Economic & Social Impact Assessment

TELLUS

ACIL ALLEN CONSULTING

REPORT TO
TELLUS HOLDINGS LTD
29 JANUARY 2017

ECONOMIC AND SOCIAL IMPACT

OF THE PROPOSED CHANDLER FACILITY

FINAL REPORT

ACIL ALLEN CONSULTING PTY LTD
ABN 68 102 652 148

161 WAKEFIELD STREET
ADELAIDE SA 5000
AUSTRALIA
T +61 8 8122 4965

LEVEL FIFTEEN
127 CREEK STREET
BRISBANE QLD 4000
AUSTRALIA
T+61 7 3009 8700
F+61 7 3009 8799

LEVEL TWO
33 AINSLIE PLACE
CANBERRA ACT 2600
AUSTRALIA
T+61 2 6103 8200
F+61 2 6103 8233

LEVEL NINE
60 COLLINS STREET
MELBOURNE VIC 3000
AUSTRALIA
T+61 3 8650 6000
F+61 3 9654 6363

LEVEL ONE
50 PITT STREET
SYDNEY NSW 2000
AUSTRALIA
T+61 2 8272 5100
F+61 2 9247 2455

LEVEL TWELVE, BGC CENTRE
28 THE ESPLANADE
PERTH WA 6000
AUSTRALIA
T+61 8 9449 9600
F+61 8 9322 3955

ACILALLEN.COM.AU

AUTHORS

ANTONIA HODBY | PETER JOHNSON

C O N T E N T S

EXECUTIVE SUMMARY I

1

Introduction *1*
1.1 Facility details 1
1.2 Location 3
1.3 Data sources 4
1.4 Major assumptions 5
1.5 Economic modelling 5
1.6 Glossary of key economic terms 6
1.7 Social impact assessment 7
1.8 Acronyms 7
1.9 Report structure 8

2

Economic And Social Baseline *9*
2.1 Key stakeholders 9
2.2 Land use 9
2.3 Population 10
2.4 Demography 11
2.5 Overview of the economy 14
2.6 Businesses 20
2.7 Workforce 20
2.8 Economic infrastructure 24
2.9 Health services 25
2.10 Education services 26
2.11 Housing market 26
2.12 Social amenity 29
2.13 Summary 30

3

Economic And Social Impact *31*
3.1 Facility financial assumptions 31
3.2 Major employment assumptions 33
3.3 Contribution to Gross Product 35
3.4 Contribution to real incomes 37
3.5 Job creation 38
3.6 Contribution to government revenue 39
3.7 Opportunities for regional centres 41
3.8 Employment and training 43
3.9 Availability of goods and services 45
3.10 Residual infrastructure 46
3.11 Population 47
3.12 Community health and well being 47
3.13 Culture and way of life 48
3.14 Impact on social infrastructure 49

CONTENTS

3.15 Impact from workforce 50
3.16 Summary 51

4

Economic and Social Risk Assessment *52*
4.1 Risks of the proposed Chandler Facility not realising its economic and social benefits 52
4.2 Forced or unpredicted delays 53
4.3 Contingencies 53
4.4 Summary of impacts and commitments 54

5

Summary *58*
5.1 Key project assumptions 58
5.2 Economic impact 59
5.3 Opportunities for regional centres 60
5.4 Social impact 61
5.5 Contingencies 62
5.6 The Chandler Facility's role in the current social and economic environment 62

6

Bibliography *64*

A

Tasman Global Computable General Equilibrium Model *A–1*

FIGURES

FIGURE ES 1 CONTRIBUTION TO GROSS PRODUCT: CHANDLER FACILITY II
FIGURE ES 2 CONTRIBUTION TO JOB CREATION: CHANDLER FACILITY III
FIGURE 1.1 CHANDLER FACILITY LOCATION 4
FIGURE 1.2 ILLUSTRATIVE SCENARIO ANALYSIS USING *TASMAN GLOBAL* 6
FIGURE.2.1 ESTIMATED RESIDENT POPULATION: NORTHERN TERRITORY AND LOCAL REGION (2004 – 2014) 11
FIGURE.2.2 AGE AND GENDER PROFILE: INDIGENOUS AND NON INDIGENOUS PEOPLE: NORTHERN TERRITORY, LOCAL REGION, SANDOVER PLENTY SA2 AND THE ALICE SPRINGS LOCAL GOVERNMENT AUTHORITY 13
FIGURE 2.3 VALUE OF GROSS STATE PRODUCT BY STATE (JUNE 30) 14
FIGURE 2.4 GROSS STATE PRODUCT: AVERAGE ANNUAL GROWTH 15
FIGURE 2.5 NORTHERN TERRITORY MINING PRODUCTION AND VALUE 17
FIGURE 2.6 NORTHERN TERRITORY MINING PRODUCTION BY MINERAL GROUP 17
FIGURE 2.7 TOTAL HISTORIC AND PROJECTED VISITOR NIGHT GROWTH: NORTHERN TERRITORY 19
FIGURE 2.8 UNEMPLOYMENT RATE: NORTHERN TERRITORY AND LOCAL REGION 21
FIGURE 2.9 INDUSTRY OF EMPLOYMENT: NORTHERN TERRITORY AND LOCAL REGION (% OF TOTAL EMPLOYED PERSONS AGED 15+) 22
FIGURE.2.10 NON SCHOOL QUALIFICATION NORTHERN TERRITORY AND LOCAL REGION (% OF TOTAL PERSONS WITH A QUALIFICATION AGED 15+) 23
FIGURE.2.11 PERSONAL WEEKLY INCOME: NORTHERN TERRITORY AND LOCAL REGION (% OF TOTAL PERSONS AGED 15+) 24
FIGURE 2.12 MEDIAN HOUSE AND UNIT PRICES: ALICE SPRINGS 28
FIGURE 2.13 MEDIAN HOUSE PRICE AND RENTAL PRICE: GREATER DARWIN 29

C O N T E N T S

FIGURE 3.1	CHANDLER FACILITY CAPITAL AND OPERATIONAL EXPENDITURE	32
FIGURE 3.2	EXPECTED REAL REVENUE: CHANDLER FACILITY ($ MILLION)	33
FIGURE 3.3	DIRECT EMPLOYMENT: CHANDLER FACILITY: CONSTRUCTION AND OPERATIONS	35
FIGURE 3.4	CONTRIBUTION TO GROSS PRODUCT: CHANDLER FACILITY	36
FIGURE 3.5	CONTRIBUTION TO REAL INCOMES: CHANDLER FACILITY	37
FIGURE 3.6	EMPLOYMENT CREATION: CHANDLER FACILITY: CONSTRUCTION AND OPERATION	39
FIGURE 3.7	ESTIMATED DIRECT TAXATION PAYMENTS: CHANDLER FACILITY	40
FIGURE 3.8	ESTIMATED DIRECT AND INDIRECT TAXATION PAYMENTS: CHANDLER FACILITY	41
FIGURE 3.9	OCCUPATIONAL CLASSIFICATION: CHANDLER FACILITY: CONSTRUCTION AND OPERATION DIRECT WORKFORCE	44
FIGURE 3.10	CONSTRUCTION TIMING OF PROPOSED RESOURCES DEVELOPMENTS: CENTRAL NORTHERN TERRITORY	46

TABLES

TABLE 2.1	POPULATION ESTIMATES (2014)	10
TABLE 2.2	POPULATION AND POPULATION GROWTH ESTIMATES	11
TABLE 2.3	PROPOSED RESOURCES DEVELOPMENTS: CENTRAL NORTHERN TERRITORY	18
TABLE 2.4	HEALTH SERVICES	25
TABLE 2.5	PUBLIC HOUSING WAIT TIMES (MONTHS): DECEMBER 2005 AND MARCH 2015	27
TABLE 2.6	RATES OF OFFENDING PER 100,000 POPULATION BY CRIME: DARWIN AND ALICE SPRINGS	29
TABLE 3.1	PROJECT FINANCIAL ASSUMPTIONS: CHANDLER FACILITY	31
TABLE 3.2	MAJOR PROJECT ASSUMPTIONS: CHANDLER FACILITY	34
TABLE 3.3	PROJECTED CUMULATIVE CHANGE IN REAL ECONOMIC OUTPUT AND REAL INCOME: CHANDLER FACILITY	36
TABLE 3.4	DIRECT AND INDIRECT JOB CREATION: CHANDLER PROJECT	38
TABLE 3.5	CUMULATIVE PROJECTED CHANGE IN REAL GOVERNMENT TAX REVENUES, RELATIVE TO THE REFERENCE CASE	41
TABLE 3.6	PROPOSED RESOURCES DEVELOPMENTS: CENTRAL NORTHERN TERRITORY	45
TABLE 4.1	SUMMARY OF IMPACTS AND COMMITMENTS: NORTHERN TERRITORY AND LOCAL REGION	54
TABLE A.1	SECTORS IN THE TASMAN GLOBAL DATABASE	A–2
TABLE A.2	OCCUPATIONS IN THE TASMAN GLOBAL DATABASE, ANZSCO 3-DIGIT LEVEL (MINOR GROUPS)	A–5

EXECUTIVE SUMMARY

Tellus Holdings Ltd (Tellus) is proposing to develop the Chandler salt mine and waste storage and isolation facility (herein referred to as the Chandler Facility) and associated above ground infrastructure at an expected cost of around $648 million. For the purposes of this economic impact assessment, it is assumed the Facility would produce up to 500,000 tonnes per annum of rock salt for sale as well as additional production of salt for use in the in the facilities for the storage of hazardous waste. It should be noted that updated engineering studies estimate that it is more likely that up to $750,000 tonnes of rock salt per annum would be produced at the Chandler Facility.

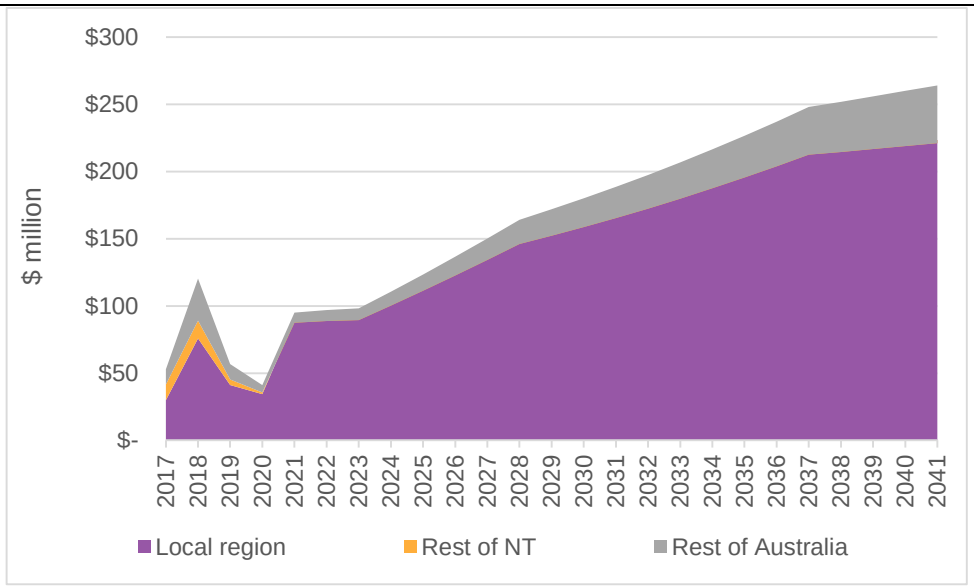
Construction is expected to occur over the period from 2017 to 2020 with the peak construction period occurring in 2018. The construction period would have a high Australian content. Around 67 per cent of the total construction costs would be sourced from Australia and 36 per cent would be spent in the Northern Territory. All of the 1,299 workers required to construct the Facility would be sourced from Australia including an estimated 940 workers from the Northern Territory.

Operation of the Facility would occur concurrently with construction and would also begin in 2018. Over the twenty five years of operation modelled for this Economic Impact Assessment, the Facility would incur operations costs of an average of $80 million per annum of which 64 per cent would be spent in Australia and 52 per cent in the Northern Territory.

The Local region, comprising the Sandover Plenty SA2 area and the Alice Springs Local Government Area, would benefit significantly from the Chandler Facility. Around $118 million of capital expenditure would be spent in the region and an average of $26 million per annum in operation. Local employment would receive a boost with 477 construction workers sourced from the region and an average of 90 full time equivalent workers per annum in operations.

ACIL Allen used Computable General Equilibrium modelling using the *Tasman Global* model to estimate the impacts of the construction and operation activities associated with the Chandler Facility. Modelling found that over the life of the Facility, including the construction period, the Gross Domestic Product of Australia would rise by nearly $4.1 billion or an average of $166 million each year (Figure ES 1). Most of this impact would be realised in the Northern Territory with nearly all of the impact realised in the Local region where the Facility is located. In total, the Facility would add $3.6 billion or an average of $144 million in each of the twenty five years of construction and operation, to the Gross State Product of the Northern Territory. This is a significant annual contribution to the Northern Territory and is equivalent to around 0.6 per cent of the current Gross Territory Product of $23.1 billion.

FIGURE ES 1 CONTRIBUTION TO GROSS PRODUCT: CHANDLER FACILITY

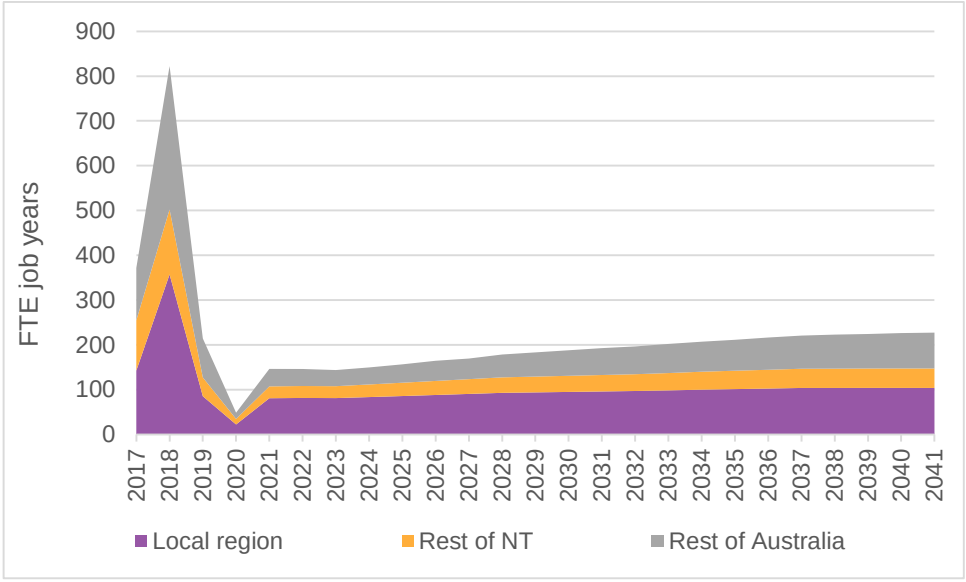


SOURCE: ACIL ALLEN MODELLING

In terms of contribution to real incomes, which is a measure of the wealth of Australian residents, the Chandler Facility would contribute $3.4 billion to the real incomes of Australians over the life of the Facility. This includes an increase of $441 million to real incomes in the Northern Territory.

Job creation from the Facility would be significant. The Chandler Facility is expected to create direct employment of 1,299 full time equivalent workers over the four year construction period from 2018 to 2021 and around 160 workers per annum in steady state workforce (2021). As well as direct employment, the Facility would create indirect employment measured in full time equivalent job years. The development of the Chandler Facility is expected to result in the creation of 5,400 full time equivalent direct and indirect job years over the life of the Facility, an average of 217 full time equivalent job years per annum. The Facility would deliver long term job creation in Australia particularly in the Northern Territory where most of the job creation would be realised. In the Northern Territory an estimated 3,600 full time equivalent job years would be created over the life of the Facility. This is equivalent to an average of 146 full time equivalent job years per annum.

FIGURE ES 2 CONTRIBUTION TO JOB CREATION: CHANDLER FACILITY



Note:

SOURCE: ACIL ALLEN MODELLING

A large amount of Federal and Territory revenue would be generated as a result of the Chandler Facility both in terms of direct payments in the form of Company taxation and Payroll taxation as well as indirect taxation payments from the flow on activity from the Facility. Total taxation (direct and indirect) over the modelled life of the Facility is expected to total $1.9 billion. In total, the Northern Territory is likely to receive $34 million in direct and indirect taxation, or an average of $1.4 million per annum.

As well as modelled economic benefits, this Economic Impact Assessment also analysed a number of other economic and social benefits of the Facility in terms of the benefit to the Local region from the creation of new employment opportunities for local job seekers and new businesses opportunities for businesses wishing to support the Chandler Facility and other projects identified in the Local region area. This analysis was undertaken by ACIL Allen based on our economic analysis as well as a review of the Social Impact Assessment (Michels Warren Munday, 2016) conducted for the Chandler Facility.

These opportunities would assist in retaining and attracting population to the Local region and particularly the town of Alice Springs. Despite a fairly positive outlook created by an anticipated increase in activity in the mining sector in the area, the Local region is currently experiencing population decline and low forecast population growth and the Chandler Facility would be important in helping to address this decline. It is thought that the economy of Alice Springs is such that it would be able to absorb the impact of the Chandler Facility particularly because of the current low occupancy rates for accommodation establishments and the depressed housing market. There is however a very low unemployment rate in the Alice Springs Local Government Area which would suggest that there is a tight labour market in the town.

Indigenous people would have a number of opportunities as a result of the Facility. Tellus have committed to a target of ten per cent Indigenous employment as well as other commitments that would benefit local Indigenous people such as the use of the Facility's access roads, and sponsorship of sporting and academic programs in the nearby Titjikala Aboriginal community. The Company would be making agreements with Traditional Owners, land owners and local Aboriginal communities through proposed land use agreements. These are currently under negotiation with the Government and the Central Land Council are considered confidential. Finally, Tellus would have financial commitments to local Aboriginal groups under the *Native Title Act 1993*.

Impacts on the social infrastructure in the Local region is expected to be confined to Alice Springs where the majority of infrastructure is located. It is expected that the level of infrastructure in Alice Springs is such that it is able absorb any impact as a result of new population moving to the town or from the Chandler Facility such as in the case of a medical emergency. The impact on social services in Santa Teresa, Finke and Titjikala is expected to be minimal but it is recognised that if population returns to these communities, it would place stress on social infrastructure and in particular on local housing.

There would be some negative impacts from the Chandler Facility that can be managed through mitigation measures. These impacts primarily impact Traditional Owners and those people who live in or visit the surrounding area. They include increased vehicle movements on shared roads and a permanent change to the visual landscape.

Tellus have made a number of commitments aimed at enhancing the potential positive opportunities and benefits and minimise or negate identified negative impacts. These commitments would ensure that the risks to the Facility not achieving intended outcomes is low.

1 INTRODUCTION

Tellus Holdings Ltd (Tellus) is proposing to develop the Chandler Salt Mine and Processing Facility (the Facility) located approximately 120 km south of Alice Springs in the Northern Territory.

Tellus is an infrastructure project development company with a proposed dual revenue infrastructure business model. This involves mining the commodity salt and backfilling the voids left from mining with valuable materials such as equipment and archives for temporary storage and later retrieval, and waste for long-term storage and permanent isolation.

In order to understand the economic and social impact of the Chandler Facility, Tellus have commissioned ACIL Allen Consulting (ACIL Allen) to conduct an economic impact assessment of the Facility. This report sets out the findings of the economic assessment along with the findings of the Social Impact Assessment conducted by Michels Warren Munday (Michels Warren Munday, 2016).

1.1 Facility details

Tellus propose to develop a new underground rock salt mine and complementary storage business with supporting aboveground infrastructure that would export up to 750,000 tonnes of salt product per annum. The Facility would also provide for the safe and secure storage and permanent isolation of up to 400,000 tonnes of waste per annum. Note that the economic modelling presented in this report is based on the production of 500,000 tonnes per annum of rock salt as this was the information available when modelling was undertaken. Subsequent engineering studies have indicated that up to 750,000 tonnes per annum is possible.

Mining activities at the Chandler Facility would involve:

- Deep mining of rock salt using a 'room and pillar' system of mining.
- Transport of salt via shaft hoisting to the surface.
- Stockpiling of rock salt for processing and packaging.
- Transport of rock salt to domestic and overseas market:
  - Domestic market (via road and rail) - road transport via truck on federal and state highways. Rail transport via a proposed new railway siding located at the Apirnta Facility.
  - Overseas market (via rail) - rail transport also via the proposed new railway siding located at the Apirnta Facility, predominantly south to a port facility in Adelaide. From there, rock salt would be shipped to overseas markets predominantly in Asia.

Storage and permanent isolation at the Chandler Facility would involve:

- Transport of materials (equipment, archives, etc.) and waste, predominantly by rail, for receipt and temporary storage at the Apirnta Facility.
- Transfer of waste materials from the Apirnta Facility to the Chandler Facility via the proposed Chandler Haul Road.

- Transport of packaged materials via mine access decline or via hydraulic backfill into the voids left from the salt mining operation.
  - Waste would be permanently isolated in line with a strict waste acceptance criteria and in accordance with operational management plans.
  - Materials such as equipment and archives would be stored separately for future retrieval.
- Once full, sealing the underground voids permanently with an engineered barrier.

The Facility would be designed and managed to allow for future waste recovery opportunities – that is, wastes would be stored like-with-like and the final disposal locations of all waste would be tracked and logged for future reference.

The salt would be mined from the Chandler Salt Bed which is located approximately 850 metres below the surface. Materials stored within the voids left from the mining operation would, therefore, be situated within a salt bed approximately 200 to 300 metres thick allowing the waste to be permanently removed from the biosphere in a stable and dry environment.

The key underground infrastructure at the Chandler Facility would include:

- Underground mine.
- Mine access decline.
- Two ventilation shafts (one allowing for salt hoisting and personnel riding as well as downcast ventilation, and one for upcast ventilation).

The key aboveground infrastructure at the Chandler Facility would include:

- Salt processing facilities (salt processing and sales would be deferred for the first five years of salt mining).
- Waste unloading area.
- Waste storage warehouse.
- Surface hydraulic backfill plant and underground reticulation.
- Salt and overburden stockpiles.
- Maintenance buildings.
- Administration buildings.
- Worker accommodation.
- Solar/diesel hybrid power plant.
- Clean and raw water dams.
- Water and sewage treatment.
- Fuel storage facility.
- Utility reticulation.
- Technology recovery park.

Apirnta Facility

The Chandler Facility would be supported by a proposed new rail siding and a laydown area that would support the temporary storage of wastes (the Apirnta Facility). The purpose of the storage and transfer facility would be to provide a licensed facility that safely allows for the temporary storage of waste products prior to being transported by road for storage and permanent isolation at the Chandler Facility.

Waste would be brought to the storage and transfer facility via rail and offloaded at the new rail siding. They would be transported into the Apirnta Facility for temporary storage prior to being transported, via the proposed Chandler Haul Road, for storage and/or permanent isolation at the Chandler Facility.

The proponent is seeking approval for the Apirnta Facility to temporarily store a maximum of 400,000 tonnes of waste, although average volumes are expected to be less than this amount. The waste would be stored either in a warehouse, within an open storage yard or within a liquid storage tank.

The Apirnta Facility would receive waste materials transported via road and rail from reputable companies licenced to transport dangerous goods. Waste arriving would be inspected, sampled, unloaded and appropriately stored in line with a strict waste acceptance criteria and in accordance with operational management plans.

Waste materials to be stored in the warehouse would be sealed in storage containers and wrapped in plastic on wooden pallets then stacked in high-bays. The storage yard would be used for the temporary storage of waste materials that would be sealed in shipping containers. The liquid storage tank would be used to store a variety of liquid wastes.

The Chandler Haul Road and Henbury Access Road

Haul and access roads would be constructed as part of the Proposal. The Chandler Haul Road would be approximately 30 kilometres long and would connect the Chandler Facility to the Apirnta Facility. It would provide for the movement of salt from the Chandler Facility to the rail siding at the Apirnta Facility. It would also provide for the movement of waste temporarily stored at the Apirnta Facility to the Chandler Facility

The Henbury Access Road would be approximately 60 kilometres long and would connect the Apirnta Facility to the Stuart Highway. The main purpose of the access road is to provide for the movement of workers and delivery vehicles to and from the Stuart Highway to the Apirnta Facility and through to the Chandler Facility. The Henbury Access Road would be constructed once mining operations have begun. During construction, all workers, equipment and delivery vehicles would access the Chandler Facility via the existing Maryvale Road (a public road).

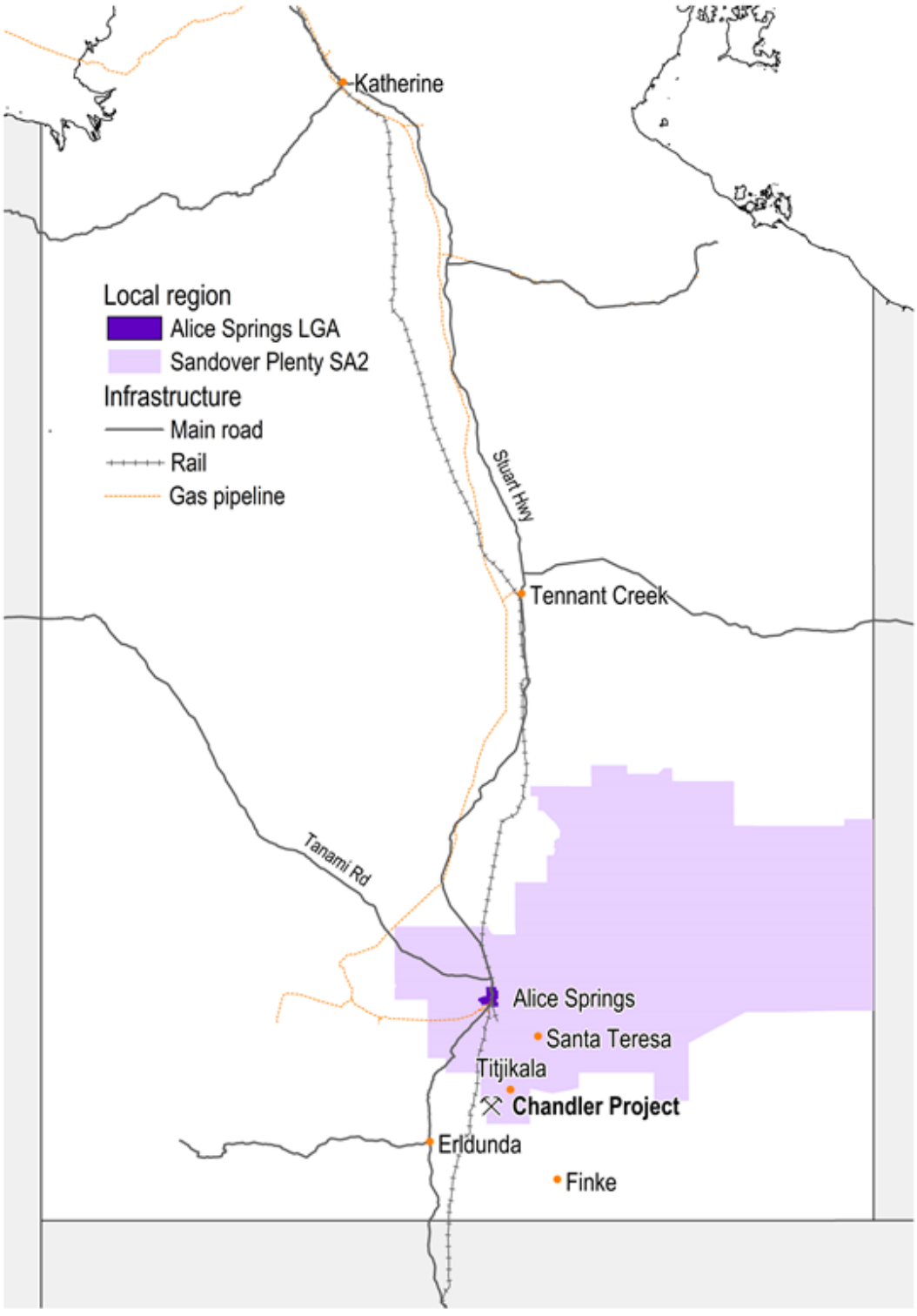
Both roads would be unsealed and would be designed appropriate to their proposed end use. The Henbury Access Road is proposed to be single lane with passing places and the Chandler Haul Road is proposed to be dual lane. Both roads would be designed and constructed to appropriate industry standards.

1.2 Location

The proposed Chandler Facility is located approximately 120 km south of Alice Springs in the MacDonnell Shire Council Local Government Area (LGA) in the Northern Territory as illustrated in Figure 1.1 which shows the geographic location of the Facility. The nearest local town is the Aboriginal community of Titjikala, approximately 25 km east of the site. The Henbury rail siding which forms part of the Central Australian Railway is 30 km to the west.

The Chandler Facility including all ancillary features are located on pastoral lease land governed under the Northern Territory Pastoral Land Act (NT). It is defined by two Mining Lease Areas (MLA): MLA 30612 is approximately 100 km^2 and includes the Maryvale and Henbury Estates.

FIGURE 1.1 CHANDLER FACILITY LOCATION



SOURCE: ACIL ALLEN FROM GIS

1.3 Data sources

Facility data for the construction and operation phases of the Chandler Facility described in this report was sourced from Tellus Holdings. Note that all company data provided by Tellus is based on the current design of the Chandler Facility. The detailed design of the Chandler Facility is not yet complete

and therefore the company data and the associated economic impact results presented in this report should be viewed as preliminary and would be updated after detailed design has been completed.

All other data regarding the description of the economy and key economic variables has been sourced from publicly available sources. The primary source of data is the Australian Bureau of Statistics including the 2011 Census as well as other updated information held by this agency relating to population and gross territory product. All workforce size and unemployment data is sourced from the Department of Employment.

All social impact assessments have been sourced from the Social Impact Assessment conducted for the Chandler Facility (Michels Warren Munday, 2016).

Data for this report has been collected for the following statistical areas which have been referred to as:

— Northern Territory – as defined by the boundaries of the Northern Territory.
— Local region – as defined by the Sandover Plenty SA2 area as defined by the Australian Bureau of Statistics in addition to the Alice Springs Local Government Area. Together they comprise an area of 129,842 km^2.

1.4 Major assumptions

When reading and interpreting this report, a number of key assumptions should be taken into consideration:

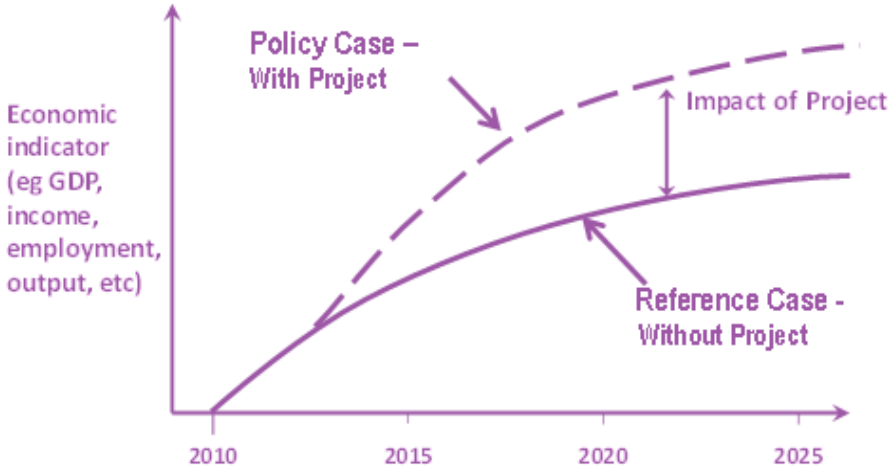
— all company data is based on indicative estimates as of March 2016
— all data is presented in calendar years
— all data is presented in Australian dollars
— all data is presented in real dollars. This means that its value has been adjusted for inflation
— the term *Chandler Facility* refers to both the construction and asset operations phases of the Chandler Facility
— all operations employment figures exclude temporary employees associated with activities such as planned shutdown maintenance and ad hoc scopes of work
— *life of the Facility* refers to the three years of construction of the Chandler Facility from 2017 to 2020 inclusive plus 25 years of operations from 2017 to 2041.

1.5 Economic modelling

Economic modelling was undertaken using Computable General Equilibrium modelling. For this analysis, ACIL Allen's Computable General Equilibrium model, *Tasman Global*, was used to estimate the impacts of the construction and operation activities associated with the Chandler Facility.

In applications of the *Tasman Global* model, a Reference Case simulation forms a 'business-as-usual' basis with which to compare the results of various simulations. The Reference Case provides projections of growth in the absence of the Chandler Facility in terms of Gross Product, population, labour supply, industry output and so on and provides projections of endogenous variables such as productivity changes and consumer tastes. The Policy Case assumes all productivity improvements, tax rates and consumer preferences change as per the Reference Case projections but also includes the impacts of the Chandler Facility. The two scenarios give two projections of the economy and the net impact of the Chandler Facility is then calculated as deviations from the Reference Case as illustrated in Figure 1.2.

FIGURE 1.2 ILLUSTRATIVE SCENARIO ANALYSIS USING *TASMAN GLOBAL*



SOURCE: ACIL ALLEN

Further details of the *Tasman Global* model can be found in Appendix A.

Economic modelling for the Chandler Facility was undertaken for the construction and operation phases of the Facility concurrently where data for the operations phase was provided for a twenty five year period from 2017. In total, twenty five years of data was modelled including four of construction. Note that the operation phase is able to start immediately and so the operation and construction phases run concurrently for the first four years. Three regions were modelled as required by the NT EPA (Northern Territory Environmental Protection Authority, 2013). These regions are:

- The Local region as defined by the Australian Bureau of Statistics Sandover Plenty SA2 plus the Alice Springs Local Government area
- The Northern Territory
- Australia.

1.6 Glossary of key economic terms

All economic impact results are presented in terms of the direct plus the indirect (or flow on) impact of the Chandler Facility. This indirect impact is often referred to in other forums as the multiplier effect. This indirect impact embodies the effect of changes in demands from other industries which is caused when the initial impact from the construction and operations of a new project leads to more spending in the economy which creates more income and taxes which leads to further spending and so on.

Gross Product or real economic output

A measure of the increase in the size of an economy

Real economic output is a measure of the output generated by an economy over a period of time (typically a year). It represents the total dollar value of all goods and services produced over a specific time period and is considered as a measure of the size of the economy. At a national level, real economic output is referred to as Gross Domestic Product (GDP). At the state level, economic output (or GDP equivalent) is called Gross State Product (GSP) while at a regional level is usually called Gross Regional Product (GRP).

Real income

A measure of the welfare of residents in an economy or the increase in ability to purchase goods and services and to accumulate wealth

Although changes in real economic output are useful measures for estimating how much the output of the economy may change due to the Chandler Facility, changes in real income are also important as

they provide an indication of the change in economic welfare of the residents of a region through their ability to purchase goods and services.

Real income measures the income available for final consumption and saving after adjusting for inflation. An increase in real income means that there has been a rise in the capacity for consumption as well as a rise in the ability to accumulate wealth in the form of financial and other assets. The change in real income from a development is a measure of the change in welfare of an economy.

Real employment

The number of net full time equivalent job years created as a result of a project

Real employment is the direct and indirect (flow on) employment as a result of a project. The impact is created as a result of spending in the economy to construct and operate a project. It is a net effect meaning that it takes into account transfers of labour from one job to another (crowding out effects).

Job years

Real employment is measured in job years. A job year is employment of one full time equivalent (FTE) person for one year. Alternatively in can be expressed as one 0.5 FTE person for two years.

Net present value

The value of a future stream of income (or expenses) converted into current terms by an assumed annual discount rate. The underlying premise is that receiving, say, $100 in 10 years is not 'worth' the same (i.e. is less desirable) than receiving $100 today.

Real and nominal dollars

Nominal dollars are dollars that are expressed in the actual dollars that are spent or earned in each year, including inflation effects. Real dollars have been adjusted to exclude any inflationary effects and therefore allow better comparison of economic impacts in different years. Over time, price inflation erodes the purchasing power of a dollar thereby making the comparison of a dollar of income in 2040 with a dollar of income in 2015 invalid. Adjusting nominal dollars into real dollars overcomes this problem.

1.7 Social impact assessment

A social impact assessment was conducted by Michels, Warren Munday (Michels Warren Munday, 2016). The purpose of the social impact assessment is to:

- map likely social change as a result of the Chandler Facility
- predict and assess consequent beneficial and detrimental impacts on people and communities, and
- outline how these impacts would be enhanced, mitigated and managed over the life of the Facility.

The methodology for preparing the social impact assessment began with scoping key areas for study based on a risk and opportunity matrix that informed an initial grouping of social impacts. A baseline of the existing social environment was then developed based on qualitative and quantitative research, stakeholder consultation, and a literature review. The baseline was used to analyse the significance of potential positive and negative impacts – both intended and untended – of the Facility.

1.8 Acronyms

A number of acronyms are used throughout this report. These and their meaning are presented in the following table.

ABS	Australian Bureau of Statistics
AUD or $	Australian dollars
billion	Billion measured by $1x10^9$ (or 1,000 million) as per the US convention
CGE	Computable General Equilibrium (model)

FIFO	Fly in-fly out work practice
FTE	Full time equivalent
GDP	Gross Domestic Product
GRP	Gross Regional Product
GSP	Gross State Product
t	Tonnes

1.9 Report structure

This report describes the economic impacts of the Chandler Facility on the Northern Territory and the Local region. The report aims to address the NT EPA Guidelines for the Preparation of an Economic and Social Impact Assessment for the Chandler Facility (Northern Territory Environmental Protection Authority, 2013).

The report begins by outlining the historical and projected economic and socioeconomic baseline data of the Northern Territory and the Local region. This Chapter uses latest publicly available data to describe the economy including the population, key industries, the characteristics of the workforce. This baseline would be used to provide context around the economic modelling and to provide a measure against which the economic impacts can be described.

Chapter Three describes the economic impact of the Chandler Facility using economic modelling and other economic analysis. It also presents the results of the social impact assessment. Chapter Four discusses the risks of the Facility and identifies the commitments made by Tellus to enhance the positive impacts and minimise or negate identified negative impacts. Chapter Five provides a summary of the report.

Appendix A provides a description of the Tasman Global Model and its key assumptions. This model is the *Tasman Global* Computable General Equilibrium model used to estimate the economic impact of the Chandler Facility.

2 ECONOMIC AND SOCIAL BASELINE

The following sections outline the economic and social setting in which the Chandler Facility would operate. All data and analysis is based on latest available statistical data. Note that in some instances, latest available data is as of the 2011 Australian Bureau of Statistics Census. While slightly outdated, this data does provide a good indication of the baseline of the community and economy.

2.1 Key stakeholders

The key stakeholders of the proposed Chandler Facility are the:

- Southern Arrernte or Pertame people who are the Traditional Owners of the land on which the Chandler Facility is located. The Traditional Owners mainly live in the community of Titjikala as well as in Alice Springs and in remote outstations
- nearby communities of Finke, Santa Maria and Titjikala
- Northern Territory Government
- Central Land Council which is the governing body that covers the wider area around the Chandler Facility. Its area extends from Kalkaringi in the north west, to Tennant Creek, to Finke and Docker River in the south west, and
- MacDonnell Shire Council which comprises the area in and around the town of Alice Springs.

2.2 Land use

The proposed Chandler Facility is located in the MacDonnell Shire Council Local Government Area in the Northern Territory. The proposed Facility including all ancillary features is located on pastoral lease land governed under the Northern Territory Pastoral Land Act (NT). It is defined by two Mining Lease Areas (MLA): MLA 30612 is approximately 100 km^2 and includes the Maryvale and Henbury Estates.

The land is currently used for the production of beef by the Maryvale Pastoral Company. There is an existing unsealed public road located near to the proposed Chandler facility known as the Maryvale Road (Old South Road) which connects the town of Titjikala to Alice Springs. This road is used by the pastoral property as well as people wishing to access Titjikala and other remote communities and out stations. It is an essential piece of infrastructure as it is the only means by which to evacuate people in a medical emergency. Other users of the road are cattle trucks, tourists visiting Chambers Pillar and the Finke Desert Race, and resources companies.

The Titjikala community is an area of three square kilometres excised from the Maryvale Pastoral lease. The town is home to Traditional Owners as well as other Aboriginal people. Traditional owners also live on nearby areas including Oak Valley and Walkabout Bore which are in the vicinity of the proposed Chandler Facility and its ancillary features. The land on which the proposed Chandler

Facility is located is of great significance for the Southern Arrernte people and continues to be part of their traditional lore and customs.

2.3 Population

The following sections describe the population of the Northern Territory and the Local region as well as highlighting the contribution that the Sandover Plenty SA2 and the Alice Springs Local Government Area make to the Local region.

2.3.1 Population density and distribution

The estimated resident population of the Northern Territory is currently (as of 30 June 2014) just over 245,000 people with the majority of the population concentrated around the capital city of Darwin, and the central Australian town of Alice Springs. The current population of the Local region is 33,164 which is around 14 per cent of the population of the Northern Territory.

The Local region comprises of the Allice Springs Local Government Area and the Sandover Plenty SA2 area. The Alice Springs Town Council has a current population of 28,667 people of whom most live in the town of Alice Springs. This is equivalent to just under 12 per cent of the population of the Territory and 86 per cent of the population of the Local region. The Sandover Plenty SA2 area is sparsely populated and has a current population of 4,497.

TABLE 2.1 POPULATION ESTIMATES (2014)

Location	Population
Northern Territory	245,000
Local region	33,164
Sandover Plenty SA2	4,497
Alice Springs (LGA)	28,667
Finke*	162
Santa Teresa*	555
Titjikala*	201

*SOURCE: (AUSTRALIAN BUREAU OF STATISTICS, 2015), * (AUSTRALIAN BUREAU OF STATISTICS, 2012) FOR 2011 ONLY*

There are a number of small population centres located in the areas surrounding the Chandler Facility. These include the Aboriginal communities of Santa Teresa (Ltyentye Apurte) and Titjikala (Tapatjatjaka) which are located in the Sandover Plenty SA2 area and Finke (Aputula) which is located to the south of the SA2. Together these towns have a population of just over 900 people of which 555 live in Santa Teresa. Table 2.1 shows estimates of the population of areas surrounding the Chandler Facility.

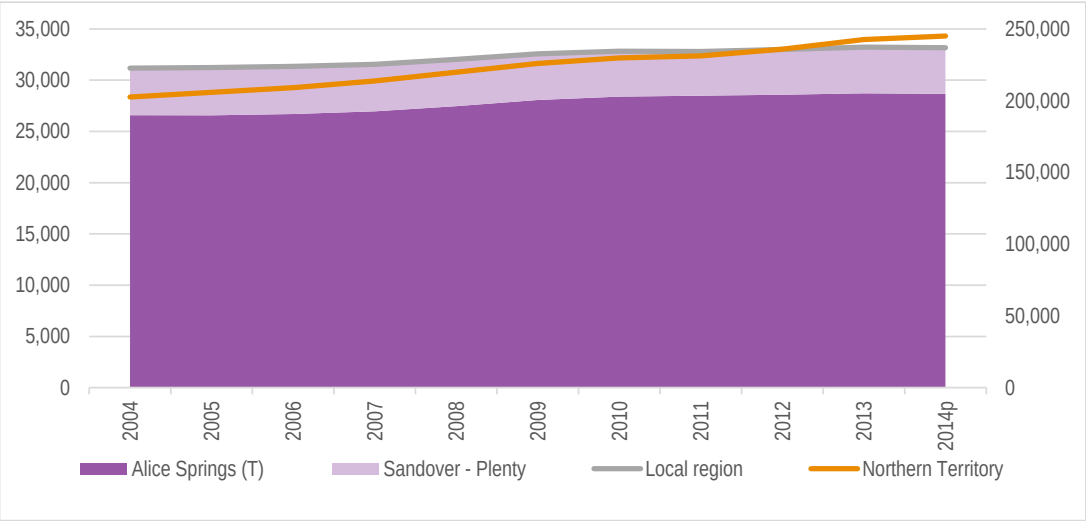
In terms of population density, the Northern Territory is home to around 0.2 persons per km^2 and the Local region is home to 0.3 persons per km^2. However, in the areas outside of the Alice Springs Local Government Area, the population density is far less at 0.03 persons per km^2.

2.3.2 Historical population growth

Figure.2.1 shows the estimated resident population of the Northern Territory and the Local region over the decade from 2004 to 2014. The Figure shows that the population of the Local region has experienced slight growth of around 0.6 per cent per annum since 2004 which is equivalent to around 200 people per year. Nearly all of this growth has come from population increases in the Alice Springs Local Government Area which has recorded population growth of 0.7 per cent per annum equivalent or just over 200 people per year. In the areas outside of the town, there has been negative population growth of around 0.2 per cent per annum or a loss in population of just under ten people each year. Population in the Local region has plateaued since 2010 and has experienced a slight decline from 2013 to 2014 of 0.2 per cent as a result of population decline in the Alice Springs and in Sandover Plenty areas.

In comparison, the population of the Northern Territory has risen by an average of 1.7 per cent per annum over the decade to 2014 as a result of large increases in Darwin of around 1.6 per cent per annum (Australian Bureau of Statistics, 2015). However, Territory population growth has also slowed in the year to 2014 to around 1.0 per cent per annum.

FIGURE.2.1 ESTIMATED RESIDENT POPULATION: NORTHERN TERRITORY AND LOCAL REGION (2004 – 2014)



SOURCE: AUSTRALIAN BUREAU OF STATISTICS CAT 3218.0. ESTIMATED RESIDENT POPULATION

NOTE: P = PRELIMINARY ESTIMATION

2.3.3 Population forecasts

Table 2.2 shows the population of selected areas of relevance to the Chandler Facility along with their recent population growth and estimates of their expected growth where ACIL Allen has estimated population forecasts for the Sandover Plenty SA2 and the Alice Springs Local Government Area based on regional population projections published by the Northern Territory Government (NT Government, 2015). The Table shows that the population of the Local region is expected to grow at around 1.3 per cent per annum while the population of the Northern Territory is expected to continue to increase at around 1.7 per cent per annum. The lower growth in the Local region is a result of little to no growth expected in the Sandover Plenty SA2 in line with ten year historic growth rates.

TABLE 2.2 POPULATION AND POPULATION GROWTH ESTIMATES

Location	Population	Population growth 2013-2014	Population growth forecast (2013-14 to 2018-19)	Population forecast (2018-19)
Northern Territory	245,000	1.0%	1.7% per annum	261,966
Local region*	33,164	-0.2%	1.3% per annum	35,775
Sandover Plenty*	4,497	-0.5%	0.0% per annum	5,000
Alice Springs (LGA)*	28,667	-0.2%	1.6 % per annum	31,280

*SOURCE: (AUSTRALIAN BUREAU OF STATISTICS, 2015) (NT GOVERNMENT, 2015) * ACIL ALLEN FROM (NT GOVERNMENT, 2015)*

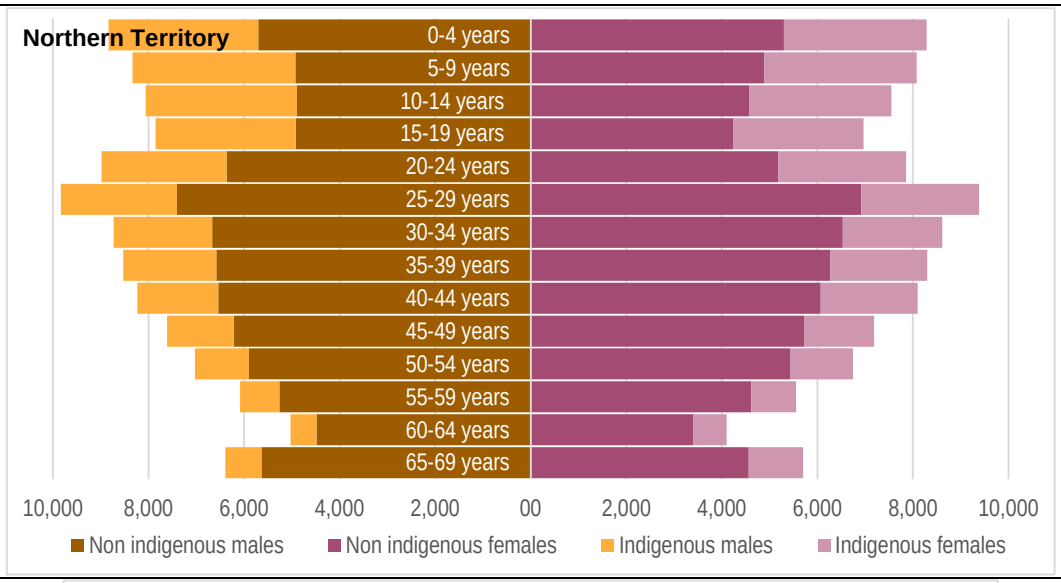
2.4 Demography

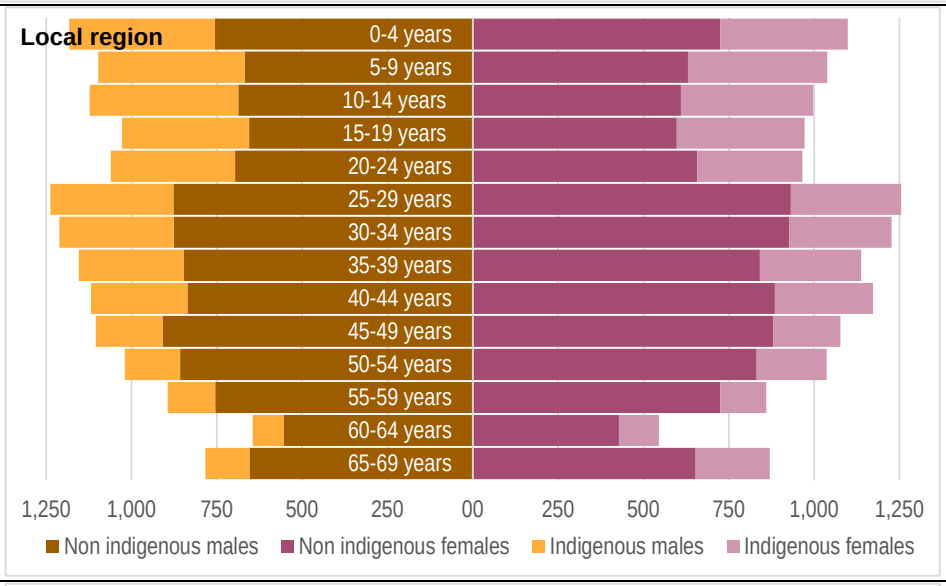
The age and gender profile of people living in the Northern Territory and the Local region is presented in Figure.2.2. The Figure shows the Northern Territory and the Local region both have fairly standard population profiles which are characterised by a higher number of people of working age and are typical of larger populations. However, the demographic profile of the Local region shows a comparative lack of population in the 20 to 29 age groups suggesting that people from this demographic leave the region to find employment and life experience elsewhere.

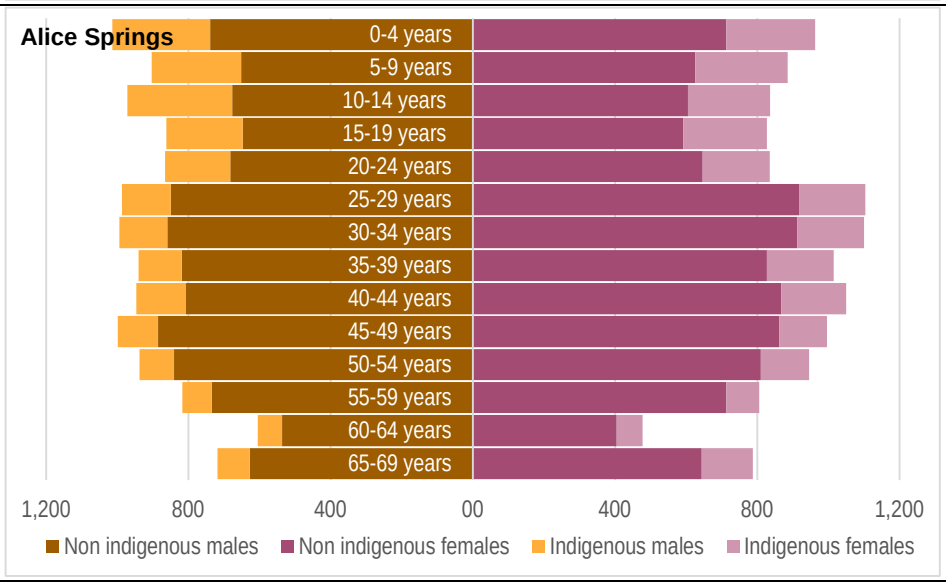
The profiles also show the large number of Indigenous people that live in the Northern Territory, particularly in the Local region. Around 27 per cent of the population of the Northern Territory is Indigenous, while 28 per cent of the Local region are Indigenous.

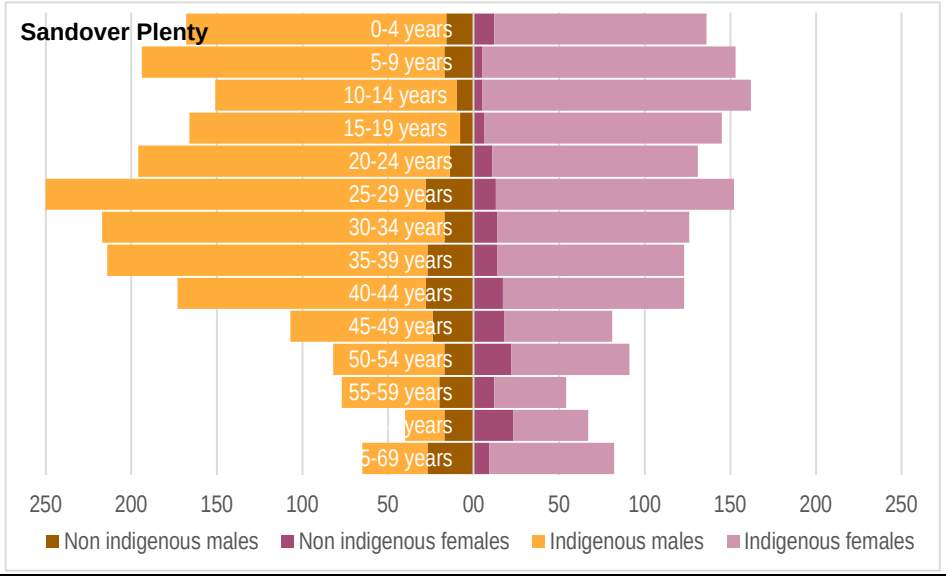
The Figure also shows the demographic profiles of the Alice Springs Local Government Area and the Sandover Plenty SA2 area to illustrate the differences in the two areas that make up the Local region. The Local region is dominated by the demographic profile of Alice Springs as this is where most of the population from the region lives. In contrast, the Sandover Plenty SA2 area has a very large Aboriginal population comprising 89 per cent of the population. There is very large male population in the area and a higher number of people in the 20 to 29 age groups.

FIGURE.2.2 AGE AND GENDER PROFILE: INDIGENOUS AND NON INDIGENOUS PEOPLE: NORTHERN TERRITORY, LOCAL REGION, SANDOVER PLENTY SA2 AND THE ALICE SPRINGS LOCAL GOVERNMENT AUTHORITY







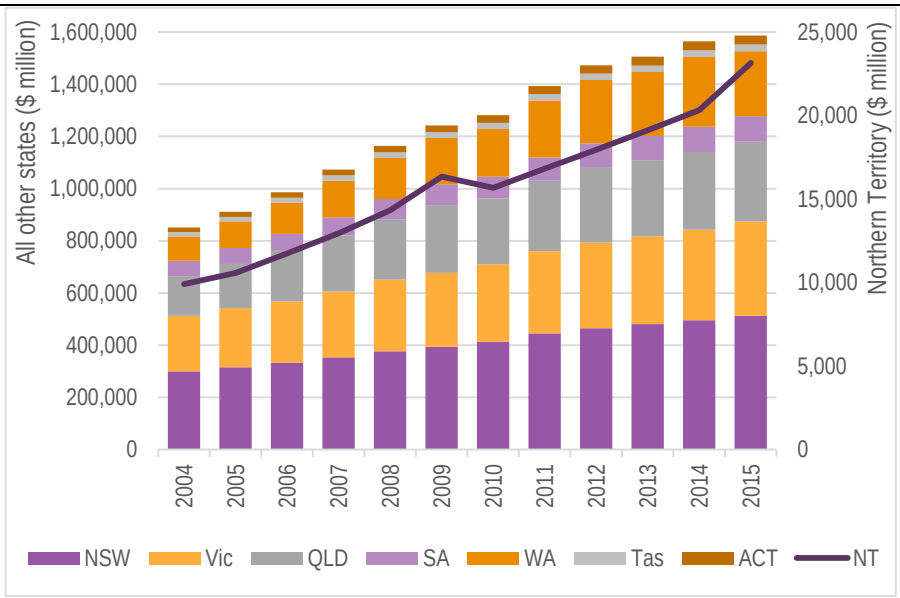


SOURCE: AUSTRALIAN BUREAU OF STATISTICS 2011 CENSUS DATA BY PLACE OF USUAL RESIDENCE. NON INDIGENOUS INCLUDES PERSONS WHO DID NOT STATE THEIR CULTURAL BACKGROUND

2.5 Overview of the economy

The value of the Gross State Product of the Northern Territory is currently $23.1 billion (2014-15). This is equivalent to 1.4 per cent of Australia's Gross Domestic Product which was worth $$1.6 trillion in 2014-15 and is the smallest share of Australia's total Gross Domestic Product as illustrated in **Figure** 2.3 which shows Gross Product over time by State and Territory.

FIGURE 2.3 VALUE OF GROSS STATE PRODUCT BY STATE (JUNE 30)



Note: as of June 30.

SOURCE: AUSTRALIAN BUREAU OF STATISTICS CATALOGUE 5220.0 CURRENT PRICES

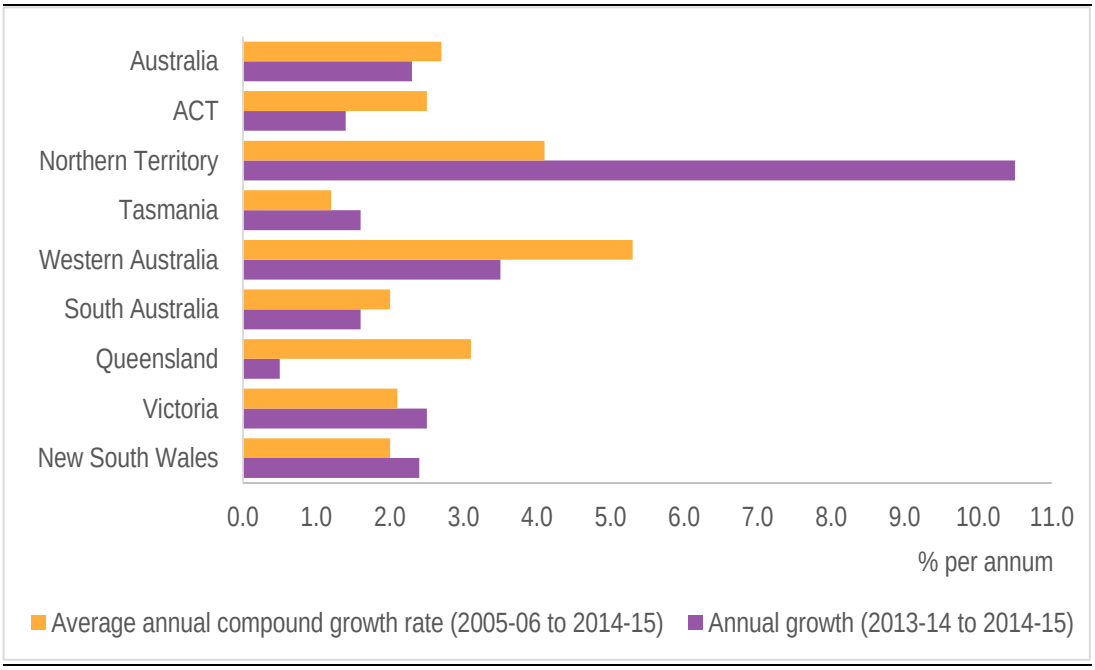
2.5.1 Historic economic growth

Whilst the Territory contributes only a small share of Australia's Gross Domestic Product, it is currently experiencing very high rates of growth as illustrated in **Figure** 2.4 which shows Gross State Product by State. In the period from 2013-14 to 2014-15, the Gross State Product of the Northern Territory grew in real terms by 10.5 per cent which was the highest growth rate of any State or Territory in

Australia and the highest rate of growth experienced by the Northern Territory over the past decade. The reason for this growth was the large investments associated with the construction of major projects such as the Ichthys development. In contrast, the Gross Domestic Product of Australia grew by 2.3 per cent over the same time period.

Growth in Northern Territory Gross State Product is fairly volatile due to the small size of the economy and the comparatively large impact of major projects and global market conditions. Over the decade to 2014-15, the Gross State Product of the Northern Territory grew by an average annual compound growth rate of 4.1 per cent per annum which is the second highest of any jurisdiction behind Western Australia whose economy grew by 5.3 per cent per annum and far less than the 10.5 per cent growth experienced by the Territory over the last year. In comparison, the Gross Domestic Product of Australia grew by an average of 2.7 per cent per annum over period 2005-06 to 2014-15.

FIGURE 2.4 GROSS STATE PRODUCT: AVERAGE ANNUAL GROWTH



SOURCE: (AUSTRALIAN BUREAU OF STATISTICS, 2015)

2.5.2 Forecast economic growth

The Northern Territory Government forecasts economic growth in the Northern Territory to moderate from current levels to reach 4.5 per cent in 2014-15, where it will remain until 2016-17. This rate is above historical trend levels and reflects the ongoing effects of business investment in the Northern Territory. After 2015-16, the economy of the Northern Territory is expected to transition from one of high growth led by the construction of major developments including the Ichthys Project, the Darwin Marine Supply Base and the Defence Support Hub to one of above trend growth of around 3.0 per cent per annum led by the production phases of these major investments (NT Treasury, 2015).

In comparison, the Federal Government forecasts that Gross Domestic Product growth in Australia is expected to remain well below forecasts for the Northern Territory. Real Gross Domestic Product growth is expected to remain constant in 2014-15 at 2.5 per cent before gradually increasing to reach 3.25 per cent in 2016-17 (The Treasury, 2014).

2.5.3 Local region economy

The economy of the Local region is driven by the town of Alice Springs as the major service and supply base for the population of Central Australia and particularly for the surrounding Aboriginal population. It also supports the mining and agricultural industries, the tourism sector, and the Joint Defence Facility at Pine Gap.

There are a range of industries in the town including the government sector, the construction industry, the retail trade industry and the tourism sector. Despite this, the town has a fairly limited economic base that is heavily skewed towards the government sector and the provision of government services in the areas of public administration (police, welfare and so on), education and training, health and the local government sector.

The town holds an annual Alice Springs Mining Services Expo which showcases mining and related industry opportunities in the Alice Springs and Tennant Creek region held in conjunction with the Northern Territory Geological Survey's Annual Geoscience Exploration Seminar.

In the Sandover Plenty SA2 area, the economy is reasonably diverse however there are relatively few job opportunities for local people. As of the 2011 Census there were 1,260 people counted as working in the area. This number provides an indication of jobs because it includes people from outside of the area who work in Sandover Plenty. However, the Census only records 655 people who live in the area as in employment. This would indicate that many of these jobs are staffed by people from outside of Sandover Plenty.

A large number of jobs in Sandover Plenty are located at the Joint Defence Facility Pine Gap with the other major employers being the Government sector including the Local Government sector, and those that supply goods and services to the local population such as the retail trade and utility provision industries. Agriculture and mining are also a relatively large employers in the area providing just over 8 per cent of jobs in the SA2 area.

2.5.4 Major industries: Northern Territory

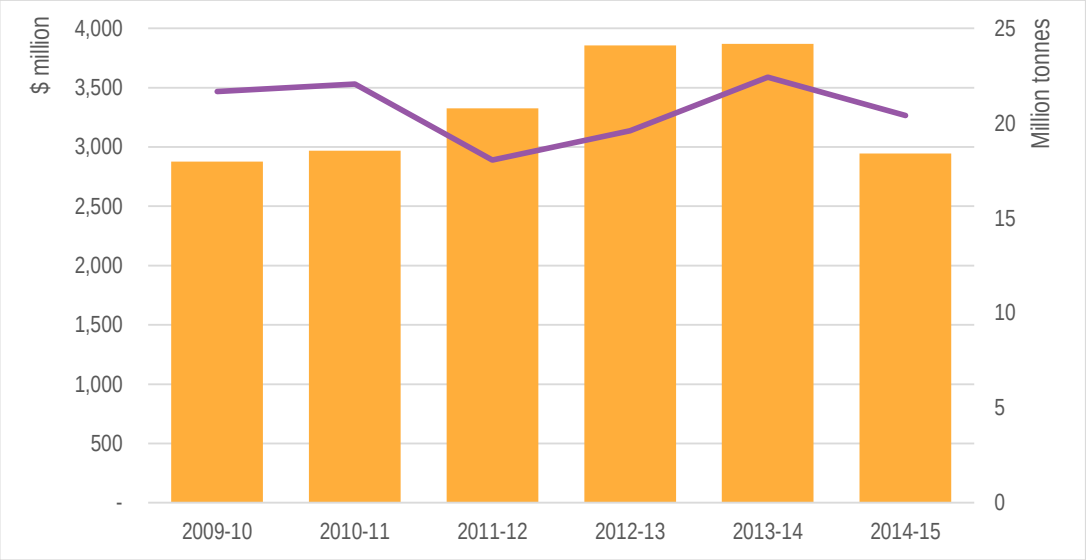
In terms of the value of industry contribution, the main industries in the Northern Territory are the construction; government and community services; and mining industries. Together, these industries account for about half of the Territory's total economic value. The largest employers are the community services; construction; and retail and wholesale trade industries.

Mining

Mining is the most significant industry in the economy of the Northern Territory accounting for 12.3 per cent of total Gross State Product in 2014-15 (NT Treasury, 2016). The major commodities are manganese, gas and liquids, and LNG production. There are five major producing mines in the Territory being the:

- Alcan Gove mine
- Gemco mine
- McArthur River Mine
- Tanami gold mine.

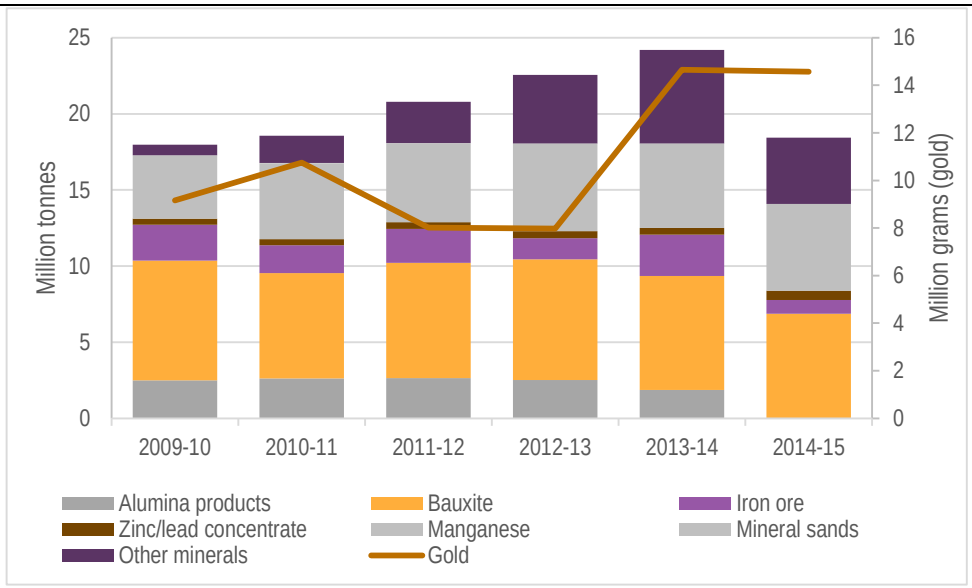
FIGURE 2.5 NORTHERN TERRITORY MINING PRODUCTION AND VALUE



SOURCE: (NORTHERN TERRITORY, 2010 - 2016). NOTE: PRODUCTION EXCLUDES GOLD AND GOLD DORE

In 2014-15, the value of mining production in the Northern Territory was estimated to be $3.2 billion which is below the $3.6 billion recorded in 2013-14 and in 2012-13 as illustrated in Figure 2.12. The declines are primarily as a result of a fall in the production of alumina and iron ore as illustrated in Figure 2.6 which shows the production of minerals in the Territory over time by mineral grouping.

FIGURE 2.6 NORTHERN TERRITORY MINING PRODUCTION BY MINERAL GROUP



SOURCE: (NORTHERN TERRITORY, 2010 - 2016).

In addition, latest statistics show energy production in the Northern Territory in 2013-14 was $3.6 million per annum. Production of energy products is expected to be higher in 2014-15 as the Dingo gas field and the Surprise oil field in Central Australia which commenced production in 2015, come into full production. The Ichthys field is expected to commence production in 2017.

There are currently two minerals projects in operation in the region surrounding the Chandler Facility. The Spinifex Bore garnet sand surface mining and processing operation is a small operation which began operation in mid-2015. Approximately 400km to the west is the Newmont's Tanami gold mine located off the Tanami Road to the west of Alice Springs.

There are also a number of proposed projects in the region around Alice Springs which are presented in Table 2.3 (Northern Territory Environmental Protection Authority, 2015). These include the proposed Mt Peake Project which is located 235 km north of Alice Springs. The proposed Nolans Bore rare earths mine is located nearby approximately 135 km north northwest of Alice Springs. This development is expected to begin production at the end of 2021 however construction of supporting infrastructure could commence as early as the middle of 2017.

TABLE 2.3 PROPOSED RESOURCES DEVELOPMENTS: CENTRAL NORTHERN TERRITORY

Project	Proponent	Construction start date	Operation start date	Location	Construction employment	Operation employment
Mt Peake Project - stage 1 - develop new open pit mining and processing operation to produce vanadium, titanium pigment and pig iron	TNG Limited	Q2 2016	Q2 2018	235 km north of Alice Springs	Up to 350	175 - 250
Nolans Bore rare earths mine	Arafura Resources	2017	2022	135 km north northwest of Alice Springs	375	248
Jervois Mine - reopen old mine with 2 open-cut pits and on - site processing plant	KGL Resources	Q2 2017	Q4 2018	Approx 270 km north-east of Alice Springs	360	300
Tanami Gold Mine expansion including second decline and increased plant capacity	Newmont	2016	2017	Approx 540 km north west of Alice Springs	na	50

SOURCE: NT GOVERNMENT (NORTHERN TERRITORY ENVIRONMENTAL PROTECTION AUTHORITY, 2015)

Government sector

The government sector in the Northern Territory provides a significant contribution to the economy through the provision of services such as Government Administration, Defence, Education and Health. Together they account for around 18.3 per cent of Territory Gross State Product. This comparatively large contribution is largely a result of the requirement to provide services to a number of small and scattered populations throughout the Northern Territory, including a large number of Aboriginal communities.

The Defence sector is a major contributor to the Northern Territory's economy generating around 6.9 per cent of the Gross State Product compared with 1.9 per cent of Australia's GDP. Defence spending in the Territory increased by 10.6 per cent or $144 million to $1.5 billion in 2013-14.

Agriculture

The agriculture industry in the Northern Territory comprises cattle and other livestock (including buffalo, crocodiles, poultry, pigs and camels), horticulture (fruit, vegetables, nursery and cut flowers) and mixed farming (field crops, hay and seeds, and forestry). In 2014-15 the agriculture, forestry and fishing industry in the Territory accounted for 1.8 per cent of Gross State Product.

The total cattle herd in the Northern Territory is around 2.2 million with large herds of cattle located in the rangelands around Alice Springs. The Northern Territory is the largest exporter of cattle in Australia producing over 500,000 cattle for the live export market in 2014-15 accounting for nearly all the turnoff from the Territory. The largest live cattle export port in Australia in terms of throughput is the Port of Darwin which exported over 613,000 cattle in 2014-15. Cattle are primarily bound for Indonesia which currently accounts for 80 per cent of the live cattle trade from the Territory. New developments including the construction of the Livingstone Abattoir in in Darwin which came into production in late 2014. The abattoir has the capacity to slaughter 1,000 cattle per day or 100,000 cattle per annum and as of September 2015 was reportedly slaughtering 400 cattle per day.

Horticulture is also a key agricultural industry with the main production being fruits such as melons, bananas and mangoes; vegetables including okra, bitter melon, snake beans, pumpkin and cucumber;

and cut flowers. The value of horticulture production in the Territory was estimated at $115 million in 2013-14 including $80 million of fruit, over $17 million of cut flowers and $16 million of vegetables. In the Local region the main horticulture developments are located at Alice Springs and Ti Tree. The industry in this area is based largely on grapes but also includes other crops such as melons, pumpkins, mangoes and dates. It is an important employer in the area particularly for people living in the towns and communities outside of Alice Springs.

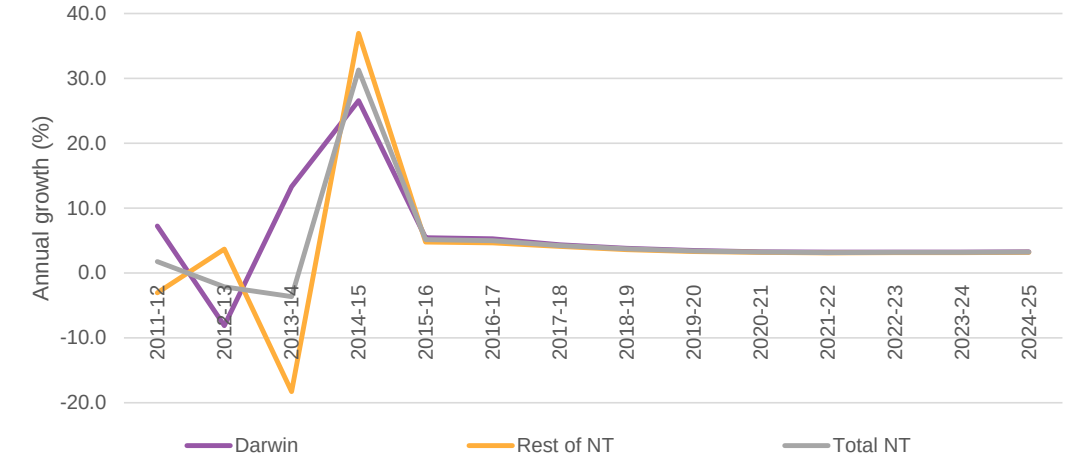
Fish production in the Territory largely comprises snapper, barramundi and shark, while crustacean production is dominated by prawns and mud crabs. The value of total fisheries production in the Territory was estimated at $61 million in 2013-14.

Tourism

Tourism is an important component of the Northern Territory economy contributing 4.0 per cent of the Gross State Product of the Territory in 2013-14. It is also one the largest employers in the Northern Territory providing around 8,000 jobs or 5.7 per cent of employment (NT Treasury, 2015). Much of this employment is in regional areas where there is limited economic diversification and few opportunities.

In 2014-15 there were nearly 1.5 million visitors to the Northern Territory and total visitor expenditure was nearly $1.5 billion. In the Alice Springs and Surrounds region there were an average of 343,000 visitors per year over the period June 2013 to June 2015. This represents a stabilisation of a downward trend in visitor numbers to the region experienced since 2005 when nearly 500,000 visitors per year visited the region. Figure 2.7 shows the historic and forecast growth in visitor nights in the Territory. It shows that there has been very strong growth in the number of visitor nights in the Territory in 2014-15 of over 30 per cent however long term projections of visitor growth are expected to remain at more conservative levels. Over the five years to 2019-20, the average number of visitor nights is expected to grow by around 4.3 per cent per annum. This growth is in keeping with forecasts of most other jurisdictions in Australia and is consistent with the five year Australian average annual growth rate of 4.4 per cent per annum (Tourism Research Australia, 2015).

FIGURE 2.7 TOTAL HISTORIC AND PROJECTED VISITOR NIGHT GROWTH: NORTHERN TERRITORY



SOURCE: (TOURISM RESEARCH AUSTRALIA, 2015)

There are 8,500 accommodation rooms in the Northern Territory with a current room occupancy rate of 65 per cent. In the Alice Springs tourism region there are nearly 1,500 accommodation rooms (Australian Bureau of Statistics, 2015) with a room occupancy rate of 65 per cent for the year ending June 2015 representing an increase of 3 per cent on the previous year and confirming a two year increase in occupancy rates in the region. Peak occupancy rates in the town tend to be in the months of August, September and October as a result of winter holiday breaks when room occupancy rates reached just under 80 per cent in 2015 (Tourism NT, 2015).

2.6 Businesses

Darwin is the main service centre for the Northern Territory supporting a wide range of industries including the government sector, the oil and gas industry, mining and the defence sector. It continues to position itself as a strategic position for shipping, regional freight and as a distribution gateway. There are around 14,500 businesses in the Northern Territory as of June 2014 with the greater Darwin area home to around 71 per cent of businesses while nearly 16 per cent of businesses are located in Alice Springs (NT Department of Business, 2015). A number of large projects have been constructed in the Northern Territory in recent years. These include the INPEX Ichthys LNG Project, the Darwin Marine Supply Base, the Defence Support Hub, and Darwin Waterfront Precinct which are all either in or close to completion. The construction and operation of all of these projects have required businesses located in Darwin for the supply of goods and services. There are therefore a number of businesses located in Darwin with recent experience in supporting the construction and subsequent operation of a developments that are comparable to the Chandler Facility.

The business sector in the Local region is dominated by the town of Alice Springs. Alice Springs supports nearly 2,300 businesses including those in the construction, food and accommodation, transport and logistics, financial services and so on. As the business hub for the surrounding region including the mining sector, there are businesses located in the town that can support the construction effort and the operations phase of the Chandler Facility.

There are very few businesses located in the Local region that are located outside of Alice Springs. Most businesses are involved in the pastoral industry or in the provision of goods and services to local communities.

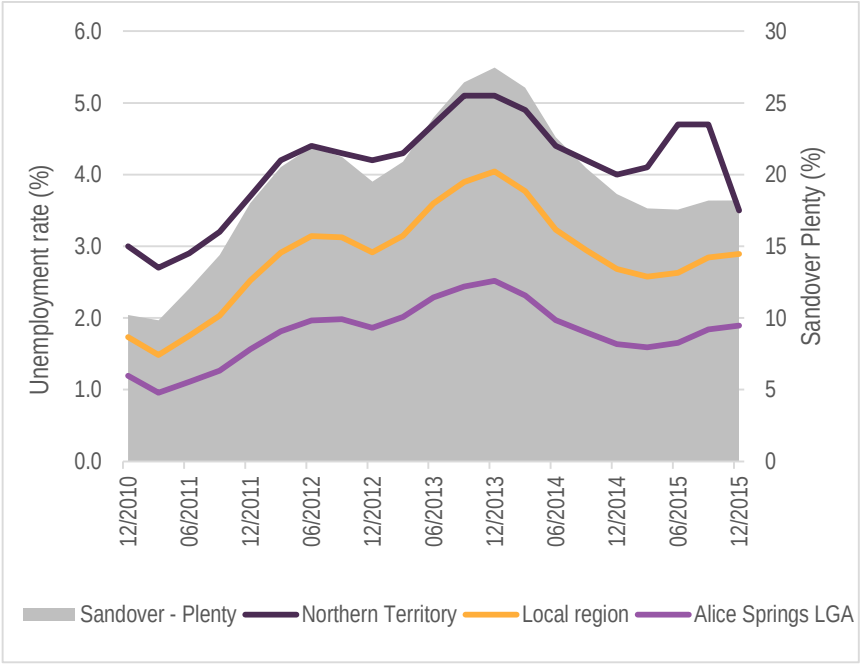
2.7 Workforce

There is a large workforce in the Northern Territory of nearly 122,000 people of which around 6,000 are currently seeking work. This equates to an unemployment rate in the Northern Territory of around 4.2 per cent (2015) where the unemployment rate is defined as the number of people seeking work as a percentage of the workforce, as reported by the Department of Employment (Department of Employment, 2015).

Figure 2.8 shows the unemployment rate in the Northern Territory and in the Local region for the period from December 2010 through to December 2015. The workforce in the Local region comprises of around 20,500 people of which nearly 19,300 are located in the Alice Springs Local Government Area and the remaining 225 in the Sandover Plenty SA2 area.

The unemployment rate in the Local region is currently 2.7 per cent which is well below the rate for the Territory and indicates only 560 job seekers in the region. While around two thirds of these job seekers are located in Alice Springs, there is a comparatively higher number of job seekers in the Sandover Plenty SA2 area. This is represented by a much lower unemployment rate in Alice Springs of 1.7 per cent compared to an unemployment rate in Sandover Plenty of 17.9 per cent. This higher unemployment rate is reflective of the limited job opportunities in these areas and the difficulties that job seekers face in securing employment. Furthermore, it is likely that there are other people from the area that are not currently seeking work due to the low expectation of gaining employment resulting in an unemployment rate that is not reflective of the actual number of job seekers in the area.

FIGURE 2.8 UNEMPLOYMENT RATE: NORTHERN TERRITORY AND LOCAL REGION



SOURCE: DEPARTMENT OF EMPLOYMENT. NOTE: PEOPLE AGED 15 TO 65

2.7.1 Industry of employment

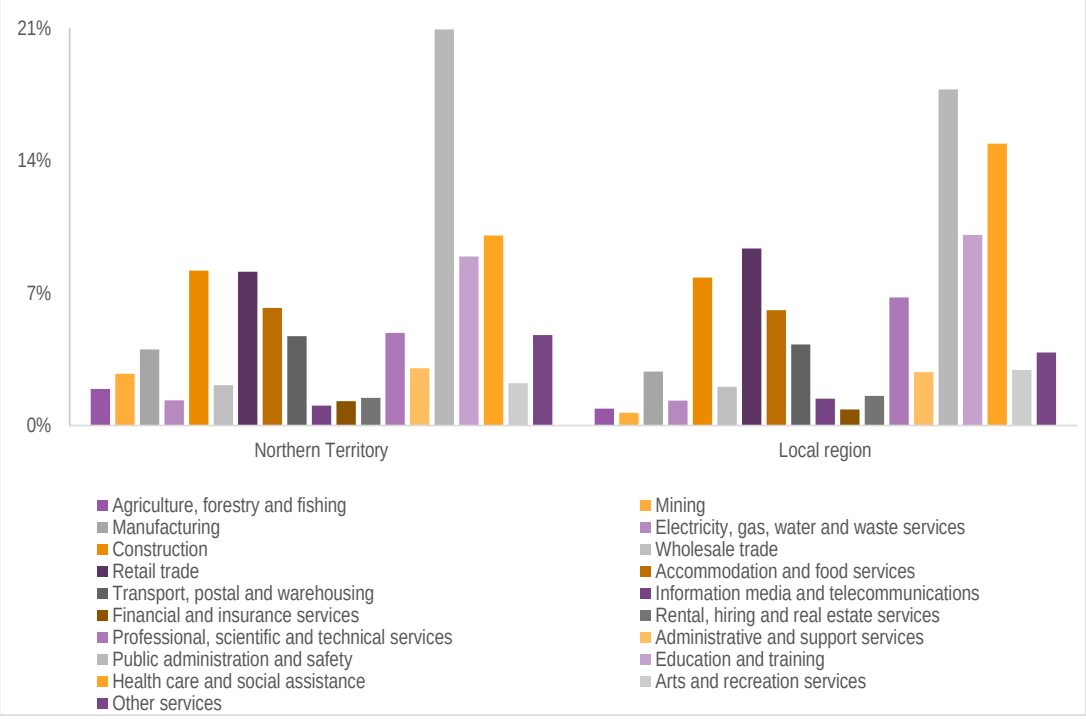
The dominance of the government sector as a major employer in the Northern Territory is highlighted in Figure 2.9 which shows the industry of employment for employed residents of the Northern Territory and the Local region. Forty per cent (n = 32,375 workers) of the employees in the Northern Territory are employed in the industries of Public administration and safety, Education and training and Health care and social assistance which largely reflect the industries that comprise the government sector including services provided by Local, Territory and Federal governments. In comparison, 43 per cent (n = 5,000) of the Local region are employed in this sector.

The employment profile of the Local region is dominated by the workforce of Alice Springs where 95 per cent of the employed workforce was located in 2011. In the Sandover Plenty SA2 area, the reliance on the government sector as the major employer is even more pronounced with 51 per cent (n=335 of the 655 people employed) of the working population employed in this sector.

The three main industries of employment in the Northern Territory are the Public administration and safety industry with 21 per cent of total employment, the Health care and social assistance industry (10%) and the Construction industry with 8.2 per cent of total employment. The three main industries of employment in the Local region are the government related industries of Public administration and safety (18%), Health care and social assistance (15%) and Education and training (10%). Retail trade is also an important employer in the Local region employing for just over nine per cent of employed persons that live in the region. These industries reflect the role of the town of Alice Springs as a regional service centre and population base.

The employment profile of the Local region largely reflects the profile of the Alice Springs Local Government Area. In the Sandover Plenty SA2, the employment profile is quite different with the main industries of employment being the Public administration and safety (28%), Education and training (13%), and Agriculture, forestry and fishing (11%). The Other services (8%) and Retail trade (6%) industries are also important employers where Other services includes industries such as repairs and maintenance to vehicles and machinery, hairdressers, religious providers and household services. These key employers reflect the basic nature of the economy in Sandover Plenty that focusses on the provision of goods and services to the local community and the role of the pastoral industry in the economy.

FIGURE 2.9 INDUSTRY OF EMPLOYMENT: NORTHERN TERRITORY AND LOCAL REGION (% OF TOTAL EMPLOYED PERSONS AGED 15+)



SOURCE: AUSTRALIAN BUREAU OF STATISTICS 2011 CENSUS DATA BY PLACE OF USUAL RESIDENCE. EMPLOYED PERSONS AGED 15 AND OVER

As of the 2011 Census, the Mining industry was a relatively small employer in the Northern Territory accounting for just under three per cent of jobs compared to less than one per cent of employment in the Local region. Nevertheless, the industry provides good opportunities for local people employing 93 residents of the Local region in 2011 including 73 in the Sandover Plenty SA2.

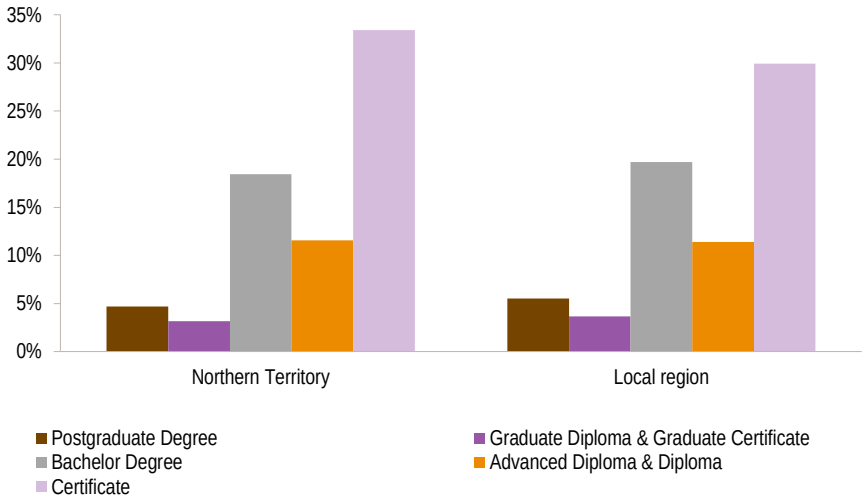
In 2013-14 the mining industry directly accounted for 4.3 per cent of total resident employment in the Territory (NT Treasury, 2015). Given the closure of several mines in the Northern Territory in recent years, including all of the Territory's iron ore mines, it is likely that this share has fallen.

2.7.2 Skills level

Fifty seven per cent of people aged 15 and over in the Northern Territory hold a non-school qualification compared to 60 per cent of the Local region.

Figure.2.10 shows the non-school qualifications of people aged 15 and over who hold a qualification and who live in the Northern Territory, compared to those that live in the Local region as of the 2011 Census. The Figure shows that in both regions, the most commonly held qualification is a Certificate.

FIGURE.2.10 NON SCHOOL QUALIFICATION NORTHERN TERRITORY AND LOCAL REGION (% OF TOTAL PERSONS WITH A QUALIFICATION AGED 15+)



SOURCE: AUSTRALIAN BUREAU OF STATISTICS 2011 CENSUS DATA BY PLACE OF USUAL RESIDENCE. PERSONS WITH A QUALIFICATION AGED 15 AND OVER

In the Local region, 29 per cent of qualified people hold a Bachelor degree or higher (Postgraduate Degree, Graduate Diploma and Graduate Certificate, and Bachelor Degree) while the equivalent for the Northern Territory is 26 per cent. The higher qualifications in the Local region are a result of the occupation profile in the Alice Springs Local Government Area which supports a large number of government workers and other tertiary qualified people. In the areas outside of Alice Springs, only 7 per cent of the population with a qualification hold the same level of qualifications compared to 31 per cent in Alice Springs.

In terms of absolute numbers, the number of qualified people in the Local region with a Bachelor or higher degree is 3,860 people which is 16 per cent of all the people in the Northern Territory with these qualifications. The Alice Springs Local Government Area accounts for 3,761 of these people. In contrast, the Sandover Plenty SA2 has 99 similarly qualified people accounting for just 0.4 per cent of the Northern Territory total.

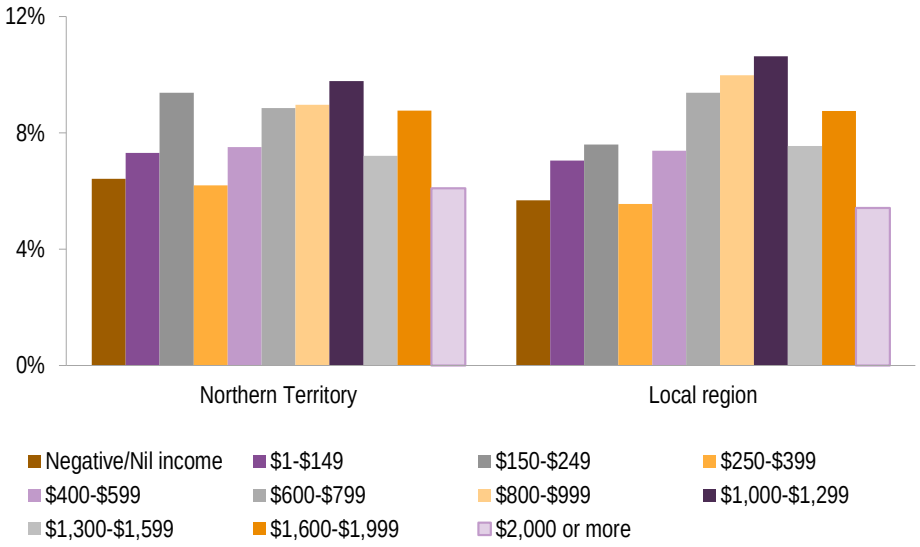
2.7.3 Income

The 2011 Census recorded 32 per cent of the population in the Northern Territory earning in excess of $1,000 per week and 6 per cent of the population earn in excess of $2,000 per week. The Local region also recorded 32 per cent of the population in the Northern Territory earning in excess of $1,000 per week however 12 per cent of the population earned in excess of $2,000 per week.

Incomes in the Alice Springs Local Government area are comparatively high with 36 per cent of the population earning in excess of $1,000 per week and 6 per cent earning in excess of $2,000 per week. This is equivalent to 14 per cent of all of the people in the Northern Territory in this wage bracket. These higher earnings is because there are a high number of tertiary qualified people and people working in professional occupations who tend to earn higher incomes living in the town.

Just five per cent (n = 130) of the population of the Sandover Plenty SA2 earn in excess of $1,000 per week and one per cent (n=17) earn in excess of $2,000 per week.

FIGURE.2.11 PERSONAL WEEKLY INCOME: NORTHERN TERRITORY AND LOCAL REGION (% OF TOTAL PERSONS AGED 15+)



SOURCE: AUSTRALIAN BUREAU OF STATISTICS 2011 CENSUS DATA BY PLACE OF USUAL RESIDENCE. PERSONS AGED 15 AND OVER

2.8 Economic infrastructure

The following sections provide a brief overview of the key economic and social infrastructure in Darwin and Alice Springs being the centres that are most likely to support the Chandler Facility through the provision of the majority of goods, services and labour. The subsequent sections provide more detailed information on the health services, education services, and housing market in the areas surrounding the proposed Chandler Facility.

Darwin

Darwin is the main population centre in the Northern Territory and is the key government and services sector for the Northern Territory. It offers a modern standard of living and a high standard of social infrastructure expected of a city.

The city is a significant part of the AustralAsia Trade Route, which includes: the AustralAsia Railway that links Darwin to the national rail network, an expanded East Arm Port, abundant industrial land at the adjoining Darwin Business Park and a growing number of shipping links with Asia.

Darwin is becoming an important supply, service and distribution base for major minerals and energy projects located in the north of Australia, the Timor Sea and South-East Asia. In the near term, significant investment from the INPEX Ichthys LNG Project which is nearing completion, the Darwin Marine Supply Base and the Defence Support Hub will continue to underpin the continued rapid growth in the Darwin economy. The operation of these developments will provide growing demand for employment and goods and services to support their production phases. At the same time, large lifestyle developments such as the Darwin Waterfront Precinct will enhance the social, cultural and general liveability aspects of the city for residents and tourists.

Alice Springs

Alice Springs is the largest population centre in central Australia and is the service centre for the surrounding region. It is well serviced by transport infrastructure due to its location on the Stuart Highway and the Adelaide to Darwin railway. The Alice Springs Airport is the major airport for the region providing air links to all of the mainland capital cities in Australia as well services to Cairns, Tennant Creek and Uluru.

Alice Springs is a modern and well catered for town with a good level of social infrastructure. Facilities include a teaching hospital, a university, childcare facilities, several high schools, numerous primary and preschools, a library and a variety of recreational facilities including two shopping malls and an aquatic centre. There are campuses of the Charles Darwin University and the Batchelor Institute located in town as well as a number of registered training providers. The town is the base of the Royal Flying Doctor service which provides 24-hour primary emergency retrievals and inter-hospital transfers. There is a public transport service that services areas within the town.

Finke, Santa Teresa and Titjikala

Finke, Santa Teresa and Titjikala are small Aboriginal communities that support a basic level of services and infrastructure. Finke is a very isolated community accessible by a 434km road that travels through Titjikala to Alice Springs. The community has a health care centre, school, church, community store, an airstrip and the Ngaanyatjarra Pitjantjatjara Yankunytjatjara (APY) Women's Council Aboriginal Corporation that runs a number of services including a youth program and sport and recreation activities.

Santa Teresa which is the largest of the three communities is located 85km south east of Alice Springs. The town has several retail outlets including a general store, fuel supply, and art and craft centre. There is also a primary school, health clinic, police station a church and an airstrip.

Titjikala is located 130km south of Alice Springs and supports an airstrip, a community store, primary school, art centre, health clinic and church.

2.9 Health services

Government health services in the Northern Territory are provided by five public hospitals, community health clinics, environmental health, disability services, mental health services, sexual assault referral centres and alcohol mandatory treatment centres. This is complemented by Aboriginal Congress in Alice Springs which provides a range of services to Aboriginal communities in Central Australia.

Alice Springs Hospital is an accredited teaching hospital which provides services to the towns and communities in Central Australia. It has a capacity of 183 beds. Services provided at Alice Springs Hospital include general medicine, rehabilitation medicine, palliative care, nephrology, emergency medicine, anaesthesia, intensive care, surgery (including ophthalmology, orthopaedics and ear, nose and throat), psychiatry, paediatrics, obstetrics and gynaecology. A new emergency department began construction in mid 2015 and is expected to be completed by mid-2017.

There are category 2 primary health care centres in the communities of Titjikala, Santa Teresa and Finke. Titjikala Community Health Centre provides primary health care services including emergency care, medical evacuations (by road), preventable chronic disease, childhood and adult immunisations, men's and women's health checks, and infectious and communicable disease prevention. It also runs a number of public health programs. The centre has several visiting outreach programs including nutrition, men's health, chronic disease, alcohol and other drugs and midwifery services.

Primary health care services are provided at the Mpwelarre Health Aboriginal Corporation (Santa Teresa Health Centre) in Santa Teresa and the Aputula (Finke) Community Health Centre as described in Table 2.4.

TABLE 2.4 HEALTH SERVICES

Health service	Description	Managing authority
Alice Springs Hospital	A public hospital that serves the Central Australia region Services include general medicine, rehabilitation medicine, palliative care, nephrology, emergency medicine, anaesthesia, intensive care, surgery (including ophthalmology, orthopaedics and ear, nose and throat), psychiatry, paediatrics, obstetrics and gynaecology.	NT Government

Health service	Description	Managing authority
Titjikala Health Clinic	Services include emergency care, medical evacuations (by road), preventable chronic disease, childhood and adult immunisations, men's and women's health checks, infectious and communicable disease prevention. Upgrades in 2016 include an ambulance bay and a new purpose-built renal room.	NT Government
Aputula Health Clinic (Finke)	The Aputula Health Clinic is staffed by two Registered Nurses, two Aboriginal Health Workers and a visiting doctor. It has 9 rooms with separate men's and women's waiting areas and consulting rooms. There is an emergency treatment room, pharmacy, office and laundry.	NT Government
Mpwelarre Health Aboriginal Corporation (Santa Teresa Health Centre)	Santa Teresa Health Centre has a community GP who is non-resident but provides 24 hr telephone support to the clinic staff. The clinic is staffed by two remote area nurses and four Aboriginal health workers. There are also a range of health professionals in different fields that visit the community at varying intervals. A daily bus for patients operates between the Clinic and Alice Springs.	Private

SOURCE: VARIOUS NT GOVERNMENT WEB SITES

2.10 Education services

The education system in the Northern Territory caters for students from preschool to tertiary level, in line with Australian recognised standards.

A range of tertiary and vocational education and training courses are available throughout the Northern Territory, at facilities such as Charles Darwin University, Yirara College and the Batchelor Institute of Indigenous Tertiary Education. In addition to these institutions, there are a number private training organisations registered in the Northern Territory.

Alice Springs

Alice Springs is well-served by a range of schools including ten primary schools (seven government and three private), and five secondary schools (three government and two private).

Tertiary education in Alice Springs is provided by Charles Darwin University, the Batchelor Institute of Tertiary Education and the Centre for Appropriate Technology (brought together as the Desert Peoples' Centre). There is also a campus of the Flinders University for Remote Health.

Finke, Santa Teresa and Titjikala

There are primary schools located at Finke, Santa Teresa and Titjikala and middle schools located at Finke and Santa Teresa. The Ltyentye Apurte Catholic School is located in Santa Teresa and has a current enrolment of around 140 students, Titjikala School has a current enrolment of 25 students (including pre-primary students), and Finke (Aputula) School has enrolments of 29 students (NT Government, 2016). Once students from these communities reach senior years, they have the option of boarding in Alice Springs or going interstate to complete their education.

VET training is provided in Santa Teresa and Titjikala by the Batchelor Institute.

2.11 Housing market

The housing market in the Northern Territory comprises of publicly owned housing as well as the private ownership and lease of dwellings. The following analysis indicates that there is a high rental

vacancy rate in privately owned accommodation in Alice Springs and an easing in the private sales market. However, there is a shortage of public housing availability with wait times for this type of housing more than doubling over the past decade.

2.11.1 Public housing

The Northern Territory Department of Housing is responsible for public housing and sub-contracts tenancy and property management to other providers. The Department of Community Services is responsible for community housing in town camps (except Alice Springs and Tennant Creek) and on homelands and outstations.

In the ten years to 2015, waiting times for public housing in Alice Springs have increased for all housing categories as illustrated in Table 2.5 which shows the public housing wait times in terms of the number of months. For one bedroom units, the wait has increased from 42 months in 2005 to 87 months in 2015. The wait for one bedroom pensioner units has increased even more significantly from 21 months to 71 months. The wait for two bedroom houses has increased from 21 months to 65 months and from 34 months to 70 months for three-bedroom houses (NT Shelter, 2016). These statistics indicate a severe shortage of public housing in Alice Springs.

On average, the wait times in Alice Springs has more than doubled since 2005. In comparison, the wait times in Darwin and Palmerston have increased at a far lower level.

TABLE 2.5 PUBLIC HOUSING WAIT TIMES (MONTHS): DECEMBER 2005 AND MARCH 2015

	2005	2015	% change	% change Darwin and Palmerston
1 bedroom	42	87	107	21
1 bedroom pensioner	21	71	238	39
2 bedroom	21	65	209	33
3 bedroom	34	70	106	16

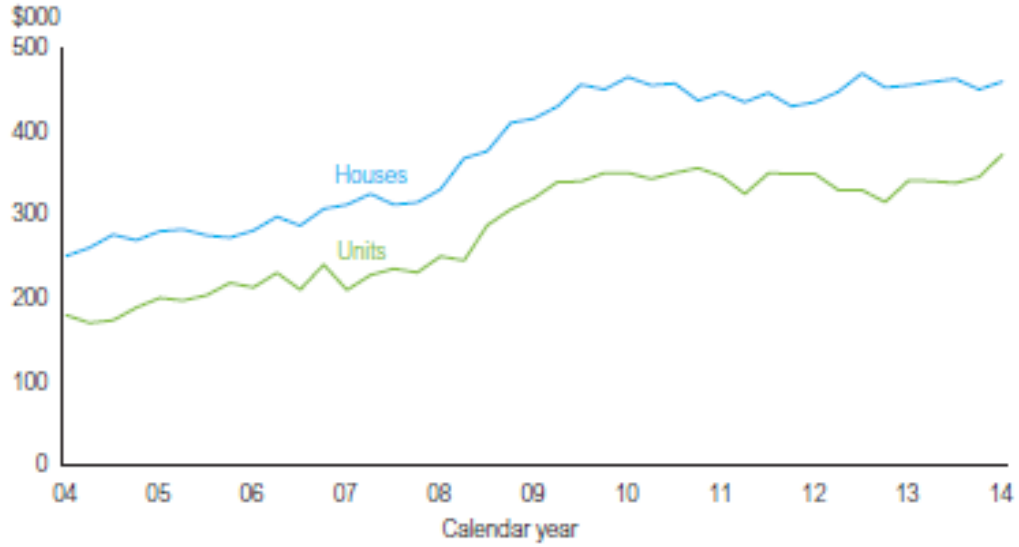
SOURCE: (NT SHELTER, 2016)

There are no official statistics available regarding public housing in Santa Teresa, Finke or Titjikala. However the Central Land Council noted that housing in remote areas governed by the Council is a key issue for people living in these communities because of critical shortages and overcrowding problems (Central Land Council, 2016).

2.11.2 House prices

In 2015, the Real Estate Institute of Northern Territory reported that the median house price in the Greater Darwin area was $608,750 while in Alice Springs it was $467,500. In the MacDonnell Regional Council where the communities of Finke, Santa Teresa and Titjikala are located, there were no recorded house sales during 2015. The Alice Springs housing market experienced strong growth from 2007 to 2011 as a result of increased demand for housing for employees of the Commonwealth Government's Northern Territory Emergency Response, otherwise known as the intervention. Since 2011, the growth in median house prices in the town has levelled off and is currently experiencing rates of around 1.0 per cent per annum for houses and units as illustrated in Figure 2.12. The Real Estate Institute of Northern Territory reports a slight improvement in the median house price in 2015 of 1.7 per cent on the previous year (Real Estate Institute of Northern Territory Inc, 2016).

FIGURE 2.12 MEDIAN HOUSE AND UNIT PRICES: ALICE SPRINGS



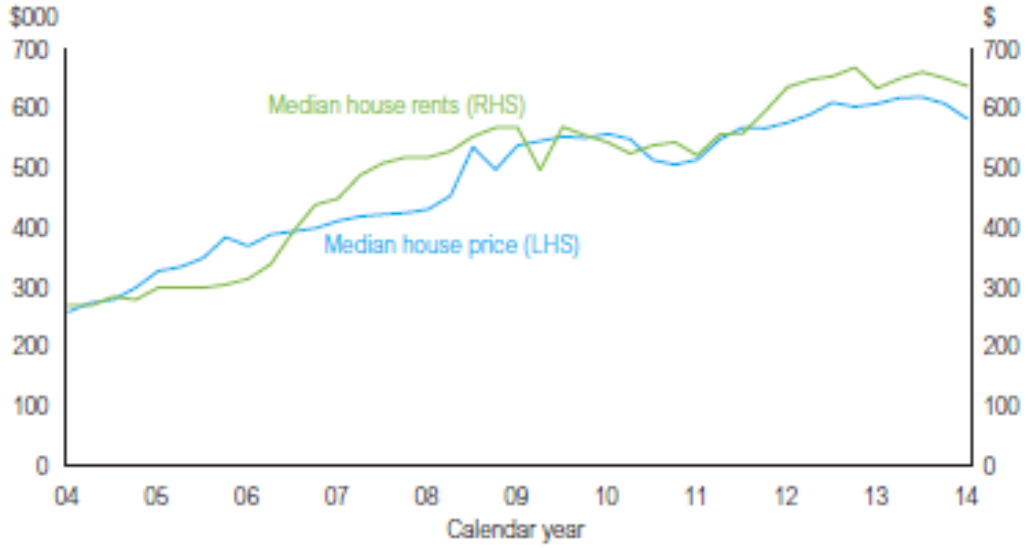
SOURCE: (NT TREASURY, 2015)

In comparison, median house prices in the Greater Darwin area are currently easing slightly after realising strong growth in 2012 and 2013 as illustrated in Figure 2.13 which shows the median house price in Darwin over time (NT Treasury, 2015). This trend is evident by comparing long term growth rates to current growth rates. Over the decade to 2014, median house prices in Darwin rose by an average of 6.0 per cent per annum compared to an annual average growth rate of 4.1 per cent during 2015 (Real Estate Institute of Northern Territory Inc, 2016).

The rental markets in both Alice Springs and Greater Darwin are currently flat with both experiencing falling rents and higher vacancy rates. In Darwin, rents for three bedroom houses fell by 15.4 per cent during 2015 and in Alice Springs they fell by 5.8 per cent. The weekly rent for two bedroom units fell by 11.6 per cent in Darwin and by 9.8 per cent.

In 2015, there was a vacancy rate of 8.8 per cent in Alice Springs for all dwellings, an increase of 3.6 per cent on the previous year. This is a higher vacancy rate than historical levels which have trended around 4.0 per cent per annum since 2011. In Darwin the vacancy rate for all dwellings in 2015 was 8.9 per cent an increase of 3.5 per cent on the previous year (Real Estate Institute of Northern Territory Inc, 2016).

FIGURE 2.13 MEDIAN HOUSE PRICE AND RENTAL PRICE: GREATER DARWIN



SOURCE: (NT TREASURY, 2015)

2.12 Social amenity

The social amenity in Darwin and Alice Springs is high although there are some social indicators in Alice Springs which highlight some social issues in the town. There is very little publicly available information regarding social amenity in the communities of Santa Teresa, Finke and Titjikala.

Alice Springs

Alice Springs supports a large population many of whom are Aboriginal. There is a growing middle-class of Aboriginal people in the town who are better educated and engaged in the workforce. At the same time, there is a large disadvantaged and more mobile population of Aboriginal people who tend to live in town camps, public housing and temporary accommodation. Many are transient and visit Alice Springs from remote communities to visit relatives, for recreation purposes such as to attend sporting events, or to access services (Michels Warren Munday, 2016).

There is occasional polarisation in Alice Springs between the existing families and newcomers such as those who move to the town to work for Aboriginal organisations or young professionals working for government departments and non-government organisations (Michels Warren Munday, 2016).

There is a high crime rate in Alice Springs as illustrated in Table 2.6 which shows the rate of offending per 100,000 of population for a number of crimes. The rates of offending in the town are significantly higher than those experienced in Darwin particularly those that relate to assault, domestic violence and alcohol related assault. Despite these very high levels, there has been a decline in offending rates for these crimes over the past year.

TABLE 2.6 RATES OF OFFENDING PER 100,000 POPULATION BY CRIME: DARWIN AND ALICE SPRINGS

	Alice Springs			Darwin and Palmerston		
	01/11/2014 - 31/10/2015	01/11/2015 - 31/10/2016	% CHANGE	01/11/2014 - 31/10/2015	01/11/2015 - 31/10/2016	% CHANGE
Assault	5,915.9	5,522.4	-6.7	2,169.3	2,005.9	-7.5
Domestic violence related assault	3,461	3,246.1	-6.2	822.9	781.3	-5.1
Alcohol related assault	3,864.8	3,342.8	-13.5	1,268.9	1,115.6	-12.1

	Alice Springs			Darwin and Palmerston		
Sexual assault	251.5	286.3	13.8	157.4	145.8	-7.4
House break-ins	1,438.2	1,073.7	-25.3	766.8	787.2	2.7
Commercial break-ins	949.4	1,288.4	35.7	421	669.8	59.1
Motor vehicle theft	1,176.1	1,374.3	16.9	1,295.1	1,040.9	-19.6
Property Damage	5,334.9	6,409.9	20.2	2,838.3	2,840.5	0.1

SOURCE: (NORTHERN TERRITORY POLICE, 2016)

Titjikala

Titjikala comprises a number of family groups including Traditional Owners. Other Traditional Owners are dispersed between Alice Springs, Titjikala, Santa Teresa, Finke and other Arrernte communities such as Hermannsburg. Many Traditional Owners also live on traditional homelands at Walkabout Bore, Mt Peachy, John Holland Bore and Oak Valley (Michels Warren Munday, 2016).

In general, the community is well-functioning and proud with families mostly living in harmony. There is strong leadership in the town which has resulted in lease money being reinvested into community facilities (Michels Warren Munday, 2016).

There is no permanent police presence in Titjikala, although there is a strong night patrol that works from about 6 pm to midnight most days. Police patrols located at Finke and Santa Teresa currently service the Titjikala community.

2.13 Summary

The Northern Territory is experiencing strong economic growth when compared to Australia as a result of continued economic activity from major developments including the construction of the Ichthys development. Despite this, a number of economic indicators are showing signs of the easing of economic activity including from falling median house prices, falling rents and the closure of several mines.

The economy in the Local region is centred on the Alice Springs Local Government Authority and the role that the town plays in the provision of government services and the supply of goods and services to the local and surrounding population and industry. The key industries in the region are the mining industry, the agricultural industry and the tourism sector. The economic profile of the region is also heavily influenced by Alice Springs which currently has a very low unemployment rate however median house prices and rents are falling and there is a decline in population. Outside of Alice Springs there are very few economic opportunities and the area is characterised by high unemployment, population decline, low skills levels and lower incomes.

From a social viewpoint, there is a high level of social infrastructure in Darwin and Alice Springs and a basic level of social infrastructure in the small communities of Santa Teresa, Finke and Titjikala which are mainly inhabited by Aboriginal people. Alice Springs is a modern city however, it has a number of poor social indicators including a high crime rate, a very high rate of alcohol related crime, a reasonably large transient Aboriginal population, and a high demand for public housing.

The outlook for the Local region is positive with forecasts of a stable of population and the potential for growth in the mining sector with several developments proposed within range of Alice Springs.

3 ECONOMIC AND SOCIAL IMPACT

The following sections describe the economic impact of the Chandler Facility in terms of the direct and indirect economic and social impacts of the Facility assuming salt sales of 500,000 tonnes per annum.

3.1 Facility financial assumptions

The key project financial assumptions for the Chandler Facility are presented in Table 3.1. It is estimated that the Facility would involve capital expenditure of around $648 million over a four year period from 2017 to 2020. For the purposes of this economic impact assessment, first production is assumed in 2017.

TABLE 3.1 PROJECT FINANCIAL ASSUMPTIONS: CHANDLER FACILITY

Item	Assumption	
Capital expenditure	$648 million	
Operations expenditure (2017-2041)	$81 million per annum average	
Local content assumptions (construction expenditure)	Local	18%
	NT	36%
	Australia	67%
	Overseas	33%
Local content assumptions (operation expenditure)	Local	32%
	NT	52%
	Australia	64%
	Overseas	36%
Tax and royalty payments (directly paid by Facility)	$40 million per annum average	

SOURCE: TELLUS HOLDINGS

At capacity, it is assumed for this economic impact assessment that the Facility would produce around 500,000 tonnes per annum of salt for sale however updated engineering studies suggest that it is more likely that the Facility could produce up to 750,000 tonnes per annum. Note that in addition to salt sales, the Facility will also use additional mined salt for use in the storage of waste. Over the twenty five years modelled life of the Facility, 8.5 million tonnes of waste is expected to be stored. The volume of waste stored is expected to grow to reach around 400,000 tonnes per annum by the end of the modelled Facility life.

Because the volume of waste storage is expected to rise over time, revenue and operations expenditure will also rise over time. This Economic Impact Assessment therefore reports the annual average revenue and operations expenditure over the twenty five year period from 2017 to 2041

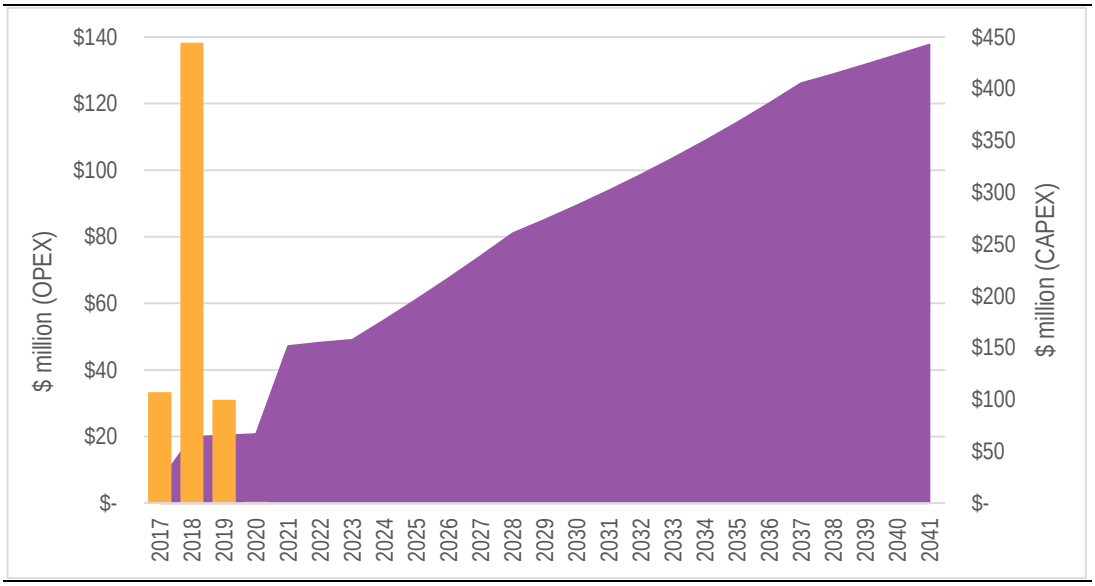
rather than a steady state status. The operations workforce would however reach a steady state and the steady state workforce is referred to when discussing direct employment for the Facility.

3.1.1 Capital and operations expenditure for the life of the project

The real capital and operating expenditures over the life of the Chandler Facility are shown in Figure 3.1. The Figure shows that peak construction expenditure would occur in the second year of construction and that the majority of the $648 million required to construct the Facility would occur in the first three years of construction of the Facility. On average, the Facility would incur capital expenditure of $162 million in each of the four years of construction.

Operations expenditure would start in year one of the Facility which is also the first year of construction. The amount of operations expenditure in the first few years of the Facility would be small at around $20 million per annum but would continue to rise over the Facility to reach $137 million by 2041. On average, over the modelled life of the Facility, there would be spending of just under $81 million per annum to operate the Chandler Facility.

FIGURE 3.1 CHANDLER FACILITY CAPITAL AND OPERATIONAL EXPENDITURE



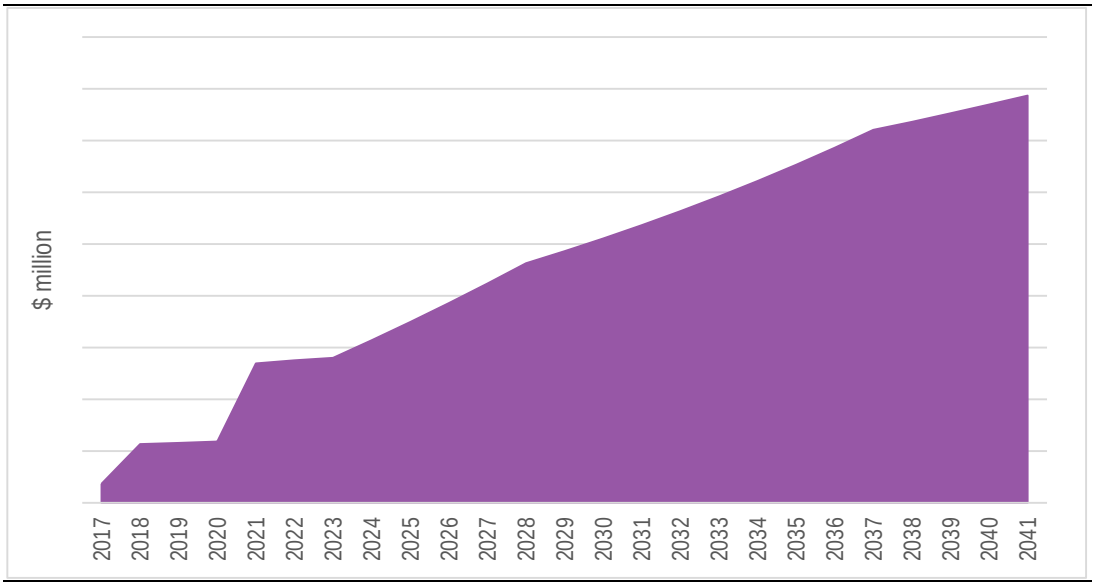
SOURCE: TELLUS HOLDINGS

3.1.2 Revenue for the life of the Facility

Revenue from the Chandler Facility will be raised from salt sales however the majority of revenue will be received from the storage of hazardous waste. Revenue is expected to be realised from the first year of operation in the form of stored waste revenue and would continue to rise over time as the tonnage of stored waste increases as illustrated in Figure 3.2. Note that the Facility can expect to realise revenue as soon as the necessary approvals are granted and it is possible that revenue could start being generated as early as late 2016.

Revenue estimates are considered commercial in confidence and have not been reported in this economic impact assessment. They have however been used to estimate the economic impact of the Facility.

FIGURE 3.2 EXPECTED REAL REVENUE: CHANDLER FACILITY ($ MILLION)



SOURCE: TELLUS HOLDINGS

3.1.3 Local content assumptions

In construction, the Chandler Facility would have a high local content with an estimated 67 per cent of all construction costs to be spent in Australia. Thirty six per cent of the total construction cost equivalent to just over $231 million would be spent in the Northern Territory and 18 per cent or over $118 million of the total construction cost would be spent in the Local region.

In operation, 64 per cent of the total operation spend over the life of the Facility, including labour, would be spent in Australia. A total of 52 per cent of the total cost to operate the Facility would be spent in the Northern Territory and 32 per cent would be spent in the Local region. This is equivalent to spending in Australia of over $1.2 billion over the twenty five modelled years of the Facility including just over $1 billion in the Northern Territory. Of this, over $600 million or around $26 million per annum would be spent in the Local region with the majority of that expenditure expected to be spent in the town of Alice Springs.

3.1.4 Tax and royalty payments

Over the life of the Facility, it is expected that $1 billion of direct taxation revenue would be paid to the Northern Territory Government and the Federal Government. This is equivalent to around $40 million per annum in direct taxation payments. Further details regarding taxation revenue from the Facility is presented in Section 3.6.

3.1.5 Value of exports

The majority of the salt produced from the Chandler Facility would be exported with the remainder required for the waste storage operations. At capacity, the Facility would produce 500,000 tonnes of salt per annum for sale to the export market. The value of these sales is considered commercial in confidence and have not been reported in this economic impact assessment.

3.2 Major employment assumptions

Table 3.2 presents the key assumptions for the direct workforces employed on the Chandler Facility while Figure 3.3 shows the construction and operations workforces by year for the Chandler Facility and where the workforces are expected to be sourced from. The Chandler Facility is expected to take around four years to construct with peak construction occurring in the second year of construction. Over the construction period, it is expected that 1,299 full time equivalent workers would be employed.

At peak construction there would be a full time equivalent workforce of around 720 workers as illustrated in Table 3.1 which shows the major project assumptions for the Chandler Facility.

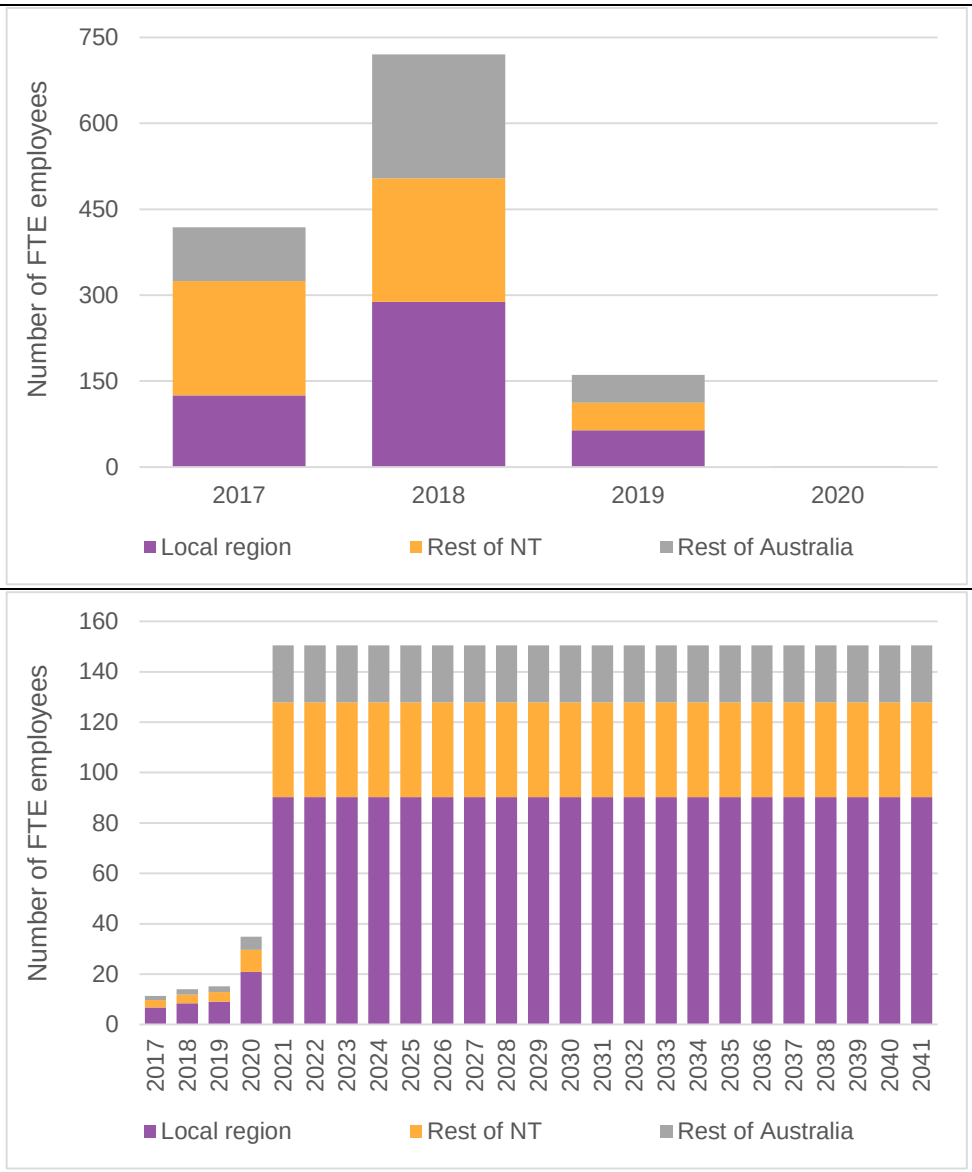
TABLE 3.2 MAJOR PROJECT ASSUMPTIONS: CHANDLER FACILITY

Item	Assumption
Construction period	4 years (48 months)
Peak construction	Year two
Construction workforce	1,299 FTE over four years
Peak construction workforce	720 FTE
Operational life	25 years
Steady state production workforce	150 FTE

SOURCE: TELLUS HOLDINGS. NOTE: FTE = FULL TIME EQUIVALENT JOB YEAR

The operational life of the Facility is expected to be in excess of 25 years with production expected to begin in the first year of construction indicating that construction and operation would occur concurrently. At steady state operations employment (2021), the mine is expected to employ 150 full time equivalent workers.

FIGURE 3.3 DIRECT EMPLOYMENT: CHANDLER FACILITY: CONSTRUCTION AND OPERATIONS



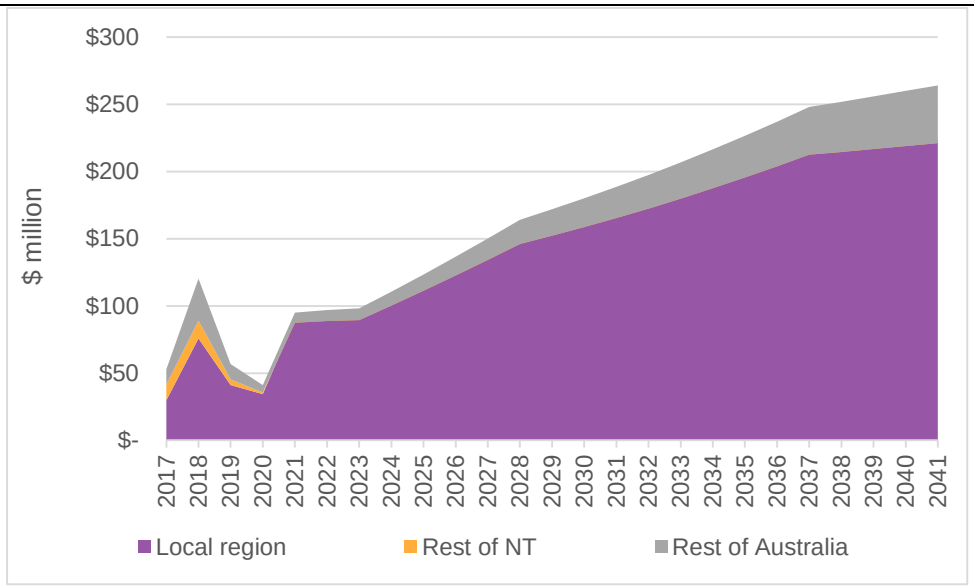
SOURCE: TELLUS HOLDINGS

3.3 Contribution to Gross Product

The expenditure in the construction and operation of the Chandler Facility will generate a stimulus to the economy of the Local region, the Northern Territory and Australia in the form of the direct expenditure on the Facility and the indirect stimulus to expenditure in the wider economy that this initial spending creates. This total contribution to the economy measured by the change in Gross Product has been estimated using a General Equilibrium Model incorporated with project data supplied by Tellus Holdings. Details of the model and its assumptions are presented in Appendix A.

Figure 3.4 shows the impacts of the Chandler Facility on Gross Product during construction and operation. The Figure shows that the impacts in the construction phase follow the expenditure pattern of the construction profile. Compared to the impacts in operation, they are relatively small. This is because the changes to the economy are projected to occur broadly in line with the value of production from the Facility. In the operations phase, the key benefits of the Facility would be realised through the monetisation of otherwise unutilised resources and additional factors of production.

FIGURE 3.4 CONTRIBUTION TO GROSS PRODUCT: CHANDLER FACILITY



SOURCE: ACIL ALLEN ECONOMIC MODELLING

Table 3.3 shows a summary of the projected cumulative change in real economic output or Gross Product, and real income as a result of the Chandler Facility under various net present value discount rates while each of the following sections describe the impact of the Chandler Facility on Gross Product over the twenty five year life of the Facility, including the construction and operations phases.

TABLE 3.3 PROJECTED CUMULATIVE CHANGE IN REAL ECONOMIC OUTPUT AND REAL INCOME: CHANDLER FACILITY

	Real economic output			Real income		
	Total (2017 to 2041)	Net present value		Total (2017 to 2041)	Net present value	
		4%	7%		4%	7%
	2016 A$m	2016 A$m	2016 A$m	2016 A$m	2016 A$m	2016 A$m
Local region	3,600	1,990	1,350	475	295	220
Rest of NT	-17	1	8	-35	-10	-0
Rest of Australia	560	310	210	2,950	1,615	1,090
Total NT	3,590	1,995	1,360	440	285	220
Australia	4,150	2,300	1,570	3,390	1,900	1,310

SOURCE: ACIL ALLEN ECONOMIC MODELLING

The additional spending in the economy as a result of the Chandler Facility would contribute significantly to the Gross State Product of the Northern Territory. Over the life of the Facility, including the construction period, the Chandler Facility would generate $3.6 billion or an average of $144 million in each of the twenty five years to the Gross State Product of the Northern Territory. This is a significant annual contribution to the Gross State Product of the Northern Territory and is equivalent to around 0.6 per cent of the current Gross Territory Product of $23.1 billion.

Nearly all of the Australia wide impacts from the Facility would be realised in the Local region as illustrated in Figure 3.4 which shows the contribution to the Gross Product of the Local region, the rest of the Northern Territory and the rest of Australia (excluding the Northern Territory). This is because the production of the Chandler Facility occurs in the Local region and it is where a large share of the labour is located. Over its twenty five year modelled life, the Chandler Facility would contribute $3.6 billion to the Gross Regional Product of the Local region. In total over the life of the Facility, the Gross

Domestic Product of Australia would rise by nearly $4.1 billion or an average of $166 million each year.

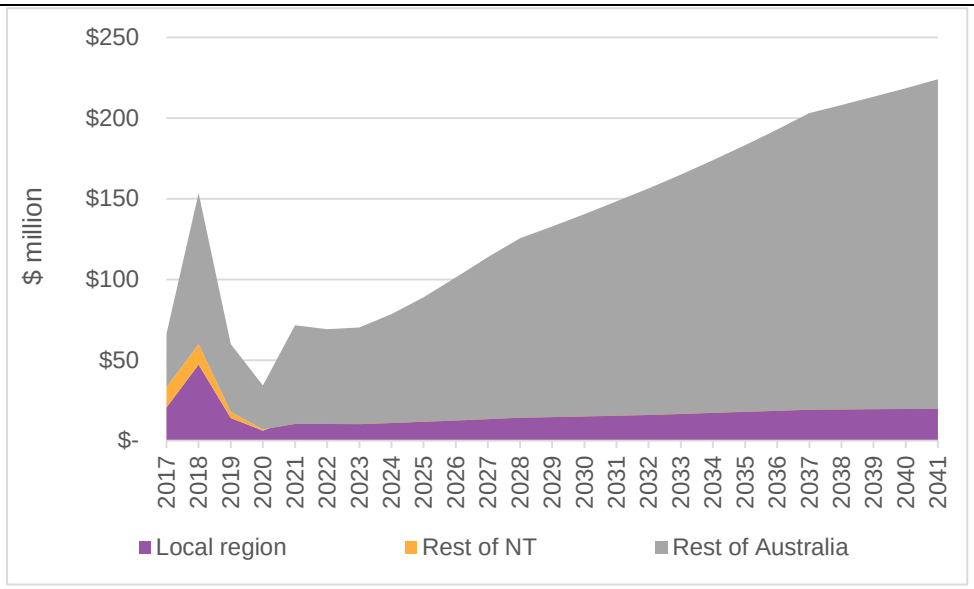
The reason that the impact on the local region is larger than the contribution to the Gross State Product of the Northern Territory is that the Facility would draw resources such as labour away from the rest of the Northern Territory.

3.4 Contribution to real incomes

Another measure of the contribution to the economy, is the contribution to real incomes. Real income is a measure of the ability to purchase goods and services, adjusted for inflation. A rise in real income indicates a rise in the capacity for current consumption, but also an increased ability to accumulate wealth in the form of financial and other assets. The change in real income from a development is a measure of the change in welfare of an economy.

The extent to which the local residents would benefit from the additional economic output depends on the level of ownership of the capital (including the natural resources) utilised in the business as well as any wealth transfers undertaken by Australian governments as a result of the taxation revenues generated by the Chandler Facility.

FIGURE 3.5 CONTRIBUTION TO REAL INCOMES: CHANDLER FACILITY



SOURCE: ACIL ALLEN ECONOMIC MODELLING

Most of the real income benefit associated with the Facility, in absolute terms, is projected to accrue to residents outside of the Local region as illustrated in Figure 3.5. Over the life of the Facility, the Chandler Facility would contribute $3.4 billion to the real incomes of Australians. This includes an increase of $441 million to real incomes in the Northern Territory. The contribution to the Local region is higher at $476 million for the life of the Facility. The reason for this higher Local region value is that the Facility is expected to draw resources, particularly labour, away from the rest of the Northern Territory.

The reason that the majority of the impact on real incomes is realised in the rest of Australia is that only a small portion of the Facility is assumed to be owned by local residents of the Northern Territory, with a significant portion of the wealth generated by the economic activity transferred outside of the Local region and the Northern Territory to Australian shareholders of Tellus Holdings who are assumed to be evenly disbursed across Australia. In addition, the distribution of Federal taxes generated by the Facility is assumed to primarily occur in the rest of Australia.

3.5 Job creation

The Chandler Facility would result in job creation in the form of direct and indirect employment. Direct employment is the number of workers directly employed on the Facility. Indirect employment is the number of workers employed as a result of the additional expenditure in the economy from the Facility which generates additional jobs.

3.5.1 Direct employment

The Chandler Facility is expected to create direct employment of 1,299 full time equivalent workers over the four year construction period from 2017 to 2020 as illustrated in Figure 3.3 which shows the location from where workers would be sourced from by year. Over the four year construction period, 477 workers or 37 per cent of the construction workforce would be sourced from the Local region. Two thirds of the workforce or around 940 workers would be sourced from the Northern Territory (including the Local region) and the remaining 360 members of the construction workforce would be sourced from the rest of Australia.

The peak construction workforce would occur in 2018 which is the second year of construction when a full time equivalent workforce of 720 workers would be employed. At peak employment, it is expected that 40 per cent of these workers would be sourced from the Local region equivalent to a workforce of just under 290 workers. The remaining 60 per cent of the peak construction workforce would be sourced from the rest of the Northern Territory or Australia.

In steady state operation workforce (2021) the Facility would employ an estimated 150 workers. Around 90 workers or around 60 per cent of these jobs would be sourced from the Local region. In total, it is expected that nearly 128 workers on the Facility would be sourced from the Northern Territory and the remaining 22 would be sourced from Australia.

3.5.2 Total (direct and indirect employment)

As well as direct employment, the Facility would create indirect employment from the spending on goods, services and labour in the economy which supports other jobs. The total employment impact measured in terms of net full time equivalent direct and indirect job years. The impact on total employment creation has been estimated using Computable General Equilibrium modelling.

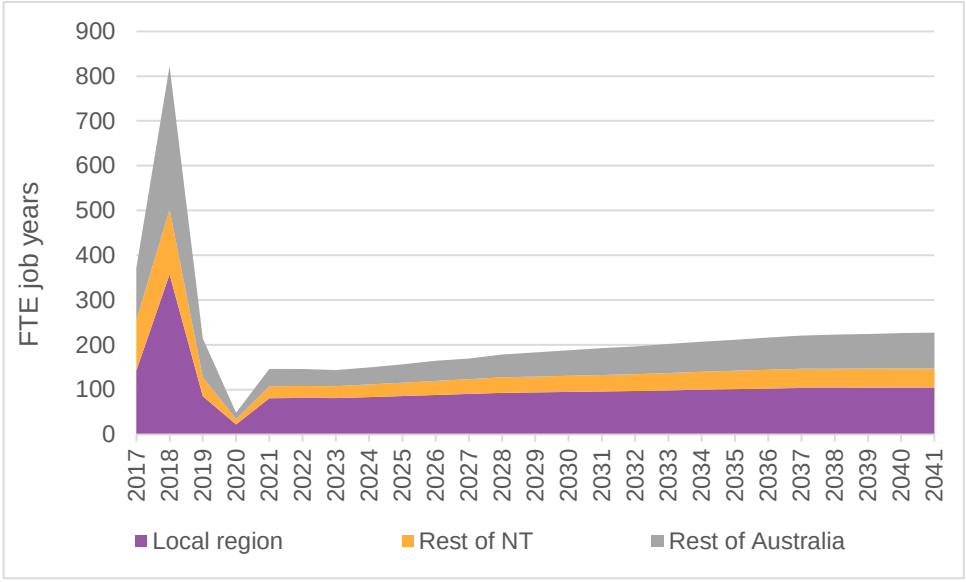
The analysis found that the construction and operation of the Chandler Facility is expected to result in the creation of 5,400 full time equivalent job years over the life of the Facility, an average of 217 full time equivalent job years per annum as illustrated in Table 3.4. Most of the job creation would occur in the Northern Territory including the Local region and would generally match the local content estimates of where employees would be sourced from.

TABLE 3.4 DIRECT AND INDIRECT JOB CREATION: CHANDLER PROJECT

	Total (2017-2014)	Annual average (2017-2014)
Local region	2,596	104
Rest of Northern Territory	1,072	43
Northern Territory total	3,665	71
Australia total	5,430	217

SOURCE: ACIL ALLEN MODELLING

FIGURE 3.6 EMPLOYMENT CREATION: CHANDLER FACILITY: CONSTRUCTION AND OPERATION



SOURCE: ACIL ALLEN ECONOMIC MODELLING

Figure 3.6 shows the employment net direct and indirect employment creation from the Chandler Facility by year. It shows that the biggest impact from the Facility would occur in the peak construction year of 2018. It also shows that the Facility would deliver long term job creation in Australia particularly in the Northern Territory where most of the job creation would be realised.

In the Northern Territory, an estimated 3,600 full time equivalent job years would be created over the life of the Facility. This is equivalent to an average of 146 full time equivalent job years per annum. Around 2,600 of these or an average of 100 per year would be located in the Local region. This equates to 30 per cent of the current number of unemployed people in the Alice Springs Local Government Area or 18 per cent of the unemployed people in the Local region.

3.6 Contribution to government revenue

The construction and operation phases of the Chandler Facility would generate a number of Federal, Territory and Local Government revenues.

Federal Government revenue would be realised through Company taxation, Income taxation and GST payments. The Northern Territory Government would receive revenue from additional taxes including Payroll taxation and Stamp Duties. Local Government in the vicinity of the Facility may receive revenue through an increase in rates revenue from any additional housing, as well as from other taxes and charges.

The direct Company taxation payments as a result of the Chandler Facility have been estimated by Tellus Holdings while all other direct taxation estimates have been generated by ACIL Allen based on data supplied by Tellus Holdings. These direct taxation payment estimates are presented in Figure 3.7 and described in detail in the following sections.

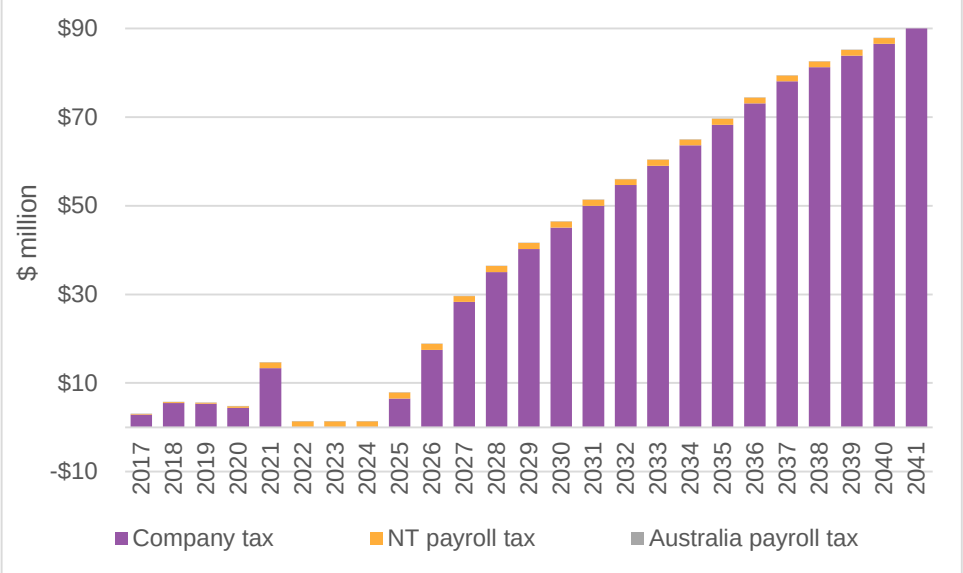
3.6.1 Payroll taxation

Payroll taxation is a general purpose tax that is currently levied by the Northern Territory Government at rate of 5.5 per cent of the total wages paid by an employer in the Northern Territory where the annual threshold before it becomes payable is $1,500,000.

The Chandler Facility is estimated to pay over $165 million in wages in the four years of construction. In the twenty five years of operation, the Chandler Facility would pay just over $540 million in wages in Australia.

Assuming no deductions, these payments would result in estimated Payroll taxation payments to the Northern Territory Government in the construction and operation of the Chandler Facility in the order of $29 million or an average of just over $1.1 million in each year of the modelled life of the Facility.

FIGURE 3.7 ESTIMATED DIRECT TAXATION PAYMENTS: CHANDLER FACILITY

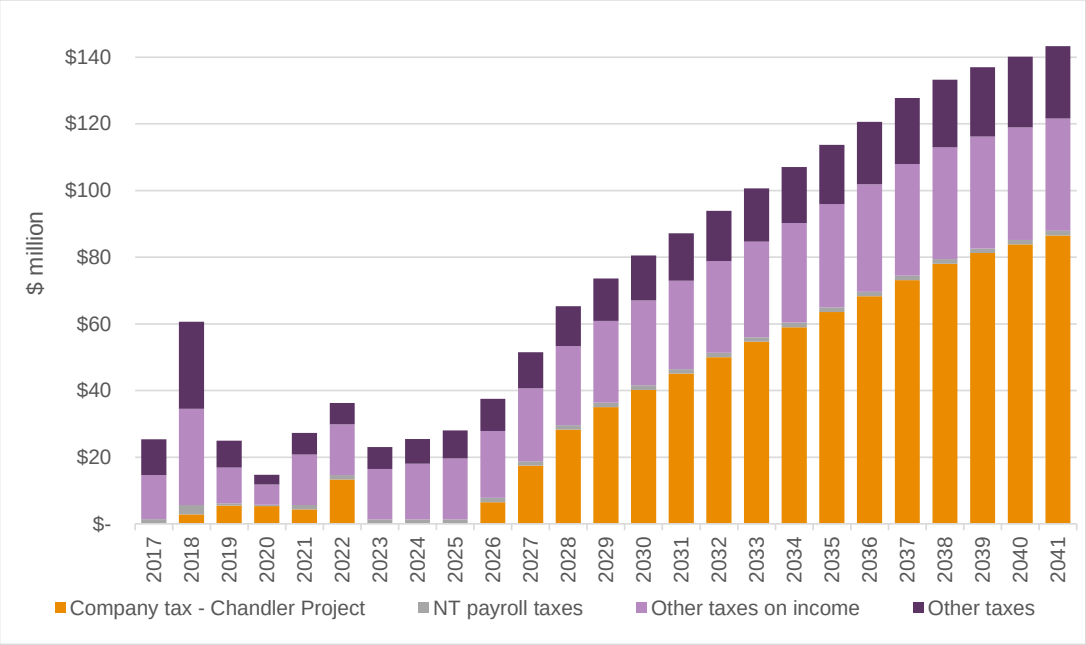


SOURCE: TELLUS HOLDINGS

3.6.2 Total taxation creation (direct and indirect)

As well as direct taxation, the Facility would also generate indirect taxation. Direct and indirect taxation has been estimated by ACIL Allen using Computable General Equilibrium modelling. The results of this analysis are presented in Figure 3.8 which shows the different streams of taxation that are expected to be generated by the Chandler Facility over time.

FIGURE 3.8 ESTIMATED DIRECT AND INDIRECT TAXATION PAYMENTS: CHANDLER FACILITY



SOURCE: ACIL ALLEN ECONOMIC MODELLING

On average, over the life of the Facility, the Chandler Facility would generate around $75 million each year in all direct and indirect government revenues. The Figure shows that the majority of taxation is a result of federal taxation in the form of Company taxation and other personal and company income taxes paid to the Federal Government as a result of the direct and flow on activity generated by the Facility.

Table 3.5 shows the total taxation over the life of the Chandler Facility under various discount rates including the construction and operation phases. The Table shows that over the modelled life of the Facility, it is expected to pay $1.9 billion in direct and indirect taxation. The majority of this taxation is in the form of company taxes paid by Tellus Holdings as well as other personal and company income taxes paid to the Federal Government. Together these taxes are expected to generate $1.8 billion in Federal revenue over the life of the Chandler Facility.

In total, the Northern Territory is likely to receive $34 million in payroll taxes as a result of direct and indirect state revenues from the Chandler Facility, or an average of $1.4 million per annum.

TABLE 3.5 CUMULATIVE PROJECTED CHANGE IN REAL GOVERNMENT TAX REVENUES, RELATIVE TO THE REFERENCE CASE

	Total (2017 – 2041)	Net Present Value 4%	Net Present Value 7%
Facility company taxes	$902	$455	$266
NT payroll taxes	$34	$22	$16
Other taxes on income	$599	$358	$242
Other taxes	$344	$207	$141
TOTAL	$1,879	$1,041	$664

SOURCE: ACIL ALLEN ECONOMIC MODELLING. DIRECT TAXATION SUPPLIED BY TELLUS HOLDINGS

3.7 Opportunities for regional centres

The contribution of the Chandler Facility to regional development is significant and includes:

- Regional economic benefits created as a result of the Facility in the form of additional spending, new business and employment opportunities, attracting new population to the area, improving the wealth of individuals in the region and so on.
- Very high local purchases including an estimated spending of $118 million in construction and an average of $26 million per year in operation in the Local region.
- A commitment to local employment including the employment of local Indigenous people.
- Residual roads infrastructure that would be constructed for the Facility would be available for local people and industry to utilise.

The following sections outline these benefits in greater detail.

3.7.1 Population retention

The population of the Local region has been experiencing slight growth of around 0.6 per cent per annum since 2004 which is equivalent to around 200 people per year. Nearly all of this growth has come from population increases in the Alice Springs Local Government Area which has recorded population growth of 0.7 per cent per annum equivalent to just over 200 people per year. In the areas outside of the town, there has been negative population growth of around 0.2 per cent per annum or a loss in population of just under ten people each year. The level of population in the Local region has plateaued since 2010 and has experienced a slight decline from 2013 to 2014 of 0.2 per cent as a result of population decline in Alice Springs and in Sandover Plenty.

A long term commitment to the region by the resources sector and supporting businesses would assist in supporting the existing workforce in the region and potentially attracting new workers and their families to the region. Job creation as a result of the Chandler Facility is expected to increase employment in the Local region by an average of 100 full time equivalent years per annum over the life of the Facility. This increase in employment could result in new population moving to the area in the form of workers and their immediate families. It is likely that this population would reside in the Local Government Area of Alice Springs which currently has a population of 28,667 and is experiencing population growth of around -0.2 per cent per annum (2013-14) with forecast population growth expected to remain low (NT Government, 2015).

Economic modelling suggests that the population of the Local region is likely to experience a boost as the demand for employment created by the direct and indirect impact of the Chandler Facility is likely to draw resources away from the rest of the Northern Territory into the Local region.

3.7.2 Contribution to business development

Tellus has made a commitment to support businesses in the Local region and the Northern Territory. Examples of the types of local businesses that could be involved in the Facility in the construction stage include earthmoving and civil engineering companies, trades such as electricians, plumbers and gas fitters, caterers, suppliers of fresh food and household consumables and so on.

In operation, there would be opportunities for local businesses to enter into long term agreements to provide goods and services to the Facility. These are likely to include those businesses that provide cleaning, maintenance, catering, grading, electrical, plumbing and other services.

3.7.3 Employment creation

Tellus has committed to an ongoing target of reducing fly in – fly out work practices and encouraging drive in – drive out work practices from Alice Springs and the surrounding area. This commitment would result in the creation of direct employment opportunities for people living in the Local region. In addition to the direct employment on the Facility, the spending by the Facility and its workers in the local economy would create indirect employment creation.

It is estimated that in construction, 37 per cent of the workforce would be employed from the Local region and in steady state operation workforce of 60 per cent. This is equivalent to around $61 million per annum in wages in construction and $24 million per annum in wages steady state production workforce in the Local region. It also represents significant opportunities for local job seekers in terms of the skills required in construction and operation. In construction, there is a large requirement for

labourers which would allow Local job seekers access to fairly long term low skilled employment. The operation phase would require a higher level of skills which have a number of benefits including assisting in attracting skilled workers to the area, providing employment opportunities for skilled job seekers already living in the area, and providing opportunities for Local people to upskill. Section 3.8.2 provides further details regarding the occupations required on the Facility in construction and operation.

3.7.4 Local content estimates for employment and purchases

In construction, the Chandler Facility would have a high local content with an estimated 67 per cent of all construction costs to be spent in Australia. This is equivalent to $436 million of spending in Australia during the four years of construction. Around $231 million or 36 per cent of the total construction cost would be spent in the Northern Territory and 18 per cent of the total construction cost would be spent in the Local region. In the Local region, $118 million would be spent during the four years of construction of which nearly $73 million would be spent in 2018, the peak construction year.

In operation, $1.2 billion or 64 per cent of the total operation spend, including labour, would be spent in Australia. A total of 52 per cent of the total cost to operate the Facility would be spent in the Northern Territory and 32 per cent would be spent in the Local region. This is equivalent to spending in Australia of over $1.2 billion over the twenty five modelled years of the Facility including just over $1 billion in the Northern Territory. Of this, over $600 million would be spent in the Local region with the majority of that expenditure expected to be spent in Alice Springs.

3.7.5 Opportunities for Indigenous participation

Tellus has committed to sponsorship of sporting and academic programs in the nearby Titjikala Aboriginal community.

The Company would be making agreements with Traditional Owners, land owners and local Aboriginal communities through proposed land use agreements. These are currently under negotiation with the Government and the Central Land Council and are considered confidential. It is anticipated that the land use agreements would generate a range of potential business opportunities for businesses in the Northern Territory and the Local region in the areas of agribusiness, tourism and conservation including ranger services and cultural and traditional tourism ventures.

Finally, Tellus would have financial commitments to local Aboriginal groups under the *Native Title Act 1993*.

3.8 Employment and training

Where possible, Tellus has a policy to source and retain local labour. During the construction stage, Tellus is assuming 90 per cent of employees would operate under fly-in fly-out (FIFO) contract conditions and during the operational stage this would be reduced to nearer 75 per cent with an objective of reducing that ratio over time to attract as many local residents as possible who would drive in drive out (DIDO) from Alice Springs and the surrounding areas including Titjikala.

3.8.1 Expected direct and indirect Facility employment during construction and operations

Section 3.5 identified the creation of 1,299 direct full time equivalent workers over the four year construction period from 2017 to 2020 with peak construction occurring in 2018 when a full time equivalent workforce of nearly 720 workers would be employed.

In construction, it is expected that around 477 workers would be sourced from the Local region. In total, 72 per cent of the construction workforce would be sourced from the Northern Territory and the remaining 28 per cent from the rest of Australia.

In steady state operations workforce, the Facility would directly employ 150 workers. Ninety jobs would be sourced from the Local region. In total, it is expected that nearly 128 workers on the Facility would be sourced from the Northern Territory and the remaining 22 would be sourced from Australia.

Job creation expressed in full time equivalent years as a result of the direct and indirect activity of the Chandler Facility is expected to result in job creation of 5,400 job years over the life of the Facility or an average of 217 job years each year. Over the life of the Facility, there would be job creation of 2,600 full time equivalent job years in the Local region, an average of just over 100 full time equivalent job years per annum.

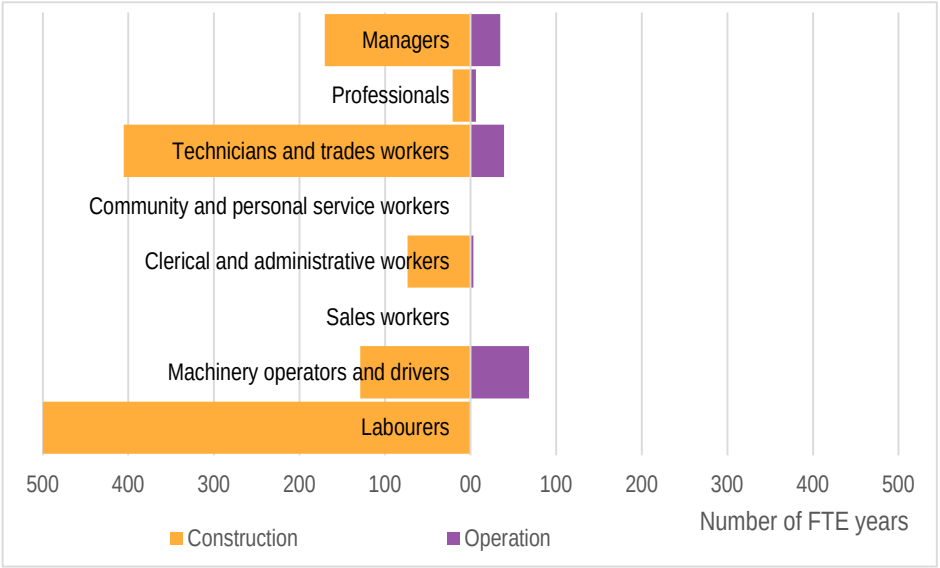
3.8.2 Estimated workforce/contractor numbers by occupational classification

The construction of the Chandler Facility would directly employ around 1,299 workers over the four years of construction. In the steady state workforce, the Facility would employ around 150 workers each year. The occupational classification of workers that would be directly hired by the Chandler Facility in construction and operation is presented in Figure 3.9 where the occupational classification is based on the Australian Bureau of Statistics Australian and New Zealand Standard Classification of Occupations (ANZCSO).

The Figure shows that the most common occupations that would be directly employed on the Chandler Facility in construction are labourers, and technicians and trades workers. Together these two occupations would employ 70 per cent of the construction workforce, a total of 900 workers. The high share of labourer occupations would be important as they would allow less skilled job seekers access to employment opportunities over a relatively long construction period.

In operation, the required occupations would have a higher skill level than during construction. The most common occupation would be Machinery operators and drivers who would account for around 45 per cent of the workforce, or 70 of the 150 required workers.

FIGURE 3.9 OCCUPATIONAL CLASSIFICATION: CHANDLER FACILITY: CONSTRUCTION AND OPERATION DIRECT WORKFORCE



SOURCE: ACIL ALLEN ECONOMIC MODELLING

3.8.3 Overall employment training proposed during commencement, construction and operations

Tellus is developing a Workforce Management Plan for the Chandler Facility. This plan would set out a range of training programs required to provide employees with the skills to work in a safe and productive way on the construction and operations phases of the Facility. It is likely that this training would focus on trade related skills, as well as on skills required by the general Facility workforce such as driver training, cultural awareness, occupational health and safety and so on.

3.8.4 Planned Indigenous employment, training and other Facility participation

Tellus has made a target of ten per cent Indigenous employment from the Local region during construction and operation. This is equivalent to an average of around nine Indigenous workers in each year of construction and ten in operation.

3.8.5 Expected level of overseas recruitment

Tellus would not actively seek employees from overseas for the construction or operation phases of the Facility.

3.9 Availability of goods and services

Table 3.6 presents the proposed resources developments in the area surrounding the Chandler Facility which could impact on the availability of goods and services to the Facility (where goods and services includes labour). These projects have been identified because they are progressed in their development with construction expected to commence in 2016 or 2017. They are all approximately 500 km from Alice Springs and are therefore considered likely to have some impact on the town. These impacts might include recruiting workers from the town, purchasing goods and services from the town, or making use of the town's infrastructure such as the airport, accommodation, training facilities and health facilities.

TABLE 3.6 PROPOSED RESOURCES DEVELOPMENTS: CENTRAL NORTHERN TERRITORY

Project	Proponent	Construction start date	Operation start date	Location	Construction employment	Operation employment
Nolans Project	Arafura Resources	2017	2019	135 km northwest of Alice Springs	Approx 500	Approx 350
Mt Peake Project - stage 1 - develop new open pit mining and processing operation producing vanadium, titanium pigment and pig iron	TNG Limited	Q2 2016	Q2 2018	235 km north of Alice Springs	Up to 350	175 - 250
Chandler Salt Mine and storage facility	Tellus Holdings	Mine: Q2 2017	Q4 2021	120 km south of Alice Springs	Peak 720	150
Jervois Mine - reopen old mine with 2 open-cut pits and on - site processing plant	KGL Resources	Q2 2017	Q4 2018	Approx 270 km north east of Alice Springs	360	300
Tanami Gold Mine expansion including second decline and increased plant capacity	Newmont	2016	2017	Approx 540 km north west of Alice Springs	na	50

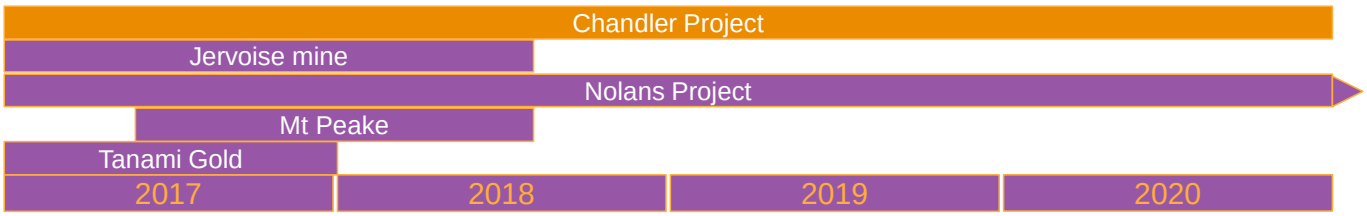
SOURCE: NT GOVERNMENT (NORTHERN TERRITORY ENVIRONMENTAL PROTECTION AUTHORITY, 2015) (NORTHERN TERRITORY GOVERNMENT, 2015).
NOTE: ALL DATES AND EMPLOYMENT FIGURES QUOTED IN THIS TABLE ARE APPROXIMATIONS ONLY

Together these mines represent peak overall construction employment in 2017 of around 400 people and operations employment of 1,100 workers. The timing of the construction of each of these developments is presented graphically in Figure 3.10. The Figure highlights the considerable overlap between the Chandler Facility and the other four proposed developments during construction.

It also shows that there would be a significant increase in demand for operations workers between the period from the end of 2017 when the Chandler Facility and the Tanami Gold Mine expansion are expected to come into operation and the beginning of 2019 when the Nolans Project is expected to come into operation. During this time, four of the proposed developments could come into production representing an increase in direct employment of nearly 900 workers.

Given the proximity of Alice Springs to the Chandler Facility and the Nolans Project and the location of the town on the direct route to the Tanami Gold Mine expansion, it is likely that all three proponents would be seeking to source some employees and goods and services from Alice Springs or to locate staff in the town.

FIGURE 3.10 CONSTRUCTION TIMING OF PROPOSED RESOURCES DEVELOPMENTS: CENTRAL NORTHERN TERRITORY



SOURCE: NT GOVERNMENT (NORTHERN TERRITORY ENVIRONMENTAL PROTECTION AUTHORITY, 2015) (NORTHERN TERRITORY GOVERNMENT, 2015).
NOTE: ALL DATES AND EMPLOYMENT FIGURES QUOTED IN THIS FIGURE ARE APPROXIMATIONS ONLY

An analysis of the economy of Alice Springs in Chapter Two indicates that despite the possibility that a number of proposed resources projects may come on line at the same or similar times, the town of Alice Springs should be able to absorb an increase in demand from the additional developments. In terms of visitor accommodation, the current annual room vacancy rate of 65 per cent and seasonally high vacancy rates of 80 per cent suggest that there are approximately 500 rooms available for overnight accommodation in the town on average which suggests that the current accommodation market could service the demand from the developments assuming that the supply of rooms are of a standard being sought by the industry. A falling housing market in terms of median prices and rental values also indicates there is some flexibility in the market to absorb additional population.

There are currently around 340 people seeking work in the Alice Springs Local Government Area. This represents an unemployment rate of 1.7 per cent. It is unknown as to what qualifications these job seekers hold or what their career aspirations might hold. However it could mean that there are opportunities for local job seekers to become involved in the construction and operation of these developments and in the flow on jobs created by the developments. It is likely however that projects would seek fly in – fly out workers for part of their workforces. For example, the Tanami gold mine currently employs only fly in – fly out staff and Arafura expects that around 210 of its steady state workers would be employed on a fly in – fly out basis with just under 40 employees sourced from the surrounding region. The Chandler Facility is expected to employ 477 people from the Local region, which includes Alice Springs, over the four years of construction and around 50 per year in operation. This could mean that the already tight labour market in the area would experience greater pressure which could lead to additional people moving to the town to take up job opportunities offered by the Chandler Facility and others.

Each year the Alice Springs Mining Services Expo showcases mining and related industry opportunities in the Alice Springs and Tennant Creek region. This would indicate that the town of Alice Springs is open to business opportunities associated with the Chandler Facility and other possible developments in the region. Tellus Holdings has indicated expenditure in the Local region of around $118 million in construction and an average of around $26 million per annum in operations. There could be pressure on local businesses during the peak construction period if all projects proceed as planned and all have a similar local content. This increase in demand may also attract new businesses to the town particularly given the number of proposed developments.

3.10 Residual infrastructure

The Facility would involve the construction of infrastructure that can be used by other parties once the Facility has ended its operational life. Key examples include the haulage road linking the Chandler facility to the Henbury Rail siding. The haulage road is approximately 31 km long. It would traverse the Henbury and Maryvale estates and would cross the Chamber Pillars Road which is a public road. It would initially be used to bring construction equipment and workers to the facility and during operation, it would be the main route for road trains taking salt from the Facility to the Henbury siding and waste from Henbury siding to the Chandler facility. This road would be available to pastoralists post mine closure.

In addition to the Haulage road, a 60 km section of the Maryvale Road would be upgraded to provide access to the Facility from the Stuart Highway. The access road would allow for delivery of equipment and consumables for the facility, staff access and road delivery of storage materials if necessary although it is envisaged the majority of storage materials would be delivered by rail via the Henbury siding. The Maryvale Road is currently used by tourists and local residents and the upgrade would therefore benefit these users.

3.11 Population

Economic analysis found that the population of the Local region is likely to experience a boost as the demand for employment created by the direct and indirect impact of the Chandler Facility is likely to draw resources away from the rest of the Northern Territory into the Local region. It is likely that this population would reside in the Local Government Area of Alice Springs. This conclusion is a result of a number of factors including the high level of social and economic services and infrastructure in the town and its relative proximity to the Chandler Facility.

Alice Springs currently has a population of 28,667 and is experiencing a population decline of around -0.2 per cent per annum (2013-14) with forecast population growth expected to remain low (NT Government, 2015). This has resulted in a favourable private housing market which is currently characterised by affordable and available rental and sales properties. Together these factors make Alice Springs an attractive and affordable place to relocate to.

It is possible that some population would also seek to move to the communities of Santa Teresa, Finke and Titjikala. It is likely that in this event, these people would be Aboriginal people who are returning to country to take up employment opportunities that arise as a direct and indirect result of the Chandler Facility. Given that Titjikala is the closest of these communities to the proposed Chandler Facility, it is reasonable to expect that most people would move to this community however family links and other demands may influence potential workers to move to other communities. The likelihood of this occurring is not expected to be great.

3.12 Community health and well being

Aboriginal health outcomes, are well below that of other Australians. High levels of disadvantage, overcrowded housing, poor diet, chronic diseases, poor early childhood health, alcohol-related harm including foetal alcohol related syndrome that affects the children of heavy drinkers and high levels of ear disease affect not only quality of life but the ability to gain employment and training opportunities (Michels Warren Munday, 2016).

The Chandler Facility provides an opportunity to foster the well being of Aboriginal people through the provision of training and employment opportunities which would provide these workers with long term economic certainty as well as training and work experience that would assist them in their career paths. This improved economic outlook has mental health benefits.

The payment of royalties by Tellus to local Aboriginal groups under the *Native Title Act 1993* provides the potential for additional spending in local communities on infrastructure and other programs that would improve the health and well being of local residents.

In addition, Tellus has committed to sponsorship of sporting and academic programs in the nearby Titjikala Aboriginal community which would have health and well being benefits from improved levels of activity and educational attainment.

3.12.1 Education and training

Tellus has committed to a ten per cent target for Aboriginal employment from the Local region during construction and operation. This is equivalent to an average of around nine Indigenous workers in each year of construction and ten in operation. This commitment would ensure that, where possible, local people are employed particularly those from the nearby communities of Santa Teresa, Finke and Titjikala where employment opportunities are limited due to their remote locations. This commitment

would allow local people to gain skills from education and training and work experience on the Facility thereby improving their employment prospects.

Tellus has committed to sponsorship of academic programs in the nearby Titjikala Aboriginal community which would also assist local people in gaining education and employment opportunities.

3.12.2 Business opportunities

If the proposed Chandler Facility is approved, Tellus would be making agreements with Traditional Owners, land owners and local Aboriginal communities through proposed Indigenous land use agreements. These are currently under negotiation with the Government and the Central Land Council and are considered confidential. It is anticipated that the land use agreements would generate a range of potential business opportunities for businesses in the Northern Territory and the Local region. This would allow local people to set up businesses or gain experience in the areas of agribusiness, tourism and conservation including ranger services and cultural and traditional tourism ventures which would have positive economic benefits.

3.12.3 Health impacts

There are health benefits from the Chandler Facility from the sponsorship of sporting programs in the nearby Titjikala Aboriginal community. In addition, long term employment and business opportunities would provide for greater certainty for those people wishing to engage which would have mental health and well being benefits.

Whilst there are a number of health and well being benefits from the Chandler Facility and the commitments made by Tellus, there is also the potential for other health impacts from potential road safety issues associated with increased vehicle movements on shared roads as a result of vehicles accessing the Chandler Facility during the construction phase. In operation, the proposed Facility will use a private company road to access the site.

These impacts can largely be managed through a construction and operation traffic management plan as well as workplace education programs such as those that address road safety. All staff would be required to observe Australian and Northern Territory laws including speed limits and other road rules.

3.13 Culture and way of life

The Southern Arrernte or Pertame people are the Traditional Owners of the land on which the Chandler Facility is located. These Traditional Owners mainly live in the community of Titjikala as well as in Alice Springs and in remote outstations. In addition, there are large populations of Aboriginal people living in the nearby remote communities of Finke, Santa Teresa and Titjikala. There are very few visitors to the area apart from tourists and visitors to the pastoral station.

There would be very little disruption to the culture and way of life of visitors to the area. There would be some minor impacts from increased vehicle movements along shared roads which would create impacts in the form of increased road safety risks. There would also be some change to the visual landscape of the area in the form of the construction of the Chandler Facility and its ancillary infrastructure.

3.13.1 Remaining on country

Employment and business opportunities created by the Chandler Facility and its flow on impacts would assist in allowing Traditional Owners and other Aboriginal people to remain on country or to relocate back to country. This would allow the culture and way of life of these people to continue.

3.13.2 Vehicle movements

There would be some disruption to the culture and way of life of the Traditional Owners of the land on which the Chandler Facility would be located and to the people living in the communities of Finke, Santa Teresa and Titjikala. These impacts would result from increased vehicle movements along shared roads and the construction of the Chandler Facility and its ancillary infrastructure. Tellus have

been in consultation with Traditional Owners since 2012 in order to minimise any disruption that the proposed Chandler Facility may have.

3.13.3 Sensitive areas

In consultation with the Traditional Owners, several sensitive areas have been identified which have designated as exclusion zones. These areas and their exclusion zones have been cleared with the Central Land Council.

There is currently a Native Title claim over the Maryvale and Henbury Estates which includes the Chandler Facility and its ancillary infrastructure. An application was filed on 24 June 2015 and registered with the National Native Title Tribunal on 9 September 2015.

Tellus have made a number of commitments that aim to ensure there is minimal impact on the way of life and culture of Traditional Owners, local residents and other visitors to the area. These commitments include:

- The creation of exclusion zones around sensitive areas identified by Traditional Areas
- A commitment to honour the agreements set out in the land use agreement. These commitments are currently under negotiation with the Government and the Central Land Council are considered confidential.
- Ensuring current access to traditional lands and to the area in general is maintained
- Obtaining Sacred Site Clearance Certificates for sites of significance
- Introducing codes of behaviour for all workers at the Chandler Facility to ensure sacred sites are respected workers understand the importance of these sites
- Ongoing interaction and consultation with Traditional Owners and nearby residents. Tellus would continue to liaise with Traditional Owners through the Environmental Impact Assessment process and throughout the life of the Facility, to ensure a good relationship is continued and to ensure that the culture and way of life of Traditional Owners and nearby residents is maintained.

3.14 Visual landscape

The area in which the Chandler Facility would be located is remote and very sparsely populated. There are few visitors to the area and very little existing infrastructure. The development of the Chandler Facility would require a permanent change to the visual landscape of the area in the form of the Facility and its ancillary infrastructure including the construction of new roads.

In construction, the impact on the visual landscape would be created by the clearing of vegetation, earthworks, and an increase in the number of people, vehicles, stockpiles, plant and equipment in the area. In operation, the above ground infrastructure would be visible for the life of the Facility along with an increase in the number of people and vehicles in the area. At the end of the life of the Facility, residual infrastructure such as roads would remain visible.

Given the remote location of the Facility, the impact of a change in the visual landscape would not be seen from Chambers Pillar Road and limited to the few people who travel into the mine infrastructure area. There may be some impact on Traditional Owners and Aboriginal people whose customs and culture are related to the land and its form.

3.15 Impact on social infrastructure

The impact on social infrastructure and services such as health, education and housing in the Local region has been assessed as a result of the direct impact of the proposed Facility. It is predicted that any impact on social infrastructure from the Chandler Facility would be realised in Alice Springs.

The impact on the social services and infrastructure in on Alice Springs is predicted to be minimal given the capacity of the social infrastructure in the town. However, cumulative impacts if other developments start at the same time could lead to greater pressures on some social infrastructure such as emergency health services.

In the surrounding communities of Santa Teresa, Finke and Titjikala, the Chandler Facility could have an impact on social services and infrastructure if people move to these communities to take up work opportunities created by the Facility. This could lead to pressures on education, police, health and other services. However, it is unlikely that the Chandler Facility would attract enough people back to the surrounding communities for there to be an impact on these services.

There are potential positive social infrastructure impacts from the Facility in the form of payments by Tellus to local Aboriginal groups under the *Native Title Act 1993*. These payments could be invested by local communities in their communities to improve the standard of social infrastructure.

3.15.1 Health services

Tellus would maintain a medical post at the Chandler Facility. In the event that staff require further medical assistance, they would be transported by road to Alice Springs Hospital or evacuated by the Royal Flying Doctor Service. Medical facilities in the towns of Santa Teresa, Finke and Titjikala would not be used by the Chandler Facility.

3.15.2 Emergency services

Tellus would have safety, incident response and emergency procedures in place that would address any emergency that arises. It is therefore not likely that emergency services such as fire, rescue and police would be required.

3.15.3 Housing market

The proposed Chandler Facility could result in some indirect impacts on social infrastructure in the Local region. If there is an increase in the population of Alice Springs as people move to the town to take up work opportunities created by the Facility, there could be some pressure in the availability and affordability in the private housing market. This situation could result in some tenants being displaced from the private housing market which would put further stress on the public housing market. This probability is expected to be low as the situation in the current private housing market suggests that there would be little impact of the Chandler Facility on the availability and affordability of private housing unless there is a cumulative impact from other developments.

Whilst no official statistics are available regarding the housing market in Santa Teresa, Finke and Titjikala, the Central Land Council noted that housing in remote areas governed by the Council is a key issue for people living in these communities because of critical shortages and overcrowding problems (Central Land Council, 2016). Any increase in population in these communities is therefore likely to add to housing stress.

3.16 Impact from workforce

The Chandler Facility is expected to create direct employment of 1,299 full time equivalent workers over the four year construction period from 2017 to 2020 as illustrated in Figure 3.3 which shows the location from where workers would be sourced from by year. Over the four year construction period, 477 workers or 37 per cent of the construction workforce would be sourced from the Local region. Two thirds of the workforce or around 940 workers would be sourced from the Northern Territory (including the Local region) and the remaining 360 members of the construction workforce would be sourced from the rest of Australia.

The peak construction workforce would occur in 2018 which is the second year of construction when a full time equivalent workforce of 720 workers would be employed. At peak employment, it is expected that 40 per cent of these workers would be sourced from the Local region equivalent to a workforce of just under 290 workers. The remaining 60 per cent of the peak construction workforce would be sourced from the rest of the Northern Territory or Australia.

In steady state operation workforce (2021) the Facility would employ an estimated 180 workers. Around 90 workers or around 60 per cent of these jobs would be sourced from the Local region. In total, it is expected that nearly 128 workers on the Facility would be sourced from the Northern Territory and the remaining 22 would be sourced from Australia.

Tellus has committed to an ongoing target of reducing fly in – fly out work practices and encouraging drive in – drive out work practices from Alice Springs and the surrounding area. Nevertheless, some of the workforce, particularly in construction, would be sourced from outside of the Local region. These staff would be housed in an accommodation village on site. All staff would be governed by strict workplace rules and responsibilities regarding drugs, alcohol and appropriate behaviour. These measures would ensure that any impact on local communities and Traditional Owners is minimal.

3.17 Summary

The proposed Chandler Facility would result in a number of positive economic and social impacts as a result of the construction, operation and maintenance of the Facility. These impacts would include those associated with the spending on goods and services, including labour, required to construct and operate the Facility.

Tellus has made commitments to source a large share of the required goods and services and labour from the Local region thereby maximising the positive impacts to the Local region and to the Northern Territory. This spending would result in greater wealth in the Northern Territory with the majority of the impact realised in the Local region. Impacts would include direct and indirect opportunities for local businesses and job seekers which would have positive economic and social impacts in the form of greater employment, incomes, individual economic outcomes, community well being, population retention and so on.

There would be some negative impacts which can largely be minimised and/or negated through management measures in the form of commitments and workplace policies. All of these impacts are confined to the Local region. The construction of the proposed Chandler Facility would alter the visual of the country which could have some impact on the Local region. Commitments put in place by Tellus to work with local people including Traditional Owners, to preserve and protect their health and well being, culture and way of life would assist in minimising this impact.

4 ECONOMIC AND SOCIAL RISK ASSESSMENT

This chapter discusses the potential economic and social risks associated with the proposed Chandler Facility in terms of not realising the intended outcomes of the Facility.

4.1 Risks of the proposed Chandler Facility not realising its economic and social benefits

There are a number of social and economic benefits of the proposed Chandler Facility that are created by the direct and indirect spending in the Local region required to construct, operate and maintain the Facility. This spending includes the payment of wages to employees and contractors who in turn purchase goods and services in the Local region. These include:

- Population retention
- Contribution to business development
- Employment creation
- Opportunities for Indigenous participation

Tellus has estimated that 477 construction workers would be sourced from the Local region and an average of 90 full time equivalent workers per annum would be sourced from the Local region in operations. Further, Tellus has estimated that $118 million would be spent in the Local region in construction and an average of $26 million per year in operation.

It is possible that the proposed level of spending in the Local region would not be able to be achieved in the event that goods and services, including labour, is not available. In this case, goods and services would have to be purchased from elsewhere and the social and economic benefits highlighted in this report may not be fully realised.

This risk is considered to be low. The Local region includes the town of Alice Springs which is the key population and service centre in central Australia. It is a modern town with a good level of social infrastructure and it supports a large population. It also supports a large number of business which service the local population and the surrounding region including the construction industry and the resources sector. The high level of social and economic infrastructure and experience in the construction industry and the mining sector would indicate that the town is well equipped to provide the goods and services, including labour, required to construct, operate and maintain the proposed Chandler Facility.

The ability of Alice Springs to cater for the proposed Chandler Facility in terms of supplying goods, services and labour is discussed in detail in Section 3.9. This section, concludes that Alice Springs should be able to absorb an increase in demand for goods and services even if other developments come on line at the same or similar times as the proposed Chandler Facility. Furthermore, the tight labour market in the town could result in additional people moving to Alice Springs to take up job

opportunities offered by the Chandler Facility and other proposed developments which would serve to boost the economy of the town.

4.2 Forced or unpredicted delays

Construction of the proposed Chandler Facility is expected to occur over the period from 2018 to 2020 with operations beginning in 2021. Tellus has completed a pre feasibility study that indicates that the Chandler Facility is technically feasible and economically viable and has no fatal flaws. A Bankable Feasibility Study is currently being developed which would inform a Final Investment Decision.

Tellus has conducted stakeholder engagement over a five year period beginning in 2012. The aim of this consultation has been to keep stakeholders informed, to manage expectations and to maintain a good working relationship. In the event of forced or unpredicted delays, Tellus would continue to engage in stakeholder consultation to inform stakeholders. In particular, Tellus would work with the Chamber of Commerce Northern Territory, the Northern Territory Government and the Industry Capability Network as the project progresses.

4.3 Contingencies

Tellus has made a number of commitments aimed at enhancing the positive impacts of the Chandler Facility and minimising or negating the negative impacts.

4.3.1 Maximising local content

Some to the commitments are aimed at increasing the likelihood that people and businesses would be sourced from the Local region which would ensure the proposed Chandler Facility would impact the economic and social baseline of the Local region in a positive way. These commitments include the following:

Commitment to spending in the Local region

Tellus has committed to a high level of spending on goods and services in the Local region including an estimated spending of $118 million in construction and an average of $26 million per year in operation. This spending would directly benefit local businesses and their employees. It would also indirectly benefit other businesses in the Local region through the spending on goods and services by these businesses.

Commitment to Indigenous employment

Tellus has made a target of ten per cent Indigenous employment from the Local region during construction and operation. This is equivalent to an average of around nine Indigenous workers in each year of construction and ten in operation. This commitment would ensure that, where possible, local people are employed particularly those from the nearby towns of Santa Teresa, Finke and Titjikala where employment opportunities are limited due to their remote locations. This commitment would allow Aboriginal people to remain on country or return to country which would assist in the continuation of laws, customs and traditions being continued on country.

Commitment to local employment

Tellus has estimated that 477 construction workers would be sourced from the Local region and an average of 90 full time equivalent workers per annum would be sourced from the Local region in operations.

Commitment to local businesses

Tellus is currently negotiating land use agreements with the Government and the Central Land Council on behalf of Traditional Owners, land owners and local Aboriginal communities and are considered confidential. It is anticipated that the land use agreements would generate a range of potential business opportunities for businesses in the Northern Territory and the Local region in the

areas of agribusiness, tourism and conservation including ranger services and cultural and traditional tourism ventures.

Commitment to use local trainers

Tellus has made a commitment to conduct all training for employees in the Local region. All training providers would also be employed from the Local region. This commitment supports local businesses including training providers and caterers.

4.3.2 Maximising other benefits to the Local region

Other commitments are aimed at maximising the benefits to people in the Local region and minimising any negative impacts. These include company policies that address workplace behaviour as well as commitments that target the health and well being of local communities.

Commitment to develop a workforce management plan

Tellus has made a commitment to develop a Workforce Management Plan. This plan would set out a range of training programs required to provide employees with the skills to work in a safe and productive way on the construction and operations phases of the Facility.

Commitment regarding residual infrastructure

Tellus has made a commitment that all residual roads infrastructure constructed to support the Facility would be available for use by local people and industry.

Commitment to health and education of nearby communities

Tellus has committed to sponsorship of sporting and academic programs in the nearby Titjikala Aboriginal community.

4.3.3 Ongoing stakeholder consultation

Tellus has committed to ongoing stakeholder consultation particularly with Traditional Owners and nearby residents. This would ensure that there is an ongoing relationship with stakeholders and that any economic and social impacts can be monitored and addressed over time.

Tellus would work with the Chamber of Commerce Northern Territory, the Northern Territory Government and the Industry Capability Network as the project progresses to identify opportunities for local businesses to ensure that local content is maximised.

4.4 Summary of impacts and commitments

The following table provides a summary of the economic and social impacts of the proposed Chandler Facility on the Northern Territory and the Local region. Where relevant, the commitments made by Tellus to enhance the positive impacts and minimise or negate the negative impacts have been noted.

TABLE 4.1 SUMMARY OF IMPACTS AND COMMITMENTS: NORTHERN TERRITORY AND LOCAL REGION

Description of impact	Level of impact (Northern Territory including Local region)	Level of impact (Local region)	Impact description	Commitment
Capital expenditure	$231 million	$118 million	High local content in construction	Commitment to local spending.
Operations expenditure	$42 million per annum	$26 million per annum	High local operations spending content	Commitment to local spending.
Construction employment	940 FTE over four years	477 FTE over four years	Direct opportunities to work on Facility and to gain experience in construction.	Local employment commitment.

Description of impact	Level of impact (Northern Territory including Local region)	Level of impact (Local region)	Impact description	Commitment
Operations employment	128 FTE per annum	90 FTE per annum	Direct opportunities to gain long term work experience on the Facility.	Local employment commitment.
Indigenous employment	9 per annum over four years	10 per annum	Opportunities for Aboriginal people from local region to gain long term employment in a new industry.	Tellus has made a target of ten per cent Indigenous employment from the Local region during construction and operation.
Job creation	146 FTE per annum	104 FTE per annum	Opportunities for employment of local people at the Facility as well as indirect opportunities from flow on impacts.	Commitment to local employment which would increase the job creation in the Northern Territory and the Local region.
Contribution to Gross Product	$144 million per annum	$166 million per annum	Large economic flow on impact from Chandler Facility. Some drawing of resources away from the rest of the Northern Territory to the Local region.	Commitment to local spending and employment which would increase the economic value created in the Northern Territory and the Local region.
Contribution to real incomes	441 million	476 million	Increase in the ability of local people to purchase goods and services and to accumulate wealth.	
Royalties and taxation	Estimated $1.1 million per annum	Potential increase in Local Government revenues	Boost to Payroll taxation in the NT	Commitment to local employment which would increase revenue from Payroll taxation.
Population		Probability of population increase in Alice Springs and potentially Titjikala	Alice Springs housing market characterised by available and affordable private housing which should be sufficient to absorb a population increase. Stressed public housing market however a low risk of Chandler Facility impacting this market. No official statistics but likely that Titjikala housing market stressed and risks associated with housing additional population.	Commitment to maximise the use of drive in – drive out employment over fly in – fly out employment which may encourage additional population to Alice Springs.
Business development	Increased demand for goods and services from NT businesses.	Increased demand for goods and services from businesses in Local region.	Direct and flow on spending would increase the demand for goods and services from businesses in the Northern Territory and Local region.	Commitment to local spending and employment. Commitment to ongoing consultation with local business organisations and government to maximise benefit to NT.

Description of impact	Level of impact (Northern Territory including Local region)	Level of impact (Local region)	Impact description	Commitment
Indigenous business development		Opportunity for Indigenous businesses to be involved in construction, operation and maintenance of Facility.	Opportunities for new and existing businesses to support the Chandler Facility including in the areas of agribusiness, tourism and conservation including ranger services and cultural and traditional tourism ventures.	Land use agreements would generate a range of potential business opportunities for businesses in the Northern Territory and the Local region.
Training opportunities	Workforce Management Plan under development. This plan would set out a range of training programs required to provide employees with the skills to work in a safe and productive way on the construction and operations phases of the Facility.	Workforce Management Plan under development. This plan would set out a range of training programs required to provide employees with the skills to work in a safe and productive way on the construction and operations phases of the Facility.	Education and training opportunities for local people. New business opportunities for local businesses involved in the education and training sector.	Commitment to develop a Workforce Management Plan. Commitment to conduct all training for employees in the Local region. All training providers would also be employed from the Local region.
Availability of goods and services		Alice Springs able to absorb increase in demand for goods and services, including housing. Potential for some stress if other proposed developments come on line at same time.	Local region able to absorb increase in demand for goods and services	
Residual infrastructure		Residual roads infrastructure available for public use.	Benefits to local road users including tourists from additional road infrastructure	Tellus has made a commitment that all residual roads infrastructure constructed to support the Facility would be able to be used by local people and industry.
Community health and well being		Positive impacts from sponsorship of sporting and academic programs in Titjikala. Potential negative impacts from increased vehicle movements.	Positive health and education impacts. Potential road safety issues from increased vehicle movements. .	Commitment to sponsorship of sporting and academic programs in Titjikala. Commitment to workplace programs regarding road safety.

Description of impact	Level of impact (Northern Territory including Local region)	Level of impact (Local region)	Impact description	Commitment
Culture and way of life		Areas sensitive to Traditional Owners.	Sensitive sites have been identified in conjunction with Traditional Owners and exclusion zones have been proposed. Ongoing consultation with Traditional Owners to ensure a good working relationship.	To maintain and respect exclusion zones around sensitive areas. To continue consultation with Traditional Owners and nearby residents throughout the life of the Facility. Continued access for Traditional Owners and others to area. Indigenous Land Use Agreement under negotiation.
Social infrastructure	Potential increase in demand for services if additional population moves to Alice Springs. Potential use of Alice Springs Hospital in the event of a medical event.	Little increase in demand expected. Potential improvement in social infrastructure through payments by Tellus to local Aboriginal groups under the *Native Title Act 1993*.	Use of Alice Springs Hospital in the event of an emergency or other medical event.	
Workforce impact	Fly in – fly out workforce from other Northern Territory and the rest of Australia.	Drive in – Drive out workforce from Local region.	Workers housed in an accommodation village. Some interaction with local residents possible but unlikely.	Commitment to maintain strict workplace regulations which minimise interaction with local residents and promote responsible behaviour.
Visual landscape		Visual landscape impacts	Change to the visual landscape from new infrastructure, increased people and vehicles in the area.	Commitment to maintain sensitive areas identified by Traditional Owners. Commitment to Workforce Management Plan to manage actions of workers in local area.

SOURCE: ACIL ALLEN CONSULTING (INCLUDING FROM MITCHELS, WARREN MUNDAY (MICHELS WARREN MUNDAY, 2016))

5 SUMMARY

Tellus Holdings Ltd is proposing to develop the Chandler Facility. The Chandler Facility is located approximately 120 km south of Alice Springs in the Northern Territory. It is proposed that Tellus would develop a dual revenue business comprising an underground rock salt mine for industrial and edible salt and using the voids resulting from mining for the secure storage and isolation of hazardous waste and the recovery of valuable materials.

Economic modelling was undertaken by ACIL Allen Consulting using Computable General Equilibrium modelling to estimate the total (direct and indirect) impact of the Chandler Facility on a range of economic variables for the Local region (comprising the Sandover Plenty SA2 area and the Alice Springs Local Government Area), the Northern Territory and for Australia. For this analysis, ACIL Allen's Computable General Equilibrium model, *Tasman Global*, was used to estimate the impacts of the construction and operation activities associated with the Chandler Facility.

Facility data for the construction and operation phases of the Chandler Facility described in this report was sourced from Tellus Holdings. All other data regarding the description of the economy and key economic variables has been sourced from publicly available sources such as the Australian Bureau of Statistics.

The economic impact of the Chandler Facility using the data supplied by Tellus and analysed by ACIL Allen has been found to be large both as a result of the direct spending on goods, services and wages by Tellus to construct and operate the Chandler Facility and from the flow on spending in the economy as a result of this stimulus. The following sections outline the size of this impact in direct terms in the form of capital expenditure, operations expenditure, direct taxation, company revenue, export stimulus and local content assumptions. The total (direct and indirect) impact in the form of job creation, and the contribution to Gross Product, real incomes and taxation is also described.

5.1 Key project assumptions

It is estimated that the Facility would involve capital expenditure of around $648 million over a four year period from 2018 to 2021.

At capacity and for the purposes of this economic impact assessment, it is assumed that the Facility would produce around 500,000 tonnes per annum of salt for sale. Note that in addition to salt sales, the Facility would also use additional mined salt for use in the storage of waste. Over the twenty five years modelled life of the Facility, approximately 8.5 million tonnes of waste is expected to be stored. Capital and operations expenditure for the life of the Facility.

5.1.1 Capital and operating expenditure

Peak construction expenditure would occur in the second year of construction and that the majority of the $648 million required to construct the Facility would occur in the first three years of construction of

the Facility. On average, the Facility would incur capital expenditure of $162 million in each of the four years of construction.

Operations expenditure would start in year one of the Facility which is also the first year of construction. The amount of operations expenditure in the first few years of the Facility would be small at around $20 million per annum but would continue to rise over the Facility to reach $137 million by 2041. On average, over the modelled life of the Facility, there would be spending of just under $81 million per annum to operate the Chandler Facility.

5.1.2 Revenue

Revenue from the Chandler Facility would be raised from salt sales however the majority of revenue would be received from the storage of hazardous waste. Revenue estimations for the Facility are considered commercial in confidence and have not been reported in this economic impact assessment however they have been used to estimate the economic impact of the Facility.

5.1.3 Local content assumptions

In construction, the Chandler Facility would have a high local content with an estimated 67 per cent of all construction costs to be spent in Australia. Thirty six per cent of the total construction cost would be spent in the Northern Territory and 18 per cent of the total construction cost would be spent in the Local region.

In operation, 64 per cent of the total operation spend, including labour, would be spent in Australia. A total of 52 per cent of the total cost to operate the Facility would be spent in the Northern Territory and 32 per cent would be spent in the Local region. This is equivalent to spending in Australia of over $1.2 billion over the twenty five modelled years of the Facility including just over $1 billion in the Northern Territory. Of this, over $600 million would be spent in the Local region with the majority of that expenditure expected to be spent in Alice Springs.

5.1.4 Tax and royalty payments

Over the life of the Facility, it is expected that $1 billion of direct taxation revenue would be paid to the Northern Territory and Federal governments. This is equivalent to around $40 million per annum in direct taxation payments.

5.1.5 Value of exports

The majority of the salt produced from the Chandler Facility would be exported with the remainder required for the waste storage operations. At capacity, the Facility would produce 500,000 tonnes of salt per annum for sale to the export market

5.1.6 Employment

Over the construction period, it is expected that 1,299 full time equivalent workers would be employed. At steady state operations employment (2021), the mine is expected to employ 150 full time equivalent workers.

5.2 Economic impact

The economic impact of the Chandler Facility is considerable. The proposed Facility would bring significant benefits from the direct spending by Tellus on the construction of the Facility and in its operation. There would also be flow on or indirect benefits which result from the additional spending in the economy on goods, services and wages. These benefits have been estimated using the *Tasman Global* Computable General Equilibrium Model and are described in the following sections.

The results presented in this Economic Impact Assessment rely on latest available estimations of data supplied by Tellus. The economic impacts calculated in the report are dependent on the value of spending on goods, services and wages and assumptions as to where this spend would occur. The high local contribution of the proposed Chandler Facility in terms of job creation and contribution to

Gross Regional Product and Gross Territory Product are a direct result of the high estimates of spending in the Local region and the Territory.

5.2.1 Contribution to Gross Product

Over the life of the Facility, including the construction period, the Chandler Facility would generate $3.6 billion or an average of $144 million in each of the twenty five years to the Gross State Product of the Northern Territory. This is a significant annual contribution to the Gross State Product of the Northern Territory and is equivalent to around 0.6 per cent of the current Gross Territory Product of $23.1 billion.

All of the impacts from the Facility would be realised in the Local region. This is because the production of the Chandler Facility occurs in the Local region and it is where a large share of the labour is located.

In total over the life of the Facility, the Gross Domestic Product of Australia would rise by nearly $4.1 billion or an average of $166 million each year.

5.2.2 Contribution to real incomes

Real income is a measure of the ability to purchase goods and services, adjusted for inflation. The change in real income from a development is a measure of the change in welfare of an economy. Over the life of the Facility, the Chandler Facility would contribute $3.4 billion to the real incomes of Australians. This includes an increase of $441 million to real incomes in the Northern Territory. The contribution to the Local region is higher at $476 million for the life of the Facility.

5.2.3 Job creation

The development of the Chandler Facility is expected to result in the creation of 5,400 full time equivalent job years over the life of the Facility, an average of 217 full time equivalent job years per annum.

Most of the job creation would occur in the Northern Territory including the Local region and would generally match the local content estimates of where employees would be sourced from. In the Northern Territory, an estimated 3,600 full time equivalent job years would be created over the life of the Facility. This is equivalent to an average of 146 full time equivalent job years per annum. Around 2,600 of these or an average of 100 per year would be located in the Local region. This is equivalent to 30 per cent of the current number of unemployed people in the Alice Springs Local Government Area or 18 per cent of the unemployed people in the Local region.

5.2.4 Contribution to government revenue

On average, over the life of the Facility, the Chandler Facility would generate around $75 million each year in direct and indirect Territory and Federal government revenue. Over the modelled life of the Facility, it is expected to pay $1.9 billion in direct and indirect taxation. The majority of this taxation is in the form of company taxes paid by Tellus Holdings as well as other personal and company income taxes paid to the Federal Government.

In total, the Northern Territory is likely to receive $34 million in payroll taxes as a result of direct and indirect impacts of the Chandler Facility, or an average of $1.4 million per annum.

5.3 Opportunities for regional centres

The contribution of the Chandler Facility to regional development is significant and results from the direct and indirect spending on the construction and operation of the Facility. These benefits include:

— Regional economic benefits created as a result of the Facility in the form of additional spending, new business and employment opportunities, attracting new population to the area, and improving the wealth of individuals.

— Very high local purchases including an estimated spending of $118 million in construction and an average of $26 million per year in operation in the Local region.

— A commitment to local employment including the employment of local Indigenous people. Tellus has made a target of ten per cent Indigenous employment from the Local region during construction and operation. This is equivalent to an average of around nine Indigenous workers in each year of construction and ten in operation.
— Residual roads infrastructure that would be constructed for the Facility would be available for local people and industry to utilise.

5.4 Social impact

The Chandler Facility would create a number of positive social impacts including education and training opportunities, employment opportunities and business opportunities for workers and businesses directly and indirectly involved with the Chandler Facility. There would also be benefits to all people in the Northern Territory from improved wealth from an increase in real incomes which is a measure of the ability of individuals to earn income and accumulate wealth. Many of these impacts are addressed in the economic impact section of this report. In addition, there would be other benefits such as providing economic opportunities which would allow Aboriginal people to remain on or return to country, the potential for improved social infrastructure and improved health and well being outcomes.

5.4.1 Population

The current decline in the population of Alice Springs could be stabilised or reversed if additional people move to the town to take up employment and business opportunities. It is also possible that the Chandler Facility would either attract Aboriginal people back to country or allow Aboriginal people to remain on country because of improved economic prospects.

5.4.2 Social infrastructure

The impact on social infrastructure would be low as the Chandler Facility and its workforce would not use social infrastructure located in the towns of Santa Teresa, Finke and Titjikala. The social infrastructure located in Alice Springs is considered sufficient to be able to absorb any increase in demand as a result of the Facility.

In the event that additional population move to Santa Teresa, Finke or Titjikala, stress would be placed on social infrastructure in particular the local housing markets in those communities. The likelihood of enough population relocating to these communities to make a significant impact is low. Social infrastructure could potentially be improved in these communities if payments required under the *Native Title Act 1993* are used to improve social infrastructure.

5.4.3 Visual landscape

The Chandler Facility would permanently alter the visual landscape of the area which could have some impact on other users of the area and those people that have a connection to the land. Tellus have put in place measures that would identify areas of sensitivity and access will be allowed to the Facility area.

5.4.4 Increased vehicle movements

There could be some health impacts from increased vehicle movements along shared roads that create road safety issues. These impacts would be managed through workplace programs that ensure vehicles are driven responsibly and all road rules are observed.

5.4.5 Health and well being

Positive health impacts from the Facility include mental health and well being benefits from improved economic outcomes and long term certainty. Health benefits would also be created from the commitment by Tellus to sponsor sporting programs in Titjikala.

5.4.6 Education

Tellus has committed to sponsor education programs in Titjikala which would have benefits for the residents of this community. Education and training opportunities on the Chandler Facility would also benefit local people who gain employment at the Facility by providing skills that can be used to further their career prospects.

5.5 Contingencies

Tellus are committed to enhancing the potential positive impacts of the Chandler Facility and address any potential negative impacts. These measures include targets for local spending and employment which are aimed at ensuring that businesses and employees benefit from the construction, operation and maintenance of the Chandler Facility.

Tellus recognises the importance of local stakeholders and has conducted four years of consultation with Traditional Owners, local communities, local pastoral stations and others to ensure that a good working relationship is maintained and that the value of the area in which the Facility would be located is preserved. This consultation has resulted in a number of commitments aimed at preserving or improving the health, education and training, employment, culture and way of life, and health and well being of local people.

5.6 The Chandler Facility's role in the current social and economic environment

The Northern Territory is currently experiencing strong economic growth when compared to Australia as a result of continued economic activity from major developments including the construction of the Ichthys development. Despite this, a number of economic indicators are showing signs of the easing of economic activity including from falling median house prices, falling rents and the closure of several mines. Given this economic climate, the development of the Chandler Facility would therefore provide an important boost to the economy of the Northern Territory, particularly for local businesses and job seekers.

The economy in the Local region is centred on the Alice Springs Local Government Authority and the role that the town plays in the provision of government services and the supply of goods and services to the local and surrounding population and industry. The key industries in the region are the mining industry, the agricultural industry and the tourism sector. The economic profile of the region is also heavily influenced by Alice Springs which currently has a very low unemployment rate however median house prices and rents are falling and there is a decline in population. Outside of Alice Springs there are very few economic opportunities and the area is characterised by high unemployment, population decline, low skills levels and lower incomes.

The outlook for the Local region is positive with forecasts of a stable of population and the potential for growth in the mining sector with several developments proposed within range of Alice Springs. The Chandler Facility would be important in providing economic opportunities for people living outside of the town of Alice Springs where there are few business or employment prospects. The Facility would also assist in creating a critical mass, along with other proposed resources developments, that would contribute to supporting the economy of the town of Alice Springs which is currently experiencing a declining population and a slowdown in the housing market.

The economy of Alice Springs would be able to absorb the impact of the Chandler Facility particularly because of the current low occupancy rates for accommodation establishments and the depressed housing market. There is however, a very low unemployment rate in the Alice Springs Local Government Area which would suggest that there is a tight labour market in the town.

Indigenous people would have a number of opportunities as a result of the Facility. Tellus Holdings have committed to a target of ten per cent Indigenous employment as well as other commitments that would benefit local Indigenous people such as the use of the Facility's access roads, and sponsorship of sporting and academic programs in the nearby Titjikala Aboriginal community. The Company would be making agreements with Traditional Owners, land owners and local Aboriginal communities

through proposed land use agreements. These are currently under negotiation with the Government and the Central Land Council and are considered confidential. Finally, Tellus would have financial commitments to local Aboriginal groups under the *Native Title Act 1993*.

6 BIBLIOGRAPHY

Australian Bureau of Statistics. (2012). *2011 Census of Population and Housing.* Canberra: Government of Australia.

Australian Bureau of Statistics. (2015). *3218.0 Regional Population Growth, Australia.* Canberra: Government of Australia.

Australian Bureau of Statistics. (2015). *5220.0 Australian National Accounts: State Accounts .* Canberra: Australian Government.

Australian Bureau of Statistics. (2015). *Regional Population Growth, Australia Cat: 3218.0.* Canberra: Government of Australia.

Australian Bureau of Statistics. (2015). *Tourist Accommodation Northern Territory 2014-15.* Canberra: Government of Australia.

Carment, D. (1991). *History and the Landscape in Central Australia.* Darwin: Australian National University.

Central Land Council. (2016). *Submission to the Housing Strategy Consultation Draft .* Central Land Council.

Department of Employment. (2015). *Small Area Labour Markets.* Canberra: Government of Australia.

Michels Warren Munday. (2016). *Social Impact Assessment: Proposed Chandler Facility.* Darwin: Michels Warren Munday.

Northern Territory. (2010 - 2016). *Northern Territory Mining Production various years.* Darwin: Northern Territory Government.

Northern Territory Environmental Protection Authority. (2013). *Final Guidelines for the Preparation of an Environmental Impact Statement: Chandler Salt Mine Project.* Darwin: NT Government.

Northern Territory Environmental Protection Authority. (2015, August). Retrieved from http://www.ntepa.nt.gov.au/environmental-assessments/assessment/register/twin-bonanza-gold-mine

Northern Territory Government. (2015, October). *Mining Developments in the Nothern Territory: October 2015.* Darwin: Northern Territory Government.

Northern Territory Police. (2016, December 21). *NT crime statistics*. Retrieved from Northern Territory Police: http://www.pfes.nt.gov.au/Police/Community-safety/Northern-Territory-crime-statistics

NT Department of Business. (2015, September 04). *Business*. Retrieved from Department of Business: http://www.dob.nt.gov.au

NT Government. (2015). *Northern Territory population projections summary.* Darwin: NT Government.

NT Government. (2016, December 21). *Education Directory*. Retrieved from Education Directory: https://directory.ntschools.net/

NT Shelter. (2016). *NT Shelter Factsheets - Ten Year Housing Affordability Report Card.* Darwin: NT Shelter.

NT Treasury. (2015). *NT Budget 2015/16: Northern Territory Economic Overview.* Darwin: NT Government.

NT Treasury. (2016). *Northern Territory Economic Brief: Gross State Product 2014-15.* Darwin: NT Government.

Real Estate Institute of Northern Territory Inc. (2016). *The Northern Territory Real Estate Local Market Report: December Quarter 2015.* Darwin: Real Estate Institute of Nothern Territory Inc.

The Treasury. (2014). *Budget Paper 1: Budget Strategy and Outloook: Statement 2: Economic Outlook.* Retrieved May 16, 2014, from Australian Government: The Treasury: http://www.budget.gov.au/2014-15/content/bp1/html/bp1_bst2-01.htm

Tourism NT. (2015). *Tourism Quickstats 2015.* Darwin: Northern Territory Goverment.

Tourism Research Australia. (2015). *State and Territory Tourism Forecasts.* Canberra: Australian Government.

A TASMAN GLOBAL COMPUTABLE GENERAL EQUILIBRIUM MODEL

ACIL Allen's computable general equilibrium model *Tasman Global* is a powerful tool for undertaking economic impact analysis at the regional, state, national and global level.

There are various types of economic models and modelling techniques. Many of these are based on partial equilibrium analysis that usually considers a single market. However, in economic analysis, linkages between markets and how these linkages develop and change over time can be critical. *Tasman Global* has been developed to meet this need.

Tasman Global is a large-scale computable general equilibrium model which is designed to account for all sectors within an economy and all economies in the world. ACIL Allen uses this modelling platform to undertake industry, project, scenario and policy analyses. The model is able to analyse issues at the industry, global, national, state and regional levels to determine the impacts of various economic changes on production, consumption and trade at the macroeconomic and industry level.

A dynamic model

Tasman Global is a model that estimates relationships between variables at different points in time. This is in contrast to comparative static models, which compare two equilibriums (one before a policy change and one following). A dynamic model such as *Tasman Global* is beneficial when analysing issues where both the timing of and the adjustment path that economies follow are relevant in the analysis.

The database

A key advantage of *Tasman Global* is the level of detail in the database underpinning the model. The database is derived from the latest Global Trade Analysis Project (GTAP) database (version 8.1). This database is a fully documented, publicly available global data base which contains complete bilateral trade information, transport and protection linkages among regions for all GTAP commodities.

The GTAP model was constructed at the Centre for Global Trade Analysis at Purdue University in the United States. It is the most up-to-date, detailed database of its type in the world.

Tasman Global builds on the GTAP model's equation structure and database by adding the following important features:

- dynamics (including detailed population and labour market dynamics)
- detailed technology representation within key industries (such as electricity generation and iron and steel production)
- disaggregation of a range of major commodities including iron ore, bauxite, alumina, primary aluminium, brown coal, black coal and LNG
- the ability to repatriate labour and capital income
- a detailed emissions accounting abatement framework

— explicit representation of the states and territories of Australia
— the capacity to explicitly represent multiple regions within states and territories of Australia

Nominally the *Tasman Global* database divides the world economy into 141 regions (133 international regions plus the 8 states and territories of Australia) although in reality the regions are frequently disaggregated further. ACIL Allen regularly models Australian projects or policies at the regional level.

TABLE A.1 SECTORS IN THE TASMAN GLOBAL DATABASE

	Sector		Sector
1	Paddy rice	36	Paper products, publishing
2	Wheat	37	Diesel (incl. nonconventional diesel)
3	Cereal grains nec	38	Other petroleum, coal products
4	Vegetables, fruit, nuts	39	Chemical, rubber, plastic products
5	Oil seeds	40	Iron ore
6	Sugar cane, sugar beef	41	Bauxite
7	Plant- based fibres	42	Mineral products nec
8	Crops nec	43	Ferrous metals
9	Bovine cattle, sheep, goats, horses	44	Alumina
10	Animal products nec	45	Primary aluminium
11	Raw milk	46	Metals nec
12	Wool, silk worm cocoons	47	Metal products
13	Forestry	48	Motor vehicle and parts
14	Fishing	49	Transport equipment nec
15	Brown coal	50	Electronic equipment
16	Black coal	51	Machinery and equipment nec
17	Oil	52	Manufactures nec
18	Liquefied natural gas (LNG)	53	Electricity generation
19	Other natural gas	54	Electricity transmission and distribution
20	Minerals nec	55	Gas manufacture, distribution
21	Bovine meat products	56	Water
22	Meat products nec	57	Construction
23	Vegetables oils and fats	58	Trade
24	Dairy products	59	Road transport
25	Processed rice	60	Rail and pipeline transport
26	Sugar	61	Water transport
27	Food products nec	62	Air transport
28	Wine	63	Transport nec
29	Beer	64	Communication
30	Spirits and RTDs	65	Financial services nec
31	Other beverages and tobacco products	66	Insurance
32	Textiles	67	Business services nec
33	Wearing apparel	68	Recreational and other services
34	Leather products	69	Public Administration, Defence, Education, Health
35	Wood products	70	Dwellings

Note: nec = not elsewhere classified.

The *Tasman Global* database also contains a wealth of sectoral detail currently identifying up to 70 industries (Table A.1). The foundation of this information is the input-output tables that underpin the database. The input-output tables account for the distribution of industry production to satisfy industry and final demands. Industry demands, so-called intermediate usage, are the demands from each industry for inputs.

For example, electricity is an input into the production of communications. In other words, the communications industry uses electricity as an intermediate input. Final demands are those made by households, governments, investors and foreigners (export demand). These final demands, as the name suggests, represent the demand for finished goods and services. To continue the example, electricity is used by households – their consumption of electricity is a final demand.

Each sector in the economy is typically assumed to produce one commodity, although in *Tasman Global*, the electricity, transport and iron and steel sectors are modelled using a 'technology bundle' approach. With this approach, different known production methods are used to generate a homogeneous output for the 'technology bundle' industry. For example, electricity can be generated using brown coal, black coal, petroleum, base load gas, peak load gas, nuclear, hydro, geothermal, biomass, wind, solar or other renewable based technologies – each of which have their own cost structure.

The other key feature of the database is that the cost structure of each industry is also represented in detail. Each industry purchases intermediate inputs (from domestic and imported sources) primary factors (labour, capital, land and natural resources) as well as paying taxes or receiving subsidies.

Factors of production

Capital, land, labour and natural resources are the four primary factors of production. The capital stock in each region (country or group of countries) accumulates through investment (less depreciation) in each period. Land is used only in agriculture industries and is fixed in each region. *Tasman Global* explicitly models natural resource inputs as a sector specific factor of production in resource based sectors (coal mining, oil and gas extraction, other mining, forestry and fishing).

Population growth and labour supply

Population growth is an important determinant of economic growth through the supply of labour and the demand for final goods and services. Population growth for the 112 international regions and for the 8 states and territories of Australia represented in the *Tasman Global* database is projected using ACIL Allen's in-house demographic model. The demographic model projects how the population in each region grows and how age and gender composition changes over time and is an important tool for determining the changes in regional labour supply and total population over the projection period.

For each of the 120 regions in *Tasman Global*, the model projects the changes in age-specific birth, mortality and net migration rates by gender for 101 age cohorts (0-99 and 100+). The demographic model also projects changes in participation rates by gender by age for each region, and, when combined with the age and gender composition of the population, endogenously projects the future supply of labour in each region. Changes in life expectancy are a function of income per person as well as assumed technical progress on lowering mortality rates for a given income (for example, reducing malaria-related mortality through better medicines, education, governance, etc.). Participation rates are a function of life expectancy as well as expected changes in higher education rates, fertility rates and changes in the workforce as a share of the total population.

Labour supply is derived from the combination of the projected regional population by age by gender and the projected regional participation rates by age by gender. Over the projection period labour supply in most developed economies is projected to grow slower than total population as a result of ageing population effects.

For the Australian states and territories, the projected aggregate labour supply from ACIL Allen's demographics module is used as the base level potential workforce for the detailed Australian labour market module, which is described in the next section.

The Australian labour market

Tasman Global has a detailed representation of the Australian labour market which has been designed to capture:

- different occupations
- changes to participation rates (or average hours worked) due to changes in real wages

- changes to unemployment rates due to changes in labour demand
- limited substitution between occupations by the firms demanding labour and by the individuals supplying labour
- limited labour mobility between states and regions within each state.

Tasman Global recognises 97 different occupations within Australia – although the exact number of occupations depends on the aggregation. The firms who hire labour are provided with some limited scope to change between these 97 labour types as the relative real wage between them changes. Similarly, the individuals supplying labour have a limited ability to change occupations in response to the changing relative real wage between occupations. Finally, as the real wage for a given occupation rises in one state relative to other states, workers are given some ability to respond by shifting their location. The model produces results at the 97 3-digit ANZSCO (Australian New Zealand Standard Classification of Occupations) level which are presented in Table A.2.

The labour market structure of *Tasman Global* is thus designed to capture the reality of labour markets in Australia, where supply and demand at the occupational level do adjust, but within limits.

Labour supply in *Tasman Global* is presented as a three stage process:

1. labour makes itself available to the workforce based on movements in the real wage and the unemployment rate;
2. labour chooses between occupations in a state based on relative real wages within the state; and
3. labour of a given occupation chooses in which state to locate based on movements in the relative real wage for that occupation between states.

By default, *Tasman Global*, like all CGE models, assumes that markets clear. Therefore, overall, supply and demand for different occupations will equate (as is the case in other markets in the model).

Greenhouse gas emissions

The model has a detailed greenhouse gas emissions accounting, trading and abatement framework that tracks the status of six anthropogenic greenhouse gases (namely, carbon dioxide, methane, nitrous oxide, HFCs, PFCs and SF6). Almost all sources and sectors are represented; emissions from agricultural residues and land-use change and forestry activities are not explicitly modelled.

The greenhouse modelling framework not only allows accounting of changes in greenhouse gas emissions, but also allows various policy responses such as carbon taxes or emissions trading to be employed and assessed within a consistent framework. For example, the model can be used to measure the economic and emission impacts of a fixed emissions penalty in single or multiple regions whether trading is allowed or not. Or, it can be used to model the emissions penalty required to achieve a desired cut in emissions based on various trading and taxation criteria.

Detailed energy sector and linkage to *PowerMark* and *GasMark*

Tasman Global contains a detailed representation of the energy sector, particularly in relation to the interstate (trade in electricity and gas) and international linkages across the regions represented. To allow for more detailed electricity sector analysis, and to aid in linkages to bottom-up models such as ACIL Allen's *GasMark* and *PowerMark* models, electricity generation is separated from transmission and distribution in the model. In addition, the electricity sector in the model employs a 'technology bundle' approach that separately identifies up to twelve different electricity generation technologies:

1. brown coal (with and without carbon capture and storage)
2. black coal (with and without carbon capture and storage)
3. petroleum
4. base load gas (with and without carbon capture and storage)
5. peak load gas
6. hydro
7. geothermal
8. nuclear

9. biomass
10. wind
11. solar
12. other renewables.

To enable more accurate linking to *PowerMark,* the generation cost of each technology is assumed to be equal to their long run marginal cost while the sales price in each region is matched to the average annual dispatch weighted prices projected by *PowerMark* – with any difference being returned as an economic rent to electricity generators. This representation enables the highly detailed market based projections from *PowerMark* to be incorporated as accurately as possible into *Tasman Global*.

TABLE A.2 OCCUPATIONS IN THE TASMAN GLOBAL DATABASE, ANZSCO 3-DIGIT LEVEL (MINOR GROUPS)

ANZSCO code, Description	ANZSCO code, Description	ANZSCO code, Description
1. MANAGERS	**3. TECHNICIANS & TRADES WORKERS**	**5. CLERICAL & ADMINISTRATIVE**
111 Chief Executives, General Managers and Legislators	311 Agricultural, Medical and Science Technicians	511 Contract, Program and Project Administrators
121 Farmers and Farm Managers	312 Building and Engineering Technicians	512 Office and Practice Managers
131 Advertising and Sales Managers	313 ICT and Telecommunications Technicians	521 Personal Assistants and Secretaries
132 Business Administration Managers	321 Automotive Electricians and Mechanics	531 General Clerks
133 Construction, Distribution and Production Managers	322 Fabrication Engineering Trades Workers	532 Keyboard Operators
134 Education, Health and Welfare Services Managers	323 Mechanical Engineering Trades Workers	541 Call or Contact Centre Information Clerks
135 ICT Managers	324 Panel beaters, and Vehicle Body Builders, Trimmers and Painters	542 Receptionists
139 Miscellaneous Specialist Managers	331 Bricklayers, and Carpenters and Joiners	551 Accounting Clerks and Bookkeepers
141 Accommodation and Hospitality Managers	332 Floor Finishers and Painting Trades Workers	552 Financial and Insurance Clerks
142 Retail Managers	333 Glaziers, Plasterers and Tilers	561 Clerical and Office Support Workers
149 Miscellaneous Hospitality, Retail and Service Managers	334 Plumbers	591 Logistics Clerks
	341 Electricians	599 Miscellaneous Clerical and Administrative Workers
2. PROFESSIONALS	342 Electronics and Telecommunications Trades Workers	
211 Arts Professionals	351 Food Trades Workers	**6. SALES WORKERS**
212 Media Professionals	361 Animal Attendants and Trainers, and Shearers	611 Insurance Agents and Sales Representatives
221 Accountants, Auditors and Company Secretaries	362 Horticultural Trades Workers	612 Real Estate Sales Agents
222 Financial Brokers and Dealers, and Investment Advisers	391 Hairdressers	621 Sales Assistants and Salespersons
223 Human Resource and Training Professionals	392 Printing Trades Workers	631 Checkout Operators and Office Cashiers
224 Information and Organisation Professionals	393 Textile, Clothing and Footwear Trades Workers	639 Miscellaneous Sales Support Workers
225 Sales, Marketing and Public Relations Professionals	394 Wood Trades Workers	
231 Air and Marine Transport Professionals	399 Miscellaneous Technicians and Trades Workers	**7. MACHINERY OPERATORS & DRIVERS**
232 Architects, Designers, Planners and Surveyors		711 Machine Operators
233 Engineering Professionals	**4. COMMUNITY & PERSONAL SERVICE**	712 Stationary Plant Operators
234 Natural and Physical Science Professionals	411 Health and Welfare Support Workers	721 Mobile Plant Operators
241 School Teachers	421 Child Carers	731 Automobile, Bus and Rail Drivers
242 Tertiary Education Teachers	422 Education Aides	732 Delivery Drivers
249 Miscellaneous Education Professionals	423 Personal Carers and Assistants	733 Truck Drivers
251 Health Diagnostic and Promotion Professionals	431 Hospitality Workers	741 Storepersons
252 Health Therapy Professionals	441 Defence Force Members, Fire Fighters and Police	
253 Medical Practitioners	442 Prison and Security Officers	**8. LABOURERS**
254 Midwifery and Nursing Professionals	451 Personal Service and Travel Workers	811 Cleaners and Laundry Workers
261 Business and Systems Analysts, and Programmers	452 Sports and Fitness Workers	821 Construction and Mining Labourers
262 Database and Systems Administrators, and ICT Security Specialists		831 Food Process Workers
263 ICT Network and Support Professionals		832 Packers and Product Assemblers
271 Legal Professionals		839 Miscellaneous Factory Process Workers
272 Social and Welfare Professionals		841 Farm, Forestry and Garden Workers
		851 Food Preparation Assistants
		891 Freight Handlers and Shelf Fillers
		899 Miscellaneous Labourers

SOURCE: ABS (2009), ANZSCO – AUSTRALIAN AND NEW ZEALAND STANDARD CLASSIFICATIONS OF OCCUPATIONS, FIRST EDITION, REVISION 1, ABS CATALOGUE NO. 1220.0.

ACIL ALLEN CONSULTING PTY LTD
ABN 68 102 652 148

ACILALLEN.COM.AU

ABOUT ACIL ALLEN CONSULTING

ACIL ALLEN CONSULTING IS ONE OF THE LARGEST INDEPENDENT, ECONOMIC, PUBLIC POLICY, AND PUBLIC AFFAIRS MANAGEMENT CONSULTING FIRMS IN AUSTRALIA.

WE ADVISE COMPANIES, INSTITUTIONS AND GOVERNMENTS ON ECONOMICS, POLICY AND CORPORATE PUBLIC AFFAIRS MANAGEMENT.

WE PROVIDE SENIOR ADVISORY SERVICES THAT BRING UNPARALLELED STRATEGIC THINKING AND REAL WORLD EXPERIENCE TO BEAR ON PROBLEM SOLVING AND STRATEGY FORMULATION.