

# 01

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# Introduction



# 1. Introduction

## 1.1 Overview

Arafura Resources Limited (Arafura) is proposing to develop Nolans Project (the project) located approximately 135 kilometres (km) north west of Alice Springs, Northern Territory (NT) (Figure 1-1). The project is construction, mining, processing, rehabilitation and decommissioning of a rare earth (RE) mine and associated infrastructure.

The project is targeting a fluorapatite mineral deposit containing REs at Nolans Bore. The Nolans site comprises the mine site, a processing site, a borefield area and accommodation village site, and interconnecting access roads and utility service corridors (Figure 1-2).

Mining operations will be undertaken using conventional open pit methods (drill, blast, load and haul) at a maximum overall mining rate of ten million tonnes per annum (tpa), to produce an average one million tonnes of concentrator feed each year.

Excavated ore will be fed to beneficiation circuits at the mine site. The circuits will include staged crushing, grinding, wet magnetic separation and flotation. A concentrator will produce phosphate-bearing and RE-bearing concentrate in a slurry form. The slurry will be pumped via a high density polyethylene (HDPE) pipeline to the processing site approximately eight kilometres to the south of the mine site.

The processing site contains RE extraction processing units, a sulfuric acid plant, process residue storage facilities (RSFs), evaporation ponds, a power station and other infrastructure to support the operation. From the processing site, RE concentrate will be transported to Port of Darwin, NT and subsequently, to an offshore RE separation plant. The RE separation plant will be in an established chemical precinct capable of meeting the reagent demands of the refining process; and subject to a separate approvals process. The offshore component is excluded from the scope of this Draft Environmental Impact Statement (EIS).

The project triggers assessment under the Commonwealth *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act), controlling provisions 18 and 18 A (listed threatened species and communities) and 21 and 22A (nuclear actions) and NT *Environmental Assessment Act 1982* (EA Act), at the level of an EIS (refer to Appendix A and Appendix B).

This EIS is submitted to the NT EPA and DoE for assessment in accordance with relevant legislation.

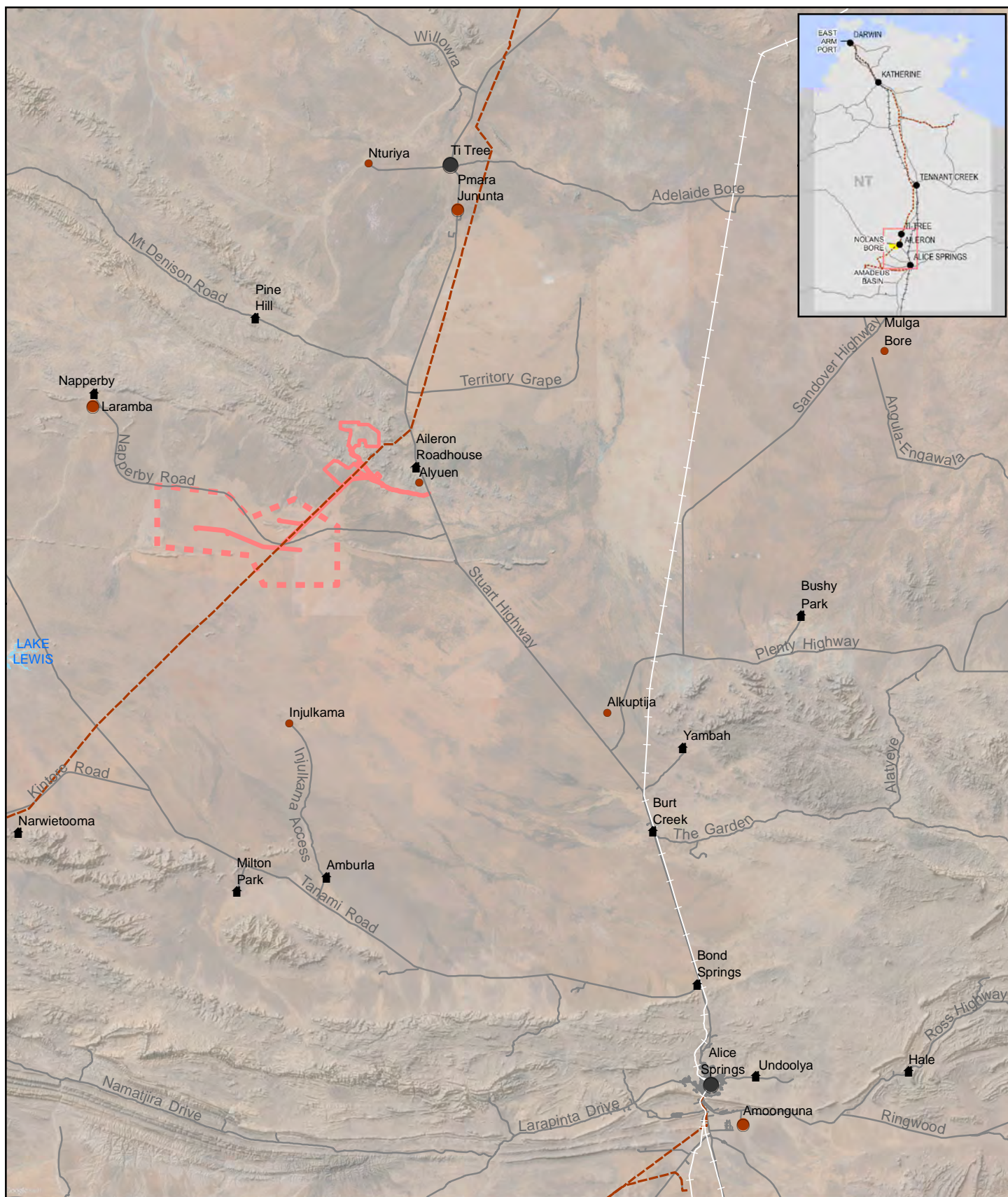
## 1.2 Proponent details

The project proponent is Arafura Resources Limited (Arafura or the Company or the Proponent). Arafura has a registered office in Perth, Western Australia, and an office in Darwin, NT.

The Proponent's contact for the project is:

Mr Brian Fowler  
Arafura Resources Limited  
General Manager Northern Territory and Sustainability  
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Phone: +61 8 8947 5588  
Email: [eis@arultd.com](mailto:eis@arultd.com)

Arafura has engaged independent consultants to prepare specialist technical studies as well as the main EIS report. The names of, work done by and the qualifications and experience of key persons involved in preparing the EIS are provided in Appendix C.

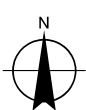


#### LEGEND

- Town
- Community
- Station
- Outstation
- Gas Pipeline
- Roads
- Project Areas
- Borefield Area
- Waterbodies

0 10 20 30 40  
Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 53



Arafura Resources Limited  
Nolans Project  
Environmental Impact Statement

Job Number 43-22301  
Revision 0  
Date 13 Apr 2016

Project location

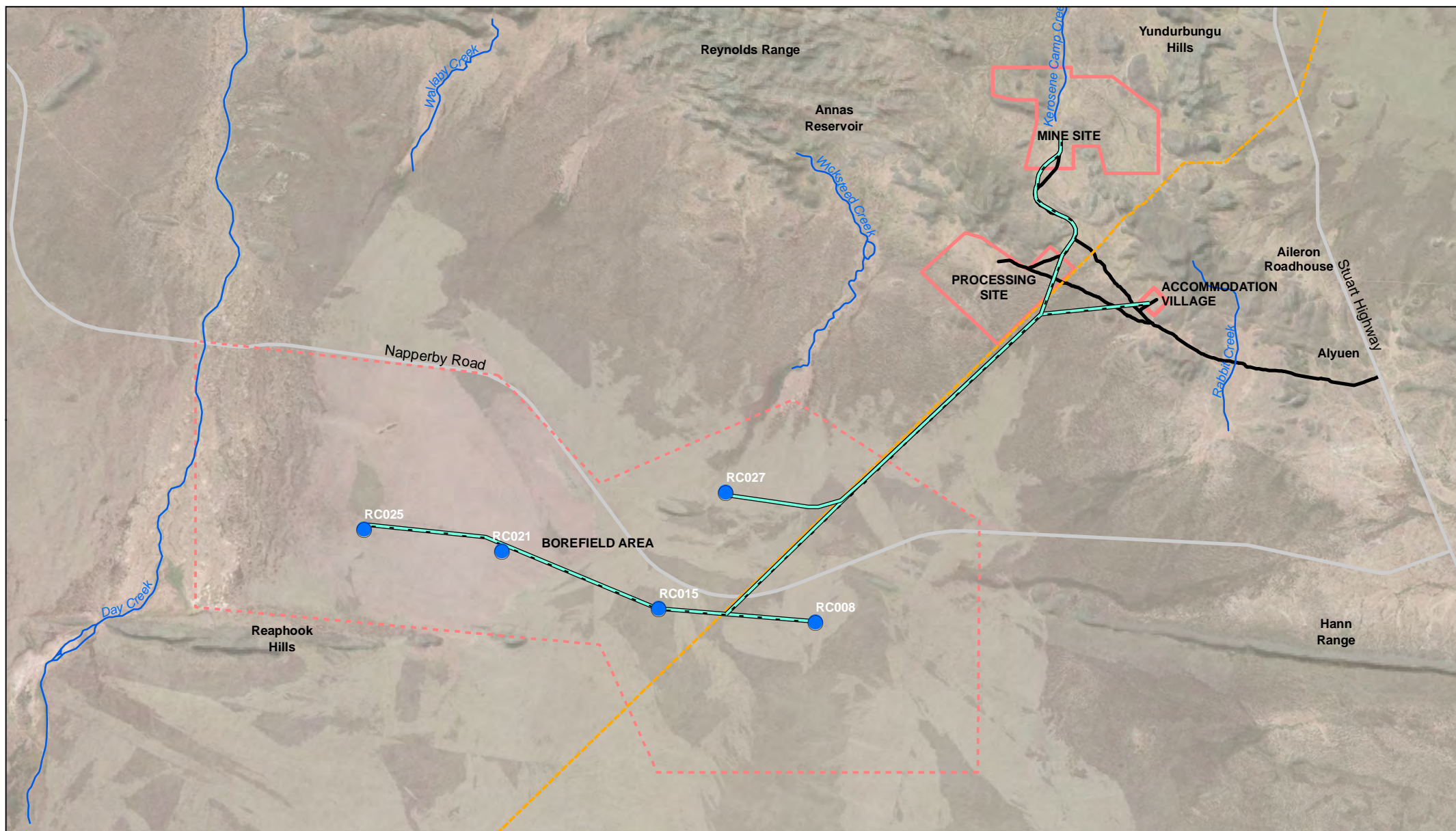
Figure 1-1

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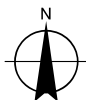




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Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 53



#### LEGEND

- Water Bores
- - - Proposed Powerline
- Proposed Pipelines and Easement
- - - Gas Pipeline
- Waterways
- Existing Roads
- Existing Access Track
- - - Borefield Area
- Project Area



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Nolans site

Figure 1-2

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Data source: GA - Imagery (2008), Roads, Waterways, Placenames (2015). ESRI - Shaded Relief (2009). ARL - Water Bores, Proposed Pipelines, Borefield Area, Proposed Mine Site, Treatment Plant and Accommodation Village (2015). Created by: CW, CM

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### 1.2.1 Ownership and commodity information

Arafura is an emerging RE producer. The project will be the company's first mining and chemical processing operation. The Nolans Project is 100% owned by Arafura, an Australian stock exchange listed company.

Arafura is positioning itself to produce high quality RE products, and to target customers in key growth areas such as the automotive, clean energy technology and electronics sectors. In 2014 the global demand for RE products reached 126,000 tonnes, and this demand is forecast to grow at 5% per annum over next ten years; driven by technology innovation, particularly in industrial and clean energy sectors.

The project has the potential to supply 10% of the world's magnet feed demand through its production of NdPr (neodymium-praseodymium, or didymium) oxide. The use of REs in the permanent magnet sector is expected to grow by approximately 10% per annum.

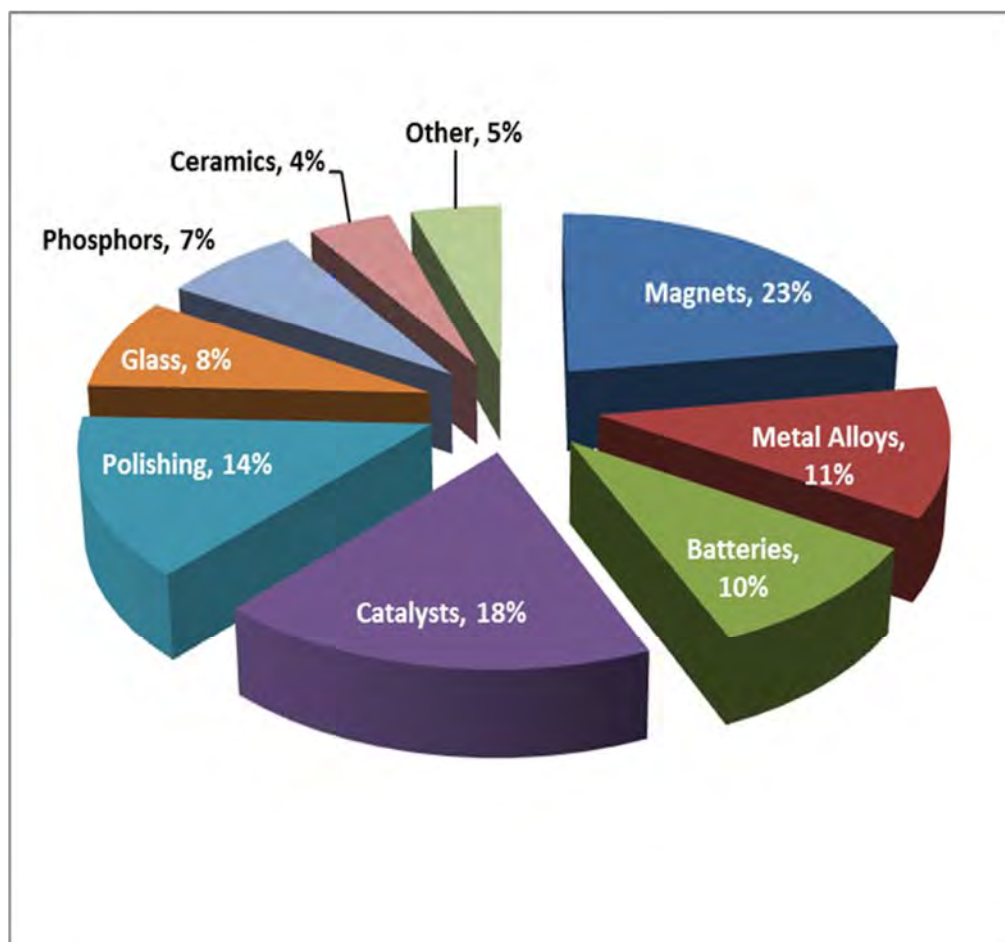


Figure 1-3 End uses of rare earth products (Arafura 2014)

### 1.2.2 Market position

Arafura's sales plan targets customers across the entire RE supply chain where visibility, security and stability of supply are becoming increasingly important. To position Arafura strongly in the regional markets of Europe, Japan, South Korea and North America, a combination of direct sales to end users and partnering with strategic distributors is important. Arafura has forged long-term relationships with key end users and strategic trading partners involved in key markets.

### 1.2.3 Key business dealings

Expertise in processing and marketing of REs resides in China. Arafura has recognised the need for strategic Chinese partnerships to enhance their access to RE expertise.

The East China Mineral Exploration and Development Bureau is a major state-owned enterprise and an important long-term strategic partner for, and shareholder in, Arafura. East China Mineral Exploration and Development Bureau has been the conduit through which Arafura has developed relationships with a number of Chinese RE producers, research institutes and investment groups, to help accelerate the development of the project.

Planning and project feasibility has progressed over a number of years as new information about the mineral deposit, processing technologies, project economics, RE markets and site conditions has developed.

## 1.3 Development context including project background

### 1.3.1 Project title

The recent and current name is the Nolans Project which is herein referred to as “the project”. The project has previously been referred to as the Nolans Bore Project, Nolans Rare Earth Project, and Nolans Bore Rare Earth Mine.

### 1.3.2 Status of the project

The project is in the Definitive Feasibility Study (DFS) phase and Arafura is seeking environmental approval for the project.

In September 2014, Arafura released the Nolans Development Report (Arafura 2014). In December 2014 Arafura lodged a variation notification to the NT Environment Protection Authority (NT EPA) in accordance with the Section 14A “Procedure where proposed action altered” under the NT Environmental Assessment and Administrative Procedures under the EA Act. Pursuant to Section 14A of the Environmental Assessment Administrative Procedures, the NT EPA considered the alteration and determined that an EIS is necessary with respect to the project. Final Terms of Reference (TOR) for the preparation of an EIS (Appendix B) were issued in May 2015.

In February 2015, the Proponent also submitted a revised referral (EPBC 2015/7436) describing the changes to the proposed action to the Federal Minister for the Environment. In March 2015, the delegate of the Minister determined the project to be a controlled action (Appendix A) and that assessment and approval is required at a federal level. Triggers for assessment under Commonwealth legislation include the potential to have a significant impact on the following matters of national environmental significance that are protected under Part 3 of the EPBC Act:

- Listed threatened species and communities (sections 18 & 18A) and
- Protection of the environment from nuclear actions (sections 21 and 22A).

The project is being assessed under a bilateral agreement between the Australian and NT Governments made under section 45 of the EPBC Act. Arafura is seeking approval under the EPBC Act and EA Act.

### 1.3.3 Project schedule

Arafura developed a detailed project execution plan for the Nolans Project in 2014, including planned commencement of construction in the second half of 2016 through to planned commencement of project operations in the first half of 2019 (Arafura 2014).



Construction of the mine, processing plant and associated infrastructure may take up to 30 months to complete. Pre-stripping will commence in Year 1 and provide construction materials for all proposed infrastructure.

#### 1.3.4 Background

The Nolans Bore RE-phosphorus-uranium deposit was discovered in 1995 by PNC Exploration. The first exploration drilling was carried out at Nolans Bore in 2001 on Exploration Licence (EL) 9672, a predecessor tenement to Arafura's current EL 28473.

Systematic drilling of the site has been undertaken by Arafura since 2000. Nearly all of the exploration and resource definition activity has been confined to an area measuring 1.5 x 1.2 km, centred approximately on the now decommissioned Nolan stock bore. This work indicates the widespread presence of RE-rich fluorapatite mineralisation at or near surface, within steeply dipping veins up to tens of metres in thickness and hundreds of metres in length extending below 250 metres drilled depth across large parts of the deposit. The full extent of the deposit is yet to be outlined, but deeper drilling in one part of the deposit has encountered mineralisation and alteration down to at least 430 metres (m) below surface (Arafura 2014).

In February 2008 Arafura applied for a Mineral Lease (ML) over the deposit and immediate surrounds (ML 26659; 1,404 hectares). In March 2008 a Notice of Intent (Arafura and GHD 2008) was submitted to the former NT Department of Natural Resources, Environment and the Arts (NRETA) for consideration under the EA Act. NRETA referred the project for assessment under the EA Act at the level of an EIS, and issued EIS guidelines for the project.

In August 2008, a referral (EPBC 2008/4371) under the Commonwealth EPBC Act was submitted to the former Department of Environment, Water Heritage and Arts. The Minister declared the project a "controlled action" under controlling provisions section 21 and 22A of the EPBC Act relating to a "nuclear action".

Planning of the project continued throughout 2010 and 2012, and extensions to the timeframe of the EIS guidelines were sought and granted by the NT environmental regulator.

Since 2008, the Nolans Bore mineral resource has approximately doubled and project requirements have altered, resulting in an expanded footprint that now includes a borefield, a downstream chemical processing operation at the processing site, and an accommodation village. As a result, additional ML applications were lodged with the NT Department of Mines and Energy (DME) to accommodate the expanded footprint of the project on ELs 28473, 28498 and 29509.

The project's 2008 post-beneficiation flow sheet has changed from a single complex, intended to be located at Whyalla in South Australia, to a split configuration comprising a processing plant at the Nolans site and an offshore RE separation plant in an established chemical precinct capable of meeting the reagent demands of the refining process.

A summary of the project's development in a global context is provided in Table 1-1.

Table 1-1 Summary of Nolans Project development context

Year	Project development context
1995	Discovery of Nolans Bore rare earths-phosphorus-uranium prospect by PNC Exploration
2001	Arafura acquires Nolans Bore exploration licence. First drill hole into Nolans Bore and maiden Joint Ore Reserves Committee (JORC) mineral resource (4 million tonnes).
2003	Arafura lists on the Australian Stock Exchange
2005	First metallurgical test program
2006	Australian Government grant (\$3.3 million) for process development
2007	Pre-feasibility study: REs, phosphoric acid, uranium processing in the NT. China imposes RE export and production quotas.
2008	First environmental studies at Nolans site. Mine site mineral lease lodged. Global financial crisis.
2009	Chinese investment (24.86%) into Arafura. Process and configuration changes: REs, phosphate, uranium, gypsum processing in South Australia.
2011	Rare earth price bubble
2012	Major process breakthrough: first separated RE products. Major JORC mineral resource upgrade (47 million tonnes). Maiden JORC ore reserve (24 million tonnes).
2013	Rare earth prices collapse. Process and configuration changes: RE processing in the NT and offshore.
2014	Increased Chinese technical involvement in process development. Life-of-operation water supply secured. Processing site mineral leases lodged.
2015	EIS recommences on expanded project footprint. China removes RE export duties and quotas. Increase in JORC mineral resource (56 million tonnes).

### 1.3.5 Hydrogeological investigations

A hydrogeological investigation at the proposed Nolans mine site was completed in 2011 to estimate dewatering requirements during mining operations (Environmental Earth Sciences 2011).

In 2010-11 hydrological investigations to identify a sustainable water supply for the life of project initially focussed on potential groundwater supplies in the Cainozoic basins within about 40 km of Nolans Bore, and in particular, in the Ti Tree Basin aquifer to the northeast of the Nolans mine site.

In 2012 Arafura shifted its attention towards exploring the groundwater potential in the concealed and poorly constrained northern Burt and eastern Whitcherry basins (herein referred to as the "Southern Basins") to the southwest of the mine site.



Arafura completed an exploratory water drilling program in the Southern Basins in late 2012 that successfully encountered groundwater in all exploration bores, including two bores in a high yielding thick sandstone aquifer.

A follow-up drilling campaign during mid-2014 included drilling through the entire Cainozoic sequence into the underlying basement units, and undertaking controlled pump testing of production bores sited in the best aquifers and dispersed across the entire area.

The Southern Basins area provides a sizeable, high-yielding, slightly brackish groundwater system that has the capacity to service the life of the operation, and therefore a viable sustainable alternative and preferred supply to the Ti Tree Water Control District.

## 1.4 Project location and regional context

### 1.4.1 Location and land tenure

The Nolans mine site is located 10 km west of the Stuart Highway, 65 km west of the Darwin-Adelaide railway, and 150 km by road from the major Central Australian town of Alice Springs (Figure 1-1). The Stuart Highway is the main highway from Adelaide to Darwin. The access road to the Nolans site is a proposed new sealed road.

The Nolans site is located at latitude 22.565° south and longitude 133.239° east, within three granted ELs 28473, 28498 and 29509 (Figure 1-4).

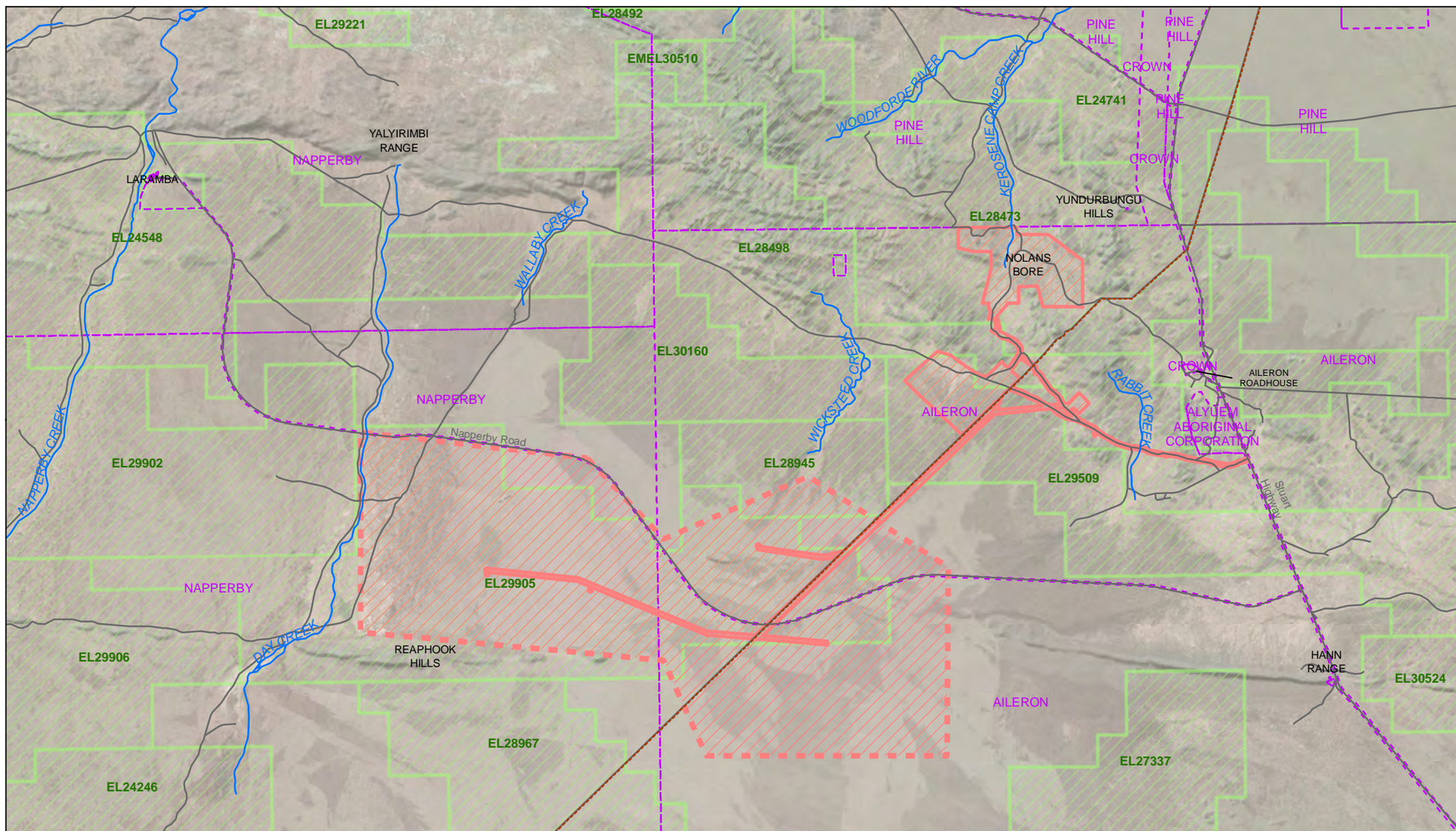
Arafura has lodged applications for the following mining and ancillary tenements with the DME:

- ML 26659 over the mine site and
- MLs 30702, 30703 and 30704 over the processing site and accommodation village.

Aileron Pastoral Holdings Pty Ltd also hold background land tenure to the mine site and processing site under Aileron Perpetual Pastoral Lease (PPL 1097). The predominant land use on the pastoral lease is cattle grazing.

There may be a requirement for a separate Indigenous Land Use Agreement (ILUA) covering access to the borefield, which is situated some 35 km southwest of the mine site.



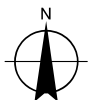


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Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 53



#### LEGEND

--- Gas Pipeline  
— Waterways  
— Roads

Project Areas  
 Borefield Area  
 Pastoral Leases

Exploration Licence



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Revision | 0  
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Land tenure

Figure 1-4

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Data source: GA - Roads, Waterways, Gas Pipelines, Imagery (2015). DME - Mineral Titles (2015), DPLE - Tenure, Cadastre (2015). ESRI - SRTM (2006). GHD - Project Areas (2015). Created by: CM



The Adelaide to Darwin railway runs through Alice Springs. The rail corridor is located approximately 40 km east of Nolans site and the closest point. Arafura proposes to utilise the railway, accessing it at Alice Springs.

Daily flights between Alice Springs and most Australian capital cities eliminate the requirement for a dedicated airstrip at Nolans. The nearest paved and gravel airstrip to the Nolans site is at Ti Tree and Aileron Station respectively. The latter may be suitable for use by emergency aircraft following some upgrade.

The Amadeus Basin to Darwin natural gas pipeline passes directly adjacent to the Nolans processing site and within five kilometres of the mine site (Figure 1-1). The project will utilise gas during operation. A gas take-off line will be required to tap into the gas pipeline to service the site.

#### 1.4.2 Major communications and community centres

The town of Alice Springs (population of about 26,000), south-southeast of the Nolans site along the Stuart Highway, is served by modern road, rail and telecommunications infrastructure. Traditional owners of the land on which Arafura will operate are Anmatjere people, with senior traditional owners living in the Alyuen, Ti Tree, Pmara Jutunta and Laramba communities and further afield in places such as Alice Springs (Figure 1-5). (Note that Anmatjere is also written Anmatyerr. Both spelling variations are utilised throughout this EIS).

Small communities and family outstations in the surrounding area include:

- Aileron Roadhouse - an important stop-over for travellers on the Stuart Highway, 12 km east of the Nolans site.
- Aileron Station – a 4,078 km<sup>2</sup> cattle station within which nearly the entire footprint of the Nolans Project is contained (with the exception of the western extent of the borefield and the Woodforde carbonate quarry). The property was acquired in July 2015 by Melbourne-based Aileron Pastoral Holdings Pty Ltd.
- Alyuen (Aileron) – a family outstation 130 km north of Alice Springs and two km west of the Stuart Highway (population about 20). It is located about 15 km south east of the Nolans site.
- Alkuptija (Gillians Bore) - a family outstation three kilometres west of Stuart Highway and 70 km south east of Nolans mine site (population about 20).
- Burt Creek (Rice's Camp) – a family outstation close to Stuart Highway and 93 km south east of Nolans mine site (population about 15).
- Injulkama (Amburla) – a family outstation 56 km south of Nolans mine site and 100 km to the north west of Alice Springs (population about 10).
- Laramba - a key community due to its relative proximity to the Nolans site and borefield. Access to the community is by the Napperby station road, which runs west from the Stuart Highway. The community is located approximately 50 km west of the Nolans site. Laramba is a large community of mostly Aboriginal people (population approximately 300) including some of the traditional owners of the Nolans site. It has a school, community health centre and other facilities.
- Napperby Station – a 5,356 km<sup>2</sup> cattle station, 50 km to the west which has been owned and operated by the Chisholm family since 1948. This includes a shared borefield area and Laramba community living area.

- Pine Hill Station – 2,686 km<sup>2</sup> cattle station bordering Aileron Station to the north. It hosts the proposed Woodforde carbonate quarry (not the subject of this EIS) and until recently was owned and operated by the Braitling family.
- Pine Hill (Anyumgyumba) – a small family outstation located near the Pine Hill Station homestead, 35 km west of the Stuart Highway and approximately 29 km north of the Nolans mine site. It has a small transient population.
- Pmara Jutunta (Six Mile) – a major community of about 190 people 46 km to the north east of Nolans mine site and close to the Stuart Highway and Ti Tree community.
- Ti Tree – a community located 170 km north of Alice Springs and 53 km north of the mine site, along the Stuart Highway. It is a large community with facilities including a school, health centre, library, police station and airstrip. Population is approximately 280 persons. Ti Tree serves as the operational centre for the Anmatjere Community Government Council.
- Nturiya (Ti Tree Station) is 17 km to the west of Ti Tree and has a population of about 100.

#### 1.4.3 Landmarks

The Nolans mine site is at the head of the Kerosene Camp Creek valley on the north facing slopes of a northeast – southwest trending ridge of the Reynolds Range, whilst the processing site is situated on the southern slopes of the same ridge. Topographic elevation is 886 m above sea level (m ASL) at Mt Boothby to the east of the mine site, and 1,006 m ASL at Mt Freeling to the west. Most of the Kerosene Camp Creek valley floor at the mine site is typically between 650 and 700 m ASL whilst the processing site is at an elevation of about 670 m ASL (Figure 1-5).

#### 1.4.4 Water features

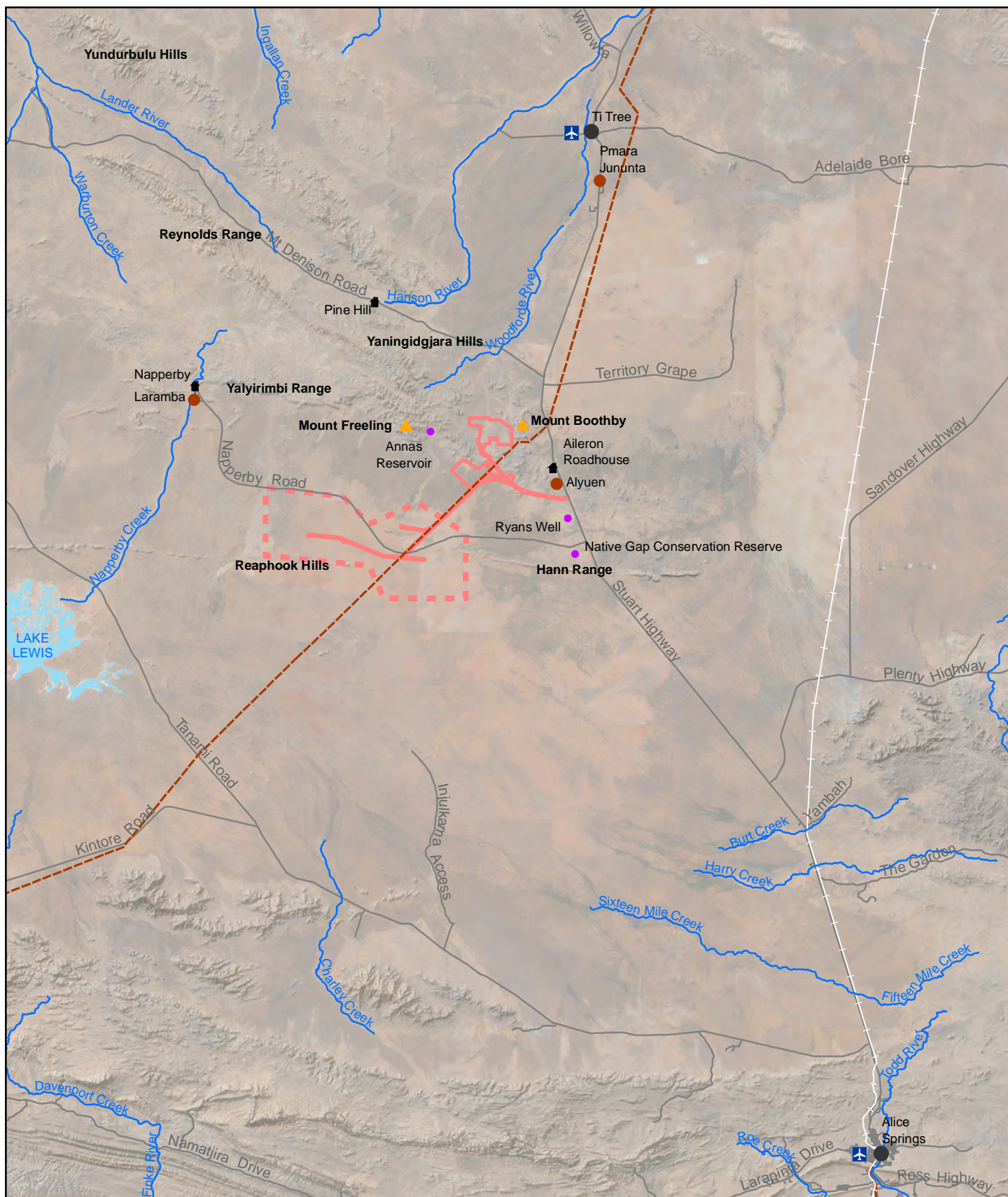
The important surface water drainage features within the Nolans site flow only immediately following rainfall events. Surface water flows originate in the catchments of the Reynolds Range and Yalyirimbi Range. These flows typically result in terminal creeks (i.e. their flow does not make it to a secondary water feature), including Gidyea Creek, Day Creek, Wallaby Creek, Wicksteed Creek, Kerosene Camp Creek, Rabbit Creek and Allungra Creek. Napperby Creek is the exception in that it discharges to the ephemeral Lake Lewis, following periodic high rainfall events. Likewise, the Woodforde River also discharges to the Hanson River downstream (north) of the study area. No significant surface water drainage features originate from the Hann Range, Reaphook Hills or in the low-lying dune country of the relatively flat plains of the Ti Tree Basin and Southern Basins.

The Nolans mine site is in the headwaters of the Woodforde River drainage system that flows across the south western fringe of the Ti Tree Basin. Kerosene Camp Creek is an ephemeral creek that flows through the centre of the mine site before joining the Woodforde River 10 km to the north. Nolans Creek is a major tributary of Kerosene Camp Creek that drains an area of 26 km<sup>2</sup> and flows adjacent to the eastern boundary of the proposed flotation tailings storage facility (TSF) and between two waste rock dumps (refer Chapter 3).

The processing site occupies a small part of the headwaters of several poorly defined creeks draining southwards into the Lake Lewis catchment. Distinct channels have not formed within these headwaters and runoff from the processing site is dispersed in minor rills.

The access road from the Stuart Highway to the Nolans site will cross the headwaters of numerous creeks draining southwards into the Lake Lewis catchment.



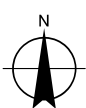


#### LEGEND

- |             |                    |                    |                  |
|-------------|--------------------|--------------------|------------------|
| ● Town      | ⚡ Station          | — Roads            | ▭ Project Areas  |
| ● Community | ● Site of Interest | - - - Gas Pipeline | ▭ Borefield Area |
| ▲ Mountain  | ✈ Airport          | — Waterways        | ■ Waterbodies    |

0 10 20 30  
Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 53



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Land marks and water features

Figure 1-5

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Data source: GA - Roads, Waterways, Placenames, Placenames, Lakes (2015). ESRI - Shaded Relief (2009). Google Earth Pro - Imagery (Date extracted: 15/12/2015). ARL - Project Areas (2015). Created by: CM

Water sampling in the Woodforde River indicates fresh but very turbid water, neutral in pH and with sufficient dissolved oxygen to support aquatic life. Conditions at the mine site may exhibit higher salinity and turbidity due to the lower volume of flow and dilution capacity. Baseline groundwater data indicates that aquifer discharge is not suitable for human consumption but is considered suitable as stock water.

Further details on surface water are contained in Chapter 7 and Appendix I. Further details on hydrogeology are contained in Chapter 8 and Appendix K.

#### 1.4.5 Sites of cultural and/or social significance

A number of sites in the vicinity of the Nolans site have historical and/or cultural interest. Sites on the National Reserve System closest to the project site (and the approximate distance at the closest point to the project site) include Annas Reservoir (7.5 km), Ryan Well (18.5 km) and Native Gap (28.5 km).

Annas Reservoir Conservation Reserve (Figure 1-5) played an important part in the overland journeys of nineteenth century explorers and settlers including John McDouall Stuart in 1860 and Alfred Giles in 1879. It was also a strategic water supply to the Overland Telegraph Construction team. In 1884 Annas Reservoir became the station homestead for the Barrow Creek Pastoral Company station (51,800 km<sup>2</sup>) which was later abandoned.

Aileron Roadhouse is situated along the Stuart Highway about an hour and a half's drive north of Alice Springs and three and a half hours' drive south of Tennant Creek (Figure 1-5). The roadhouse hotel was established in 1936 to provide a stopover for travellers heading up and down the 'track'. Today the roadhouse continues to be an important stop-over providing various amenities for travellers along the Stuart Highway.

Ryan Well Historical Reserve is close by (Figure 1-5) and contains a hand dug well from 1889 that was part of a pastoral settlement in the early twentieth century. Later in the 1930's, it became an important supply point for miners heading north-west to the 'Granites' gold rush.

Native Gap Conservation Reserve is a small roadside reserve located alongside the Stuart Highway between Alice Springs and Tennant Creek. The Reserve is of great importance to Arrernte and Anmatjere Aboriginal people (Figure 1-5), is a registered sacred site, is at the intersection of several creation-time stories and its name probably derives from the profile of a 30 m high sandstone ridge which dominates the site. It is also associated with the Overland Telegraph Line which was constructed through the area in the late nineteenth century.

Archaeological surveys carried out in 2006, 2010, 2012 and 2015 are described in detail in Chapter 16. Survey and assessment has identified a number of historic and cultural heritage items within, and in the vicinity of, the project area (within 100 m of proposed infrastructure), including 63 Aboriginal archaeological sites, 76 isolated artefacts and one potential historic site. Aboriginal site features include artefacts, quarries, scarred trees, grinding surfaces, reduction areas, a rockshelter, potential habitation structure, and engraving.

The potential historic site, Old Albs Bore and Yard, is associated with the pastoral history of Aileron Station, and consists of a water tank, stock yards, and a windmill.

#### 1.4.6 Features of ecological significance

The Nolans site and part of the access road are within the Burt Plain bioregion (sub-region BRT1) (refer Chapter 9). The Burt Plain bioregion is a national priority bioregion for conservation planning and covers an area of about 73,800 km<sup>2</sup>. The bioregion is very poorly reserved, and most ecosystems are not well represented, particularly mulga woodlands. The region contains five small conservation or historical reserves and one national park (Dulcie Ranges National Park) totalling 0.26% of the area of the bioregion.



The Department of Land Resource Management (DLRM) mapping shows no significant flora but indicates the presence of significant fauna in the immediate vicinity of the Nolans site and its access road including Rainbow Bee-eater (*Merops ornatus*), Glossy Ibis (*Plegadis falcinellus*), Bush Stone-curlew (*Burhinus grallarius*) and Redthroat (*Pyrholaemus brunneus*).

Further details of the flora and fauna at the Nolans site are in Chapters 9 and 10 and Appendices M and N.

#### 1.4.7 Other proposals or actions associated with this project

Carbonate material is required for acid neutralisation and pH control on the project. Arafura has secured exploration title (EMEL 30510) over a sizeable carbonate deposit located on Pine Hill Station north of the Woodforde River (Figure 1-4).

The deposit comprises fine to medium-grained marble and marly limestone. The carbonate unit dips moderately to the north and northeast and is assumed to continue with depth. Sampling has indicated that this material has suitable acid neutralisation capacity for use at the processing site.

The annual requirement of carbonate material will be nominally 125,000 tpa delivered to the processing plant, some 35 km to the south west.

It is anticipated that the carbonate will be mined by conventional quarrying methods using suitable bench heights to a maximum depth of around 50 m (although this can be extended if necessary). The quarry width at the natural surface will be around 100 m.

Arafura will seek a contractor to undertake the following scope of work:

- Drill and blast 125,000 tonnes of carbonate material at the Woodforde quarry each year.
- Crush and screen the blasted material.
- Load and haul the crushed carbonate product to the processing site, a distance of approximately 35 km.
- Construct a haul road of a standard suitable for the size and type of haulage units proposed by the contractor.
- Maintain two stockpiles of 20,000 tonnes of carbonate at the processing site and a similar stockpile at the Woodforde quarry.
- Provide site power, all water, fuel, lubricants, ground engaging tools and spares for the nominated equipment.
- Provide all necessary personal protection equipment, safety equipment, safe working procedures and licensing for the proposed operation.
- Provide adequate meals and accommodation for the contractor's nominated workforce.

The proposed Woodforde quarry and haul road from the quarry to the Nolans processing site are not included in the scope of this EIS, but are described with reference to other exploration activities and/or areas that may be mined in the future, or other potential future actions planned. A separate regulatory approval will be sought for the quarrying operation in the future.

#### 1.4.8 Other proposals and actions in the region

There are a number of potential mining, mineral processing operations, gas fields and gas pipeline opportunities that are proposed for the Central Australian region (Figure 1-6). The proposed operations lie within 400 km of Nolans site. Table 1-2 is reproduced from the Northern Territory Government's March 2016 publication "Mining Developments in the Northern Territory".

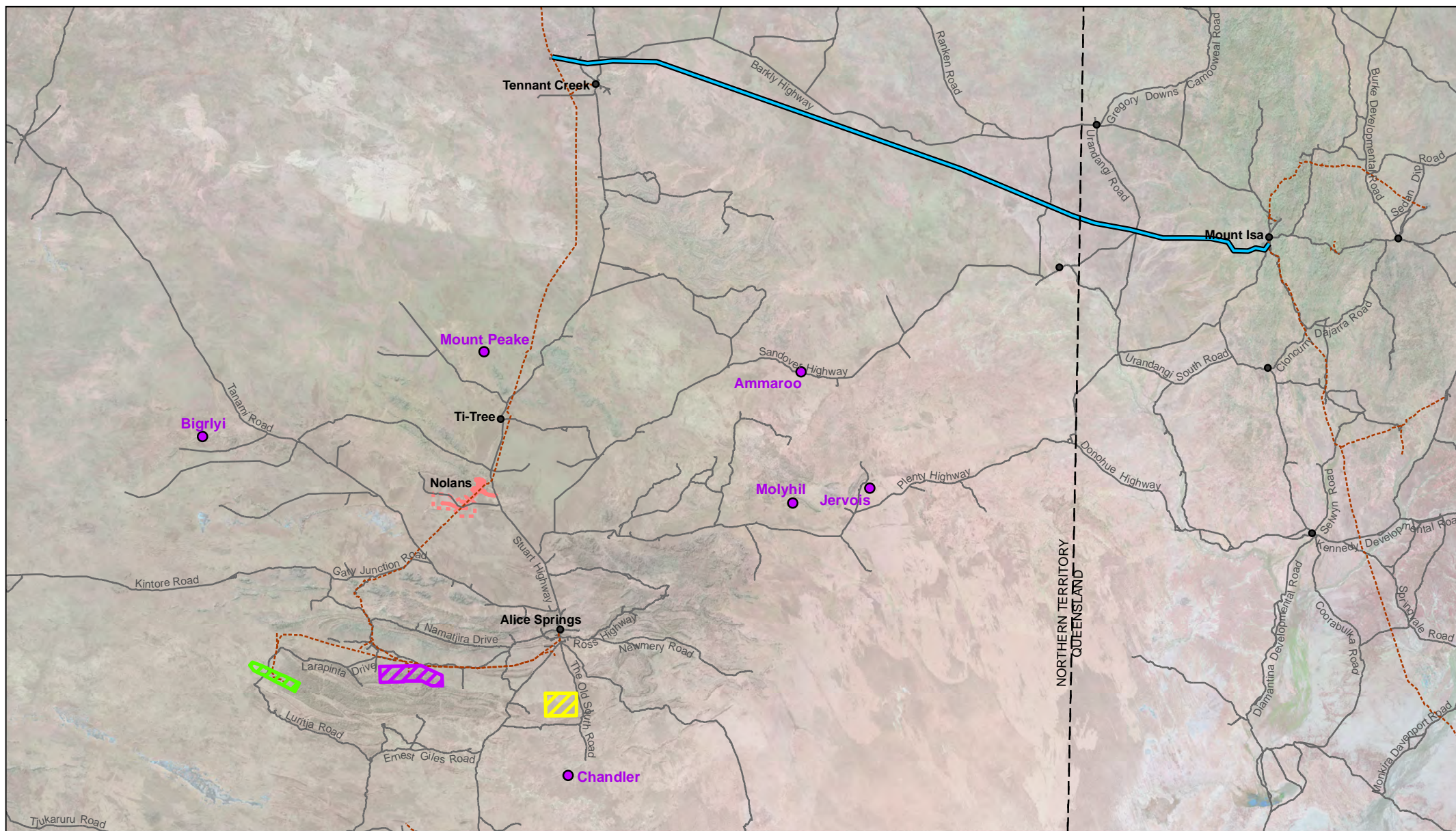
Some of these projects/ potential projects have a similar development timeline to the Nolans Project and have the potential to compete with Arafura for infrastructure investment and skilled human capital.

In addition to the above listed proposed resource developments, Central Petroleum Limited has in recent years acquired natural gas production assets in the Amadeus Basin, including the 100% ownership of the Palm Valley and Dingo gas fields; and 50% ownership of the Mereenie oil and gas field in a joint venture with Santos. Central provides established customers with gas via the Amadeus Basin to Darwin natural gas pipeline.

Jemena Northern Gas Pipeline Pty Ltd proposes to construct and operate a high pressure underground gas pipeline between the Amadeus Gas Pipeline commencing at Warrego approximately 45 km north-west of Tennant Creek, and the Carpentaria Gas Pipeline near Mount Isa. The pipeline would be 622 km in length; with approximately 457 km in the NT.

Chapter 4 provides discussion on potential cumulative impacts in the region.

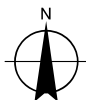




1:4,250,000 @ A4

0 25 50 75 100  
Kilometres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: GDA 1994  
Grid: GDA 1994 MGA Zone 53



#### LEGEND

● Towns and communities

● Other Projects within 400 km of Nolans Project

— Northern Pipeline Project

--- Gas Pipeline

— Roads

Project Area

Palm Valley Gas Field

Dingo Gas Field

Mereneie Oil Gas Field



Arafura Resources Limited  
Nolans Project  
Environmental Impact Statement

Job Number | 4322301  
Revision | 0  
Date | 13 Apr 2016

Other Projects within  
400 km of Nolans Project

Figure 1-6

Table 1-2 Mining and mineral resource actions and proposals in the region  
(NTG 2016)

Mine	Information
<b>Ammaroo</b>	
Company	Rum Jungle Resources Limited
Location	200 km south east of Tennant Creek
Description	New mine including open cut strip mining operations with crushing and screening to produce Phosphate Rock Concentrate for export or conversion to phosphoric acid for export or further conversion to ammonium phosphate fertilisers.
Product	Rock phosphate, phosphoric acid or ammonium phosphate fertilisers
Resource	Global Resource of 1.145 billion tonnes @ 14% P <sub>2</sub> O <sub>5</sub> (10% cut-off) or 338 Mt @ 18% P <sub>2</sub> O <sub>5</sub> (15% cut-off) Measured Resource of 138 Mt @ 15.7% P <sub>2</sub> O <sub>5</sub> (10% cut-off)
Mine Life	25 years plus (potentially as much as 100 years)
Approvals	Environmental – in progress Mining – pending environmental approvals
Proposed Schedule	Pre-Feasibility completed in September 2014. Securing strategic industry investor. Construction – 2017/18 and Production – 2018/19
Jobs	Construction – TBC Production – 110-300
Capex	A\$500M to A\$1.8B depending on product and associated deployment
<b>BIGRLY</b>	
Company	Energy Metals Limited
Location	Approximately 340 km NW of Alice Springs
Description	Potential open pit and underground mining with on-site processing through simple acid leach circuit.
Product	Uranium
Resource	7.5 Mt @ 0.13% U <sub>3</sub> O <sub>8</sub> for 21.1 M lbs U <sub>3</sub> O <sub>8</sub> & 19.7M lbs V <sub>2</sub> O <sub>5</sub> 3.63 Mt @ 0.14% U <sub>3</sub> O <sub>8</sub> for 11.2 Mlbs U <sub>3</sub> O <sub>8</sub> & 15.7 Mlbs V <sub>2</sub> O <sub>5</sub>
Mine Life	Pre-Feasibility Study (PFS) based on 8 years
Approvals	Development proposals yet to be submitted.
Proposed Schedule	Results of Pre-Feasibility Study released in June 2011. Feasibility and environmental studies continue. Construction and Production – TBA



Mine	Information
Jobs	Construction – TBA Production – TBA
Capex	A\$181M (from Pre-Feasibility Study).
<b>Chandler</b>	
Location	Approximately 120 km south of Alice Springs
Description	New Underground multi-mineral salt mine utilising standard mining technology, access via decline, room and pillar using a continuous miner. Voids left from mining used for storage. Surface facilities include salt processing plant (wet & dry), offices, camp and airstrip.
Product	Industrial and edible salts, associated minerals (fertilizer) & storage/disposal
Resource	309 Mt Halite (NaCl) JORC Measured Resource = 525 year mine life
Mine Life	25 years extendable
Approvals	Environmental – in progress    Mining – Pending environmental
Proposed Schedule	DFS stage 1 (FEL2) completed in June 2014. DFS (FEL3) due in 2016. Construction (Darwin East Arm) – Q2 2016 Storage – Q4 2016 Construction (Chandler siding) – Q4 2016 Storage – Q3 2017 Construction (Mine) – Q2 2017 and Production – Q4 2021
Jobs	Construction – 280-350 Production – 180
Capex	A\$648.7M
<b>Jervois</b>	
Company	KGL Resources Limited
Location	Approximately 270 km north-east of Alice Springs
Description	Reopen old mine based on open cut for first 4 years and underground operation from years 4 to 8. Sulphide ore processed via a conventional flotation processing facility to produce a copper concentrate. A second product of lead zinc concentrate will also be produced in certain ore zones.
Product	Copper concentrate with bismuth, silver & gold credits plus a separate lead and zinc concentrate with bismuth, silver & gold credits.

Resource	30.5 Mt @ 1.1% Cu & 23 g/t Ag (includes 113,000 oz gold & 190 kt Pb/Zn)
Mine Life	8 years+
Approvals	Terms of Reference for EIS issued May 2014. EIS being prepared.
Proposed Schedule	Pre-Feasibility Optimisation Study released October 2015. Construction – Q3 2017 and Production – Q4 2018
Jobs	Construction – Peaking at about 360 Production – Peaking at about 300
Capex	Initial CAPEX A\$189.5M
<b>Molyhil</b>	
Company	Thor Mining PLC
Location	220 km northeast of Alice Springs
Description	Proposed open pit mining operation with on-site processing by flotation to produce W and Mo concentrate. Definitive Feasibility Study completed in July 2012 with upgrade in January 2015. Letter of Intent signed for tungsten offtake.
Product	Tungsten and Molybdenum concentrates.
Resource	4.71Mt at 0.4% combined WO <sub>3</sub> and Mo
Reserve	3.0 Mt at 0.31% WO <sub>3</sub> and 0.12% Mo
Mine Life	Initially 6 year
Approvals	Environmental – November 2011 Mining – pending assessment of MMP
Proposed Schedule	Development subject to obtaining project finance
Jobs	Construction – 60 Production – 70
Capex	A\$70M
<b>Mount Peake</b>	
Company	TNG Limited
Location	235 km north of Alice Springs



Description	Open pit mining and onsite processing to produce a magnetite concentrate. Concentrate railed to processing site near Darwin to produce high purity iron, vanadium and titanium products. New processing technology developed.
Product	High purity Vanadium (99% V <sub>2</sub> O <sub>5</sub> ), Titanium Pigment & Pig Iron
Resource	160Mt @ 0.3% V <sub>2</sub> O <sub>5</sub> , 5% TiO <sub>2</sub> , 23% Fe (120Mt Measured JORC)
Mine Life	Approximately 20 years
Approvals	EIS submitted February 2016 and available for public review through March 2016. MMP yet to be submitted. Separate development proposal and approval process for proposed Darwin Refinery.
Proposed Schedule	Definitive Feasibility Study completed July 2015. Construction (Mine) – Q3 2016 Production (Mine) – Q2 2018
Jobs	Construction (Mine) – up to 350 Production (Mine) – 175 to 250
Capex	A\$970M for Stage 1 A\$792M for Stage 2 (from DFS)

## 1.5 Structure of the EIS

The structure of the EIS is based on a combination of:

- Addressing and following the order of the NT EPA TOR where relevant
- Addressing potential environmental project risks identified in the NT EPA TOR and the environment project risk assessment (Chapter 5 of this EIS and Appendix F and G) and
- Presenting information in an order that aims to set the context for the reader and provide a logical sequence of information.

A summary overview of the structure of the EIS is below.

<b>Chapter 1 - Introduction</b>
Chapter 1 provides an overview and background to the project, proponent details, and context and setting of the project location.
<b>Chapter 2 – Regulatory context</b>
Chapter 2 summaries legislation and key guidelines that apply to the project and Arafura's approach to environmental management.
<b>Chapter 3 – Project description</b>
Chapter 3 provides a detailed description of the proposed action assessed in the EIS and for which Arafura is seeking environmental approval.
<b>Chapter 4 – Project alternatives and cumulative impacts</b>

Chapter 4 provides a high level summary of alternatives to various aspects of the project considered by Arafura throughout the development of the project. Cumulative impacts that may arise from projects being undertaken by other companies is summarised.

#### Chapter 5 – Risk assessment

Chapter 5 includes a description of the risk assessment method undertaken for the environmental and human health aspects of Nolans Project. A summary of the risk assessment is included. The content of the EIS is largely based around addressing the identified higher risks.

#### Chapter 6 – Community consultation

A summary of community and stakeholder consultation is included in this chapter. Key themes and matters raised during consultation are summarised. The content of the EIS is also aimed at addressed key themes raised by the community.

#### Chapter 7 – Surface water

The surface water chapter provides a description of key surface water features and functions in vicinity of the project and how the project may impact the existing environment. Potential mitigation measures are recommended.

#### Chapter 8 - Groundwater

The groundwater chapter provides a “water story” to understand the groundwater resources of the area and their users, potential impacts to groundwater from the project and relevant mitigation measures.

#### Chapter 9 – Biodiversity

The Biodiversity chapter includes a description of existing flora and fauna of the project area, threatened species listed in the NT only, context for threatened species listed under the EPBC Act, discussion about potential impacts in the project life of mine (LOM) envelope and mitigation measures.

#### Chapter 10 - Protected Matters under the EPBC Act

This chapter focuses on matters protected under the EPBC Act including matters of national environmental significance (MNES), particularly certain threatened species that triggered assessment under the EPBC Act. The intention of this chapter is to assist the Department of the Environment in assessing information relevant to their jurisdiction (combined with Chapter 12 Radiation).

#### Chapter 11 – Human health and safety

This chapter addresses the potential impacts to human health and safety associated with all stages and components of the Nolans Project. It includes risks to the workforce and the general public for the duration of the project, including post-closure, as required in the TOR for the project.

#### Chapter 12 – Radiation

Chapter 12 provides an overview of the radiological environment of the Nolans Project including a summary of the natural levels of background radiation in the region and impacts from operating the project on workers, the public and the environment. This chapter also address potential impacts on environmental air quality resulting from radon gas and other radioactive emissions.

#### Chapter 13 – Air

This chapter addresses potential impacts on air quality resulting from dust and processing plant emissions for all stages of the project.



#### Chapter 14 – Noise and vibration

A study of key noise and vibration generating activities of the project, and how they may impact nearest human sensitive receptors, is summarised in Chapter 14.

#### Chapter 15 – Socioeconomic

This chapter provides a summary of the project's social impact assessment and economic assessment describing potential benefits and consequences to the socioeconomic environment.

#### Chapter 16 – Historic and cultural heritage

Chapter 16 includes a summary of known indigenous and cultural heritage sites and items/objects, their potential significance and potential impacts and mitigation. At the request of the Central Land Council, sacred site mapping is not included in the public record due to cultural sensitivities.

#### Chapter 17 – Transport

In this chapter, key transport movements to and from Nolans site, and the contribution of the project to the transport network is assessed.

#### Chapter 18 – Rehabilitation, decommissioning and closure

A conceptual framework, objectives and risks for/of rehabilitation, decommissioning and closure are discussed in Chapter 18.

#### Appendices

Key supporting documents and/or technical reports that are the foundation of the EIS chapters are included as appendices. They include more detail about methods, guidelines, assumptions, calibration, monitoring considerations and concept management plans. The management plans are live documents and will be updated throughout various phases of the project as required by regulators (and Arafura management), in the event the project is approved and Arafura proceeds.