-basin SIA case study assessed the impacts of a conceptual shale gas development on communities in and around the Beetaloo sub-basin. The affected communities were grouped into social catchments due to their relationship to the regional service centres of Katherine and Tennant Creek and the major roads that connected these centres and the communities.

Indicative social values incorporating the community capitals and IAIA values were identified based on experience in Northern Territory Aboriginal communities and with unconventional gas development in other jurisdictions. The values informed community consultation on the social impacts of unconventional gas development, which was conducted in two stages.

Detailed discussion to confirm the social values, understand community concerns and inform the social baseline was compromised by the short duration of the case study (in contrast to the long-term strategic approach proposed by CSRM (2017)), community opposition to an unconventional gas industry, and lack of a real project with clearly defined activities and impacts.

Despite heightened sensitivity to the impacts of unconventional gas development due to a concerted campaign by opponents of industry development, some communities were appreciative of the information provided in the second round of consultation, confirming that awareness and education are key factors in working towards a 'social licence to operate'.

The study found significant disparity between the regional service centres and remote Aboriginal communities due to their remoteness affecting access to services, their poor state of housing, limited access to a functioning labour market, and differences in health and education status. With development expected to be distant from these communities, the more pressing issue will be how they realise opportunities from unconventional gas development.

A range of threats and impacts, typical of unconventional gas development were identified. The key concerns for communities are impacts on surface water and groundwater resources, likely heightened by the PFAS contamination in and around RAAF Base Tindal near Katherine and incorrect assumptions about water management based on coal seam gas development in Queensland. The other key concerns relate to the manner in which Aboriginal communities will benefit from unconventional gas development, with the equitable distribution of benefits a major concern.

The study found that the identified threats and impacts can be managed using proven methods and strategies from unconventional gas development in other jurisdictions. Lessons learned in other jurisdictions will enable these approaches to be refined for the Northern Territory context and improved to avoid the suboptimal outcomes achieved in some instances.

The SIA Framework and CSIRO's guidelines for achieving a 'social licence to operate' will assist in overcoming community perceptions that an unconventional shale gas industry is:

- Short-term and cyclical in nature.
- Similar to the coal seam gas industry in Queensland, with similar impacts.
- Aloof to community concerns and has disregard for the social outcomes of development.

The strategic approach to compiling a social baseline proposed by CSRM (2017) will assist in identifying and managing cumulative impacts on the geographically dispersed and diverse communities.

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Appendix A - Affected community profiles

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1. Introduction

The approach to identifying and grouping affected communities into social catchments and compiling baseline profiles of the communities is presented in this appendix along with a regional overview and baseline information for affected communities in each social catchment.

2. Affected communities and social catchments

The Inquiry Terms of Reference defined 'affected communities' as:

> *the people or groups of people that are most likely to be impacted by the development of unconventional gas resources in and around the Beetaloo sub-basin… which may include, without limitation, community members, pastoralists, Aboriginal organisations and local businesses.*

By this definition, communities in and adjacent to the Beetaloo sub-basin are affected communities, particularly those in proximity to areas explored for unconventional gas reserves and those on or serviced by major transport routes, as these routes provide access to goods and services, labour markets and business opportunities. The affected communities, their relationship to the Beetaloo sub-basin and related transport routes are listed in Table A2.1.

Table A2.1 Affected communities and their relationship to the Beetaloo sub-basin

Affected community	Major transport route	Relationship to Beetaloo sub-basin
Katherine (town)	Stuart Highway	Outside; northwest of sub-basin
Barunga	Central Arnhem Road	Outside; northeast of sub-basin
Beswick	Central Arnhem Road	Outside; northeast of sub-basin
Mataranka	Stuart Highway	Outside; north of sub-basin
Jilkminggan	Roper Highway	Outside; northeast of sub-basin
Minyerri	Roper Highway	Outside; northeast of sub-basin
Ngukkurr	Roper Highway	Outside; northeast of sub-basin
Borroloola	Carpentaria Highway	Outside; east of sub-basin
Robinson River	Carpentaria Highway	Outside; east of sub-basin
Larrimah	Stuart Highway	Inside northern part of sub-basin
Daly Waters	Stuart Highway	Inside northern part of sub-basin
Dunmarra	Stuart Highway	Inside southern part of sub-basin
Newcastle Waters	Stuart Highway	Outside; south of sub-basin
Elliott	Stuart Highway	Outside; south of sub-basin
Tennant Creek	Stuart Highway	Outside; south of sub-basin

To facilitate assessment, the affected communities were grouped into social catchments. The factors influencing the clustering of the communities are:

- **Location and community links**: Centres with a population level that may indicate some potential for providing 'local employment' should sub-basin development proceed. Generally these communities are located outside of, but in proximity to, the Beetaloo sub-basin. Consideration of potential physical and cultural links are also important factors influencing grouping and the potential to experience shared perceptions of impact.
- **Logistics or support industry potential**: It is assumed that the development of an unconventional gas industry would require at least a moderate level of logistical and maintenance support. This could be a purpose-built area within gas field or a facility located in the existing large towns north and south of the sub-basin that currently support industrial activity, for example Katherine, which currently provides support to the mining industry and RAAF Base Tindal and/or Tennant Creek, which provides support to the mining industry.
- **Dominant economic activity**: Pastoral operations constitute the principal economic activity within the Beetaloo sub-basin, with the Stuart Highway and to a lesser extent the Carpentaria Highway facilitating economic activity associated with tourism.

These factors resulted in the affected communities being grouped according to the major transport route they used or were serviced by, and their relationship to Katherine and Tennant Creek, the regional towns north and south of the sub-basin respectively. Katherine and Tennant Creek were grouped together as they are the only urban centres in vicinity of the sub-basin. An overview of the social catchments and their affected communities is provided below.

2.1. Affected communities (urban)

This social catchment comprises the towns of Katherine and Tennant Creek, with populations of 9,800 and 3,000 respectively. Located on the Stuart Highway, these towns are service centres for their hinterland areas and have a higher population and broader array of services compared to the predominantly Aboriginal communities in the hinterland region. They have active community and business representative groups who plan and engage with government in order to draw public investment for development purposes in their area.

2.2. Affected communities (north)

The communities within this area to the east of Katherine include Barunga, Beswick, Mataranka, Jilkminggan, Minyerri, and Ngukurr. They have a combined population of approximately 3,300 of predominantly Aboriginal persons with the exception of Mataranka. These communities are within relatively easy reach of services available in Katherine. The furthest, Ngukurr, is located approximately 320 km east along the Roper Highway. Residents are likely to have traditional landownership interests in the northern part of the Beetaloo sub-basin and form a community of interest supported by access provided by the Roper Highway.

2.3. Affected communities (central)

The main communities in this area include Larrimah, Daly Waters, Dunmarra, Newcastle Waters and Elliott. They have a combined population of 460, which excludes residents on pastoral stations (of which there are 24 with land within the Beetaloo sub-basin). Common interests centre on pastoral operations, as well as servicing vehicle traffic (including the tourist trade) on the Stuart Highway.

While there may be limits on the ability to source a labour force from within this area, it could be expected that residents would seek opportunities for work and supplementary income, particularly if facilities and infrastructure were located on their properties.

2.4. Affected communities (east)

The main community in this area is Borroloola which has a population of approximately 700. Residents commonly access services in Katherine via the Carpentaria Highway through the Beetaloo sub-basin, but also in Tennant Creek accessed via the Tablelands and Barkly highways. Relationships extend north toward the Roper River and southeast toward the Queensland Gulf country and Mount Isa. As the nearest residential location to the McArthur River Mine, there are likely to be a number of residents with skills and work experience that are compatible with workforce requirements for a gas project, particularly during the construction phase where facilities and support infrastructure is being established.

The affected communities and social catchment they have been assigned are listed in Table A2.2.

Table A2.2 Social catchments and affected communities

Social catchment	Affected communities
Affected communities (urban)	Katherine (town) Tennant Creek
Affected communities (north)	Barunga Beswick Mataranka Jilkminggan Minyerri Ngukurr
Affected communities (central)	Larrimah Daly Waters Dunmarra Newcastle Waters Elliott
Affected communities (east)	Borroloola Robinson River

3. Baseline characterisation method

The term ‘baseline’ refers to the socioeconomic characteristics of affected communities. Data to support the characterisation of the socioeconomic baseline of affected communities is described in this section.

3.1. Data collection

The SIA case study reports secondary data collection. The primary data source was the Australian Bureau of Statistics (ABS). Table A3.1 presents the ABS statistical areas used in this report.

Additional information was sourced from the Northern Territory Government Treasury, as well as regional and local planning documentation developed by government and industry bodies.

Where possible, the latest census data (2016) was used. However, some data from the 2016 census was not available to the public at time of writing, and where this was the case 2011 census data was used.

Table A3.1 ABS statistical areas used in the SIA case study

Level	Statistical area level
Territory	
Northern Territory	SA4
Regional	
Katherine region	SA3-70205
Victoria River	SA2-702051068
Katherine Town	SA2-702051067
Elsey	SA2-702051065
Gulf	SA2-702051066
Social catchment	
Affected communities (urban)	
Katherine (town)	SA2-702051067
Tennant Creek	SA2-702021056
Affected communities (north)	
Roper Gulf RC	LGA-73600
Elsey	SA2-702051065
Barunga	SA1-7106501
Beswick	SA1-7106502
Mataranka	SA1-7106506
Jilkminggun	SA1-7106507
Minyerri	SA1-7106606
Ngukurr	SA1-7106608
Affected communities (central)	
Roper Gulf RC	LGA-73600
Elsey	SA2-702051065
Central Beetaloo	SA1-7106508
Elliott	SA1-7105510
Affected communities (east)	
Roper Gulf RC	LGA-73600

Level	Statistical area level
Borroloola	SA1-7106601
Borroloola surrounding area	SA1-7106602
Garawa	SA1-7106614
Mara	SA1-7106613
Yanula	SA1-7106612

3.2. Data analysis

In conjunction with community and stakeholder consultation, the data presented herein contributed to the derivation and substantiation of social values. A social value is defined in the SIA case study, as a quality of the area potentially subject to project effects for which community stakeholders have high regard, and that is conducive to individual or community well-being into the future.

The potential for a project to impair or enhance existing social values is central to assessing how communities may be affected if the unconventional gas industry were to be developed within the Beetaloo sub-basin.

The data informing the socioeconomic baseline is framed according to the social values, as defined in the SIA case study (which were in turn influenced by the data presented herein).

Four indicative social values were identified as being of importance to affected communities:

- SV1 Liveable community.
- SV2 Affordable lifestyle.
- SV3 Community identity and spirit.
- SV4 Capacity for sustainable economic activity.

The key indicators of these values differ depending on whether the community was rural or urban, as presented in Table A3.2 and Table A3.3. These indicators are intended to be illustrative rather than exhaustive.

Table A3.2 Social values and indicators for urban communities

Social value	Indicators (urban)
SV1 Liveable community	• Access to, and proximity of, quality services (health, education, aged care, childcare, retail etc) • Balanced demographic profile • Harmonious relationships, lack of conflict • Respect for law by community members • Adequate infrastructure that is well-maintained (housing, roads, airport, power, water and sewerage, telephone, internet) • Effective local governance • Opportunity for recreational, cultural and sporting pursuits • Safe social and physical environment
SV2 Affordable lifestyle	• Cost of land and housing • Local Government charges

Social value	Indicators (urban)
	• Income levels • Cost of food, power and other essential items
SV3 Community identity and spirit	• Level of volunteering and availability of assistance • Local celebrations • Recognition, preservation and promotion of heritage • Capacity to accommodate visitors • Perceptions of being able to influence community destiny • Employment share by industry
SV4 Capacity for sustainable economic activity	• Viability, vitality and diversity of local industry • Workforce participation and employment • Job creation and retention of young people • Supportive business environment (e.g. availability of serviced industrial land, adequate zoning, provision of information on opportunities) • On-going environmental integrity (e.g. surface and groundwater, land degradation) • Willingness of business to invest

Table A3.3 Social values and indicators for rural communities

Social value	Indicators (rural)
SV1 Liveable community	• Proximity and access to traditional country • Degree of satisfaction with management of traditional country • Respectful and harmonious relationships within and between communities (both Aboriginal and non-Aboriginal) • Access to service delivery (in particular health and education) that acknowledges and respects culture • Ability for extended family residence • Respect for law by community members • Adequate infrastructure that is well-maintained (roads, airport, power, water and sewerage, telephone, internet) • Effective local governance • Opportunity for recreational, cultural and sporting pursuits • Safe social and physical environment
SV2 Affordable lifestyle	• Availability of adequate housing • Income levels • Cost of housing • Cost of food, power and other essential items
SV3 Community identity and spirit	• Recognition and promotion of cultural heritage • Perceptions of being able to influence community destiny • Existence of viable enterprise activity • Number and strength of Aboriginal organisations • Status of reconciliation with non-Aboriginal community • Level of volunteering and availability of assistance • Local celebrations
SV4 Capacity for sustainable economic activity	• Availability of employment opportunities • Aboriginal workforce participation and employment • Aboriginal business start-ups and ownership • Level of education achievement, including retention to Year 12 and post-school destinations

4. Katherine regional context

A regional summary is provided as context for the affected communities' baseline profiles. The relevant region is the Katherine region, also known as the 'Big Rivers Region'. This summary is not intended to be a comprehensive characterisation of the region – it is intended as a high-level overview of key social characteristics.

The Katherine region extends from the border of Western Australia to the border of Queensland, and to the Gulf of Carpentaria in the north. It covers an area of 326,250 square kilometres and is represented by four SA2-level statistical areas: Victoria River, Katherine Town, Elsey and Gulf. The region recorded a population of 18,710 at the 2016 census, equating to 8.1% of the Northern Territory population. Katherine Town, the fourth largest town in the Northern Territory, is the regional centre for the provision of government and private sector services.

Summary regional statistics are shown in Table A4.1. These data show that Katherine Town dominates statistics for the Katherine region, comprising over half of the regional population. People identifying as Aboriginal or Torres Strait Islander (ATSI) comprise approximately 49% of the regional population, and between 70% and 85% in areas outside of Katherine Town. Outside of Katherine Town, English is a minority language.

This suggests that social analysis must be conducted at a community scale rather than a regional scale, because broad-scale analyses would not capture significant variations within the region. Studies and/or communications should be multi-lingual to reflect a variety of primary languages.

Table A4.1 Summary statistics for Katherine region (ABS Census, 2016)

	Northern Territory	Katherine region	Victoria River	Katherine Town	Elsey	Gulf
Population	228,836	18,716	2,487	9,777	2,301	4,151
% Territory	100%	8%	1%	4%	1%	2%
% Region	-	100%	13%	52%	12%	22%
ATSI People	58,248	9,162	1,829	2,179	1,635	3,519
%	25.5%	48.9%	73.5%	22.3%	71.1%	84.8%
Median age	32	29	25	33	29	25
ATSI median age	25	23	22	25	25	22
Top 3 languages spoken at home	English (58.0%)	English (46.3%)	English (21.7%)	English (65.0%)	Kriol (61.5%)	Kriol (41.8%)
	Kriol (1.9%)	Kriol (19.9%)	Warlpiri (19.1%)	Kriol (4.6%)	English (21.1%)	English (31.2%)
	Djambarrpuyngu (1.9%)	Warlpiri (2.8%)	Gurindji (13.6%)	Tagalog (1.2%)	Rembarrnga (0.4%)	Nunggubuyu (5.8%)

Notwithstanding intra-regional variations, broad characteristics of Katherine region can be set out. This section discusses population and demographics, the region's economic profile, and the degree of community services available.

4.1. Population and demographics

As shown in Table A4.1, the population of Katherine region was 18,710 persons in 2016. Population trends in the past and projected into the future are shown in Table A4.2. This projection suggests that the rate of Aboriginal population growth is projected to be more than twice the growth rate of the non-Aboriginal population in the 2021–2026 period.

In future, there is likely to be a larger Aboriginal population, both numerically and as a proportion of the total population. The growth rate of the non-Aboriginal population is projected to slow, which may accentuate the proportional difference between Aboriginal and non-Aboriginal populations.

Table A4.2 Population growth rates (past, current and projected) for Katherine region

	2011–2016	2016–2021	2021–2026
Katherine region Aboriginal population	1.1%	1.1%	1.2%
Katherine region non-Aboriginal population	0.7%	0.7%	0.5%

Source: Northern Territory Department of Treasury and Finance, Northern Territory Population Projections Main Update (2014 Release)

Population growth is not expected to be uniform across the region, as Table A4.3 shows. Growth rates ranged from 2.3% annually in Elsey, compared to a 0.2% decline in Victoria River. There does not appear to be any correlation between growth rates and the proportion of Aboriginal persons.

Table A4.3 Population growth within Katherine region (2011–2016)

SA2-level statistical area	2011 population	2016 population	Annual growth rate	% ATSI in 2016
Katherine (town)	9,209	9,777	1.2%	22%
Gulf	4,044	4,151	0.5%	85%
Victoria River	2,515	2,487	-0.2%	74%
Elsey	2,054	2,301	2.3%	71%

The proportion of ATSI persons varies significantly across the region (Table A4.1Table A4.1 and Table A4.3). Aggregated as a region, the ratio of Aboriginal to non-Aboriginal persons within the Katherine region was 49% in 2016, representing a slight decline from previous years (Figure A4.1).

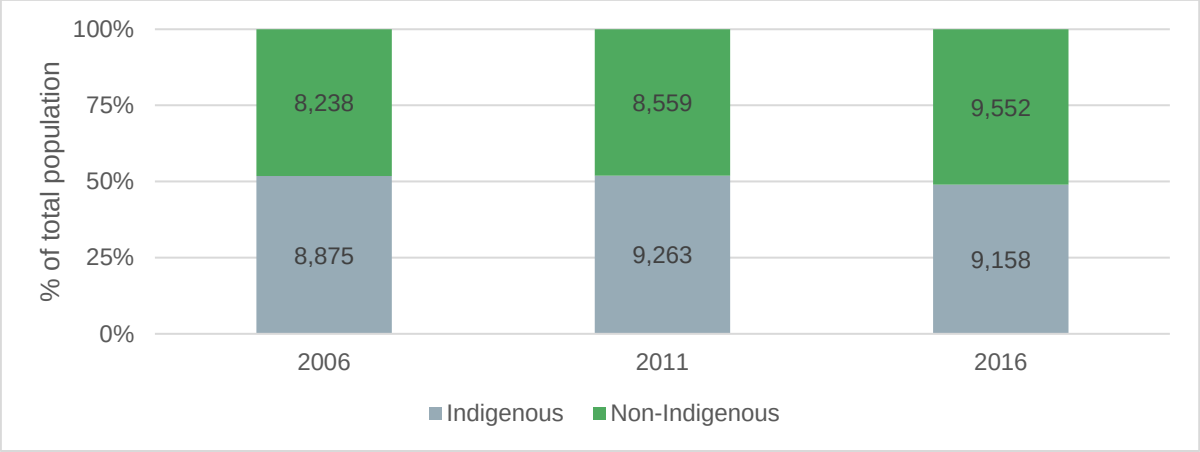


Figure A4.1 Aboriginal and non-Aboriginal populations in Katherine region (2006–2016)

4.2. Major industries

Katherine region had a gross regional product of $1,338 million in 2011–2012 (Regional Development, 2014), equating to 7.4% of the Northern Territory's gross state product. The major industries in the region are defence, mining, tourism, public administration, agriculture, forestry and fishing.

Defence

The defence sector contributes approximately $42 million annually to the gross regional product, and 46% of businesses service the sector in some form (Regional Economic Development Committee, 2014). Two military facilities are located within the region: the RAAF Base Tindal, and the Australian Army's Bradshaw Field Training Area. The Northern Territory Government notes that the Department of Defence has a significant infrastructure program proposed for the Northern Territory over the next decade (Defence Strategy Northern Territory, 2016).

Mining

The mining industry is the highest contributing industry to the Katherine regional economy, making up $293 million in gross regional product in 2011-2012 and employing 265 people (Regional Economic Development Committee, 2014). Major mining operations include McArthur River Mine, Redbank Mine and Mataranka Limestone. There are also a number of quarries and extractive operations (sand, soil, rock, gravel). The McArthur River Mine is situated near Borroloola, and is a large-scale zinc-lead mine. The mine has been operating since 1995 and is the world's second largest zinc resource. The mine operates 24/7 on a fly-in fly-out basis. In 2013, regulatory approval was given to increase production to 5 million tonnes per annum and extend the mine life to 2037. Since 2007, the mine has invested more than $12.3 million into the Roper Gulf Region through the MRM Community Benefits Trust and other community service initiatives and employed 762 people (McArthur River Mine, 2017).

Tourism

Tourism is a major industry in the Katherine Region. Key tourist attractions include Nitmiluk National Park, Edith Falls, Daly Waters Pub, and Mataranka Hot Springs, as well as other cultural tourism and fishing opportunities. Tourism in the Katherine Region is highly seasonal with peak activity during the dry season, between May and August. In the previous year (ending March 2017), the Katherine Daly

tourism region recorded 317,000 visitors, slightly lower than the three-year average of 339,000 visitors from 2015–2017 (Northern Territory Tourism, 2017). Of all visitors, 54% of overnight visitors are from elsewhere within the Northern Territory, 36% are interstate, and 10% international (ibid).

Agriculture, forestry and fisheries

Agriculture, forestry and fisheries contributed $144 million to the gross regional product in 2011-2012, and employed over 700 people (Regional Economic Development Committee, 2014). Of all field and horticultural crops produced in the Northern Territory, over 40% are supplied from the Katherine region (Northern Territory Farmers, 2015). Key crops include mangos, melons, hay/fodder, citrus and nursery/turf products. Similarly, nearly 40% of all cattle in the Northern Territory are raised in the Katherine region (Regional Economic Development Committee, 2014), which are generally exported through the Port of Darwin. This industry more than doubled in its gross regional product contribution in the decade between 2002 and 2012.

Public administration and safety

The public administration and safety industry contributed $139 million to the gross regional product in 2011-2012, employing 1,922 persons, more than any other sector (Regional Economic Development Committee, 2014). However, there was a slight decline of about 3% over the preceding decade, indicating that this industry is steady but slightly receding.

4.3. Workforce participation

ABS data for the Katherine region indicates that approximately 40% of people of working age (15 years or older) are not employed. Figure A4.2 indicates that this pattern was steady between 2001 and 2011. Figure A4.3 shows that Aboriginal persons tend to be disproportionately unemployed within the Katherine region.

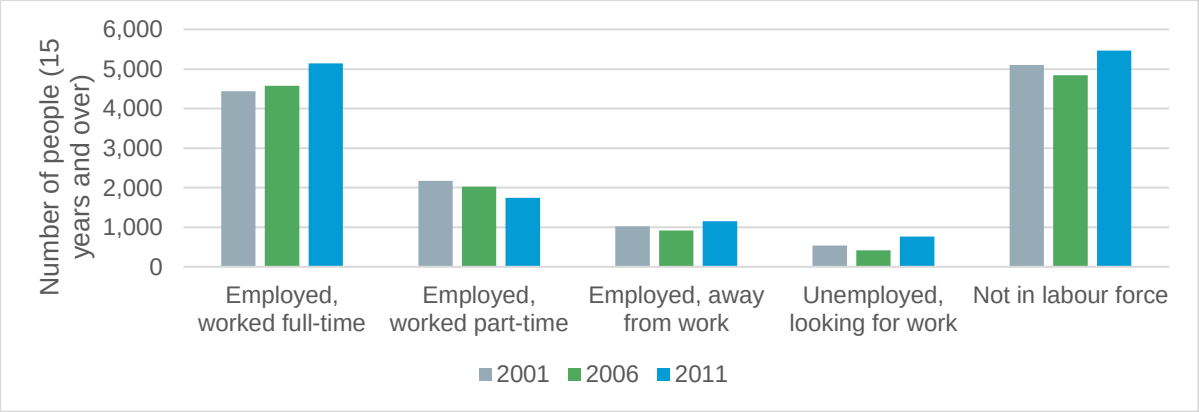


Figure A4.2 Workforce engagement in the Katherine region (2001–2011)

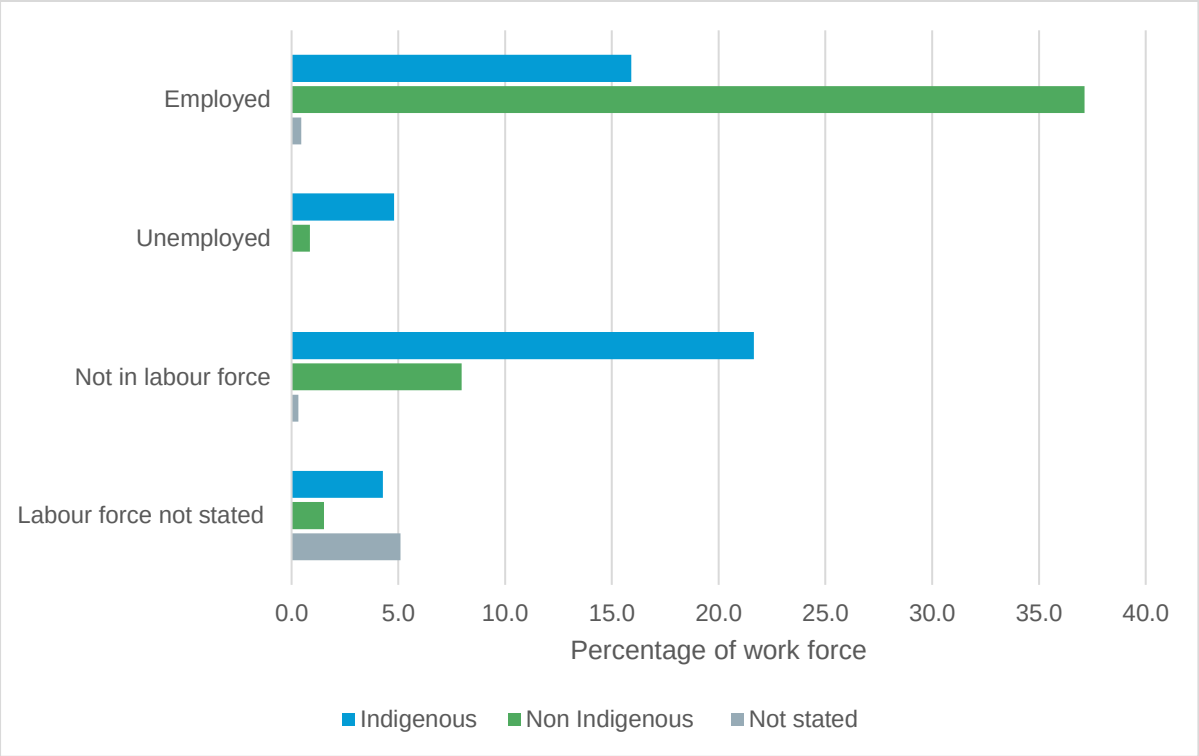
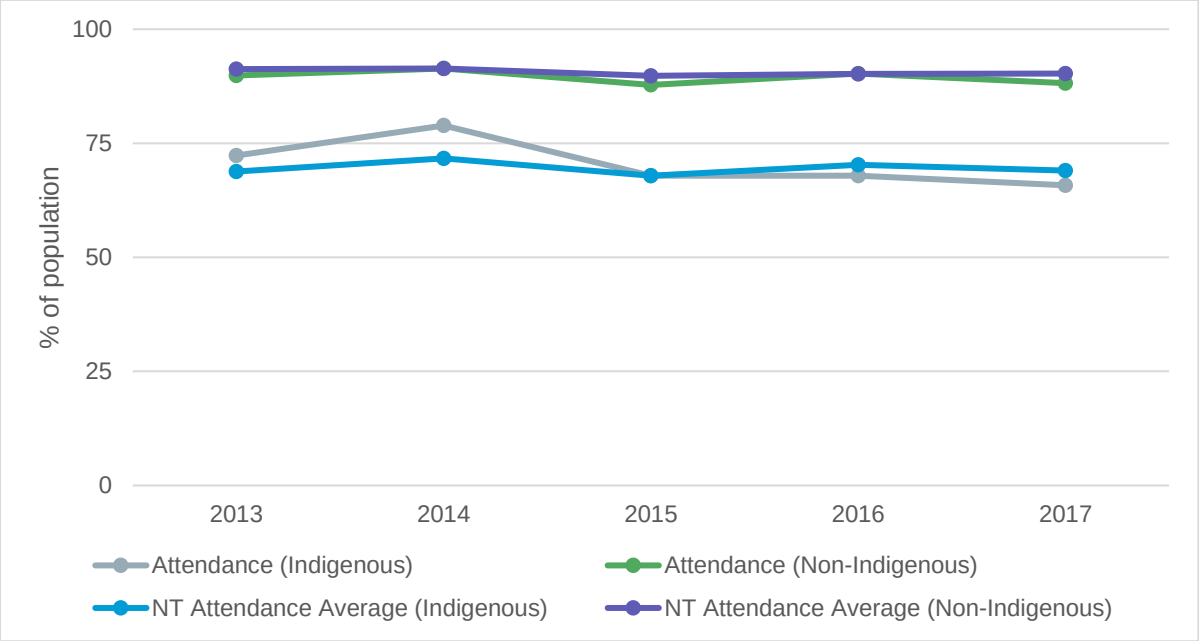


Figure A4.3 Aboriginal and non-Aboriginal engagement in the work force in the Katherine region

4.4. Education

Access to educational facilities varies across the region. In Katherine (town), there are eight schools which collectively cater for high school, primary school and special needs. Across the region, students usually have access to the one school in the town or community which caters for all students from kinder to Year 10 or 12 (NT Government, 2017).

School attendance rates in the Katherine region are presented in Figure A4.4. Aboriginal attendance is consistently lower than non-Aboriginal attendance, by over 20% in some years, which is also the case for the Northern Territory as a whole.



Source: NT Department of Education, 2017

Figure A4.4 School attendance in the Katherine region compared to Northern Territory average

4.5. Health services

The region's major hospital (Katherine Hospital) is located in Katherine town and has 60 beds. Specialist or acute health conditions which cannot be treated in Katherine are most often transferred to Darwin or Adelaide hospitals. There are a number of community General Practitioners and Aboriginal health organisations in the region.

Katherine West Health Board (KWHB) and Sunrise Health Service Aboriginal Corporation are the two major Aboriginal and remote health providers for the region. KWHB health board provides health services to remote aboriginal communities to the West of Katherine. The Sunrise Health Service Aboriginal Corporation works with communities to the east of Katherine (Sunrise Health Services Aboriginal Corporation, 2016).

4.6. Cost of living

The cost of housing within Katherine region (2011 compared to 2016) is presented in Table A4.4. The median rent rose approximately 5.3% per year. In both years, a minority of households paid rent equivalent to more than 30% of the household's income – but, as a percentage of all households, this proportion more than doubled between 2011 and 2016. This may indicate a rising trend of affordability stress for renters, though more research would be required to determine underlying reasons. For example, the possibility of rental increases in Aboriginal communities following the Commonwealth and NT Government Strategic Indigenous Housing and Infrastructure Program.

Homeowners within the Katherine region did not exhibit similar levels of stress. Monthly mortgage payments increased less than 2% between 2011 and 2016. The proportion of households spending more than 30% of the household's income nearly halved over the same period, suggesting that homeownership had become more affordable relative to income levels over the 5-year period.

The cost of goods (as given in Table A4.5) rose on average 2.4% per year.

Table A4.4 Katherine regional rental and mortgage breakdown

Category	2011	2016	2011	2016	2011	2016
	Katherine region		Northern Territory		Australia	
Median rent	$100	$130	$225	$315	$285	$335
Households where rent payments are 30%, or greater, of household income (%)	3.4%	7.6%	9.0%	9.1%	10.4%	11.5%
Mortgage monthly repayments ($)	$1,700	$1,733	$2,054	$2,167	$1,800	$1,755
Households where mortgage payments are 30%, or greater, of household income (%)	4.8%	2.5%	7.7%	5.5%	9.9%	7.2%

Source: ABS Census, 2011 and 2016

Table A4.5 Katherine regional cost of food basket survey

Area	2010	2011	2012	2014	2015
Katherine district average	$724	$797	$796	$801	$814
Katherine supermarket	$508	$565	$542	$571	$559
Katherine corner stores	$656	$720	$628	$746	$800

Source: NT Department of Health, 2012, 2014, 2015

5. Baseline profiles for affected communities

This section presents social baseline information for the four social catchments, within which affected communities have been grouped. The baseline information is sorted according to the social values identified. As discussed in the introduction to this appendix, the purpose of this information is to provide an evidence base for the SIA. As a high-level SIA case study, the evidence collected was not intended to be comprehensive, but to provide an indicative baseline for each social value.

5.1. Affected communities (urban)

This social catchment comprises Katherine town and Tennant Creek. Katherine is the fourth largest town, with 4% of the Northern Territory's population, about a quarter of which is Aboriginal. It is located 312 km southeast of Darwin on the Katherine River. The Katherine Local Government area covers 7,417 square kilometres. The Stuart Highway runs through Katherine, linking the town to Darwin in the north and other urban centres to the south.

The Aboriginal people of Katherine live in different communities located in and around Katherine. The largest of these are Mialli Brumby (also known as Kalano), which is located along the northern side of the Katherine River, and Rockhole, which is 15 km from the town centre. The other living areas are Binjari, Walpiri, and Gorge Camp (Jodetluk). Many Aboriginal people also live within the Katherine town itself.

Tennant Creek is the Northern Territory's fifth largest town, with 2% of the Northern Territory's population, about a half of which is Aboriginal. It is located on the Stuart Highway, approximately 989 km south-southeast of Darwin. The Traditional Owners of the area surrounding Tennant Creek are the Warumungu people. The two main Aboriginal languages spoken are Warumungu and Walpiri. The other main languages in the region are Walmanpa, Alyawarra, Kaytete, Wambaya and Jingili (Northern Institute, 2013).

Tennant Creek is located in the Barkly Region and serves as the region's key service centre. In addition to the major towns and major populations, the Barkly Region includes eight minor communities, 70 family outstations, 49 pastoral stations, mining operations and commercial properties (Jemena, 2016).

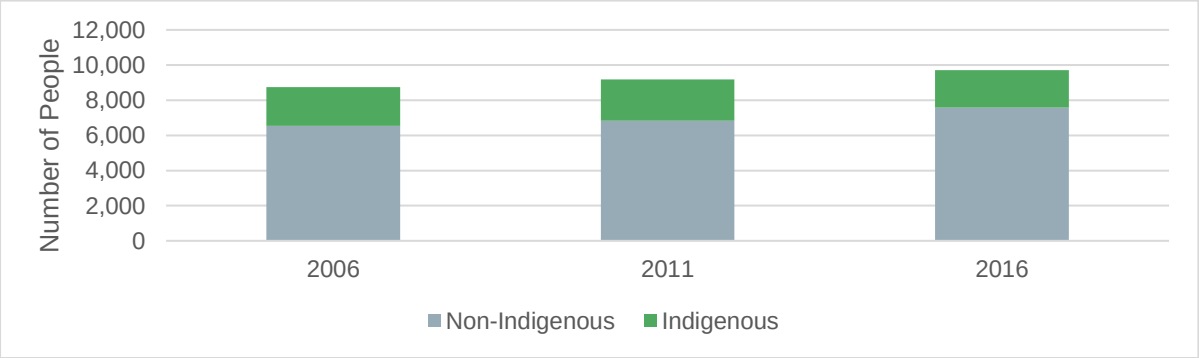
Katherine and Tennant Creek are grouped in the same social catchment because they share characteristics as urban communities. Because they are not located proximately to each other (being separated by over 600 km), baseline information for each will be presented separately.

5.1.1. Baseline information for Katherine town

SV1 Liveable community

Population and demographics

According to the 2016 census, Katherine town has a population of 9,717 persons with a median age of 33 – older than the other areas of Katherine region and likely due to its relatively lower proportion of ATSI people (22% compared with 49% for the region), who tend to have a lower median age (see Table A4.1). The total population has exhibited steady growth over the last decade (Figure A5.1).

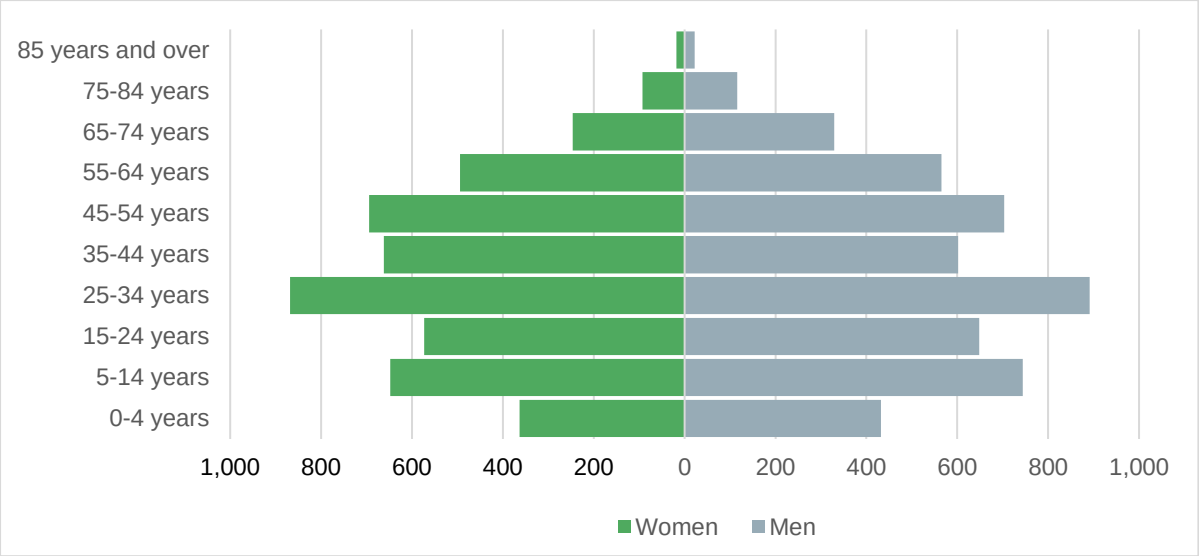


Source: ABS Census, 2016

Figure A5.1 Katherine town population growth (2006–2016)

The average household size has been 2.8 persons per household since the 2006 census, with an average of 1 person per bedroom (Table A5.1). This may be due to Katherine being made up largely of working-age non-Aboriginal residents, and school-age and older working-age Aboriginal residents (Northern Institute, 2014). Figure A5.2 presents an age-sex pyramid for Katherine for 2016, showing

that the town's population tends to be 25 to 54 years of age, with relatively fewer children and young adults.



Source: ABS Census, 2016

Figure A5.2 Age-sex pyramid of Katherine town

The population turnover (the sum of intra-Territory, interstate and overseas migration as a percentage of the resident population) is high, reaching 63% in 2011 (ibid). This suggests a certain level of demographic instability, possibly leading to fluctuating needs of Katherine town over time. Non-Aboriginal migrants tended to migrate to and from other Australian states, while Aboriginal migrants tended to be intra-Territory migrants moving to and from Roper Gulf, Victoria River, Daly, and Darwin.

Table A5.1 Median age and household demographics for Katherine town

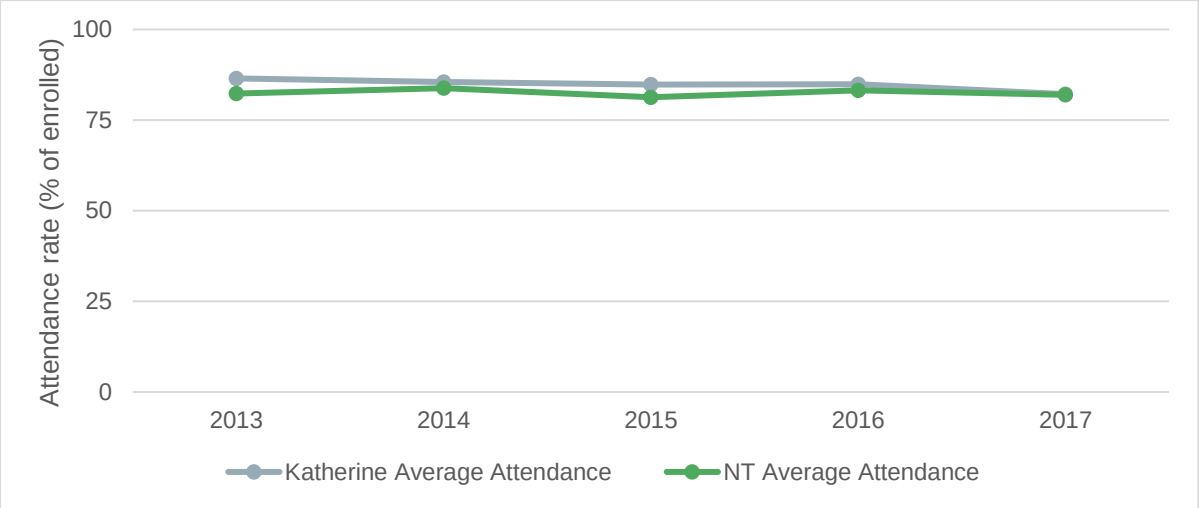
Category	2006	2011	2016
Median age	31	31	33
Average household size	2.8	2.8	2.8
Average number of people per bedroom	1	1	1

Education

Katherine has a number of public and private primary and high schools. These include St Joseph's Catholic College, Kintore Street School, Clyde Fenton Primary School, Katherine High School, Mac Farlane Primary School, Katherine South Primary School and Casuarina Street Primary School. The Kintore School caters for students with physical and intellectual impairments from pre-school to Year 12. Charles Darwin University also has a campus located on the outskirts of Katherine which offers agriculture, rural operations, conservation and land management and automotive courses.

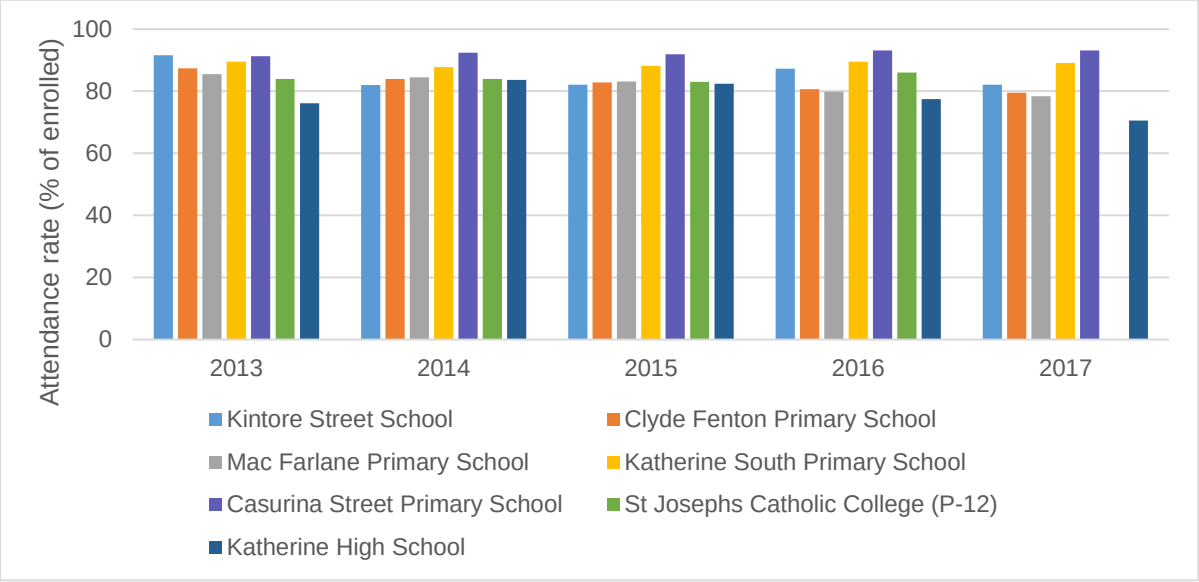
The attendance rates for the Katherine schools have been declining over the last five years, but until 2017 have historically been higher than the Northern Territory average (Figure A5.3). When disaggregated by school (Figure A5.4), it can be seen that primary school attendance has declined

over the last five years but remained above 78%, while attendance at Katherine High School has dropped below 71% in 2017.



Source: NT Department of Education, 2017

Figure A5.3 Katherine school attendance rates compared to the Northern Territory average



Source: NT Department of Education, 2017

Figure A5.4 Katherine town attendance - by school

Crime

Katherine has seen an increase in crime against people and property over the last two years. Crimes against the person were committed at a rate of 5,290 per 100,000 population in 2016–2017, a 16% increase from the previous year. Crimes against property were committed at a rate of 9,128 per 100,000 population in 2016–2017, a 23% increase (Northern Territory Police, 2017).

The rate of crime against the person in Katherine is close to double the rate of Darwin and is slightly less than Alice Springs. The rate of crime against property is less than Darwin and significantly less than Alice Springs. The Northern Territory has the highest offender rate in Australia.

In 2016, the highest offending group in the Northern Territory was 20 to 24 year olds (ABS Census, 2016). The Northern Territory Government is spending $18.2 million on youth crime prevention and allocating funding for new youth workers for Katherine as part of a youth justice system overhaul (Jones, 2017).

Community services

As Katherine is the largest town in the region it acts as a community services hub. Commonwealth and Territory Governments have offices and staff based in the town which service the wider region. The Northern Territory Police have a large station in Katherine. Many other non-government organisations and community groups are clustered in Katherine. Some of these include Anglicare, Red Cross, Beyond Blue, Cares NT, Cancer Council, Head Space, Lion's Club, Salvation Army, Apprenticeships NT, Women's Crisis Centre and RESPECT – Relationships Australia.

There are a large number of community and social groups in the town. These include Big River BMX Club, Katherine Air Force Cadets, Katherine Archery Club, Katherine Bowls Club, Roller Derby, Community Radio Station, Girl Guides, Krocs Social Rugby Club, Senior Citizen Association, QLife (for lesbian, gay, bisexual, transgender and intersex) and Landcare groups.

Katherine has a number of facilities and programs for young people. There are four sports ovals (two with lights for night use), a BMX track, a skate park, children's adventure playground, aquatic centre and a number of park and recreational areas.

The Katherine YMCA provides an Aboriginal youth program which is targeted at assisting students at risk of disengaging from education. In July 2017, the Commonwealth Government committed $200,000 to support the program (Aboriginal Affairs Media Hub, 2017). The YMCA also provides youth diversion programs for at risk youth and boys and girls groups which provide activities and social networks. The YMCA Community Youth Development provides constructive and engaging youth activities, events and programs and schools holiday programs.

The lists of community services is much greater than other towns and communities within the region. Katherine's population has far greater access to community and government support services than any other town in the Katherine Region.

Health

As Katherine is a regional hub there are a number of large health services based in the town, including Katherine Hospital. The Katherine Hospital is a non-specialist public hospital that services Katherine and the surrounding region and remote areas. It has 60 beds and a 24-hour emergency department.

Katherine also has general practitioner community practices, Aboriginal health clinics and mental health services. The Wurli Wurlinjang Health Service provides services to Aboriginal people in Katherine. Significant health issues impact Aboriginal populations in Katherine. There is a high level of endemic diseases such as diabetes, rheumatic heart disease, and chronic heart and kidney disease (Roper Gulf Regional Council, 2017). These endemic diseases are linked to the relative poverty of the region and lifestyle issues such as high alcohol consumption, high smoking rates,

overcrowded social housing and poor nutrition (ibid). There is a significant health gap between Aboriginal and non-Aboriginal Australians which is apparent within the Katherine population (ibid).

Access to health services is significantly better for the Katherine population than the wider Katherine Region.

Infrastructure

Katherine is a regional hub and the largest town in the region, with correspondingly sophisticated infrastructure relative to the rest of the region. Katherine has a small shopping mall with retail outlets, a Woolworths supermarket, chemists, bakeries and bottle shops. There are a number of other retail outlets, cafes, fast food restaurants, pubs, petrol stations, and shopfronts around Katherine.

There is also a number of government buildings including a courthouse and tourist information centre. The aquatic centre, sports grounds and showgrounds are all managed by the Katherine Town Council (Katherine Town Council, 2009). There is also a speedway where racing events are held. The roads in Katherine are all sealed and access to Katherine is open all year, other than in major flood events.

Katherine has a number of tourism facilities and accommodation. There are two small museums, art centres and a visitor's centre. There are a number of hotel and motel accommodation businesses in Katherine which support the seasonal tourism business.

Most of the major banks have offices in Katherine including the Commonwealth Bank, ANZ Bank, Westpac Bank, Bendigo Bank and the Territory Insurance Office.

Katherine has a domestic airport and RAAF Base Tindal. There is a large amount of infrastructure on the base to support the Defence population.

Katherine is currently experiencing ground and drinking water contamination from PFAS chemicals. The contamination has been linked to the use of firefighting foams on the RAAF Base Tindal and treatment options are currently being explored. This contamination has heightened the towns concerns around risks posed to water from other technologies, such as hydraulic fracturing.

SV2 Affordable lifestyle

The cost of housing and rental costs have remained proportional over the last five years, although rental costs increased at a slightly faster rate (Table A5.2). The median personal income between 2011 and 2016 increased 22%, while rental costs increased 25%. There was a 40% increase in the proportion of households who devoted more than 30% of their household income to rent. This increase was less than the region as a whole, which more than doubled over the same period. Home ownership appeared to have become relatively cheaper compared to income.

Table A5.2 Income and housing statistics for Katherine town

Category	2011	2016
Median total personal income ($/weekly)	$758	$922
Median total family income ($/weekly)	$1,766	$2,081
Median total household income ($/weekly)	$1,429	$1,690
Median rent	$200	$249
Households where rent payments are less than 30% of household income (%)	93.8%	91.4%

Category	2011	2016
Households where rent payments are 30%, or greater, of household income (%)	6.2%	8.6%
Mortgage monthly repayments ($)	$1,733	$1,733
Households where mortgage payments are less than 30% of household income (%)	94.9%	96%
Households where mortgage payments are 30%, or greater, of household income (%)	5.1%	4%

SV3 Community identity and spirit

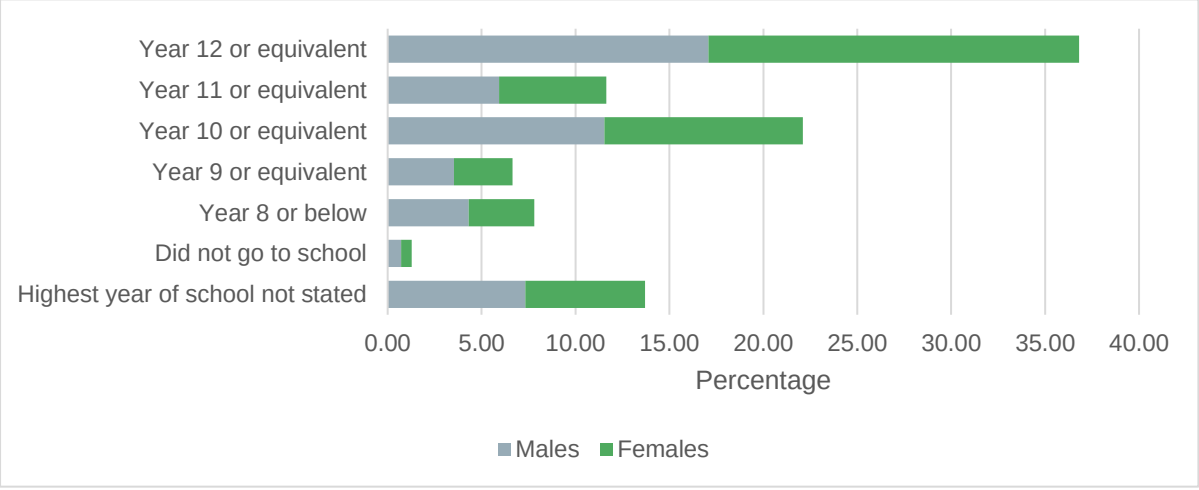
Being the major town within Katherine region, Katherine provides community services and functions which engage people from across the region. Katherine is a large multicultural town, with a strong Aboriginal and agricultural history and identity. It attracts tourists each year from across Australia and from overseas. Being the largest town in the region, Katherine has a wide range of community events, social activities and shows which draw people from across the region.

Katherine has a number of community forums including the Katherine Times newspaper, the local 8KTR Community Radio Station, the Katherine Community Markets held each Sunday morning and a number of community social and interest groups. One of the largest annual events is the Katherine Agricultural Show, which people from across the region travel to attend and compete in various events.

The Department of Defence has a number of initiatives to help promote community and inclusion in Katherine and on the Defence RAAF Base Tindal (Defence Community Hub, 2017). These include a community-based newsletter, swimming sessions, choir and a special needs support group.

SV4 Capacity for sustainable economic activity

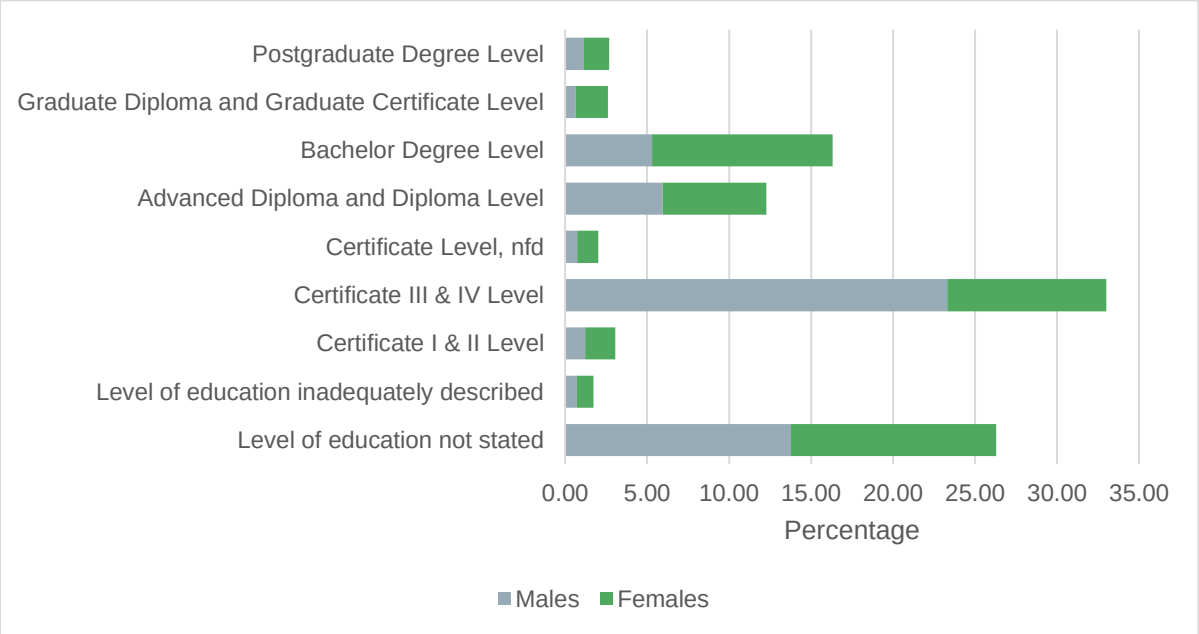
The most common level of education achieved in Katherine is Year 12, as shown in Figure A5.5. This is significantly different to the Roper Gulf and surrounding communities, where Year 10 and below where the most commonly achieved. Katherine is comparable to Darwin, which also has Year 12 as the highest level of education achieved.



Source: ABS Census, 2011

Figure A5.5 Katherine highest level of education achieved

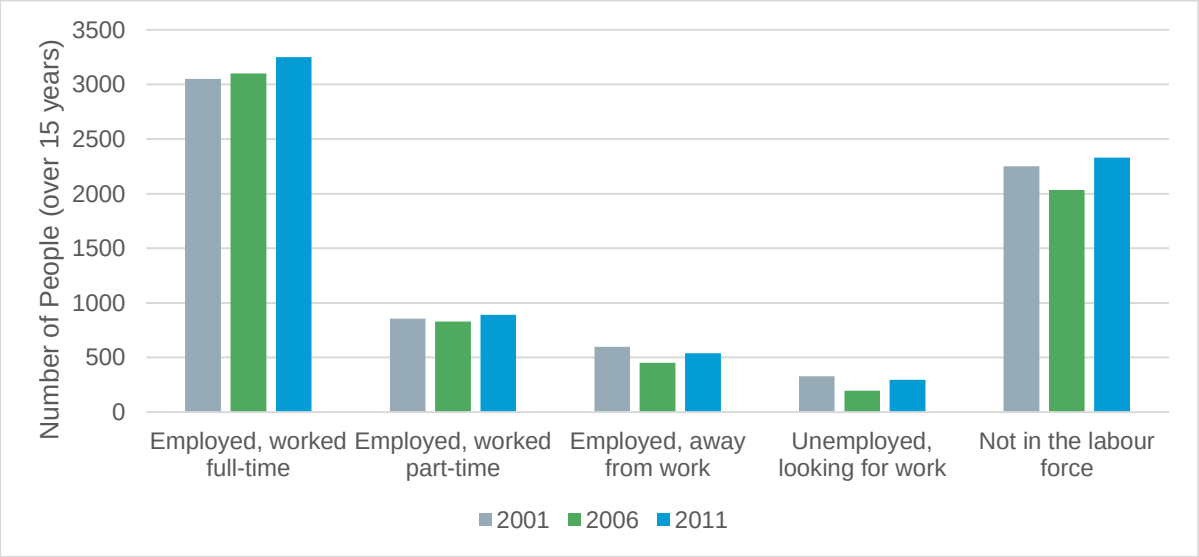
The most commonly achieved post-school qualification is a Certificate III and IV (Figure A5.6), comparable to patterns in the Roper Gulf. Higher levels of education, including advanced diplomas and bachelor degrees are commonly achieved in Katherine than the wider region. This is likely due to the high level of government, health and social services based in Katherine. The access to Charles Darwin University Campus would also influence the population's tertiary education levels.



Source: ABS Census, 2011

Figure A5.6 Katherine non-school qualifications

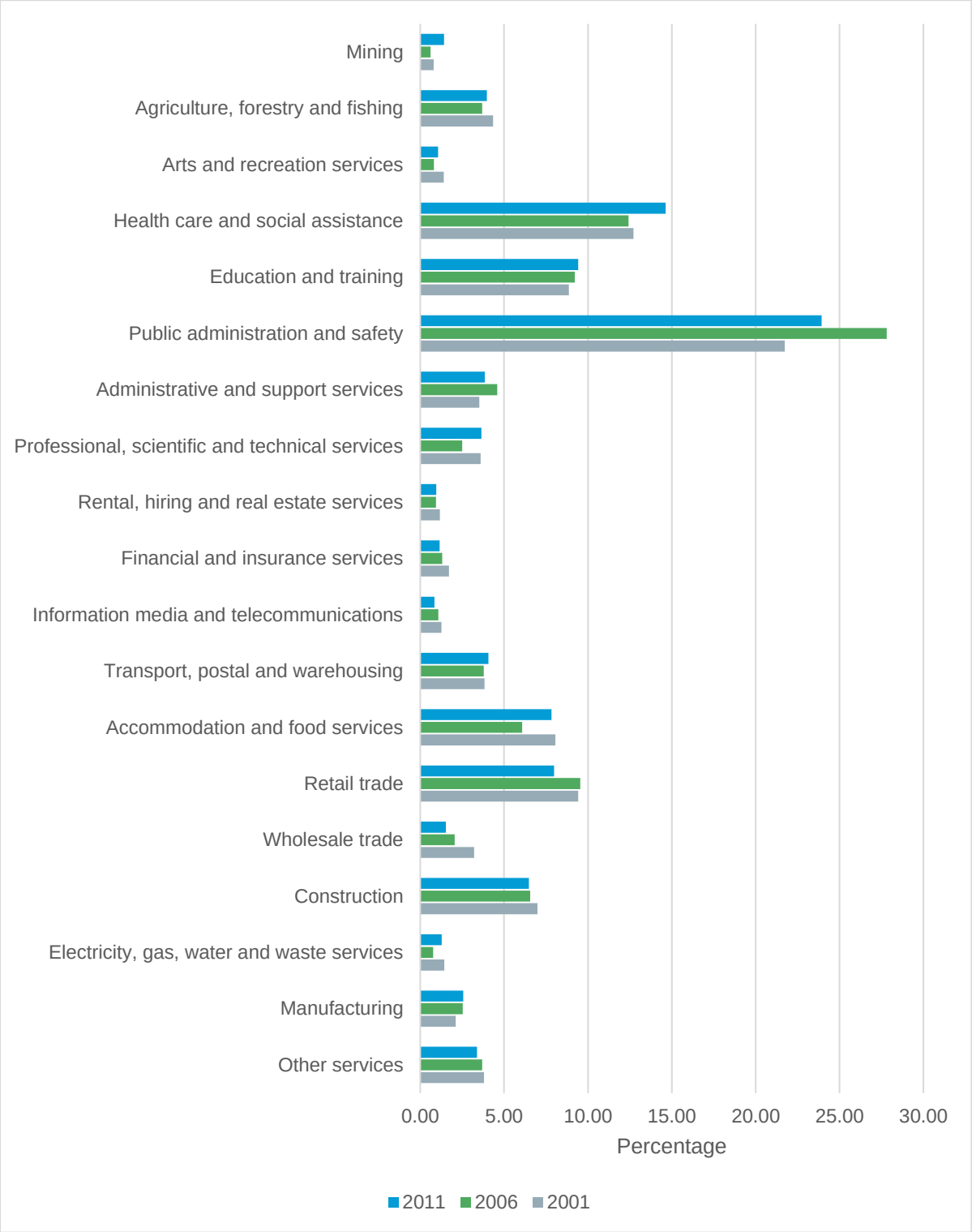
The majority of the Katherine population was employed full-time between 2001 and 2011, indicating a highly engaged workforce. Census data is shown in Figure A5.7.



Source: ABS Census, 2011

Figure A5.7 Workforce participation in Katherine

The key employment sectors in Katherine town are public administration and safety, health care and social assistance, and education and training (Figure A5.8). Katherine town also operates as a supply hub for regional businesses, as discussed above.



Source: ABS Census, 2011

Figure A5.8 Employment by sector in Katherine town

5.1.2. Baseline information for Tennant Creek

SV1 Liveable community

Population and demographics

Tennant Creek is the Northern Territory's fifth largest town, with 2% of the Northern Territory's population. It is located on the Stuart Highway. The Traditional Owners of the area surrounding Tennant Creek are the Warumungu people. The two main Aboriginal languages spoken are Warumungu and Walpiri. The other main languages in the region are Walmanpa, Alyawarra, Kaytete, Wambaya and Jingili (Northern Institute, 2013a).

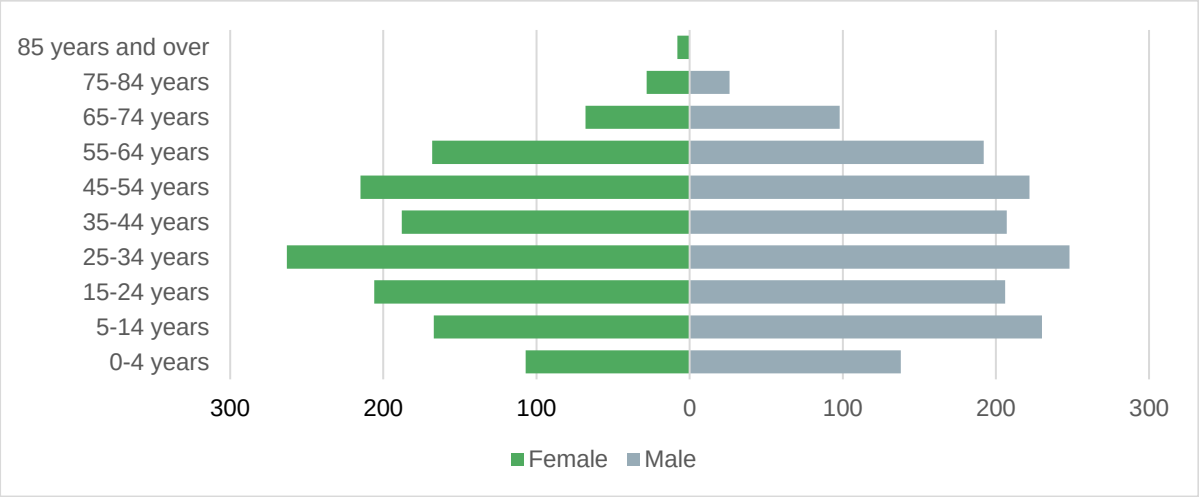
Tennant Creek is located in the Barkly Region and serves as the region's key service centre. In addition to the major towns and major populations, the Barkly Region includes 8 minor communities, 70 family outstations, 49 pastoral stations, mining operations and commercial properties (Barkly Regional Council, 2011).

Tennant Creek has a population on 2,991 and has seen a 2% decrease in population of since 2011 (Table A5.3). The median age in Tennant Creek in 33, which is slightly higher than the Northern Territory average, and the age bracket 25 to 34 years of age is the largest (Figure A5.9; also Northern Institute, 2013a). While non-Aboriginal residents tend to migrate to and from the town to interstate, Aboriginal residents migrate in from the surrounding region and out to Darwin and interstate (ibid).

Table A5.3 Key demographic data for Tennant Creek

Category	2006	2011	2016
Median age	31	32	33
Average household size	2.9	2.9	2.7
Average number of people per bedroom	1	1	1

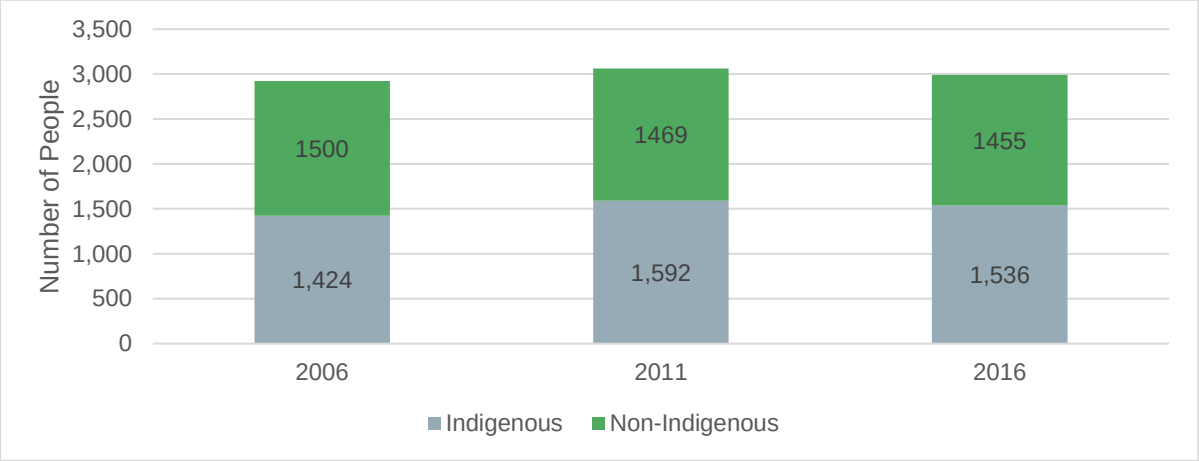
Source: ABS Census, 2006, 2011 and 2016



Source: ABS Census, 2016

Figure A5.9 Age-sex pyramid for Tennant Creek

Tennant Creek makes up close to half of the Barkly Region's population of 6,893, which is estimated to increase by 8.9% by 2021–2026 (ABS Population Projections, 2008). As can be seen in Figure A5.10, Aboriginal residents make up approximately 50% of the population.



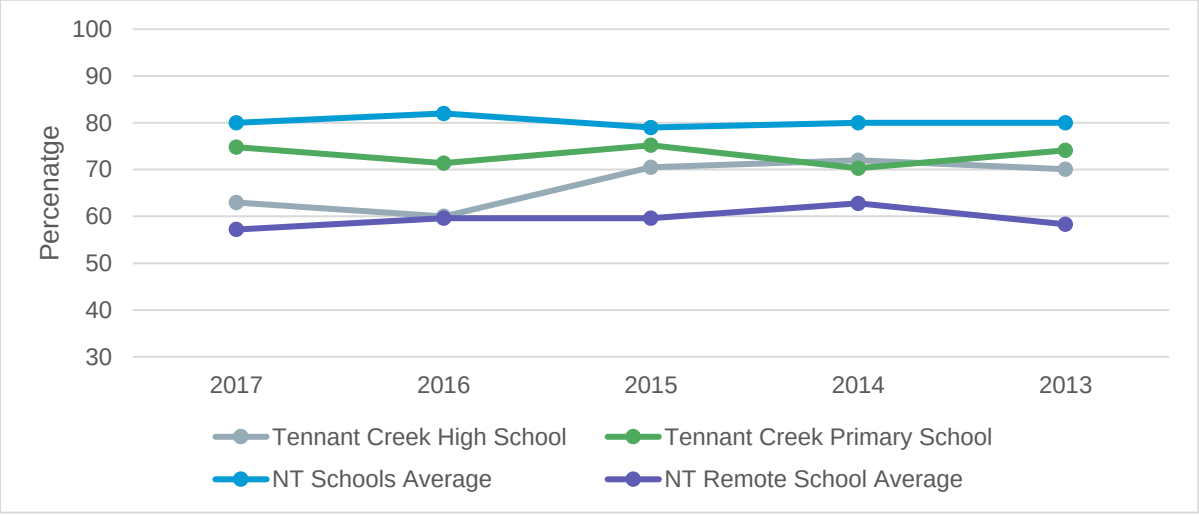
Source: ABS Census, 2016

Figure A5.10 Tennant Creek population breakdown – Aboriginal and non-Aboriginal

Education and community services

As Tennant Creek is a region hub for the Barkly Region, it has a number of community services. These include childcare services, school nutrition programs, aged cared and disability services, safe houses, night patrol, community arts center, Australian Post and Centrelink. A number of government departments, legal services and commercial business located in Tennant Creek.

One primary school and one secondary school are located in Tennant Creek. School attendance averages in the town fluctuate below the Northern Territory average but sit above the average attendance rates for remote schools (Figure A5.11) (NT Department of Education, 2015).



Source: NT Department of Education, 2015

Figure A5.11 Tennant Creek school attendance compared to Northern Territory averages

Crime

Tennant Creek recorded 10,647 crimes per 100,000 against the person and 17,208 per 100,000 against property between July 2016 and June 2017 (Northern Territory Police, 2017). During this time there was a 19.9% increase in crimes against the person and a 7% increase in crimes against property. Crimes against the person in Tenant Creek are approximately 26% higher per 100,000 than across the Northern Territory. Crime against property in Tennant Creek is approximately 17% less per 100,000 than across the Northern Territory (ibid).

Health

While health data specific to Tennant Creek was not available, the Northern Territory Medicare Local Health Atlas of 2014 (Medicare Local Northern Territory, 2014) indicated that the Barkly Region has a low Index of Relative Social Disadvantage (IRSD). The Barkly Region fell within the lowest decile of IRSD ranking within Australia. The IRSD is a general socioeconomic index that summarises a range of information about the economic and social conditions of people and households within an area. The mortality ratio for the Barkly region (the number of deaths per 1,000 people over a given period) is approximately 13.3, which is higher than the Northern Territory ratio of 7.6. According to the Northern Territory Medicare Local Health Atlas of 2014 the Barkly Region is of particular concern for low birth weights, with almost a quarter (24.7%) of the babies having a low birth weight (ibid).

Tenant Creek has a 20-bed hospital which provides accident and emergency and outpatient facilities. The hospital also provides allied health services, aged care and visiting specialists' services. St John Ambulance is located at the hospital and services a 150 km radius around Tennant Creek.

Anyinginyi Health Aboriginal Corporation provides primary health care and dental services to Aboriginal people in Tennant Creek and the surrounding region in addition to services such as community development, sport, and alcohol after care and education. More than 2,500 people access Anyinginyi's health clinic each year, with 90% of services and 80% of patients being Aboriginal (Jemena, 2016).

SV3 Affordable lifestyle

Housing and income data for Tennant Creek is provided in Table A5.4. Rental costs have risen 14% in the last five years, while personal income has risen only 3%. The average personal income is $650 per week, which is approximately a quarter less than the Northern Territory average and nearly a third less than Katherine.

Table A5.4 Housing affordability in Tennant Creek

Category	2011	2016
Median total personal income ($/weekly)	$631	$650
Median total family income ($/weekly)	$1,401	$1,592
Median total household income ($/weekly)	$1,373	$1,551
Median Rent	$125	$175
Mortgage monthly repayments ($)	$969	$1,216

Source: ABS Census, 2016

SV4 Community identity and spirit

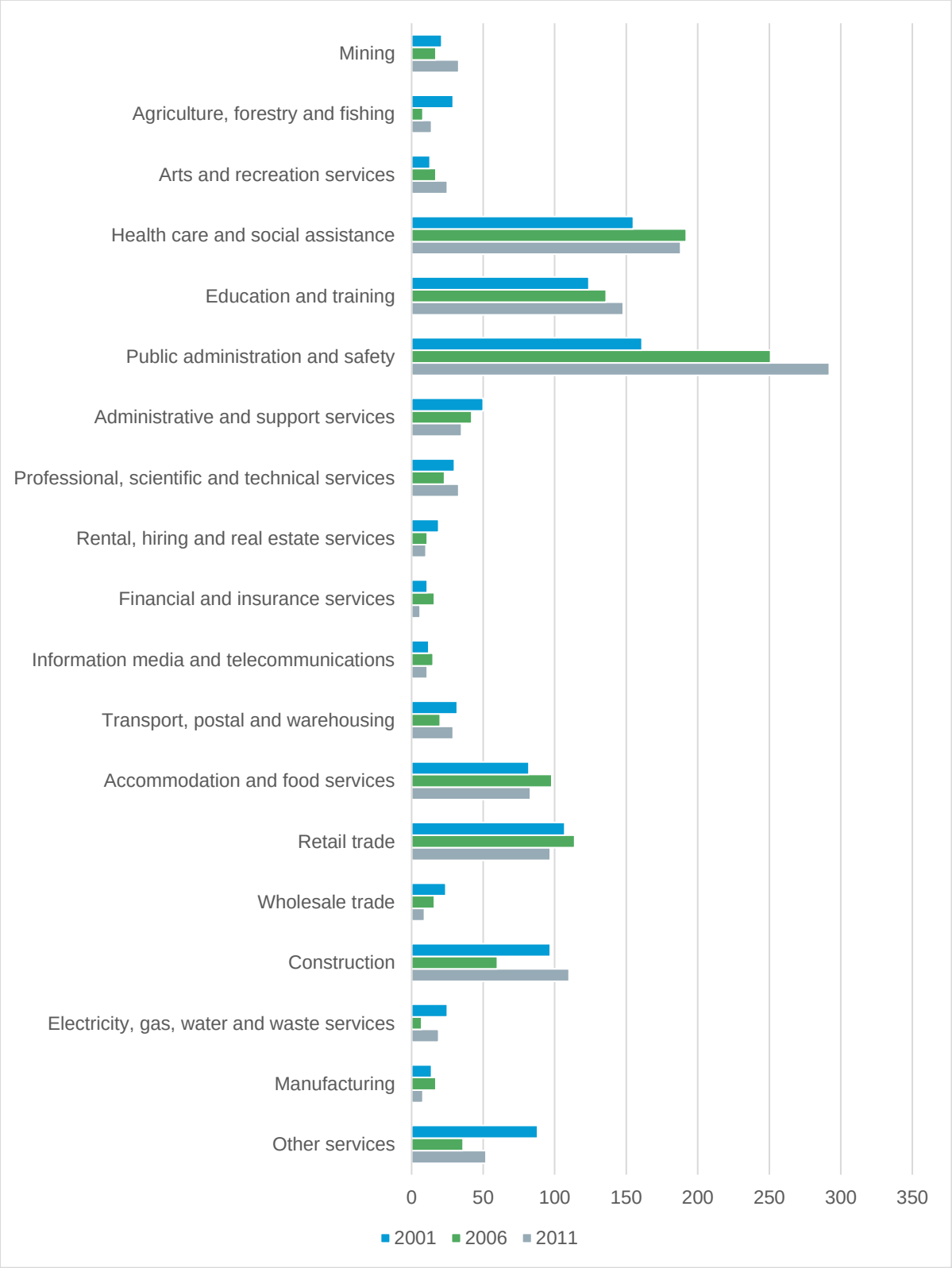
Tennant Creek is a multicultural society, with half of the population identifying as Aboriginal. There are residents from a range of nations including England, India, Germany, Greece, Philippines, Nepal and New Zealand (ABS Census, 2016). The region has a strong and proud Aboriginal history which is celebrated in the Nyinkka Nyunyu Art and Culture Centre, which has a number of fixed exhibitions which tell the local history from an Aboriginal point of view (Nyinkka Nyunyu Art and Culture Centre, 2004). It is also a space where local community performances are held, including traditional and contemporary dance, music, theatre and visual arts. Interstate and Northern Territory artists also hold performances and community events at the centre (Nyinkka Nyunyu Art and Culture Centre, 2004).

Tennant Creek is an important social and cultural hub for the Barkly Region. The town holds a number of large regional events which bring together people from across the region and Australia. A major community event is the annual Dessert Harmony Festival. The festival is the region's platform for the culturally diverse population to present, engage, participate and access the arts. The festival attracts artists from across Australia and allows the region to celebrate creativity and cultures (Desert Harmony Festival, 2017).

Tennant Creek also holds the Barkly Campdraft and Rodeo, which brings together a large number of people from pastoral stations across the region. The historic significance of this event represents the tradition of practicing, and competing in, the pastoral skills that provided the backbone of establishing the cattle industry and the pastoral stations that are one of the major economic factors in the region (Do the NT, 2017). Several horse racing events throughout the year also draw people to the town from across the Northern Territory.

SV4 Capacity for sustainable economic development

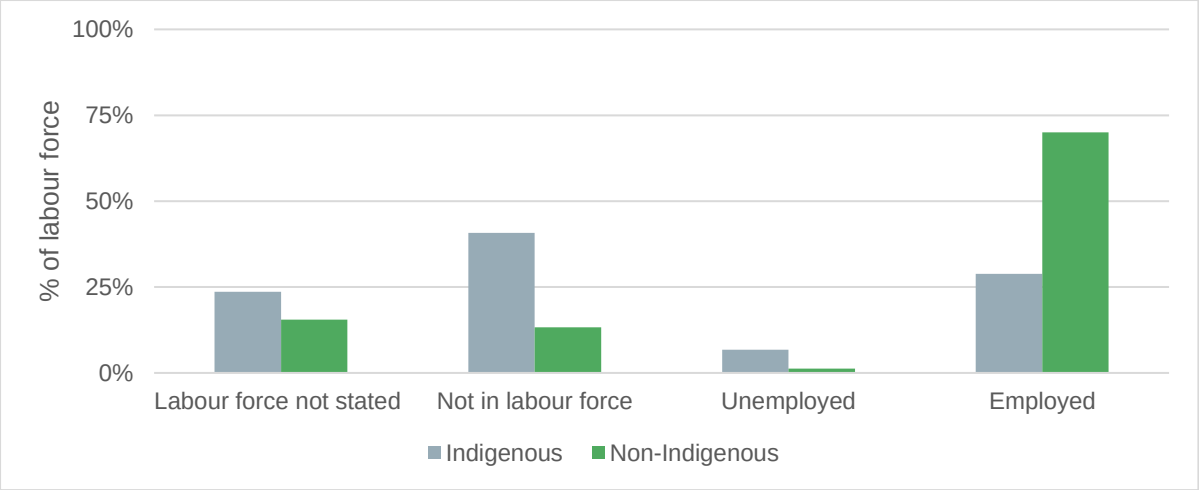
The key industries in and around Tennant Creek are mining, cattle and tourism. Public administration, health/social assistance and education/training are the highest areas of employment in Tennant Creek (Figure A5.12). Accommodation/food services and retail trade are also high areas of employment, due to their connection with the tourism industry.



Source: ABS Census, 2011

Figure A5.12 Employment by Industry in Tennant Creek

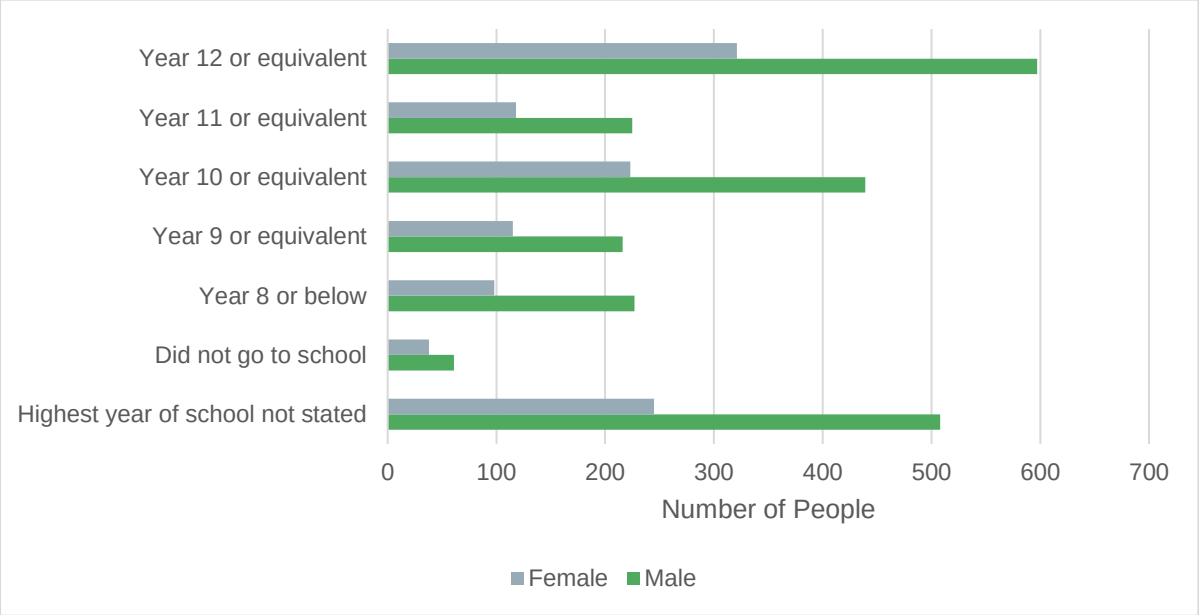
Unemployment in the Barkly Region is a significant issue. The overall unemployment rate of 8.9% for Tennant Creek was the highest in the Northern Territory in 2015, although it was down from 9.6% in 2014 (Jemena, 2016). The unemployment rate for Aboriginal people is 23.1% in the Barkly region. This is almost four times the Northern Territory unemployment rate (Jemena, 2016). Similarly, Figure A5.13 shows that unemployment among Aboriginal people is significantly higher than among non-Aboriginal people.



Source: ABS Census, 2011

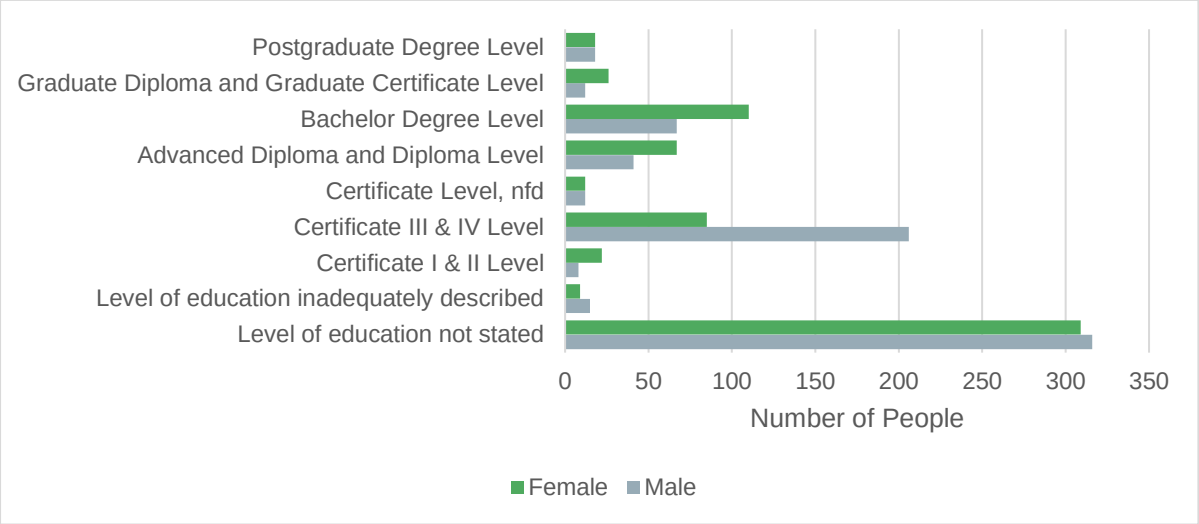
Figure A5.13 Workforce participation in Tennant Creek

Figure A5.14 and Figure A5.15 provide an indication of the educational attainment in Tennant Creek. Overall, 27% completed Year 12, while 41% did not progress beyond Year 10. Certificate III and IV qualifications was the most commonly completed non-school training.



Source: ABS Census, 2011

Figure A5.14 Highest level of schooling attained in Tennant Creek



Source: ABS Census, 2011

Figure A5.15 Non-school qualifications in Tennant Creek

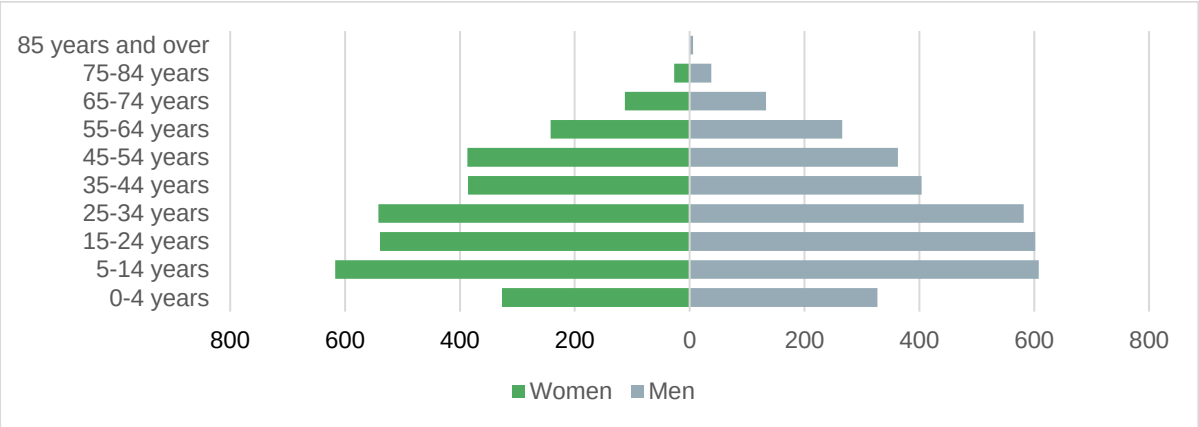
5.2. Affected communities (north)

There are six communities in this social catchment: Mataranka, Barunga, Beswick, Jilkminggan, Minyerri and Ngukurr. These communities are all serviced by the Roper Gulf Regional Council. This region is largely rural and has a number of small towns and Aboriginal communities and outstations. The Roper Gulf Regional Council area encompasses a total land area of nearly 186,000 square kilometers, with roughly one person for every 26 square kilometers.

5.2.1. SV1 Liveable community

Population and demographics

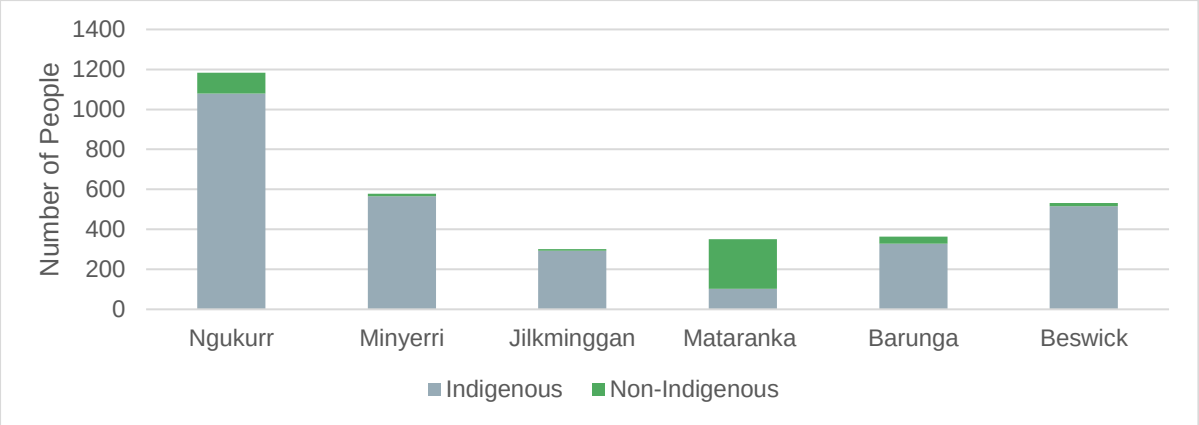
The Roper Gulf Region in 2016 had a population of 6,505. The region is demographically young with a median age of 26 years. The population has grown at approximately 1.3% each year since 2006. Figure A5.16 shows a generally balanced population, with the exception of low numbers of children 4 years old and younger. It is unclear why this pattern was recorded.



Source: ABS Census, 2016

Figure A5.16 Age-sex pyramid of Roper Gulf region

The population is predominantly Aboriginal across all communities within this social catchment, as shown in Figure A5.17. The only exception is Mataranka, which is 71% non-Aboriginal.

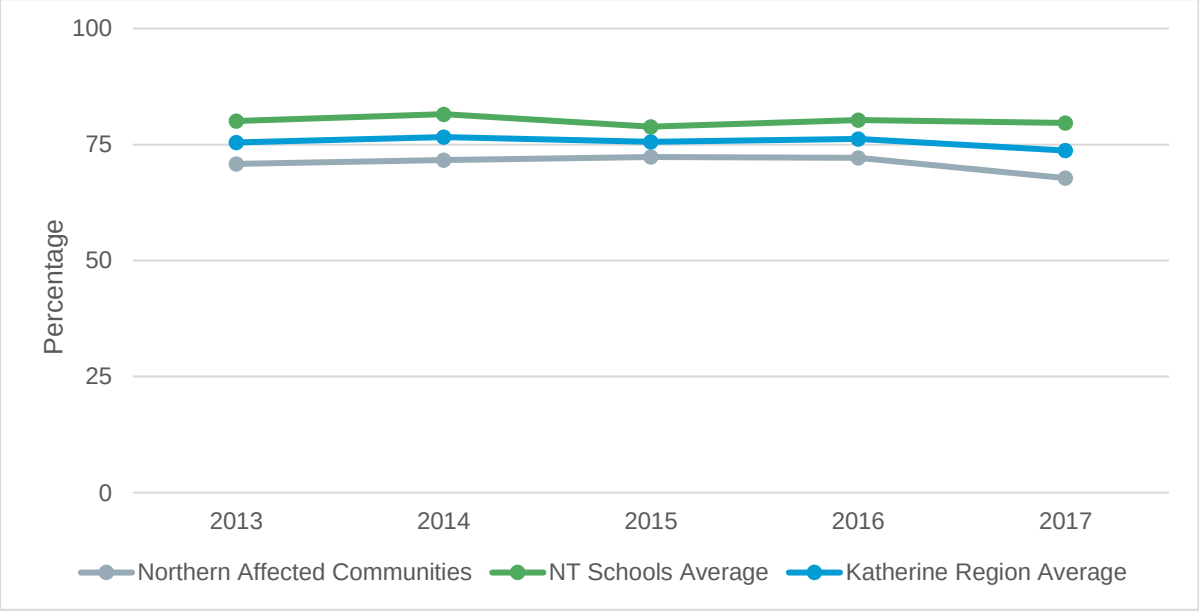


Source: ABS Census, 2016

Figure A5.17 Aboriginal and non-Aboriginal population of Affected communities (north)

Education

Each community has a primary and/or senior school, suggesting that educational facilities are accessible in all communities. The school attendance rate across the Roper Gulf Region is 10% to 15% below the Northern Territory rates, and 5% to 10% lower than the Katherine regional average, as shown in Figure A5.18.



Source: NT Department of Education, 2017

Figure A5.18 School attendance in Affected communities (north)

Figure A5.19 shows school attendance disaggregated by community. Attendance is relatively higher for Mataranka, Minyerri and Ngukurr, compared to Barunga, Beswick and Jilkminggan. Attendance for each community is fairly consistent across the last five years.

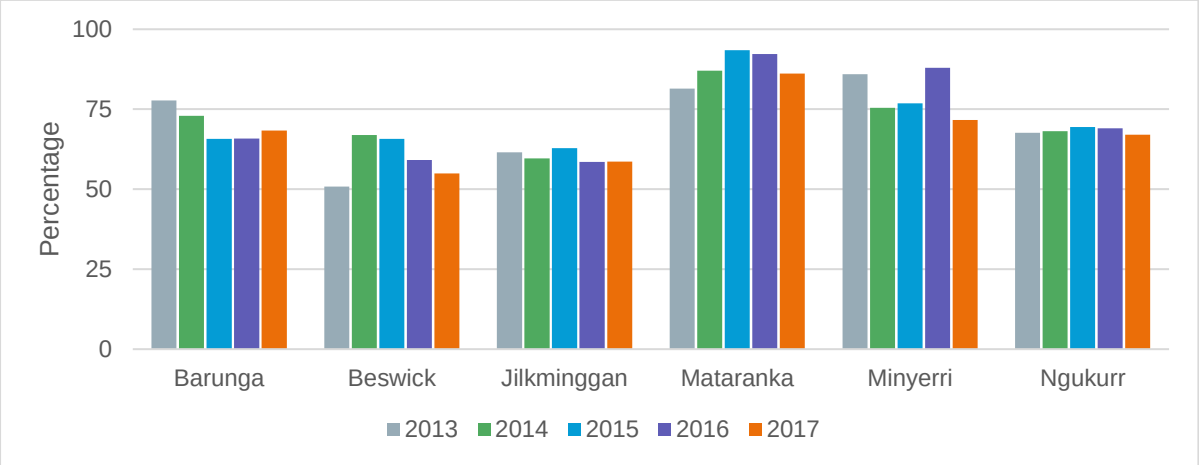


Figure A5.19 School attendance by community - Affected communities (north)

There are some youth services and programs available in the region. Ngukurr and Numbulwar have dedicated youth services, all northern affected communities have sport and recreation programs. Schools based in Bulman and Manyallaluk have nutrition programs. Ngukurr has a town swimming pool. Crèche services are lacking in the region, as they are only available in Beswick, Jilkminggan and Manyallaluk.

Centrelink agencies and Australian Post Offices are available in each of the communities in this social catchment. Training and employment of local people in Council operations occurs in each community, which supports local government as being the largest employer in the region. The Roper Gulf Shire provides aged care facilitates in limited communities.

Crime

Police stations are located in each of the communities, and crime statistics are aggregated under the NT Balance category in official statistics due to the low population numbers.

The NT Balance area has seen a slight decrease in crime against people over the last two years, and an increase in crime against property. Crimes against the person were committed at a rate of 2,942 per 100,000 population in 2016–2017, a 0.2% decrease from the previous year. Crimes against property were committed at a rate of 5,309 per 100,000 population in 2016–2017, a 12.8% increase (Northern Territory Police, 2017).

The rate of crime against the person in the NT Balance area is close to 60% of the rate in Katherine and close to 30% of the rate in Tennant Creek. The rate of crime against property is less than Katherine and significantly less than Tennant Creek. The Northern Territory has the highest offender rate in Australia.

Community services

Other services throughout the Roper Gulf Region include art centres, petrol stations and tourist accommodation in Mataranka, Daly Waters and Borroloola. Each community has at least one shop which sells food and an array of various retail goods. The range of retail goods is limited. Aboriginal communities have alcohol restrictions.

Health

Health clinics are located in each community and are generally bulk-billed. Doctors are available in clinics, with availability ranging from one day a fortnight to a full-time permanent basis. According to the 2015/2016 Sunrise Health Service Aboriginal Corporation Annual Report there were 56,094 episodes of care and 74,090 client contacts for the 2015–2016 period (Sunrise Health Services Aboriginal Corporation, 2016).

Mortality rates in the Roper Gulf Region are higher than the Australian average and life expectancy is much lower.

Infrastructure

Minyerri does not have mobile phone coverage though pay phones are available in the community. Other communities have Telstra mobile network coverage, however limited services are available outside the towns and communities.

The majority of local roads in the Roper Gulf Region are not sealed, though some communities have sealed streets. The Stuart Highway, part of the National Highway system, and the Carpentaria Highway are the major roads servicing the region. Much of the road network is subject to seasonal closure because of flooding. Unsealed roads are graded throughout the year. The Roper Gulf Shire spent $88,871 on local roads maintenance in 2015–2016 (Roper Gulf Regional Council, 2016). In 2016, the Roper Gulf Regional Council secured $2.31 million to deliver infrastructure to Ngukurr and Numbulwar, including sealed heavy vehicle routes and undercover laydown areas to the communities (ibid).

Public transport is very limited and expensive and private vehicle ownership levels are low, with 39% of people having no registered vehicle. This is much higher than the Katherine region where 19% of people do not own a registered vehicle (ABS Census, 2016).

All communities and towns have airstrips and a number of outstations have airstrips and/or helicopter access points.

5.2.2. SV2 Affordable lifestyle

The towns and communities in the Roper Gulf Region are remote, and as such the cost of living is higher than that of Darwin and Katherine. The Northern Territory Government Market basket survey (NT Department of Health, 2015) found that cost of a food basket in remote stores was $266 higher than the supermarket in the corresponding district centre ($817 compared with $599 in Katherine).

Personal average weekly income is $279, which is less than half of the Northern Territory average. Table A5.5 shows income and housing affordability statistics for the Roper Gulf Region. Personal income has remained steady between 2011 and 2016, while household income has risen 11%. Rental costs (as a proportion of income) have increased, although the cost of buying a home appears to have remained steady.

Table A5.5 Income and housing affordability statistics for the Roper Gulf Region

Category	2011	2016
Median total personal income ($/weekly)	$279	$279
Median total family income ($/weekly)	$717	$670

Category	2011	2016
Median total household income ($/weekly)	$1009	$1120
Median Rent	$50	$50
Households where rent payments are less than 30% of household income (%)	97.6%	94.8%
Households where rent payments are 30%, or greater, of household income (%)	2.4%	5.2%
Mortgage monthly repayments ($)	$806	$1733
Households where mortgage payments are less than 30% of household income (%)	99.6%	99.7%
Households where mortgage payments are 30%, or greater, of household income (%)	0.4%	0.3%

Source: ABS Census, 2016

5.2.3. SV3 Community identity and spirit

Mataranka is a tourist destination and attracts a large number of visitors each year to the town. As such, much of the town's businesses rely on and cater to tourists. The permanent population in Mataranka has a strong sense of community. An example of this is the Mataranka Better Half Club, which has been active in the community since 1977. This group has contributed to renovating the town hall, hosting community Christmas parties and a number of other community events which bring people from surrounding pastoral properties together (Rigby, 2017).

Barunga and Beswick communities both hold large annual community events. The Barunga Festival is held over the Queen's Birthday long weekend each year and attracts thousands of visitors from around the Northern Territory and Australia. The three-day event is a celebration of Aboriginal culture, sport and music. Sporting teams from across top end communities travel to the festival to compete in a range of events, such as AFL, baseball and basketball (Barunga Festival, 2017).

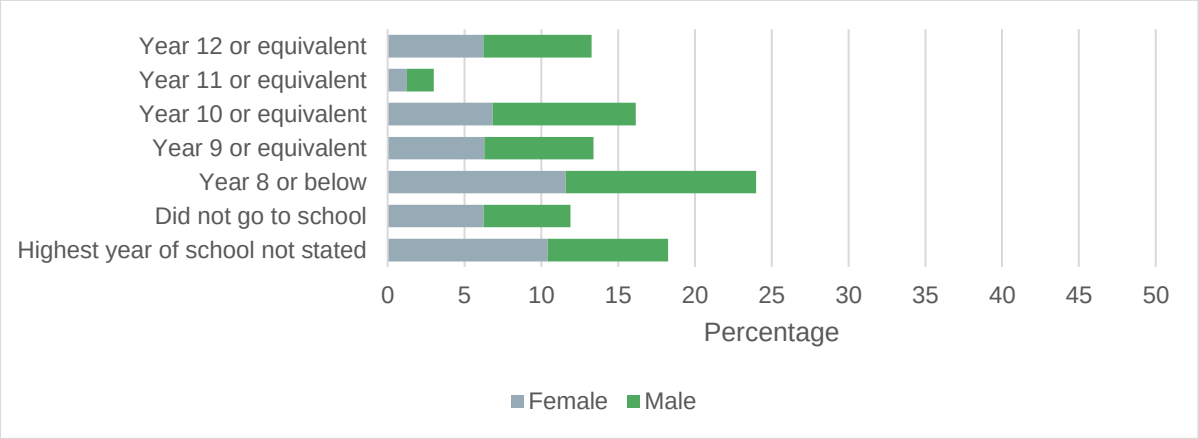
Beswick community holds the Walking with Spirits Festival each year in partnership with the Australian Shakespeare Company. The festival is a celebration of Beswick's culture and heritage through music, art and traditional corroborees from several Arnhem Land language groups (Djilpin Arts, 2017). These festivals enable people to visit, celebrate and learn from the communities.

Traditional owners in the Roper Gulf area have expressed concern over mining exploration activities in recent years. The Traditional Owners in Katherine and Ngukurr have voiced concern over exploration by Hancock Prospecting's Jacaranda Minerals and Minerals Australia in 2016. More than 6,500 square kilometers of Aboriginal-owned land in the McArthur Basin was announced in March 2016 as the first gas exploration permit on land managed by the Northern Land Council. The Traditional Owners have threatened legal action against the Northern Land Council for failing to properly consult the communities (Hope, 2016).

5.2.4. SV4 Capacity for sustainable economic activity

Educational attainment

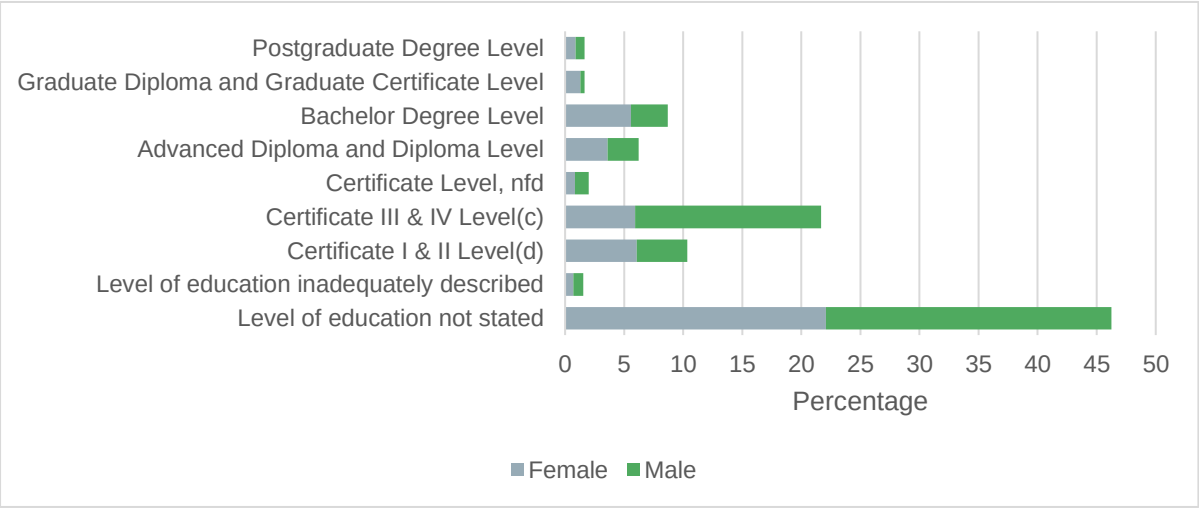
Within this social catchment, 53% of students left school during or before completing Year 10, and only 13% completed Year 12. Figure A5.20 shows that nearly a quarter of people indicated progressing no further than Year 8. This is significantly less than attainment rates within the Katherine Region, where Year 12 was the most common level of education achieved (28%).



Source: ABS Census, 2011

Figure A5.20 Highest level of education achieved within the Roper Gulf Region

For non-school qualifications, Certificate III and IV were the most commonly reported, with males achieving the majority of these qualifications (Figure A5.21). Overall, 60% of the population aged 15 years and older had no qualifications, compared with 51% for regional NT. Between 2006 and 2011 there was a decrease in the percentage of people holding vocational or tertiary qualifications (Regional Development Australia, 2016).



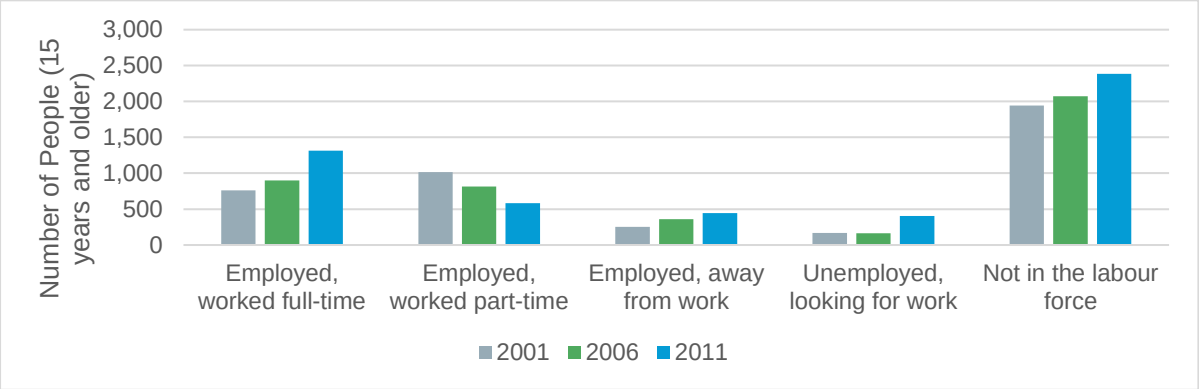
Source: ABS Census, 2011

Figure A5.21 Roper Gulf Region non-school qualifications

Workforce participation

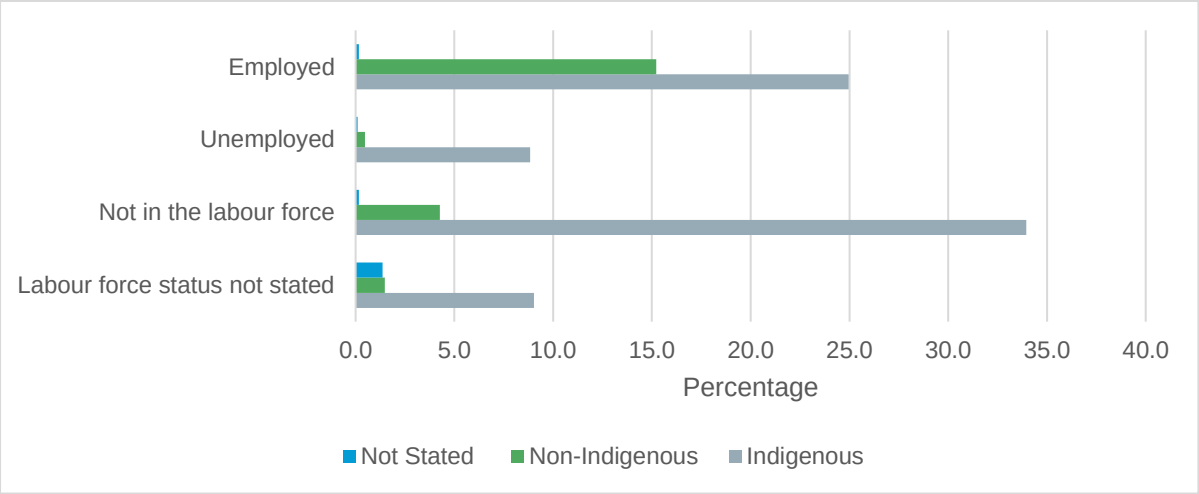
As Figure A5.22 shows, the majority of the population older than 15 years within this social catchment is not employed, and rising, with a 13% increase between 2006 and 2011. This is a similar trend to the wider Katherine Region, which saw an 11% increase over the same period. Conversely, there has also been a 31% increase in the number of people employed full-time in the Roper Gulf Region. This is much higher than the 10% increase seen in the Katherine Region. While there are a diverse range of employment opportunities in the region, the number of positions is small. Government administration, education and local retails provided the largest number of positions (EcOz, 2013).

As the largest of the communities in this social catchment, Ngukurr offers the greatest range of employment in the catchment. A jobs profile on Ngukurr (NT Department of Business, 2014c) indicated that jobs increased 30% from 2011 to 2014, to a total of 237 jobs. Approximately one quarter of these jobs were held by Aboriginal people (see Figure A5.23), and community and personal service workers made up the largest occupation group.



Source: ABS Census, 2011

Figure A5.22 Workforce participation in the Roper Gulf Region



Source: ABS Census, 2011

Figure A5.23 Aboriginal versus non-Aboriginal engagement in the workforce

Local industries

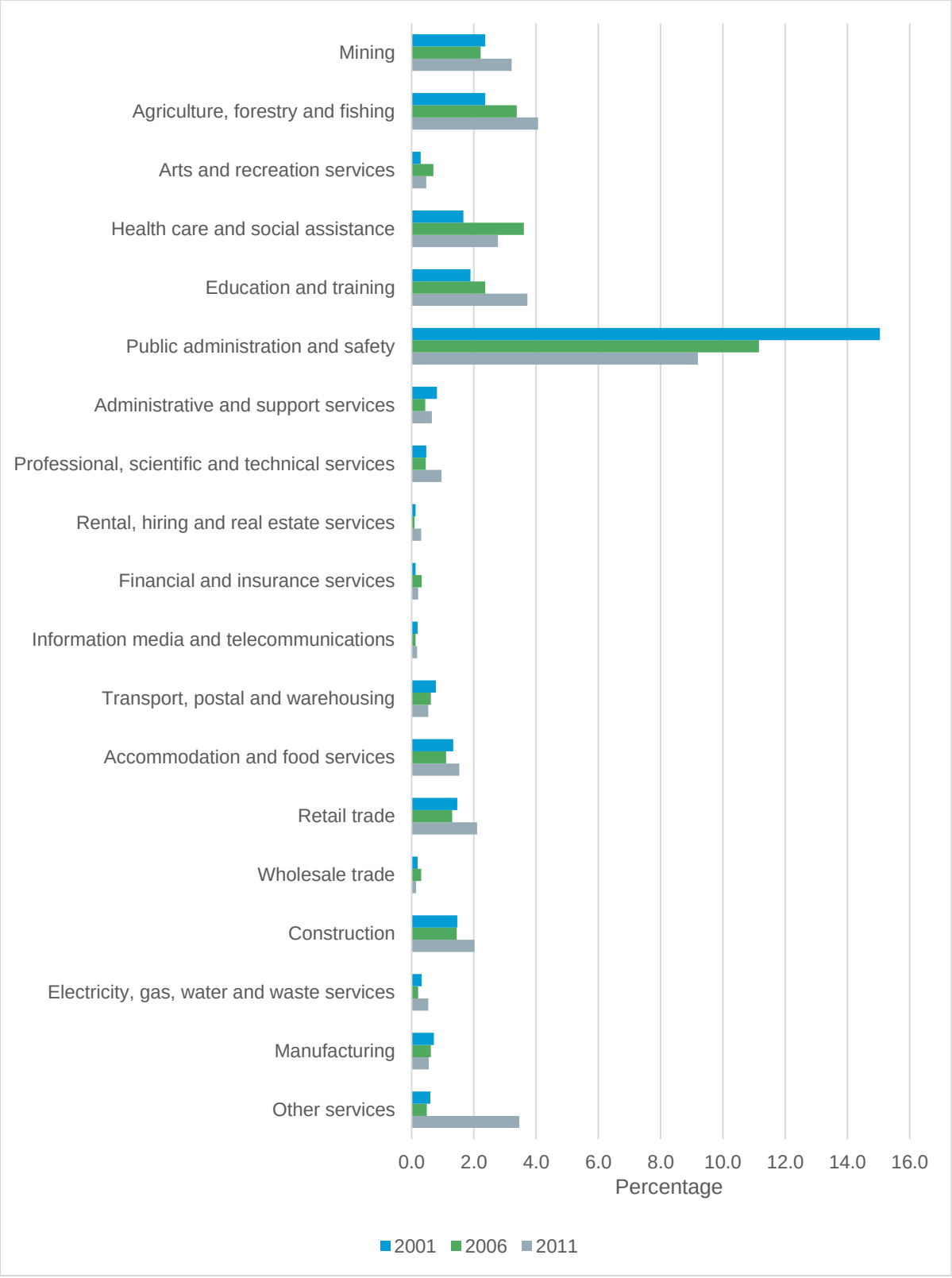
The Roper Gulf region is made up of a number of different land tenures. These include pastoral leases, mining leases, native title/Aboriginal Land and general township leases. These land tenure types influence the type of economic activity being undertaken in the region (EcOZ, 2013).

The rural land in the Roper Gulf Region is predominantly used for pastoral purposes, primarily grazing. The pastoral industry is a key part of the region's identity, with both Aboriginal and non-Aboriginal persons having strong connections to the industry (O'Brien, 2011). There are approximately 56 pastoral properties ranging from 440 to 5,000 square kilometers. As of 2011 these properties ran in excess of 200,000 cattle (O'Brien, 2011).

Government, tourism and mining are also key industries in the region. The GPD of the Roper Gulf Regional Council was $554 million, increasing 24% since 2012 (Regional Development Australia, 2011). The Roper Gulf Regional Council is one of the largest employers in the region. This is reflected in Figure A5.24, showing that 9% of people are employed in public administration (similar to the Katherine Region).

Figure A5.24 also suggests that, since 2001, there has been an increase in both agriculture and mining sectors. As discussed in Section 4, the McArthur River Mine is the largest mining operation in the region. Since 2007, the mine has employed 762 people, and has invested more than $12.3 million into the Roper Gulf Region through the MRM Community Benefits Trust and other community service initiatives (McArthur River Mine, 2017).

Mataranka is a tourist destination. In 2012, 146,300 people visited Elsey National Park, which includes Bitter Springs, Mataranka Thermal Pool and John Hauser Drive (NT Department of Tourism and Culture, 2017). This is the second most frequented park in the Katherine Region, after Nimiluk National Park.



Source: ABS Census, 2016

Figure A5.24 Roper Gulf Region – employment by industry

5.3. Affected communities (east)

This social catchment comprises two communities, Borroloola and Robinson River. Borroloola is located approximately 972 km southeast from Darwin, 655 km southeast of Katherine, and 940 km northwest of Mount Isa in Queensland. Borroloola is designated as a 'major remote town' by the Northern Territory Government.

Due to its size (871 people according to ABS Census, 2016), it functions as a regional hub and service area for surrounding communities, outstations and pastoral properties. Borroloola has four camps: Garawa Camp One, Garawa Camp Two, Yanyuwa Camp and Mara Camp. There are 26 outstations located in the surrounding regions which reply on services from Borroloola (see McArthur River Mine, 2017). There are four main Aboriginal language groups in Borroloola, the Yanyuwa, Garawa, Mara and Gurdanji.

The baseline profile focusses on Borroloola.

5.3.1. SV1 Liveable community

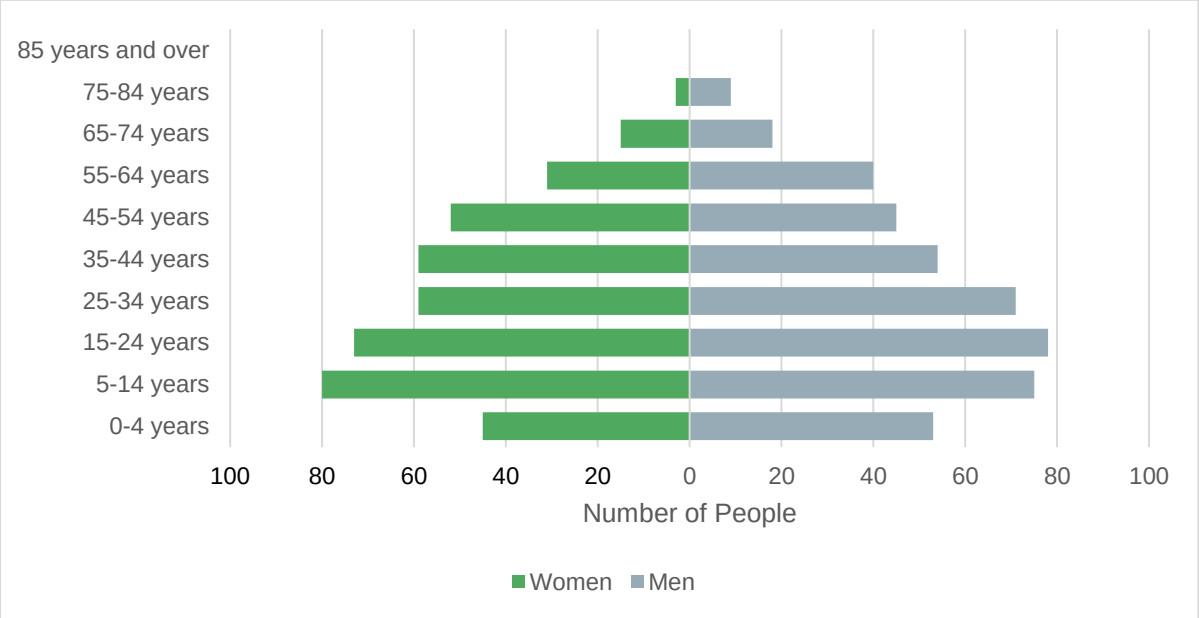
Population and demographics

Table A5.6 displays demographic statistics for Borroloola. Borroloola has a median age of 26, lower than the Northern Territory average of 31 years. Household sizes have decreased in the last 10 years. At 3.9 persons per household, the average household size is lower than the Roper Gulf average of 4.2. However, overcrowding would be expected in some households as the Northern Territory Government has planned for the construction of 22 new houses to alleviate housing issues, including overcrowding (Housing Action NT Policy, 2016).

Table A5.6 Demographic statistics for Borroloola

Category	2006	2011	2016
Median Age	25	26	26
Average household size	4.5	3.9	3.5
Average number of people per bedroom	1.9	1.8	1.6

Figure A5.25 is an age-sex pyramid for 2016, which shows a roughly pyramidal shape, except for disproportionately low numbers of children 4 years old and under.



Source: ABS Census, 2016

Figure A5.25 Combined age–sex pyramid for Borroloola

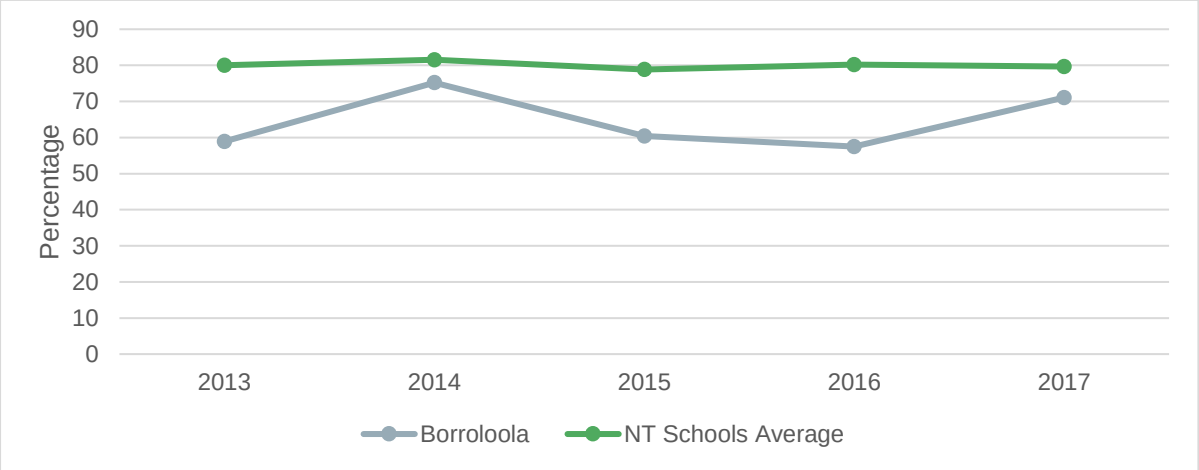
Borroloola has a mostly Aboriginal population (Figure A5.26), with the 2016 ABS Census reporting 77% of the population identifying as Aboriginal. Borroloola is an open township which has a steady tourism industry and is largely influenced by the McArthur River Mine.

Source: ABS Census, 2016

Figure A5.26 Aboriginal and non-Aboriginal population breakdown of Borroloola

Education and community services

There is one school in Borroloola. The attendance rate over the last five years is shown in Figure A5.27. Attendance fluctuates between nearly 60% and 75%, but generally lags behind the NT average. In 2015 and 2016, over $3 million was spent on building two new classrooms and refurbishments, as well as a Trades Training Centre (NT Department of Education, 2015).



Source: NT Department of Education, 2015

Figure A5.27 School attendance average of Borroloola compared with the Northern Territory

A key issue in the community is a lack of recreational activities, facilities and infrastructure for young people. The McArthur River Mine SIA (McArthur River Mine, 2011) indicated a high level of concern for this aspect in the region, with a number of stakeholders (particularly Aboriginal leaders) indicating they felt young people needed such facilities and services to help divert them from anti-social behaviour, such as drug and alcohol abuse.

One of the more prominent community infrastructure developments in Borroloola in recent years was the $2.1-million Borroloola Swimming Pool Complex, which opened in 2009. The complex features a 25 m swimming pool, wading pool for small children, and change room facilities servicing both the pool and neighbouring soccer club.

Crime

Crime data is as described in Section 5.2.1.

Health

Borroloola has one community health clinic, staffed by a general practitioner with nursing support services. In 2009–2010, Aboriginal patients accounted for over 90% of reported episodes of care (McArthur River Mine, 2011). The MacArthur River Mine Emergency Rescue Team provides emergency first aid assistance, as required. In the event of a severe medical emergency, a number of local airfields are available for use. The Borroloola Police Station coordinates emergency services. In addition to the Borroloola Health Clinic, a number of other health-related programs are currently in operation in the community, including (ibid):

- Meals on Wheels.
- Substance abuse support.
- School screening.
- Aged screening.
- Under-5 screening.
- Men and women general wellness checks.
- Immunisation.

- Chronic Disease Outreach.
- Maternity / child health.
- Communicable disease reporting and management.
- Home visiting services.
- Palliative care.

Additionally, Borroloola has three fuel outlets, three supermarkets, a post office, a caravan park (including guest house and hotel), airstrip, women's shelter and library.

Infrastructure

Road access to Borroloola is provided mainly by the Carpentaria Highway. It is a sealed highway with one lane in each direction. It is open all year but cyclonic weather or heavy monsoonal rains may close the highway for periods of up to one week. A 2WD is sufficient to get to the township during dry weather but a 4WD is necessary for some travel during the wet season.

A mail plane services the town three times weekly, which can take passengers.

5.3.2. SV2 Affordable lifestyle

Borroloola is a remote community. Personal average income is $424 per week which is significantly higher than the wider Roper Gulf region. This is likely influenced by employment opportunities at the McArthur River Mine. Similarly, the proportion of households who spend more than 30% of their income on rent has dropped in the last five years, which distinguishes this social catchment from the others reported on here. Table A5.7 provides an overview of income and housing affordability between 2011 and 2016.

While no data on food and grocery prices were available, in general, remote Northern Territory communities pay significantly more than urban centres. For example, a food basket in remote stores costs approximately $817 compared to $599 at a supermarket in Katherine (NT Department of Health, 2015).

Table A5.7 Income and housing affordability statistics in Borroloola

Category	2011	2016
Median total personal income ($/weekly)	$386	$424
Median total family income ($/weekly)	$938	$1050
Median total household income ($/weekly)	$1160	$1289
Median Rent	$50	$50
Households where rent payments are less than 30% of household income (%)	95.2%	97%
Households where rent payments are 30%, or greater, of household income (%)	4.8%	2.1%
Mortgage monthly repayments ($)	$0	$0
Households where mortgage payments are less than 30% of household income (%)	100%	100%
Households where mortgage payments are 30%, or greater, of household income (%)	0%	0%

Source: ABS Census, 2016

5.3.3. SV3 Community identity and spirit

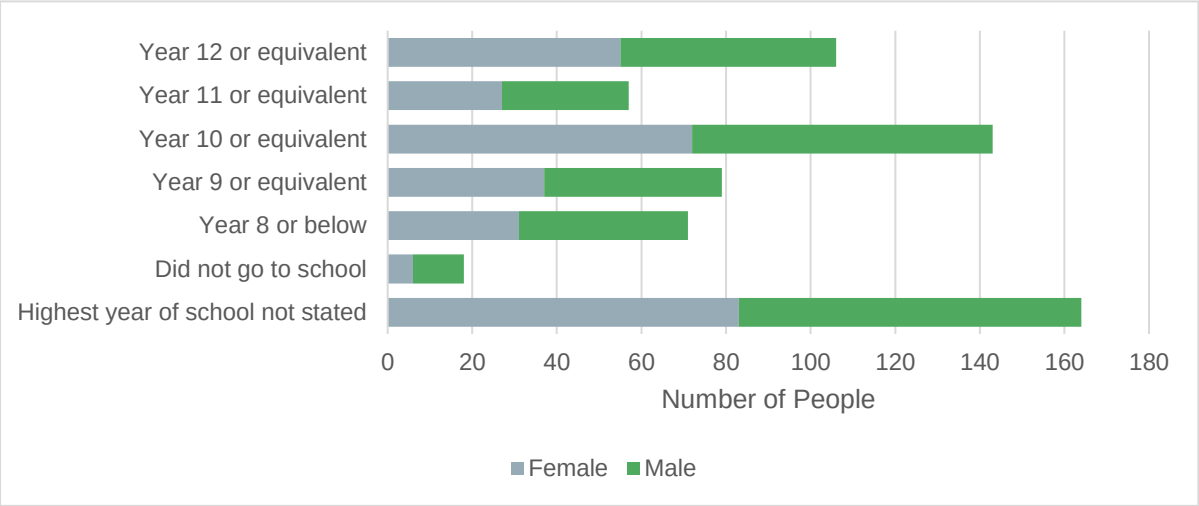
Recreational and cultural events play a role in the social fabric of Borroloola. Being a largely Aboriginal community, there is importance placed on encouraging the participation of youth in cultural events such as NAIDOC Week and Boonu Boonu Festivals (McArthur River Mine, 2011).

Borroloola's natural attractions, such as Butterfly Springs and the sandstone pillars of the Lost City, contribute to its community identity. King Ash Bay, located 50 km north of Borroloola, is a popular fishing destination which hosts the annual Easter Fishing Classic.

5.3.4. SV4 Capacity for sustainable economic activity

Educational attainment

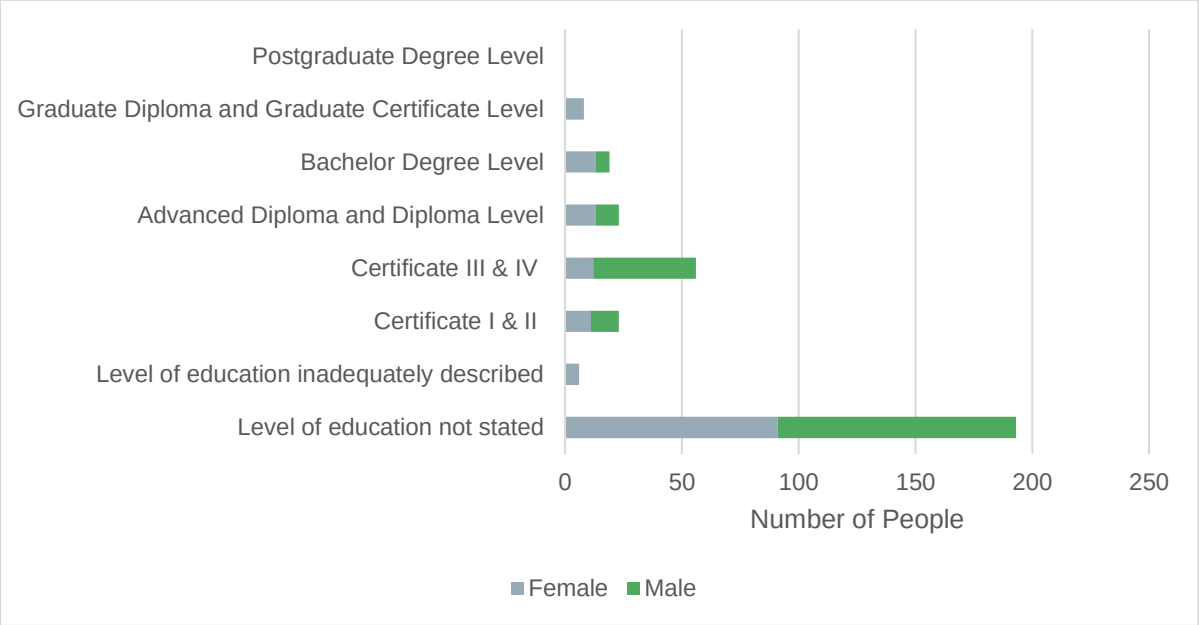
Within this social catchment, 19% of students left school during or before completing Year 10, and 26% completed Year 12. The remaining 26% did not indicate their highest level of schooling (Figure A5.28). These levels of attainment are comparable to the Katherine Region, where 28% of people had completed Year 12.



Source: ABS Census, 2011

Figure A5.28 Highest level of education achieved in Borroloola

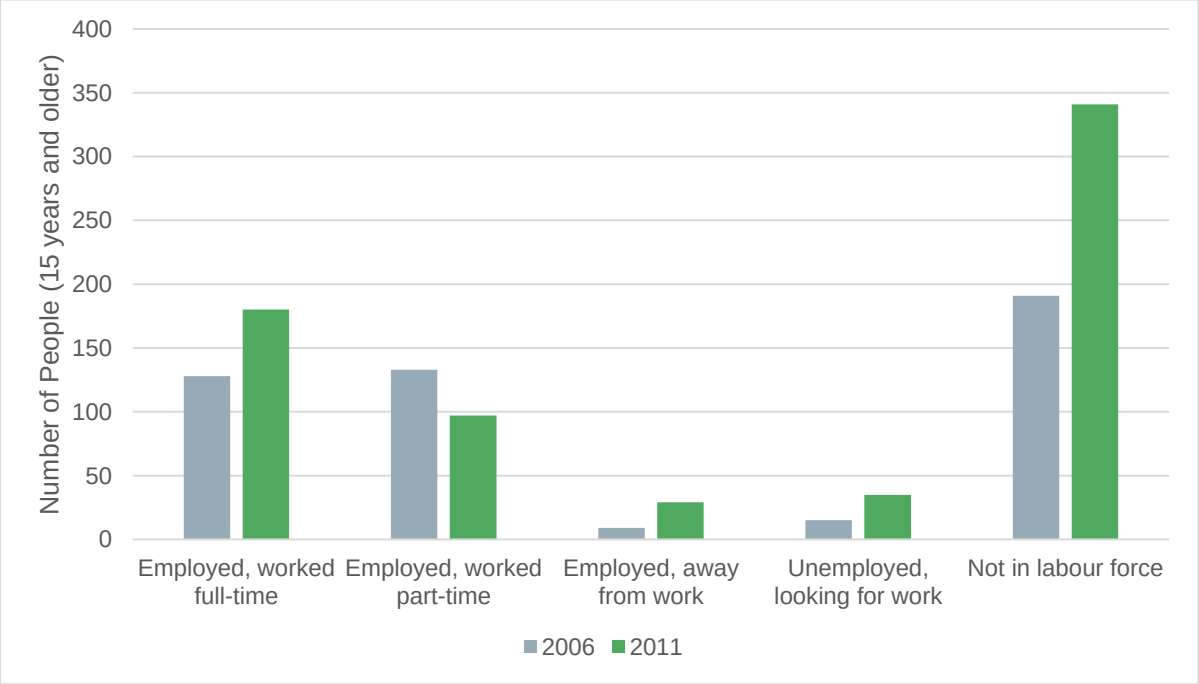
The rates of attainment of non-school qualifications is presented in Figure A5.29. Certificate III and IV were the most commonly completed, and predominantly by males.



Source: ABS Census, 2011

Figure A5.29 Non-school qualifications held in Borroloola

The majority of people in Borroloola indicated not working in the labour force (Figure A5.30). This number has grown by 79% (almost doubled) between 2006 and 2011. Full-time employment was the next most common employment type, which had also increased in number over the same period.



Source: ABS Census, 2011

Figure A5.30 Employment type in Borroloola

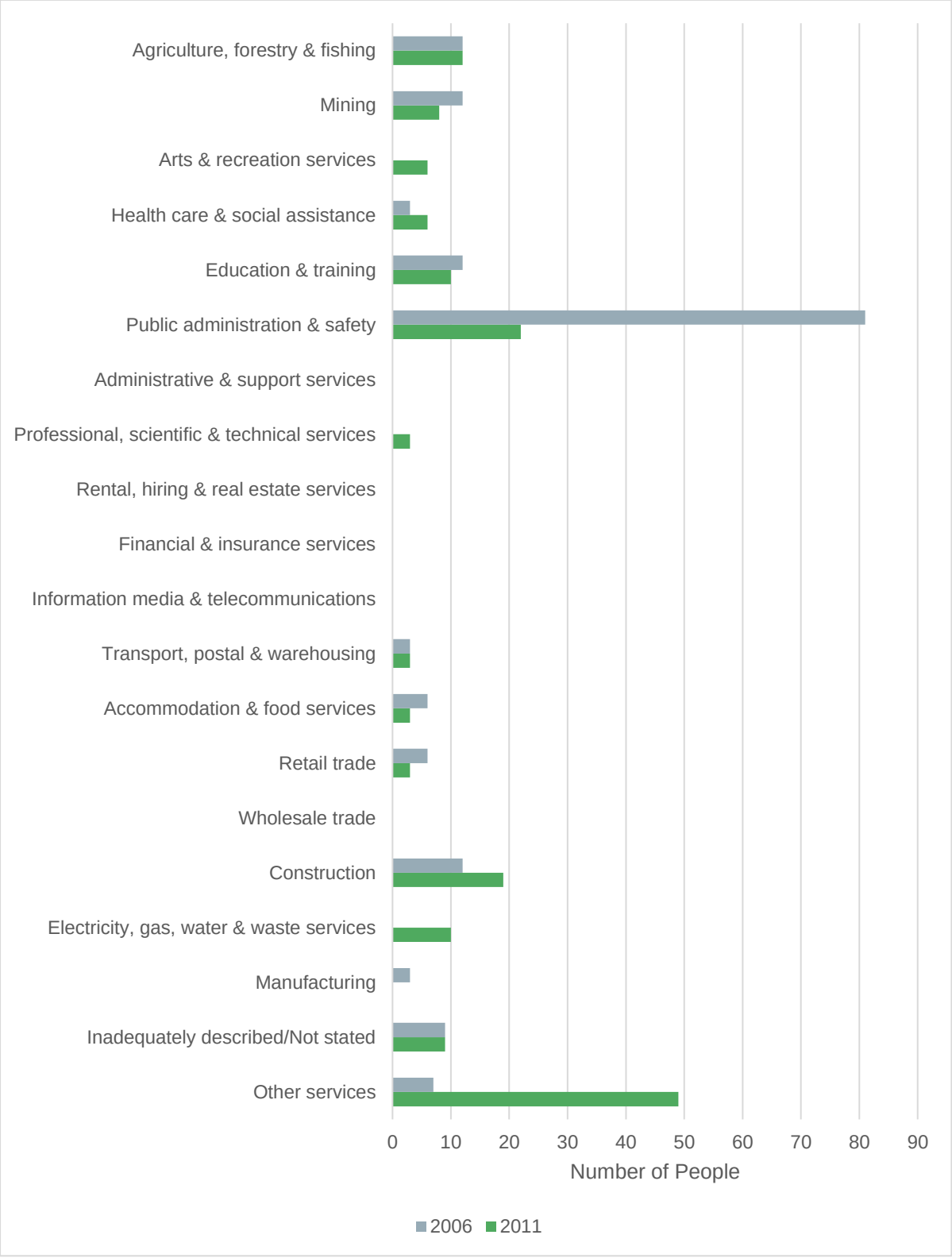
Local Industries

The most significant industry by economic output in the region is the McArthur River Mine (MRM), one of the world's largest zinc mines. While there has been a decrease in employment in the mining sector between 2006 and 2011 in Borroloola, MRM currently employs approximately 600, mostly FIFO and some local workers (Brardon, 2017).There is considerable community concern regarding environmental contamination by the mine, leading to significant community concern about a current proposal to expand the mine.

There are a number of pastoral properties around Borroloola in the Gulf of Carpentaria region. According to the EIS undertaken for the Sherwin Creek Iron Ore Project in 2013 most station owners (with the exception of Hodgson Downs) believe that their stations are underdeveloped and have the capacity to hold more cattle, but current economic circumstances make stocking with additional cattle unviable (EcOZ, 2013).

Borroloola is located on the Carpentaria Highway and is an attractive destination for tourists traveling between the Northern Territory and Queensland. There are a number of natural attractions, such as Butterfly Springs and the sandstone pillars of the Lost City. King Ash Bay is a popular fishing destination located 50 km north of Borroloola, and large numbers of tourists take part in the annual Easter Fishing Classic, held over three days. Emu Station and Lorella Springs offer tourists a cultural heritage and nature experience unique to the region.

These industries (mining, pastoralism and tourism) are key employers within this social catchment. Figure A5.31 indicates that, aside from 'other services', the largest employer (by sector) is the public administration and safety sector, potentially due to the number of people employed through the Australian Government-funded Community Development Employment Project (CDEP) program. The CDEP program aims to assist Aboriginal job seekers to gain skills, training and capabilities to find sustainable employment and improves the economic and social wellbeing of remote communities (NT Department of Business, 2014a).



Source: ABS Census, 2011

Figure A5.31 Employment by industry in Borroloola

5.4. Affected communities (central)

There are four communities and towns located along the Stuart Highway in this social catchment: Larrimah, Daly Waters, Newcastle Waters and Elliott.

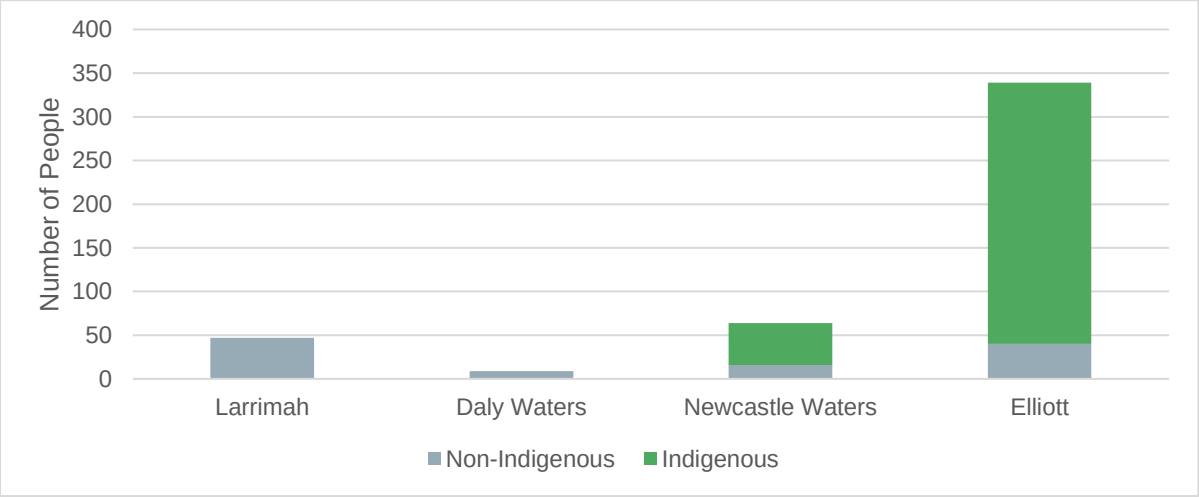
5.4.1. SV1 Liveable community

Population and demographics

Larrimah and Daly Waters have very small populations. According to the 2016 census, the population of Larrimah is 47 (median age of 41) while the population of Daly Waters is 9 (median age of 54). The key feature of Daly Waters is the Daly Waters Pub, which services locals and acts as a tourist information centre. The surrounding district is known as Birdum and has 86 people and a medium age of 34. There are 12 families in the area recorded in the 2016 census with an average of 1.3 children per family (ABS Census, 2016).

Elliott and Newcastle Waters are located within Barkly Shire along the Stuart Highway. The traditional name for the township of Elliott is Kulumindini. Elliott is the Barkly region's second largest town and sits on the edge of Newcastle Waters Station. Elliott is a stopover point on the Stuart Highway for tourists and local people (Barkly Regional Council, 2017). A small, self-sufficient community, the majority of the population lives in two town camps, known as Gurungu and Wilyuga. The Aboriginal persons residing in these camps are of the Mudburra/Djingila, Wambaya, Kutanyi and Wagai clans (Remote Area Health Corps, 2009). Newcastle Waters is a historic township located on Newcastle Waters Station. There is an Aboriginal community called Marlinja located on the station.

Figure A5.32 presents the Aboriginal and non-Aboriginal populations of the communities within this social catchment. The Aboriginal population in Elliott and Newcastle Waters is significantly greater than Larrimah and Daly Waters.



Source: ABS Census, 2016

Figure A5.32 Aboriginal and non-Aboriginal population of Affected communities (central)

Table A5.8 indicates the median age of Elliott and Newcastle Waters is significantly younger than Larrimah and Daly Waters and is more comparable to communities in Affected communities (east) and Affected communities (north). Larrimah and Daly Waters have significantly higher median ages

compared to all affected communities. This high median age is likely a reflection of these communities acting as more of a service centre, rather than a residential community.

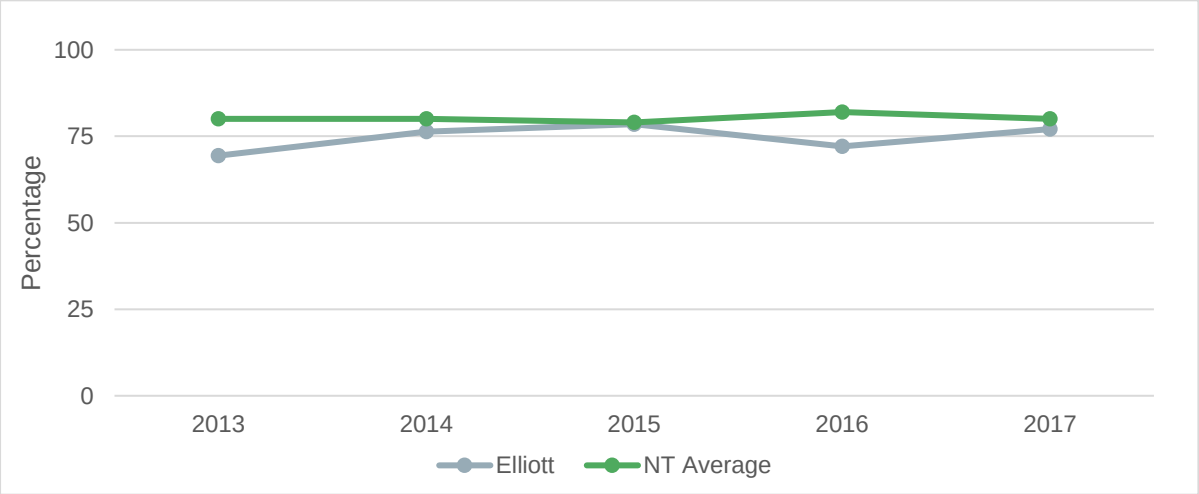
Table A5.8 Median age and household demographics for Affected communities (central)

Category	Larrimah	Daly Waters	Newcastle Waters	Elliott
Median Age	41	54	22	24
Average household size	2.1	1.4	3.4	4.1
Average number of people per bedroom	0.9	0.8	0.9	1.3

Source: ABS Census, 2016

Education and community services

There are no schools located in Daly Waters or Larrimah. The closest school to these communities is located in Mataranka. The School of the Air provides educational services to communities in this social catchment. Elliott has one school which caters for students from pre-school to middle school. As can be seen in Figure A5.33**Error! Reference source not found.**, school attendance in Elliott f luctuates below the Northern Territory average. No data was available for the other communities in this social catchment.



Source: NT Department of Education

Figure A5.33 School attendance in Affected communities (central)

Adequacy of housing is an issue in Elliott and Marlinja. The Northern Territory Government has invested in upgrading houses in both locations (Department of the Chief Minister, 2016). Houses in Elliott and Marlinja outstation are being upgraded through the Department of Local Government and Community Services Homelands and Town Camps program. The work focuses on urgent repairs, functional upgrades, and extending living areas, and will focus on local employment and training and Aboriginal employment on the project. Two local work crews have been working under the close supervision of a qualified builder and tradespeople to undertake the refurbishments (ibid).

Infrastructure in Elliott includes workshop yards to service the communities of Wilyuku, Gurungu and Marlinja outstation, a sport and recreation centre, aged care services, safe house, police station, BP

service station, art centre, play group, library, post office, Elliott School, caravan park and community store. The population in Marlinja access these services.

Daly Waters and Larrimah have very limited services and infrastructure compared to most other towns and communities in the region and Australia. The Roper Gulf Regional Council provides a range of local government services including maintenance and upgrade of infrastructure, weed control and fire hazard reduction in and around the township, as well as providing governance support. Both towns act as a road stop along the Stuart highway; as such, there are stores with fuel available, caravan parks and motels, pubs, and an air strip suitable for light aircraft.

Crime

Crime data is as described in Section 5.2.1.

Health

Communities in this social catchment are susceptible to the health issues affecting the Katherine region more broadly (see Section 4). Within this social catchment, there is one community health clinic located in Elliott. 'MiTrack', which is funded by the Department of Social Services, is a free service in the Alice Springs region to the south, for children and youth up to the age of 18 who are at risk of or experiencing early signs of mental illness (Mental Illness Fellowship of Australia, 2017).

Access to health and social services is restricted for the Daly Waters and Larrimah populations. To access medical support people need to travel hundreds of kilometers to either Mataranka or Elliott and further to Katherine or Darwin for more serious health issues. This makes people vulnerable in times of emergencies.

Infrastructure

Daly Waters is accessed via the Stuart Highway, which is sealed and accessible all year. Most roads in the region are not sealed. Surrounding properties may be vulnerable to isolation during the wet season. The Daly Waters Pub and Larrimah Hotel are key places for both tourism and as a place for local people to meet and socialise.

5.4.2. SV2 Affordable lifestyle

The remoteness of this social catchment drives up the cost of living compared to urban areas within the Northern Territory. The average cost of a food basket in remote stores in the Northern Territory is $817, compared with $844 in Alice Springs supermarkets (NT Department of Health, 2015). People from Elliott and Newcastle Waters would typically visit Tennant Creek or Alice Springs for shopping or access to higher levels of service. The cost of transport in accessing goods and services contributes significantly to the cost of living.

5.4.3. SV3 Community identity and spirit

Elliott and Marlinja's community identity is different in its demography and history than Larrimah, Newcastle Waters and Daly Waters. The country around Elliott belongs to the Jingili desert people with the Wambaya people to the east and southeast, the Yangman and Mangarrayi to the north, the Mudbura and Gurindji to the west, and the Warlpiri, Warlmanpa and Warramungu to the south and southwest. The Aboriginal people have strong spiritual connections to the country through ceremony and important dreaming tracks (Barkly Regional Council, 2017). Each year, the community of Elliott

come together to celebrate Mardi Gras with a float parade and costumes. The event is now in its twelfth year and attracts visitors from across the Northern Territory and Australia.

Newcastle Waters, Larrimah and Daly Waters are more service hubs than townships. These communities are focused around providing services along the Stuart highway than as a standalone community.

The historic township of Newcastle Waters was a gathering place for drovers on their overland cattle drives. It is located at the junction of three major overland stock routes. The historic town is not inhabited, but is it located on the actively run Newcastle Waters Station. The town attracts tourists for its history and bird watching.

Daly Waters holds a number of key social events for the region. The Daly Waters Pub is central to these events and provides a valuable meeting and socialising point for the region. The pub is an iconic feature of the area and draws a number tourists to the district.

The Daly Waters' rodeo and camp draft is held over three days and attracts large crowds from across the Northern Territory and Australia. Stations around the Daly Waters district provide help in setting up and running the event. The Daly Waters Ball is held over Easter each year and attracts mostly young crowds from across Australia. Crowds can reach upwards of 400 people at the festivities. Daly Waters has both camping and cabin accommodation for visiting tourist (Zillman, 2015).

Larrimah played an important supply and logistical role in World War II, which is celebrated in the Larrimah Museum. The town has a number of quirky tourist attractions, including the Big Stubby and the Pink Panther sitting on a chair outside the Larrimah Hotel.

5.4.4. SV4 Capacity for sustainable economic activity

The primary industry in the Larrimah and Daly River region is pastoral grazing. In the 2011 census (relevant data from the 2016 census has not yet been published), there were 66 cattle properties in the Birdum region and 58.9% of people were employed in agricultural businesses (ABS Census, 2011).

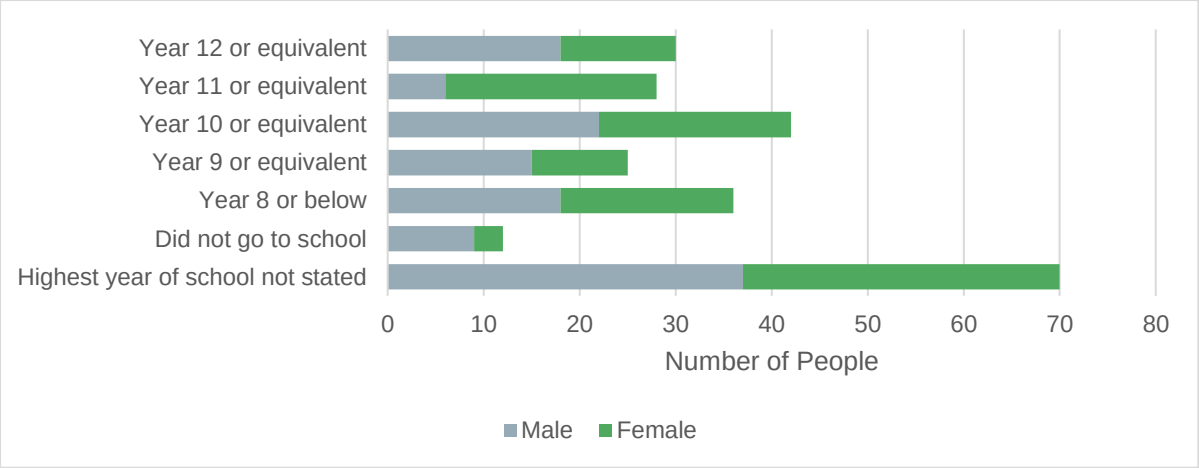
Employment in the Larrimah and Daly River region is split between pastoral grazing and businesses in the towns (ABS Census, 2011). Accommodation and pubs/taverns/bars were the second highest employment industries (ibid).

The Daly Waters and Larrimah townships are heavily dependent on the tourism industry. The towns businesses, such as the pub, store and fuel station are reliant on tourist traffic for income. The Daly Water Pub has marketed itself as a tourist destination and allows people to leave their mark on the pub by leaving a personal item behind. Larrimah's tourist attractions include the Old Police Station Museum, Teahouse and the Pink Panther outside the historic pub. The tourism industry is seasonal and is therefore much quieter from October to April (during the wet season).

In Elliot, there is a limited number of employment opportunities due to its size and remote location. According to the 2014 Jobs Profile Elliott (NT Department of Business, 2014b) there were a total of 93 jobs available in Elliott. Of these jobs, 54 were filled by an Aboriginal person. There was a decrease of 25 jobs between 2011 and 2014. In 2011, public administration and safety was the highest area of employment, followed by education/training and agriculture, forestry and fisheries (ibid).

Figure A5.34 indicates that data is scarce on educational attainment levels in Elliot, with almost 30% not disclosing the highest level of schooling attained. Fifteen percent of the population indicated not

progressing further than Year 8. The level of education in Elliott may impact people's ability to engage in higher-skilled economic activity.



Source: NT Department of Education

Figure A5.34 Educational attainment in Elliott

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Appendix B - Scope of work

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3. SCOPE OF SERVICES

3.1 BACKGROUND TO THE INQUIRY

On 14 September 2016 the Chief Minister of the Northern Territory, the Hon Michael Gunner MLA, announced a moratorium on hydraulic fracturing of onshore unconventional reservoirs in the Northern Territory. At the same time, the Chief Minister announced that a *Scientific Inquiry into Hydraulic Fracturing of Onshore Unconventional Reservoirs in the Northern Territory* (the **Inquiry**) would be established and released draft Terms of Reference, which were open for public comment for four weeks.

On 3 December 2016 the Northern Territory Government announced the final Terms of Reference for the Inquiry and the composition of the panel that will be undertaking the Inquiry (the **Panel**).

The Inquiry was established under section 4 of the *Inquiries Act 1945* (NT) and is comprised of a judicial chair, the Hon Justice Rachel Pepper, and ten scientists with expertise in areas ranging from hydrogeology to social science.

The Inquiry's final Terms of Reference can be read in full on the Inquiry's website (www.frackinginquiry.nt.gov.au).

On 20 February 2017 the Inquiry released a *Background and Issues Paper*, also available on the Inquiry's website, which was followed by hearings and community meetings in March 2017 in various town centres and remote communities across the Northern Territory. The Issues Paper includes a timeline for the Inquiry, which indicates that an interim report will be released in mid-2017, a draft final report will be released during the last quarter of the year, and a final report will be released in December 2017.

The Hydraulic Fracturing Taskforce (the **Taskforce**) has been established in the Department of the Chief Minister to support the Panel.

3.2 TERMS OF REFERENCE FOR THE INQUIRY AND THE SOCIAL IMPACT THEME

The Panel has divided the work of the Inquiry into the following themes: water, land, air, social impacts, economic conditions, cultural conditions, human health, land access, and the regulatory framework. This request for tender relates to the social impacts theme only, however, there are overlaps with the economic, cultural and regulatory framework themes.

The Terms of Reference for the Inquiry require the Panel to do the following:

(a) determine and assess the impacts and risks associated with hydraulic fracturing of unconventional reservoirs and the associated activities;

(b) determine whether additional work or research is required to make that determination;

(c) for each risk that is identified, advise the level of impact or risk that is acceptable in the Northern Territory context;

(d) describe methods, standards or strategies that can be used to reduce the impact and risk to acceptable levels; and

(e) identify what government can do, including implementing any policy, regulatory or legislative changes, to ensure that the impacts and risks are reduced to the required levels.

The *Background and Issues Paper* includes a non-exhaustive list of the potential risks and benefits associated with the social impact theme at page 21.

The Terms of Reference make it clear that the Panel must not only look at the impacts of hydraulic fracturing and the associated activities on social conditions in the Northern Territory – the Panel must also consider the social impacts of the onshore unconventional gas industry *as a whole* on the Northern Territory. This is made clear in the following extract from the Terms of Reference, which has been amended to include the relevant language only:

"When the inquiry makes a determination… about whether or not there has been an impact or risk on … social conditions, the inquiry will … consider the impacts and risks of the development of the onshore unconventional gas industry, including exploration activities such as seismic surveys and aerial surveys, land access and costs and benefits of the industry. This may be undertaken through a social impact assessment or similar activity."

In accordance with the definitions in the Terms of Reference, a reference to an "unconventional reservoir" in this document is a reference to a reservoir where the rock formation is *shale*. There is currently no gas being produced from shale reservoirs in the Northern Territory. The Amadeus Basin is currently producing gas from conventional reservoirs.

3.3 STEERING COMMITTEE

A Steering Committee has been established to oversee the work of the supplier. The Steering Committee is comprised of the Hon Justice Rachel Pepper, Dr David Ritchie, Prof Peta Ashworth and the Executive Director of the Hydraulic Fracturing Taskforce. The point of contact for all matters will be the Executive Director of the Hydraulic Fracturing Taskforce.

3.4 PROBITY ADVISOR

The Territory has appointed a Probity Advisor to oversee the Territory's processes in relation to the stages of this process. The Probity Advisor's role is to ensure that fairness and impartiality are observed throughout, and that the evaluation criteria stated in any related documentation are consistently applied to all submissions.

PART A – SOCIAL IMPACT ASSESSMENT

3.5 DEVELOPMENT AND IMPLEMENTATION OF A SOCIAL IMPACT ASSESSMENT FRAMEWORK

3.5.1 The supplier must develop a leading practice framework for the identification, assessment and management of the social impacts associated with the development of onshore unconventional gas in the Northern Territory.[1] The framework:

(a) must include a requirement for public participation;

(b) may include components of both strategic and project-level social impact assessment; and

(c) must operate in conjunction with the Northern Territory and Commonwealth environmental assessment frameworks in a way that minimises unnecessary duplication and inconsistency.

3.5.2 The supplier must explain why the proposed framework is leading practice and in doing so must refer to the literature and leading practice social impact assessment frameworks used in other jurisdictions, including overseas jurisdictions.

3.5.3 The supplier must describe the current policy and regulatory regime in the Northern Territory for the identification, assessment and management of social impacts associated with onshore unconventional gas development.

3.5.4 The supplier must identify the structural, policy, regulatory and legislative reforms that must be made to the current regime in the Northern Territory to implement the social impact assessment framework described above.

3.5.5 The supplier must describe how the framework will operate in conjunction with the Northern Territory and Commonwealth environmental assessment frameworks in a way that minimises unnecessary duplication and inconsistency.

3.6 BEETALOO SUB-BASIN

3.6.1 The supplier must identify the people or groups of people that are most likely to be impacted by the development of unconventional gas resources in and around the Beetaloo sub-basin, shown in **Attachment B**, which may include, without limitation, community members, pastoralists, Aboriginal organisations and local businesses (the **Affected Communities**).

3.6.2 The supplier must describe the methodology used to identify the Affected Communities.

3.6.3 The supplier must describe the Affected Communities (that is, describe the community profile or baseline conditions), which must include a description of the values listed at **Attachment A** and how such information was collected.

[1] A "social impact" is defined as a change to any of the values or conditions set out at **Attachment A** and must include cumulative social impacts.

3.6.4 The supplier must describe the type of potential social impacts, issues, concerns, risks and benefits that may arise from the development of the unconventional gas industry in the Beetaloo sub-basin on the Affected Communities. In identifying the potential impacts the supplier must consider:

(a) the list of social impacts, risks and benefits described in sections 7.5, 7.6, 7.7, and 7.8 of the *Background and Issues Paper*;

(b) submissions made to the Panel in connection with the *Background and Issues Paper*;

(c) social impacts, issues, benefits and risks typically associated with the development of onshore unconventional gas resources that have been identified in the literature and in other jurisdictions; and

(d) issues that have been identified in other social impact assessments and related studies that have been completed in or around the Beetaloo sub-basin, including those listed at **Attachment C**.

3.6.5 For each potential impact identified, the supplier must, to the extent possible:

(a) assess the potential impact (or risk) in terms of likelihood and consequence (high, medium, low);

(b) identify a potential measurable indicator, which can be qualitative or quantitative, and develop a methodology for the collection of appropriate baseline data in the Affected Communities so that changes in social values or conditions as a result of any unconventional gas development can be measured over time;

(c) collect such baseline data;

(d) identify ways to avoid, mitigate and/or manage the risk over time (including the entity that should be responsible for the management and monitoring of such risk) and predict what the level of risk will be following mitigation; and

(e) indicate whether or not the level of risk following mitigation would be deemed acceptable, and why.

3.6.6 For every potential social benefit that is identified, the supplier must recommend strategies to realise and maximise such benefit.

3.6.7 The supplier must identify any issues that must be addressed in subsequent project-based social impact assessments associated with the development of unconventional gas in the Beetaloo sub-basin.

3.6.8 The supplier must develop and implement a leading practice community consultation program to support its responses to section 3.6. The supplier must consult, without limitation and where practicable, the Aboriginal Areas Protection Authority; the Northern Land Council; the Departments of Primary Industry, Resources and Trade, Business and Innovation, and Tourism NT; local and regional councils; the Northern Territory Cattleman's Association; NT Farmers, and petroleum operators and titleholders in the Beetaloo sub-basin. The Steering Committee must approve the program prior to implementation.

PART B - SOCIAL LICENCE TO OPERATE

3.7 The supplier must describe, with reference to the literature and examples from other jurisdictions:

(a) the concept of a "social licence to operate" as it applies to the onshore unconventional gas industry in the Northern Territory;

(b) the nature and extent of any potential risks to affected stakeholders, including the Northern Territory Government, petroleum titleholders and operators in the Northern Territory, the Northern Territory community, and the communities affected by development, where industry has not obtained and/or maintained a social licence to operate;

(c) the measures that onshore unconventional gas industry and government can take to enable industry to earn and maintain a social licence to operate in the Northern Territory; and

(d) how industry's social licence to operate can be measured in the Northern Territory, including a part of the Northern Territory.

3.8 The supplier must identify, to the extent practicable, the measures that the petroleum titleholders and operators in the Beetaloo sub-basin have taken in the past, and can take in the future, to earn and maintain a social licence to operate in the Affected Communities.

3.9 TIMELINES AND REPORTING

3.9.1 The work must be in the form of a written report.

3.9.2 The report must include a literature review that includes all references used in section 3.5 and 3.6.

3.9.3 At the end of each calendar month following the award of the tender the supplier must provide the Steering Committee with a written progress report and a verbal presentation within five working days of receipt of the report.

3.9.4 The supplier must provide the Steering Committee with a draft final report and a verbal presentation to the Steering Committee on or prior to 1 September 2017.

3.9.5 A final report must be provided to the Steering Committee by 15 September 2017 and the supplier must present the final report to the Panel on a date to be determined.

3.9.6 The Inquiry will publish the final report on the Inquiry's website on a date to be determined.

ATTACHMENT A

The *International Association for Impact Assessment* defines “social impacts” as changes to one or more of the following:[2]

(a) people’s way of life – that is, how they live, work, play and interact with one another on a day-to-day basis;

(b) their culture – that is, their shared beliefs, customs, values and language or dialect;

(c) their community – its cohesion, stability, character, services and facilities;

(d) their political systems – the extent to which people are able to participate in decisions that affect their lives, the level of democratisation that is taking place, and the resources provided for this purpose;

(e) their relationship with their environment – the quality of the air and water people use; the availability and quality of the food they eat; the level of hazard or risk, dust and noise they are exposed to; the adequacy of sanitation, their physical safety, and their access to and control over resources;

(f) their health and wellbeing – health is a state of complete physical, mental, social and spiritual wellbeing and not merely the absence of disease or infirmity;

(g) their personal and property rights – particularly whether people are economically affected, or experience personal disadvantage which may include a violation of their civil liberties; and

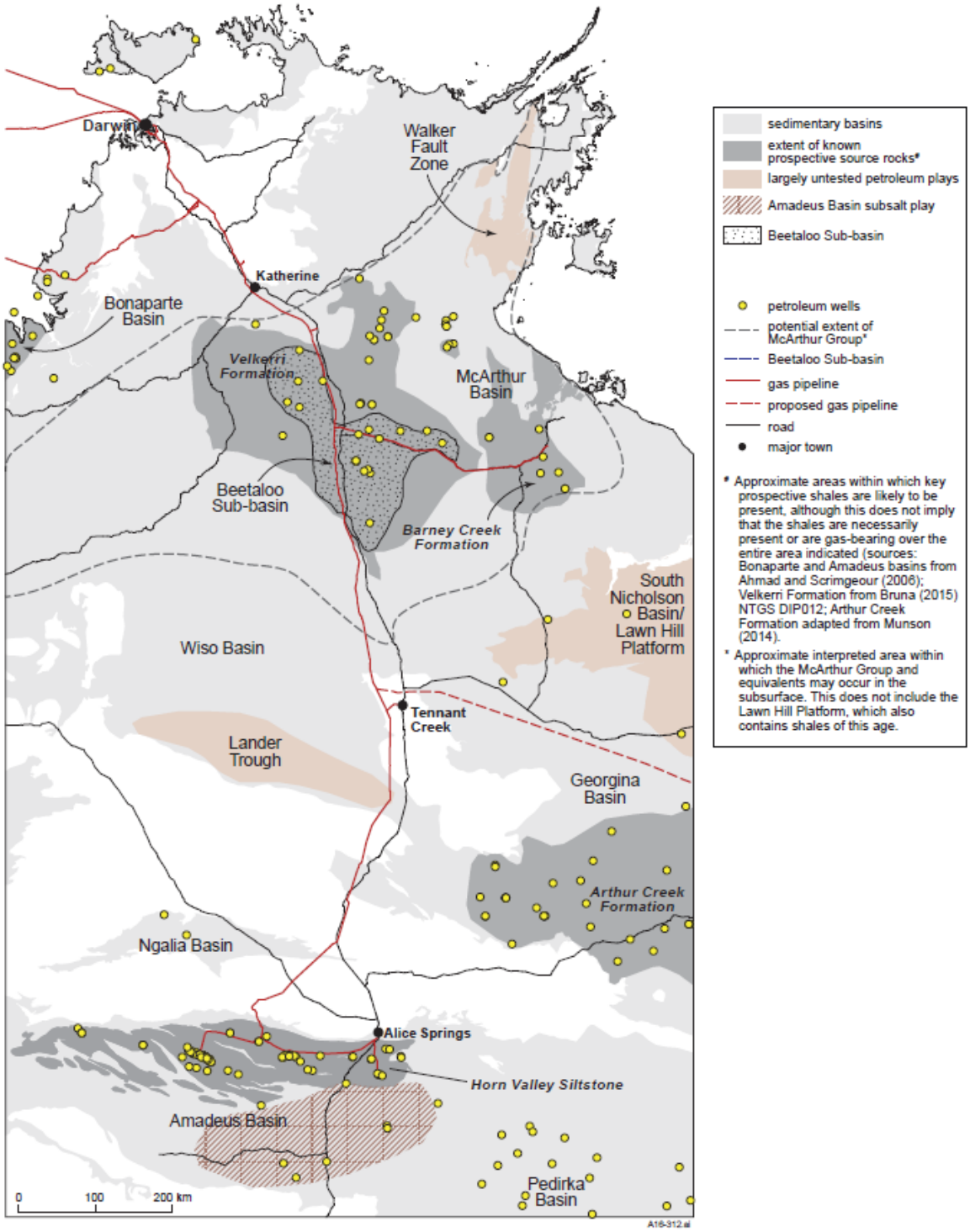
(h) their fears and aspirations – their perceptions about their safety, their fears about the future of their community, and their aspirations for their future and the future of their children,

in each case, to the extent such impact would not otherwise be assessed as part of an environmental impact assessment under Northern Territory or Commonwealth legislation.

[2] Adapted from Vanclay, F. 2003 International Principles for Social Impact Assessment. *Impact Assessment and Project Appraisal* 21(1), 5-11 (available at http://dx.doi.org/10.3152/147154603781766491 last accessed 21 April 2017)

ATTACHMENT B (1)

Northern Territory petroleum potential

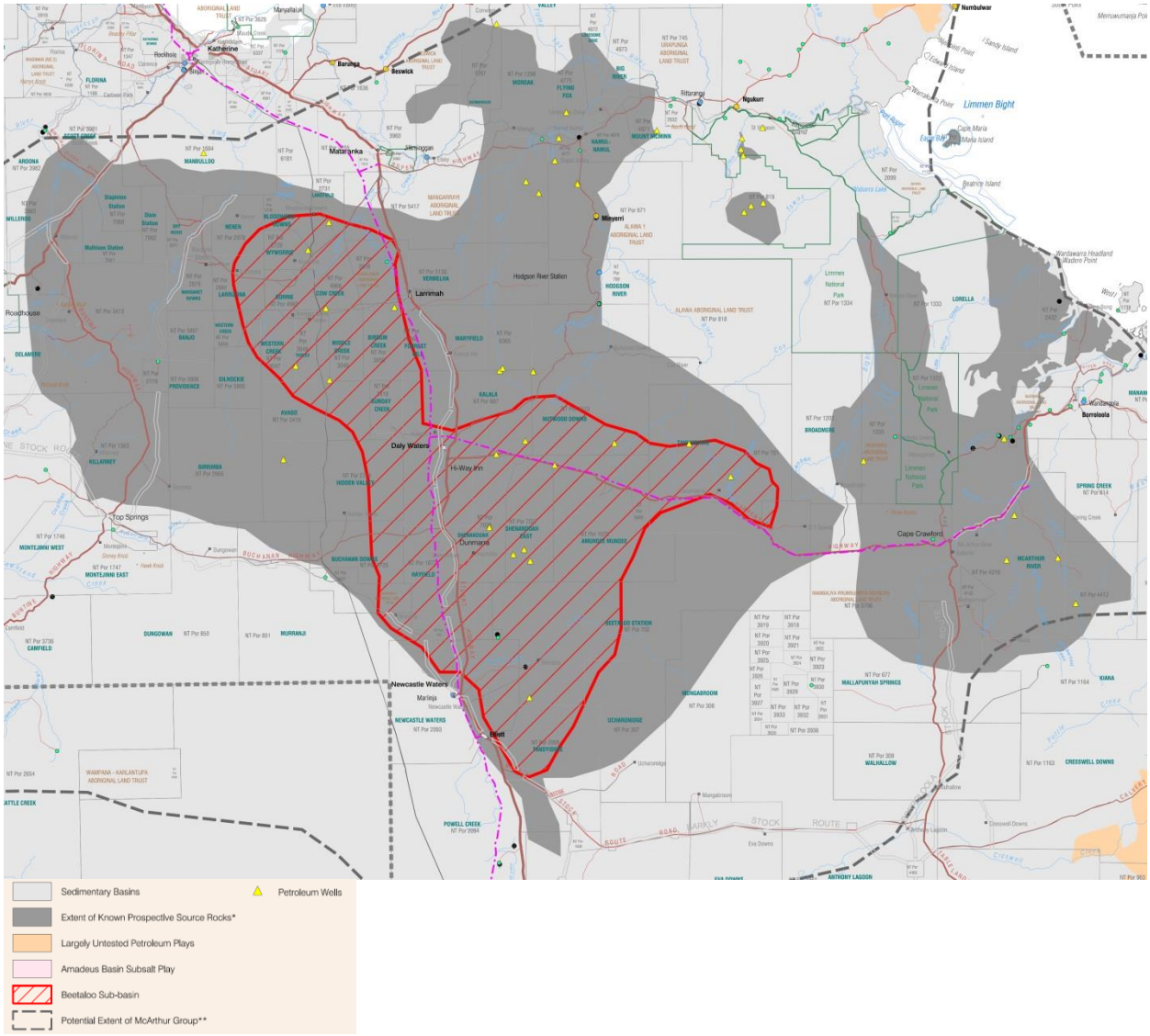


Dec 2016

Northern Territory Geological Survey
Department of Primary Industry and Resources

AUSTRALIA'S NORTHERN TERRITORY

ATTACHMENT B (2)



ATTACHMENT C

1. The research monograph entitled Ngukurr at the Millenium:" A Baseline Profile for Social Impact Planning in South East Arnhem Land, by J. Taylor, J. Bern, and K.A. Senior.

2. Social Impact Assessment undertaken by EcOz in connection with the Western Desert Resources Roper Bar Iron Ore Project.

3. The Economic and Social Impact Assessment undertaken by EcOz in connection with the Sherwin Creek Iron Ore Project.

4. The Social Impact Assessment Scoping Study and the Economic and Social Impact Assessment undertaken by Circle Advisory in connection with the Northern Gas Pipeline.