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INTRODUCTION

The Groote Eylandt Mining Company Pty Ltd (GEMCO) (the proponent) is proposing to undertake the Southern Lease Exploration Program (2023-2025) (the exploration program) in Exploration Licence (EL) 2455, known as the Southern Lease. The exploration program is scheduled to commence in 2023 and will take approximately three years to complete.

Hansen Environmental Consulting, on behalf of the proponent, has prepared this referral for the exploration program. This referral has been prepared to meet the requirements of the *Environment Protection Act 2019* (NT) (EP Act) and the NT EPA Guideline *Referring a proposal to the NT EPA* (NT EPA, 2021). The overall conclusion of the EP Act Referral is that the exploration program is not predicted to have a significant impact on the environment. There is a high level of confidence in this conclusion because of the large amount of baseline environmental work that has been undertaken, including large scale field programs. In addition, the proposed activities are very similar in scope to other exploration programs previously undertaken by the proponent. The potential impacts from exploration are therefore well understood and the measures to mitigate these impacts are well established. Notwithstanding this finding, the proponent is lodging this EP Act Referral to obtain certainty on the approval requirements for the exploration program.

Background

The proponent operates a manganese mine (termed "the existing GEMCO mine" or the Western Leases) on Groote Eylandt (Figure 1). The existing mine is the main development on the island and has been operating for nearly 60 years. As part of its long-term strategy, the proponent is assessing potential future manganese resources. The Southern Lease is the most prospective exploration area on Groote Eylandt and exploration, undertaken since 2016, has confirmed the presence of high grade manganese ore. The proponent is proposing to undertake additional exploration drilling to obtain further information about the manganese resource. It is also proposing to undertake geotechnical investigations that would inform the design of a potential future mining project in the Southern Lease. The exploration drilling and geotechnical investigations are collectively referred to as the "exploration program".

Proponent

The proponent, GEMCO, has two shareholders, South32 Limited (60%) and Anglo Operations (Australia) Pty Ltd (40%).

South32 is a globally diversified metals and mining company. South32 mines and produces bauxite, alumina, aluminium, metallurgical coal, manganese, copper, nickel, silver, lead and zinc in Australia, Southern Africa and South America. Manganese product from the existing GEMCO mine is shipped to customers around the world.

Anglo Operations (Australia) Pty Ltd is a wholly owned subsidiary of Anglo American Plc, a mining group based in the United Kingdom that is listed on the London Stock Exchange. Anglo American Plc is one of the world's largest mining companies and has a diverse portfolio of interests in iron ore, manganese, base metals, precious metals, minerals, and steelmaking coal.

Regulatory Approvals

The key regulatory approvals required for the exploration program and their status are listed in Table 1.

Table 1 Key Regulatory Approvals

APPROVAL	LEGISLATION	AGENCY	STATUS
NORTHERN TERRITORY APPROVALS			
Environmental Approval	*Environment Protection Act 2019* (NT) (EP Act)	Northern Territory Environment Protection Authority (NT EPA)	Under the EP Act, if a project has the potential to have a significant impact on the environment, a referral must be made to the NT EPA to confirm if an approval is required and, if required, the appropriate approval pathway. Although an assessment of the potential impacts of the exploration program has been undertaken and has concluded that the exploration program is unlikely to have a significant impact on the environment, an EP Act Referral is being made to obtain certainty on the approval requirements for the exploration program.
Mining Management Plan	*Mining Management Act 2001* (NT)	Department of Industry, Tourism and Trade (DITT)	It will be necessary to obtain Authorisation for the exploration program under the *Mining Management Act 2001* (NT). This Authorisation will not be granted until the NT EPA has undertaken any necessary environmental assessment.
FEDERAL GOVERNMENT APPROVALS			
Environmental approval	*Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	The EPBC Act requires approval to be obtained for activities that are likely to have a significant impact on Matters of National Environmental Significance (MNES). An assessment of significance has been undertaken (by specialist ecologists) and concluded that the exploration program is unlikely to have a significant impact on MNES and consequently does not require approval under the EPBC Act. However, the proponent is proposing to lodge an EPBC Act Referral to obtain certainty on the approval requirements for the exploration program.
Consent from landowners	*Aboriginal Land Rights (Northern Territory) Act 1976* (Cth) (ALRA)	Prime Minister and Cabinet	ALRA is Commonwealth legislation which provides Aboriginal landowners with legal title to traditional lands. Freehold land granted under ALRA is referred to as Aboriginal land. Groote Eylandt is Aboriginal land under ALRA and the Anindilyakwa Land Council (ALC) is the land council responsible for this land.

APPROVAL	LEGISLATION	AGENCY	STATUS
			The proponent signed an Exploration Agreement under ALRA with the ALC on 17 May 2016.
Tenement	*Mineral Titles Act 2010* (NT)	DITT	The exploration program is located on EL2455, an exploration tenement located to the south of the existing mine.

SETTING

The Southern Lease is located on Groote Eylandt in the Gulf of Carpentaria (Figure 1). The Traditional Owners of the Groote Eylandt Archipelago are an amalgamation of two cultures, the Warnindilyakwa, and the Nunggubuyu (ALC, 2021). Both cultures speak Anindilyakwa as their first language, and the land, people and culture are also referred to by this term. Groote Eylandt is largely undeveloped, and much of the island is still used for traditional practices. The existing GEMCO mine is the main development on the island. There are three townships on Groote Eylandt, namely Alyangula, Angurugu and Umbakumba (Figure 1).

Groote Eylandt, and the surrounding marine area, has significant ecological value. The Groote Eylandt Archipelago has been declared an Indigenous Protected Area (IPA). An IPA is an area of Indigenous-owned land or sea where Traditional Owners have entered into an agreement with the Federal Government to promote biodiversity and cultural resource conservation (DCCEEW, 2022).

The area in which the exploration program will be undertaken ("the exploration program area") is in the north-western part of the Southern Lease (Figure 2). There is no built infrastructure in the exploration program area, other than 4WD access tracks. Angurugu is the nearest township and is located approximately 10 km by direct line from the northern boundary of the exploration program area. The land within and surrounding the exploration program area comprises natural bushland that is mainly eucalypt dominated open forest and woodland. *Melaleuca*-dominated vegetation also occurs within riparian zones and wetlands. Outcrops of the geological basement form rocky outcrops and are referred to as "white rock". Some white rock areas have cultural significance to the Anindilyakwa People. The exploration program area is also traversed by the Arnduwamurrumanja Creek, Salt Creek, Second Creek, and Yenbakwa River (Figure 2).

The nearest outstations are Yedikba Outstation, which is located approximately 400 m from the exploration program area (and 650 m from the nearest proposed disturbance) and Wurrumenbumanja Outstation, which is located approximately 80 m from the exploration program area (and 1 km from the nearest proposed disturbance).

PLANNING OF EXPLORATION

Groote Eylandt, including the Southern Lease, has significant environmental and cultural values. The proponent has therefore undertaken a comprehensive planning process to locate its exploration activities to avoid impacts on environmental and cultural values where possible. This has involved:

- Gathering baseline data on environmental and cultural values to ensure that the most sensitive features in the Southern Lease are identified.
- Undertaking an iterative project planning process to identify an area for future exploration that avoids the most sensitive environmental and cultural features in the Southern Lease.

Baseline Data

In 2016, after the signing of the Exploration Agreement between the proponent and the ALC, the proponent commenced exploration drilling to gain a better understanding of the manganese resource. Figure 3 shows the potential mineralised area in the Southern Lease (i.e. the area in which manganese may potentially occur). This is the area in which exploration would be undertaken if there were no environmental or cultural considerations. It comprises approximately 16,830 ha.

The proponent also commenced baseline environmental studies in 2016. Baseline environmental work was undertaken with the permission of the ALC. The Traditional Owners were provided with an opportunity to participate in fieldwork and most field surveys included Traditional Owner participation. Baseline environmental work has included:

- Terrestrial ecology work, including:
  - A baseline terrestrial ecology assessment of the western part of the Southern Lease in 2016.
  - A large-scale research project (termed the "Southern Lease Small Mammal Research Project") undertaken between 2017-2019 in consultation with the Northern Territory Government.
  - Reviewing Northern Territory government vegetation mapping and refining this mapping through undertaking fieldwork in areas of sensitive or significant vegetation types (e.g. riparian and wetland areas) as defined in the *Land Clearing Guidelines – Northern Territory Planning Scheme* (DEPWS, 2021a) (Land Clearing Guidelines).
- Undertaking an aquatic ecology field survey in 2019 to determine the baseline condition of aquatic ecosystems associated with each of the watercourses in the Southern Lease.
- Mapping the alignment of waterways, including watercourses (i.e. the more significant waterways, generally with riparian vegetation and aquatic ecology values) and drainage features.
- Mapping of catchment areas.
- Engaging the ALC to undertake a study to define the location of sacred sites and delineate the required buffer zones around these sites (termed restricted work areas).

Project Planning Process

In 2019 the proponent undertook an internal planning process, guided by the baseline environmental work, to delineate the most environmentally sensitive areas of the Southern Lease. The kinds of features that were identified and considered were large, perennial rivers and their floodplains, estuarine areas, significant wetlands, and monsoonal vine thicket. The proponent then delineated an area for future exploration that avoids the identified sensitive areas, referred to as the "potential exploration area" and shown in Figure 3. It comprises 9,521 ha. Excluding the most sensitive areas from the potential exploration area resulted in approximately 7,300 ha of potential mineralised area being excised from future drilling programs.

In 2019, the proponent consulted with the ALC, the NT EPA, DEPWS and DITT about the process that was adopted to plan exploration and develop the potential exploration area. All stakeholders were supportive of the process.

All of the proponent's recent exploration (i.e. since 2019) in the Southern Lease has been limited to the potential exploration area, which has minimised the impacts of exploration. The exploration program that is the subject of this EP Act Referral has also been limited to the potential exploration area.

Limiting the exploration program to the potential exploration area has ensured that the activities are located in a broad area that avoids the most sensitive environmental and cultural features in the Southern Lease. At a finer

scale, and to further reduce impacts, the following additional measures have been adopted to avoid impacts on sensitive features:

- The exploration program has been sited and designed to ensure that there will be no disturbance of watercourses, or riparian or wetland vegetation as defined under the *Land Clearing Guidelines – Northern Territory Planning Scheme* (DEPWS, 2021a).
- On ground pre-clearance surveys will be undertaken prior to disturbance to ensure that sensitive local environmental features are identified and avoided.
- A sacred sites assessment has been recently undertaken and has identified the location of sacred sites and protective buffers (termed restricted work areas). All exploration activities will be sited beyond the sacred sites and restricted work areas.

PREVIOUS EXPLORATION PROGRAMS

Subsequent to the delineation of the potential exploration area, there have been two exploration programs in the Southern Lease (termed Stage 1 and Stage 2). These were designed to determine whether manganese is present in areas with little geological information, gain further information on the extent and type of mineralisation in areas already confirmed as containing manganese and provide core samples which were subject to laboratory testing for geometallurgical properties. Exploration methods that have been used include aircore drilling for regional exploration holes, and infill drilling using Reverse Circulation (RC) and diamond drilling methods. Access tracks were developed to facilitate the exploration programs. The full extent of the Stage 1 Exploration Program has been rehabilitated, as has the majority of the Stage 2 Exploration Program undertaken prior to 2022.

Both exploration programs were referred to the NT EPA under the now superseded *Environmental Assessment Act 1982* (NT) and *Environmental Assessment Administrative Procedures 1984* (NT). In both cases, the NT EPA concluded that potential environmental impacts and risks arising from the planned activities could be adequately managed and were not significant. The NT EPA determined that neither exploration program required further assessment. The exploration programs were undertaken in accordance with Mining Management Plans prepared under the *Mining Management Act 2001* (NT) and approved by DITT.

PROJECT DESCRIPTION

Overview

The exploration program includes:

- Exploration drilling, including infill drilling (using RC drilling) and geometallurgical investigations (using diamond drilling);
- Geotechnical investigations, including developing geotechnical boreholes (using diamond drilling) and geotechnical test pits; and
- The development of new tracks to access drill pads and test pits, as well as the use of tracks from previous exploration programs.

Clearing for the exploration program will be undertaken in accordance with the proponent's Permit to Clear process, which includes a pre-clearance survey. This will ensure that clearing is well planned, undertaken in accordance with all necessary regulatory approvals and sensitive local features are identified and avoided.

The components of the exploration program are discussed in subsequent sections, with avoidance and mitigation measures described in the *Avoidance and Mitigation Section* at the end of this Executive Summary.

Drilling and Geotechnical Investigations

Exploration Drilling

Exploration drilling will consist of:

- Infill drilling (using RC drilling):
  - Infill drilling is undertaken in locations where previous drilling has already confirmed that manganese is present. Infill drilling provides further information on the manganese mineralisation.
  - Approximately 1,424 infill drill holes are proposed to be drilled, with holes distributed in a grid pattern and spaced approximately 60 m apart.
- Geometallurgical investigations (using diamond drilling):
  - Diamond drilling provides core samples, which are subject to detailed geological and geometallurgical analysis.
  - Diamond drilling is proposed to be undertaken at approximately 14 locations.

It will be necessary to clear a pad for each drill hole, using a D6 scrub dozer. Clearing will be in accordance with the proponent's Permit to Clear process. Clearing will be conducted using the "blade up" method, whereby the blade of the dozer is lifted to reduce soil disturbance and to avoid disturbing the topsoil horizon. Grasses and cleared vegetation will be pushed into small windrows at the side of the drill pad (with the cleared vegetation respread across the drill pad when it is rehabilitated). The extent of clearing for the drilling program will be limited by minimising the width of access tracks and the area of drill pads. The cleared areas will be rehabilitated and naturally regenerate following drilling.

Geotechnical Investigations

Geotechnical investigations will consist of:

- Drilling of geotechnical boreholes (using diamond drilling):
  - The geotechnical boreholes provide information about the physical, mechanical and chemical properties of sub-surface materials.
  - Approximately 14 geotechnical boreholes are proposed to be drilled.
  - The methods for clearing the drill pads, drilling the boreholes and rehabilitating the drill pads are as per the description of exploration drilling in the preceding section.
- Developing geotechnical test pits:
  - Test pits provide bulk samples of material for geotechnical testing, including strength testing, dispersion, and material quality/characterisation.
  - Approximately 63 geotechnical test pits are proposed to be developed. They will be excavated with a backhoe to a depth of approximately 3 m, with the test pits visually inspected and bulk samples of material taken from them.
  - To avoid additional clearing, all test pits will be located in the centre of access tracks, or on the drill pads developed for the geotechnical boreholes.
  - Each test pit will be backfilled immediately following the collection of samples. Topsoil that was previously removed from the test pit will be reinstated over the disturbed area after the backfilling is completed.

Access Tracks

The sites for drill holes and test pits will be accessed via a combination of the following:

- New tracks established as part of the proposed exploration program;
- Tracks from previous exploration. These include tracks that will still be "open" at the time that the proposed exploration program is undertaken (e.g. tracks from any recent exploration), as well as "closed" tracks. Closed tracks are tracks from previous exploration programs that have already been rehabilitated, ranging from tracks rehabilitated in 2016 to tracks rehabilitated in 2022.

Where possible, drill holes and test pits have been sited to avoid the need for new tracks, with existing tracks used in preference to the development of new tracks. Vegetation clearing procedures for access tracks will follow a similar process as outlined above for the drill pads. The access tracks will be approximately 3 m in width to allow for safe movement of vehicles and equipment. Access tracks will be rehabilitated as per the methods outlined above, and will include measures to prevent the ongoing use of the tracks to avoid them becoming permanent access tracks.

Disturbance

Figure 4 shows the location of drill pads, test pits and tracks, and Figure 5 shows the total disturbance footprint associated with the exploration program over a period of three years. Table 2 contains a summary of the total disturbance associated with the exploration program. The area disturbed at any one time will be less than the total area, given that the disturbance occurs over a three year period and disturbed areas are progressively rehabilitated.

Table 2 Summary of Total Exploration Program Disturbance

ELEMENT	NUMBER	AREA
Exploration Drilling		
Drill pads (i.e. RC drill pads and diamond drill pads)	1,438 drill pads, comprising 1,424 RC drill pads and 14 diamond drill pads	25.76 ha[1]
New tracks to access exploration drill pads	67.7 km	20.31 ha
Tracks from previous exploration	51.0 km of track	15.29 ha. This is the full area of tracks to be used. Some of these tracks will already be open and will not require clearing.
Geotechnical Investigations		
Drill pads (i.e. diamond drill pads)[2]	14 drill pads	0.35 ha
Geotechnical test pits	63 test pits	No clearing. The test pits are small enough to be located on the tracks or on drill pads developed for the geotechnical boreholes.
New tracks to access geotechnical drill pads and test pits[2]	3.3 km of track	0.99 ha
Total Area		**62.70 ha**

[1] This is a maximum disturbance area given that it does not account for the fact that it may be possible to locate some diamond drill holes on the same site as RC drill pads.
[2] The geotechnical program will also use tracks listed as part of the drilling program, but these tracks are accounted for in the areas quoted for the exploration drilling.

Figure 4 and Figure 5 are indicative and subject to change given that the pre-clearance surveys and advice from the ALC and/or cultural monitors may necessitate the relocation of drill pads, test pits and tracks. However, any drill pads, test pits or tracks that are required to be relocated will be situated within the exploration program area; not exceed a total disturbance area of 63 ha; comply with pre-clearance requirements; and not be located within watercourses, wetlands or riparian vegetation (as shown in Figure 5) or sacred sites and their restricted work areas.

Rehabilitation

Rehabilitation of drill pads and tracks is planned to occur progressively during the three year exploration program and is designed to occur before the onset of the next wet season. Drill pads and access tracks will be rehabilitated using the same methods adopted for previous exploration in the Southern Lease, which includes the following:

- Removing and disposing of any rubbish.
- Respreading any remaining drill cuttings on drill pads.
- Respreading the windrows of cleared vegetation (e.g. logs, vegetation cover and leaf litter) on the disturbed area. Note that topsoil is not stripped as part of developing the drill pads or access tracks and so it is not necessary to respread topsoil.

The area will then be allowed to naturally revegetate from endemic seeds in the soil seed bank and from adjacent vegetation.

Upon completion of rehabilitation, and prior to the commencement of the wet season, felled timber and logs will be placed across the entrance to access tracks and along a sufficient distance of track to prevent ongoing access. This measure is designed to prevent the access tracks becoming permanent tracks. This will assist with reducing the potential for threatening processes to be introduced. There may be some instances where tracks may be required to remain open longer than a single dry season but these would be considered an exception to the rehabilitation process and would be subject to an internal review and approval process.

As each drill pad and track is rehabilitated, a checklist will be completed, and a photograph taken of the pad or track. The checklist will confirm that all drill holes have been capped and backfilled, rubbish has been removed, drill cuttings/surface materials have been spread back over the pad, and logs have been placed where the associated access track intersects a public access track.

Monitoring of rehabilitated areas will also be undertaken one to two wet seasons after rehabilitation has been completed. Monitoring will be undertaken in the dry season by an experienced ecologist or environmental practitioner and will comprise:

- Inspecting access tracks to confirm they are not being used and that the log barriers are effective in preventing access;
- Inspecting drill pads for erosion or for evidence of subsidence in drill holes that have been backfilled;
- Assessing the area to confirm that revegetation is occurring;
- Undertaking a survey to identify the presence of weeds; and
- Taking a photograph of each drill pad.

The ALC will also be provided with an opportunity to inspect rehabilitated exploration areas to confirm the rehabilitation has been undertaken to the satisfaction of the Traditional Owners.

Corrective action will be taken in response to issues identified during monitoring. If monitoring reveals the presence of weeds, the weeds will be recorded and treated/removed, and further monitoring will be undertaken to confirm the success of weed control/removal work.

The proponent has achieved considerable success with rehabilitation of exploration drill pads and access tracks. Regeneration monitoring was undertaken in the Southern Lease in 2021 to assess exploration areas that were cleared between 2016 and 2019. Monitoring showed that canopy species were regenerating at 98% of sites, while mid-layer and ground layer regeneration was present at all sites. Monitoring has also been undertaken within the Eastern Leases. Overall, monitoring undertaken in both the Eastern Leases and Southern Lease indicates that the rehabilitation process and techniques employed by the proponent allow exploration areas to successfully regenerate over time.

Timing

Exploration activities will commence once all environmental approvals are obtained. The exploration program is intended to be undertaken over three drilling campaigns, in successive dry seasons (generally May to December). The exploration program is scheduled to commence in calendar year 2023 and be completed by 2025. Drilling may extend beyond this if there are delays in the program (e.g. due to weather).

Workforce and Accommodation

Only a small workforce will be required for the exploration program, with the drilling workforce being mostly contractors. Contractors undertaking exploration activities may be existing residents of Groote Eylandt, or non-residents, employed on a fly-in and fly-out basis either from Darwin or Cairns. Accommodation will be provided in the proponent's existing accommodation village, located in Alyangula.

The scheduling arrangements will determine the number of people on site at any one time, but workforce requirements are small (approximately three people per drill rig, two people involved in the development of geotechnical test pits and up to 14 support staff (e.g. dozer operator, geologist)).

Related Projects

Depending on the results of the proposed exploration program, further exploration (i.e. beyond that described in this EP Act Referral) may be required in the future. The details of any potential future exploration work cannot be determined at this point in time because the scope and location of future exploration will be dependent on the results of the exploration drilling that is the subject of this EP Act Referral. Separate approvals will therefore be sought for any future exploration that may be required.

The proponent is also currently undertaking a pre-feasibility study for a potential future mining project in the Southern Lease, which would require approval under the EP Act and the EPBC Act and the proponent is intending to lodge referrals under those Acts in 2023. A mining project, unlike the proposed exploration program, would have the potential to give rise to significant impacts on environmental values. Consequently, it is anticipated that a detailed environmental impact assessment process will be required for a mining project, with a multi-year impact assessment and approval process. Current scheduling indicates that a mining project in the Southern Lease, if developed, would not commence prior to 2026. The exploration program described in this EP Act Referral is scheduled to have been completed by this time.

Significance of the Exploration Program

There is direct employment associated with the exploration program. This includes employment of Traditional Owners, particularly as cultural monitors during the Permit to Clear process. However, the key significance of the exploration program relates to its role in securing the long-term future of the proponent's operations on Groote Eylandt.

The existing GEMCO mine has been operating for nearly 60 years and is an integral part of the economy of Groote Eylandt. The existing GEMCO mine provides significant socio-economic benefits to the Traditional Owners, as well as the regional economy of the Northern Territory. These benefits include:

- Provision of approximately 1,100 direct jobs at the existing mine, comprising approximately 900 employees and 200 agency contractors. This includes approximately 60 jobs for Aboriginal and Torres Strait Islanders;
- Provision of employment opportunities for service contractors;
- Royalties for distribution to the ALC and Traditional Owner groups;
- Royalties, government taxes and business opportunities which significantly contribute to both the local economy and the regional economy of the Northern Territory;
- Education, training and apprenticeship opportunities for local residents, including Traditional Owners;
- Provision of social infrastructure and services, specifically health services, to the communities on Groote Eylandt;
- Procurement opportunities for businesses on Groote Eylandt and, in particular, Indigenous enterprises; and
- Coordination of community events by the proponent.

The continuation of these benefits in the medium to long term is dependent on the identification and development of additional manganese resources by the proponent, with the Southern Lease being the proponent's only exploration tenement on Groote Eylandt. The Southern Lease is considered to be critical to the long term future of the proponent's mining operations on Groote Eylandt.

STAKEHOLDER ENGAGEMENT AND CONSULTATION

The proponent has undertaken extensive stakeholder engagement in relation to the exploration program. This has included engagement with the ALC, as well as direct engagement with the clan groups that speak for the country within the local area. This consultation has included the following:

- The proponent and the ALC signed an Exploration Agreement under ALRA for the Southern Lease in 2016. The Exploration Agreement is designed to ensure that exploration is undertaken in a manner that is respectful of the Traditional Owners' preferences and that areas considered by the Traditional Owners to be environmentally or culturally significant are protected. The signing of an Exploration Agreement was preceded by several years of discussions and culturally appropriate consultation between the proponent, the ALC and Traditional Owners.
- Since the signing of the Exploration Agreement, the proponent and the ALC have had regular discussions about proposed exploration activities in the Southern Lease. The proponent consulted extensively with the ALC between 2017-2019 during the planning of exploration and development of the potential exploration area.
- There have also been formal, quarterly meetings between the proponent and the ALC (termed Mining Liaison Committee Meetings). In addition to the attendees from the ALC and the proponent, Traditional Owner representatives from each clan are invited to be part of this committee. In these meetings, the proponent provides an update on activities undertaken in the Southern Lease and activities proposed to be undertaken. Opportunities are also identified for Traditional Owners to undertake site visits and assist with fieldwork.
- The location of sacred sites was a key consideration in the design of the exploration program. The proponent engaged the ALC in 2019 to undertake a sacred sites assessment to delineate sacred sites in the Southern Lease. The consultation program undertaken as part of the sacred sites assessment was extensive, involving more than 100 Warnindilyakwa Traditional Owners. This assessment is described further in the *Culture and Heritage Section* of this Executive Summary.

Prior to the commencement of exploration, and as part of its standard operating procedure, the proponent will also consult with the ALC on the annual work program (including timing, location of drilling activities etc.) and the results of pre-clearance surveys. During this consultation, the risks, potential impacts, and mitigation and management measures of the exploration program will be communicated. Exploration cannot commence until the ALC's endorsement of the activities has been obtained. As part of this process, the ALC may arrange for a cultural monitor to visit the proposed clearing area and provide advice on areas that should be avoided for cultural reasons.

REVIEW OF ENVIRONMENTAL FACTORS

The NT EPA has produced the *NT EPA Environmental Factors and Objectives* guideline (NT EPA, 2022). Environmental factors are aspects of the environment that may be impacted by a proposed action. The guideline identifies a total of 14 environmental factors, characterised under five themes, namely Land, Water, Sea, Air, and People (NT EPA, 2022). Objectives have been developed for each environmental factor and potential impacts must be considered relative to these objectives.

The NT EPA has also produced the *Referring a proposal to the NT EPA* (NT EPA, 2021) guideline, which requires proponents to consider potential project impacts (including all impact sources and pathways) relative to each environmental factor to determine whether the project may significantly impact the environment. This guideline contains a screening tool which includes indicative environmental values and sensitivities for each environmental factor, which are required to be considered as part of an assessment of potential project impacts.

The proponent has undertaken a self-assessment and also engaged specialist environmental consultants to undertake an assessment of the potential impacts of the exploration program, taking account of these guidelines. The assessment concluded that the exploration program has the potential to impact one environmental factor, namely terrestrial ecosystems. This environmental factor is therefore discussed in detail in the EP Act Referral, which ultimately concludes that, given the measures to avoid and minimise impacts, no significant impacts on terrestrial ecosystems, biological diversity and ecological integrity are predicted. Although it was concluded that the exploration program is unlikely to impact culture and heritage, additional information on cultural heritage has been provided in the EP Act Referral, given the importance of this issue on Groote Eylandt.

TERRESTRIAL ECOSYSTEMS

Methodology

The assessment of terrestrial ecosystems in the Southern Lease and exploration program disturbance footprint draws on information from the following three specialist ecology reports that have been prepared by Cumberland Ecology and form part of this EP Act Referral:

- *Baseline Terrestrial Ecology Report* (Appendix A). This report documents the findings of the baseline terrestrial ecology assessment of the Southern Lease.
- *Assessment of Impacts on Listed Species Report* (Appendix B). This report provides an assessment of the potential impacts of the exploration program on listed species. It accompanies the *Baseline Terrestrial Ecology Report* (Appendix A).
- *2021 Camera Fauna Monitoring Program Report* (Appendix C). This report provides the results of a camera monitoring program undertaken to assess the impacts of exploration activities on the Northern Quoll (*Dasyurus hallucatus*) and Feral Cat.

The methodology for the assessment included a literature review and database assessment, and review of the extensive field surveys that have been undertaken within the exploration program area and surrounds. Field

surveys have included terrestrial flora and fauna surveys undertaken by Cumberland Ecology over several years, as well as the following two research programs that were designed to provide information to aid with the assessment of impacts of exploration on ecological values:

- The Southern Lease Small Mammal Research Project undertaken by Cumberland Ecology between 2017 and 2018 to obtain an understanding of the occurrence and habitat preferences of two threatened species, the Northern Hopping-mouse (*Notomys aquilo*) and the Brush-tailed Rabbit-rat (*Conilurus penicillatus*) within the Southern Lease and surrounds. The project was designed in consultation with DEPWS (then the Department of Environment and Natural Resources). No records of the target species were obtained, and it was concluded that this was due to the absence of these species in the areas surveyed. The Small Mammal Research Project included survey sites within the disturbance footprint and, based on the findings of this research project, neither the Brush-tailed Rabbit-rat or Northern Hopping-mouse are likely to be present in the disturbance footprint.
- The 2021 Camera Fauna Monitoring Program undertaken by Cumberland Ecology in 2021, which aimed to provide quantitative data to assist in understanding the impacts of vegetation disturbance associated with exploration activities on the density of the Feral Cat and the occurrence of the Northern Quoll. This program was undertaken in two locations on Groote Eylandt, including the Southern Lease. The camera fauna monitoring program was recommended by DEPWS who assisted in the scoping of the program. The monitoring program concluded that exploration activities within the Southern Lease have not resulted in an increase in the naïve occupancy of Feral Cats or a decrease in the naïve occupancy of the Northern Quoll. The results of this monitoring program have assisted with informing an assessment of impacts, and are provided in the *2021 Camera Fauna Monitoring Program Report* (Appendix C).

A likelihood of occurrence assessment was undertaken for listed species identified in database searches to determine their potential to occur within the Southern Lease and disturbance footprint. For any species confirmed as present, or with the potential to occur, an assessment of impacts was undertaken in accordance with relevant guidelines, including the *Matters of National Environmental Significance. Significant Impact Guidelines 1.1* (DotE, 2013).

Baseline Ecology Setting

Vegetation Structure

The vegetation in the Southern Lease is remnant vegetation that has not been subject to previous clearing other than relatively minor clearing for public access roads/tracks and exploration. Due to the absence of broad scale vegetation clearing, habitat connectivity in the landscape is excellent and unbroken throughout. The Southern Lease provides a range of habitats for fauna species, including watercourses and wetlands, rocky outcrops and extensive areas of woodland.

Similar to the broader Southern Lease, the vegetation within the disturbance footprint is in very good condition. The disturbance footprint comprises woodland, but does not include watercourses, wetlands, riparian vegetation, or rocky outcrops.

Vegetation Communities

The vegetation community patterns within the Southern Lease strongly reflect the geology, soils, topography, and the impacts of frequent fires. The most extensive vegetation communities within the disturbance footprint comprise open woodlands to open forests dominated by *Eucalyptus tetrodonta* (Darwin Stringybark), which occur on both gently undulating sandy and lateritic soils, as well as within rocky sandstone areas.

The disturbance footprint has been sited to avoid riparian vegetation, wetlands, rainforests, vine thickets and coastal vegetation. Vegetation in the disturbance footprint comprises laterite woodland and forest habitat, with a very small area of sandstone woodland and forest.

No EPBC Act Threatened Ecological Communities occur within or surrounding the disturbance footprint.

Flora Species

Over 250 plant species have been recorded within the western portion of the Southern Lease by Cumberland Ecology during recent field surveys. Few weeds occur in the Southern Lease or the disturbance footprint and the weeds that do occur are primarily isolated to the verges of the public Yenbakwa Road. No threatened flora species have been recorded in the disturbance footprint or are expected to occur.

Fauna Species

A total of 98 fauna species have been recorded within the Southern Lease during recent field surveys, including 56 birds, 20 mammals and 22 reptiles. Additional species have also been identified in database searches.

The following threatened or migratory fauna species have been recorded or have been assessed as having the potential to occur in the disturbance footprint area:

- Masked Owl (northern) (*Tyto novaehollandiae kimberli*) (EPBC Act status: Vulnerable; TPWC Act status: Vulnerable) - present in the disturbance footprint.
- Northern Quoll (EPBC Act status: Endangered; TPWC Act status: Critically Endangered) - present in the disturbance footprint.
- Ghost Bat (*Macroderma gigas*) (EPBC Act status: Vulnerable; TPWC Act status: Not Listed) - potential to occur in the disturbance footprint.
- Fork-tailed Swift (*Apus pacificus*) (EPBC Act status: Migratory; TPWC Act status: Not Listed) - potential to occur in the disturbance footprint.

The remaining species were assessed as having a low likelihood of occurring in the disturbance footprint area and are therefore not considered further in the assessment.

Impact Assessment

Clearing

An assessment of the potential impacts of the exploration program on terrestrial ecosystems was undertaken, including an assessment of the impact of clearing approximately 63 ha of vegetation for drill pads and access tracks. The 63 ha of vegetation proposed to be cleared comprises:

- Approximately 62.6 ha of laterite woodland and forest, which represents 0.45% of the laterite woodland within the Southern Lease; and
- A small area of sandstone woodland and forest habitat (approximately 0.04 ha), which represents 0.001% of the sandstone woodland within the Southern Lease.

These habitat types are widespread on Groote Eylandt and large areas will remain, beyond the area to be affected by exploration activities. The proposed clearing will be dispersed across the exploration area, with patches of native vegetation remaining between the cleared areas. It is anticipated that the types of flora and fauna species utilising the habitat proposed to be cleared will continue to persist in these adjacent areas where suitable habitat is present and will recolonise cleared areas as they regenerate following rehabilitation. The impacts of clearing will also be minimised by implementing a pre-clearance procedure that involves clearly delineating the limits of

clearing, and relocating access tracks and drill pads around sensitive features, such as large trees, and trees with hollows suitable for the Masked Owl (northern). In addition, disturbed areas will be rehabilitated progressively. Monitoring of previous exploration areas indicates that the rehabilitation techniques used by the proponent allow exploration areas to successfully regenerate over time.

Indirect Impacts

Potential indirect impacts were assessed, including habitat fragmentation, altered fire regimes, and introduced species (weeds and feral animals). No significant impacts on habitat fragmentation are predicted, given that disturbed areas are expected to naturally regenerate into native vegetation once rehabilitation has been completed. In addition, felled timber and logs are placed across the entrance to access tracks and along a sufficient distance of track to prevent ongoing access. The closure of access tracks is necessary to ensure the success of rehabilitation and prevent ongoing access, which may lead to increased fire frequency or the spread of weeds. Preventing permanent access tracks from being formed will also assist in reducing the risk of them acting as a transport vector for feral animals such as Feral Cats. Given these measures, no significant indirect impacts are predicted. The *2021 Camera Fauna Monitoring Program Report* (Appendix C) concluded that exploration activities within the Southern Lease have not resulted in an increase in the naïve occupancy of Feral Cats, or a decrease in the naïve occupancy of the Northern Quoll. These findings provide a high degree of confidence in the impact assessment predictions.

Listed Species

The impacts of the exploration program were assessed, in detail, for the listed species potentially impacted by the exploration program. The assessments were undertaken in accordance with the *Matters of National Environmental Significance. Significant Impact Guidelines 1.1* (DotE, 2013), and concluded that the exploration program is not expected to give rise to significant impacts on listed species. Factors that were relevant to the assessment included:

- The measures that have been incorporated into the design of the exploration program specifically for the purpose of avoiding and minimising impacts on threatened species (e.g. pre-clearance surveys that ensure that Masked Owl (northern) breeding habitat is not disturbed).
- The suite of environmental management measures that are designed to minimise the impacts of the exploration program, and which will also minimise impacts on threatened species (e.g. rehabilitation activities and measures to prevent the introduction of weeds or feral animals including Cane Toads).
- Monitoring data from previous exploration programs (e.g. the *2021 Camera Fauna Monitoring Program Report* (Appendix C), which showed that exploration did not lead to a decrease in the naïve occupancy of the Northern Quoll).

Cumulative Impacts

The exploration program is part of the proponent's broader exploration campaign within the Southern Lease. Exploration is undertaken in a structured, progressive manner, which is designed to gain increasing levels of understanding of the geology and mineralisation of the area. The impacts of this iterative process, particularly in relation to clearing of vegetation, have the potential to result in cumulative impacts.

The proponent has undertaken exploration within the Southern Lease between 2016 and 2022. Each exploration program is required to complete rehabilitation of all drill pads and tracks following the completion of drilling activities. As a result of this rehabilitation process, and the observed successful natural regeneration of disturbed areas over time, it is not expected that the exploration program would result in significant cumulative impacts with the previous exploration programs undertaken between 2016 and 2022.

The exploration program will utilise some drill pads and access tracks created as part of the previous exploration programs. Some of these tracks (e.g. those used for exploration in late 2022) may still be open at the time that the exploration program is undertaken or may comprise regrowth that is only 1-2 years old. However, in assessing impacts of the exploration program, a conservative approach has been taken whereby the use of previous tracks is assessed as new clearing (i.e. the 63 ha disturbance footprint includes the use of tracks from previous exploration programs). This ensures that a full account of impacts is included, including cumulative impacts with previous exploration programs.

Overall, due to the relatively small and dispersed disturbance areas, progressive rehabilitation and successful regeneration of the previous exploration programs, the exploration program is not considered likely to result in any significant cumulative impacts on terrestrial ecosystems.

Conclusion

The objective for the *Terrestrial Ecosystems* environmental factor is to "*Protect terrestrial habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning*" (NT EPA, 2022). Based on the assessment findings, no significant impacts on terrestrial ecosystems, biological diversity and ecological integrity are predicted.

CULTURE AND HERITAGE

Sacred Sites

The *Northern Territory Aboriginal Sacred Sites Act 1989* (NT) is designed to protect sacred Aboriginal sites. Sacred sites are places in the landscape that have a special significance under Aboriginal tradition. Groote Eylandt is Aboriginal land under ALRA and the ALC is responsible for managing this Aboriginal land. The ALC has an anthropology department and employs a fulltime anthropologist. In 2019, the proponent engaged the ALC to work with the Traditional Owners to undertake a sacred sites assessment for the Southern Lease to document sacred sites and define suitable restricted work areas (i.e. buffers) to ensure their protection. The study area for the sacred sites assessment fully encompasses the disturbance footprint. Sacred sites were documented by two anthropologists (assisted by the ALC anthropologist and a Cultural Liaison Officer). Fieldwork undertaken with Traditional Owners was a fundamental component of the work, and the testimony and evidence of 106 Warnindilyakwa Traditional Owners regarding the nature and location of sacred sites was captured.

The fieldwork and consultation have been completed and reporting is underway. The ALC has provided data to the proponent confirming the location of sacred sites and restricted work areas. This information has guided project planning. The exploration program has been designed to ensure that all activities are beyond sacred sites and their restricted work areas, and that sacred sites will not be impacted by exploration (the location of sacred sites and restricted work areas is confidential and cannot be provided in a public document).

In addition to designing the exploration program to avoid impacts on sacred sites, the proponent has a Permit to Clear process that is followed before any areas are disturbed. The Permit to Clear process includes confirming that any proposed clearing is consistent with identified constraints (including sacred sites and restricted work areas). In addition, proposed clearing plans are submitted to the ALC for approval. This process has been designed to ensure that the proponent exercises a duty of care in relation to sacred sites.

The proponent also intends to ultimately obtain an Authority Certificate for the Southern Lease. An Authority Certificate provides conditions for any works undertaken on or near sacred sites. The proponent will apply for an Authority Certificate once the reporting of the ALC's sacred sites assessment has been completed.

Heritage (Archaeology)

Public registers were searched to determine if there are any objects or places that are protected on public registers and located within or in proximity to the exploration program disturbance footprint. A review of available archaeological reports pertaining to the Southern Lease was also undertaken.

The registers and archaeological reports did not identify any Indigenous or non-Indigenous archaeological sites that may be impacted by the exploration program. In addition, the exploration program disturbance footprint is located in an area that has been classified as having very low archaeological sensitivity (SHIM Consulting, 2014). Nevertheless, a procedure for unexpected finds will be adopted as a precautionary measure.

Conclusion

The objective for the *Culture and Heritage* environmental factor is to "Protect culture and heritage". Based on the assessment findings, the exploration program will not have a significant impact on sacred sites or archaeological sites. No significant adverse impacts on the cultural and heritage values of the Northern Territory are therefore predicted.

AVOIDANCE AND MITIGATION

Avoidance Measures

South 32's Environment Standard emphasises the importance of the mitigation hierarchy being followed (i.e. designing activities to avoid impacts where possible, applying mitigation measures to further reduce impacts and only relying on offsets for impacts that remain after avoidance and mitigation measures have been applied). This is consistent with the environmental decision-making hierarchy in the EP Act which requires that decision makers, proponents and approval holders follow a hierarchy of approaches (in order of priority), with the first priority being to design actions to avoid impacts on the environment, where possible.

The avoidance of impacts is most efficiently achieved during the project planning stage. As described in the *Project Planning Process Section* of this Executive Summary, the proponent has located its activities in the Southern Lease (including the exploration program) within a broad area that avoids the most sensitive environmental and cultural features. At a finer scale, the exploration program has been sited to ensure that there will be no disturbance of riparian or wetland vegetation, watercourses or sacred sites. The design of the exploration program also includes numerous measures to avoid impacts (e.g. siting geotechnical drill holes and test pits on previously cleared tracks or pads used for infill drilling, where possible).

Mitigation Measures

The proponent has undertaken exploration on Groote Eylandt for nearly 60 years and consequently has substantial experience with exploration and its potential impacts. Mitigation measures have been developed to address potential impacts, and these measures have been used successfully during previous exploration campaigns in the Southern Lease. The adopted mitigation measures reflect feedback obtained from regulators, specifically the NT EPA and DEPWS, during previous approval applications for exploration. In addition, the proponent has made three previous referrals under the EPBC Act for exploration in the Eastern Leases. None of these referrals were found to be controlled actions. However, in deciding the applications, the Commonwealth outlined the manner in which exploration should be undertaken (e.g. particular requirements for pre-clearance inspections) in order to avoid significant impacts. These measures have been incorporated as part of the proponent's standard mitigation measures for exploration.

The adopted mitigation measures include:

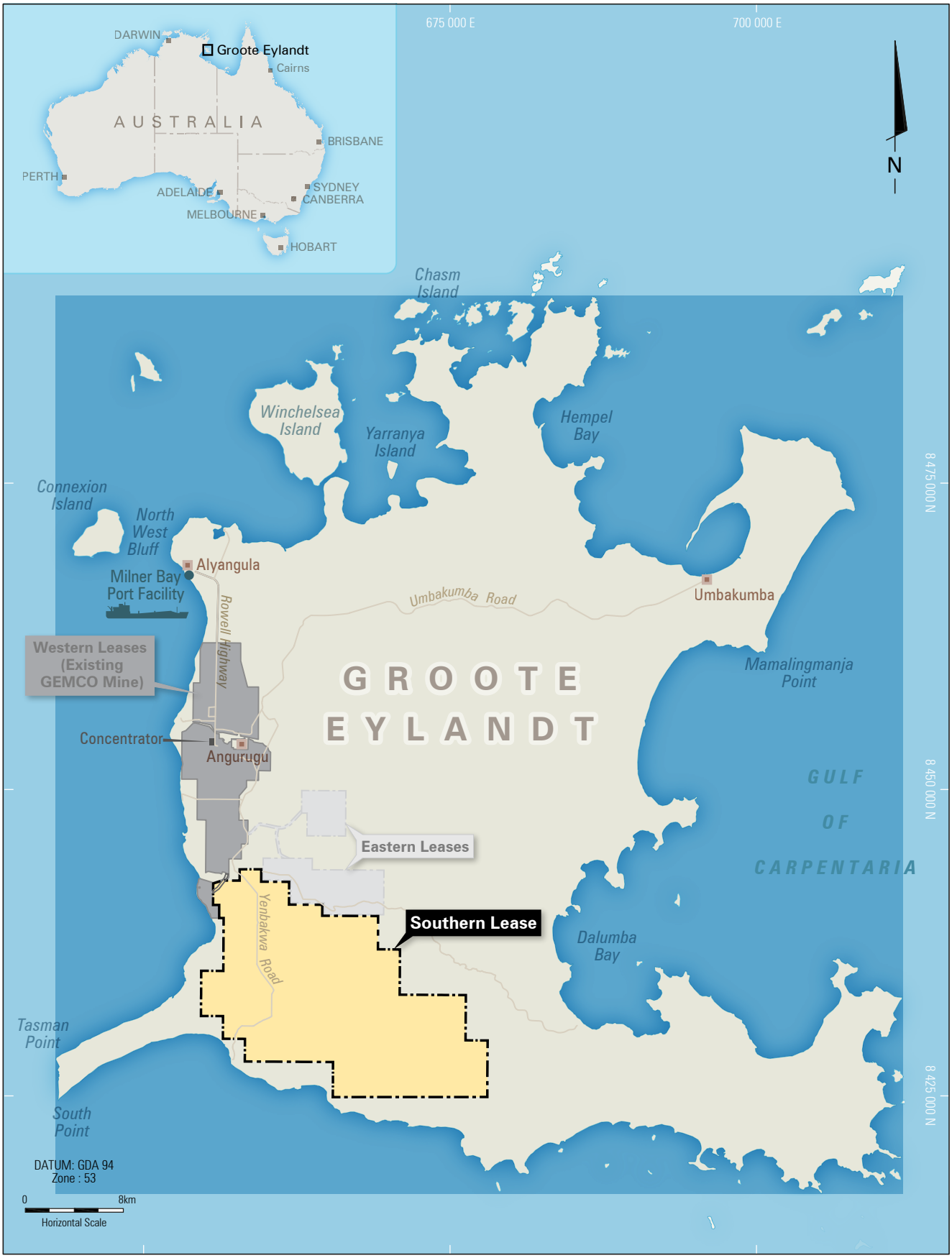
- Clearing procedures. All clearing will be undertaken in accordance with the proponent's Permit to Clear process. This process includes a pre-clearance survey to determine the precise location of habitat features for threatened species, with access tracks and drill pads relocated, as necessary, to avoid the features specified in the procedure. The process also includes obtaining endorsement from the ALC. The extent of clearing will be restricted to the minimum area required to safely complete the drilling program. This will include minimising the width of access tracks and area of drills pads. Disturbance of topsoil will be kept to a minimum by using a "blade up" method for vegetation clearing, whereby the blade of the dozer is lifted so that the topsoil is not disturbed.
- Rehabilitation and monitoring. Rehabilitation of drill pads and tracks is planned to occur progressively during the three year exploration program and is designed to occur before the onset of the next wet season. As each drill pad and track is rehabilitated, a checklist is completed confirming that rehabilitation has been undertaken according to the proponent's rehabilitation procedure. Monitoring of rehabilitated areas will be undertaken by an experienced ecologist or environmental practitioner one to two wet seasons after rehabilitation has been completed. The proponent has had considerable success with the rehabilitation of drill pads and access tracks.
- Weed management. Weed management measures in the Southern Lease will focus on preventing the introduction of weeds, the early detection and eradication of weeds before they establish, and employee awareness. Weed control and monitoring will be undertaken within cleared areas in accordance with the proponent's Weed Management Plan. The Weed Management Plan includes measures to ensure that exploration activities will not introduce or spread weeds in the Southern Lease. Such measures include washdown and inspection procedures for all vehicles and equipment, along with daily inspections of work clothes and boots for all personnel prior to entering the Southern Lease.
- Cane Toad management. The proponent has a Cane Toad Management Plan and associated quarantine procedures in place. The prevention of the introduction of the Cane Toad is critical to maintaining populations of small mammals on Groote Eylandt, including threatened species such as the Northern Quoll. The management plan includes preventative measures such as quarantine procedures relating to barging of equipment, inspections of barges and vehicles, Cane Toad fencing at key freight facilities in Darwin and on Groote Eylandt, and use of Cane Toad detection dogs. There are also monitoring measures and, in the event of a Cane Toad being found, reporting, disposal and response procedures.

There are also management measures relating to waste and hazardous materials management, erosion and sediment control and procedures to be adopted in the event of an unexpected archaeological find.

CONCLUSION

This EP Act Referral provides a detailed assessment of the environmental factors and objectives that are most relevant to the exploration program (i.e. terrestrial ecosystems, and culture and heritage). The assessments concluded that the exploration program is not predicted to have a significant impact on these environmental factors, given the measures that have been adopted to avoid and minimise impacts. The overall conclusion of this EP Act Referral is, therefore, that the exploration program is not predicted to have a significant effect on the environment.

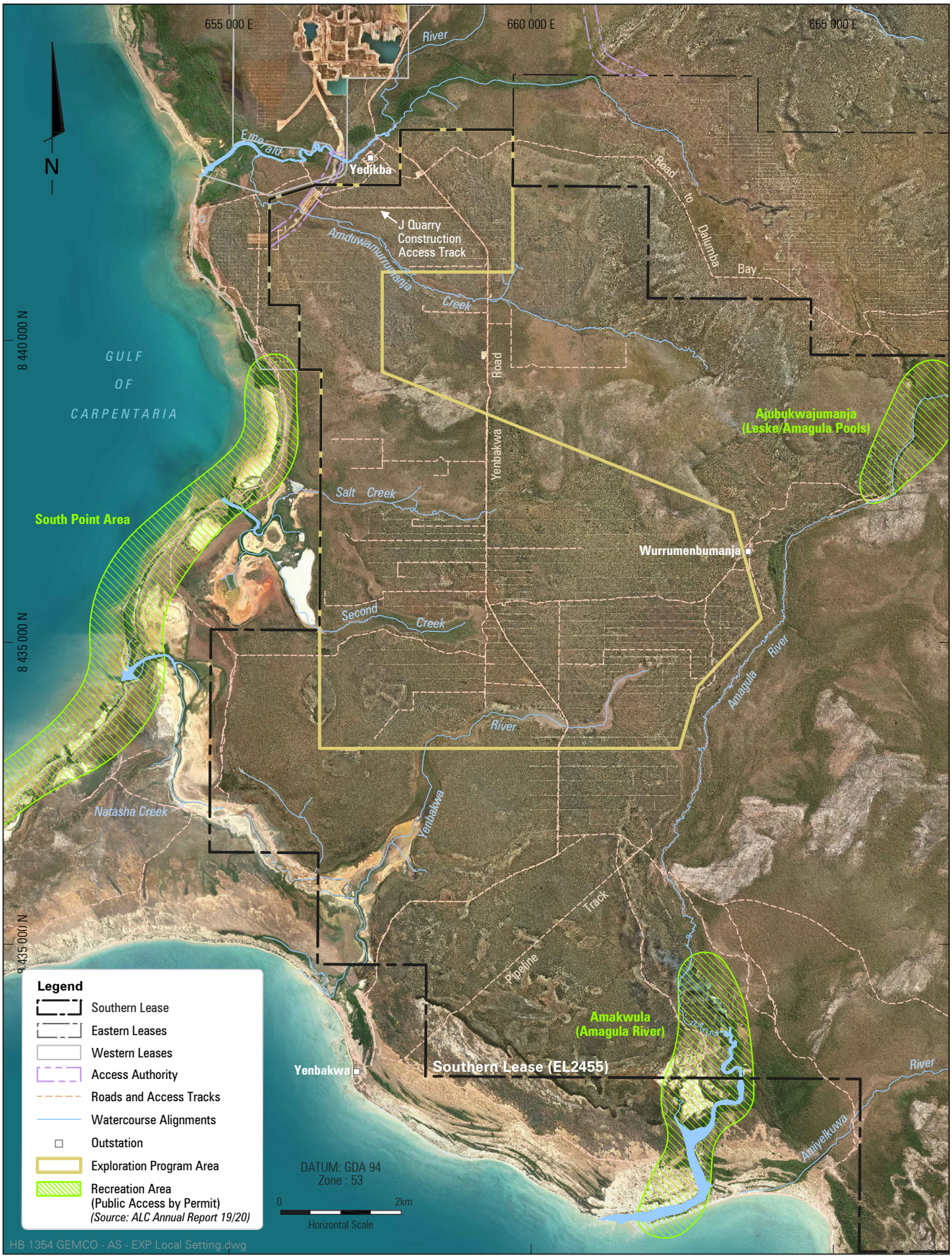
FIGURES



SOUTHERN LEASE EXPLORATION PROGRAM

Location Plan

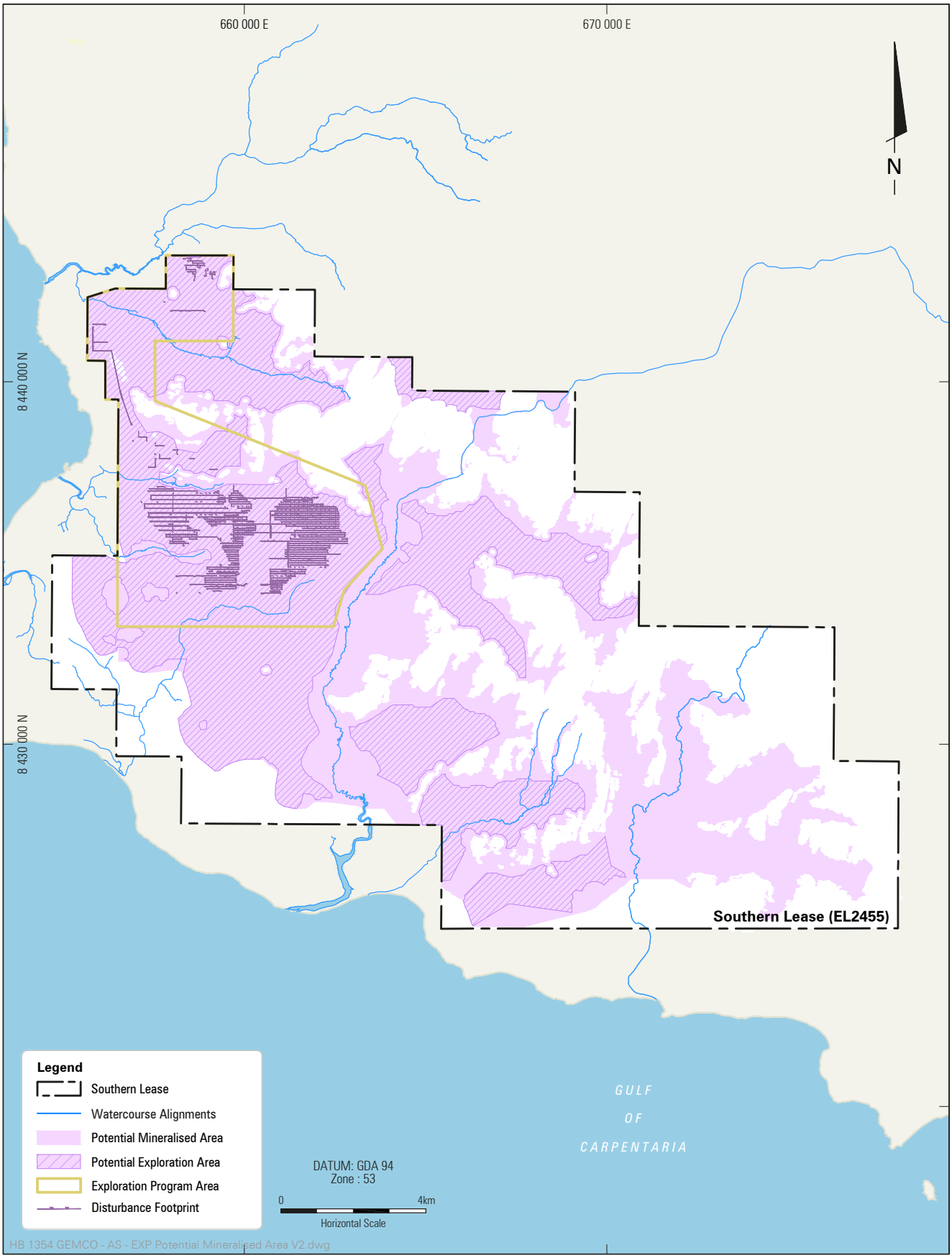
FIGURE 1



SOUTHERN LEASE EXPLORATION PROGRAM

Local Setting

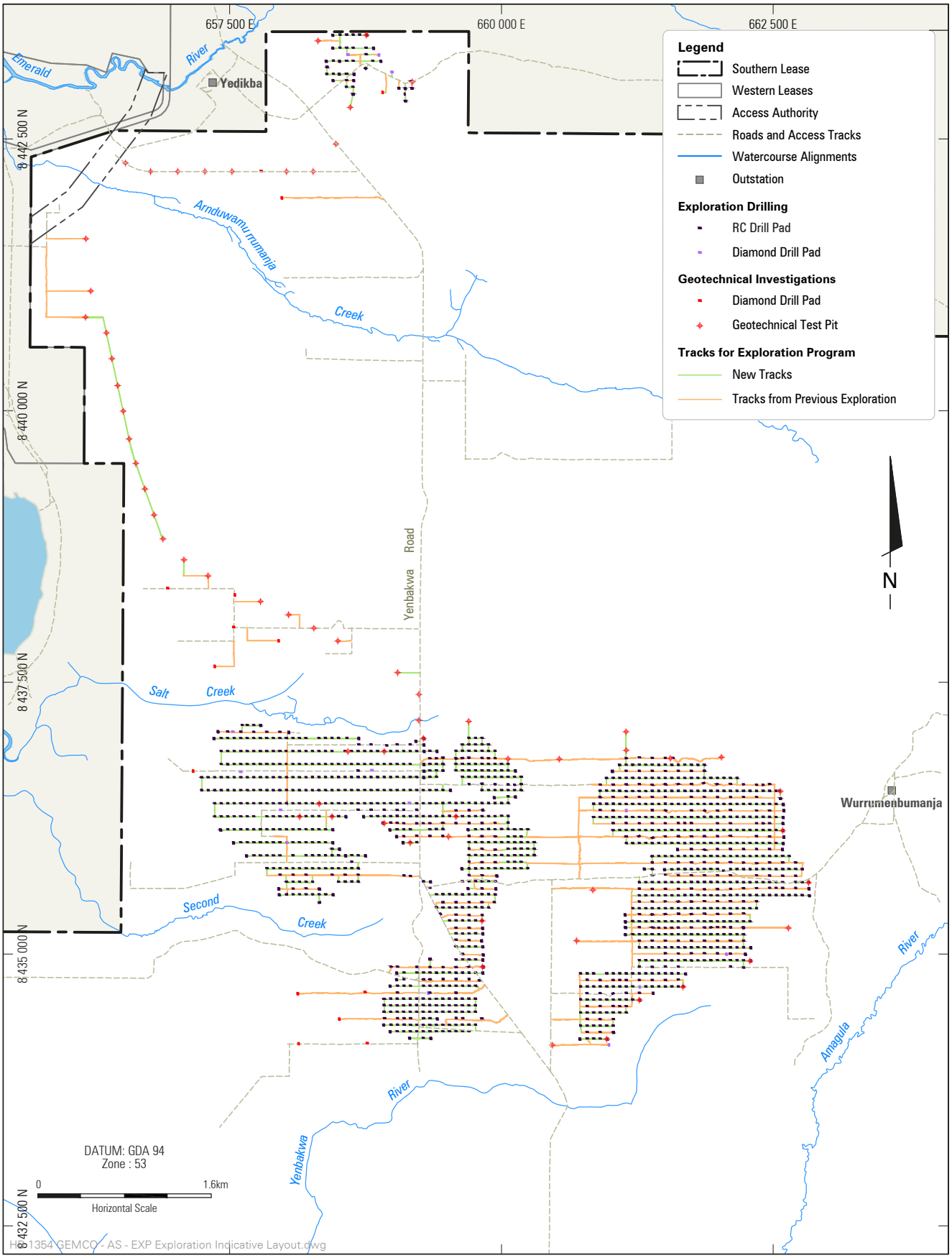
FIGURE 2



SOUTHERN LEASE EXPLORATION PROGRAM

Potential Mineralised Area

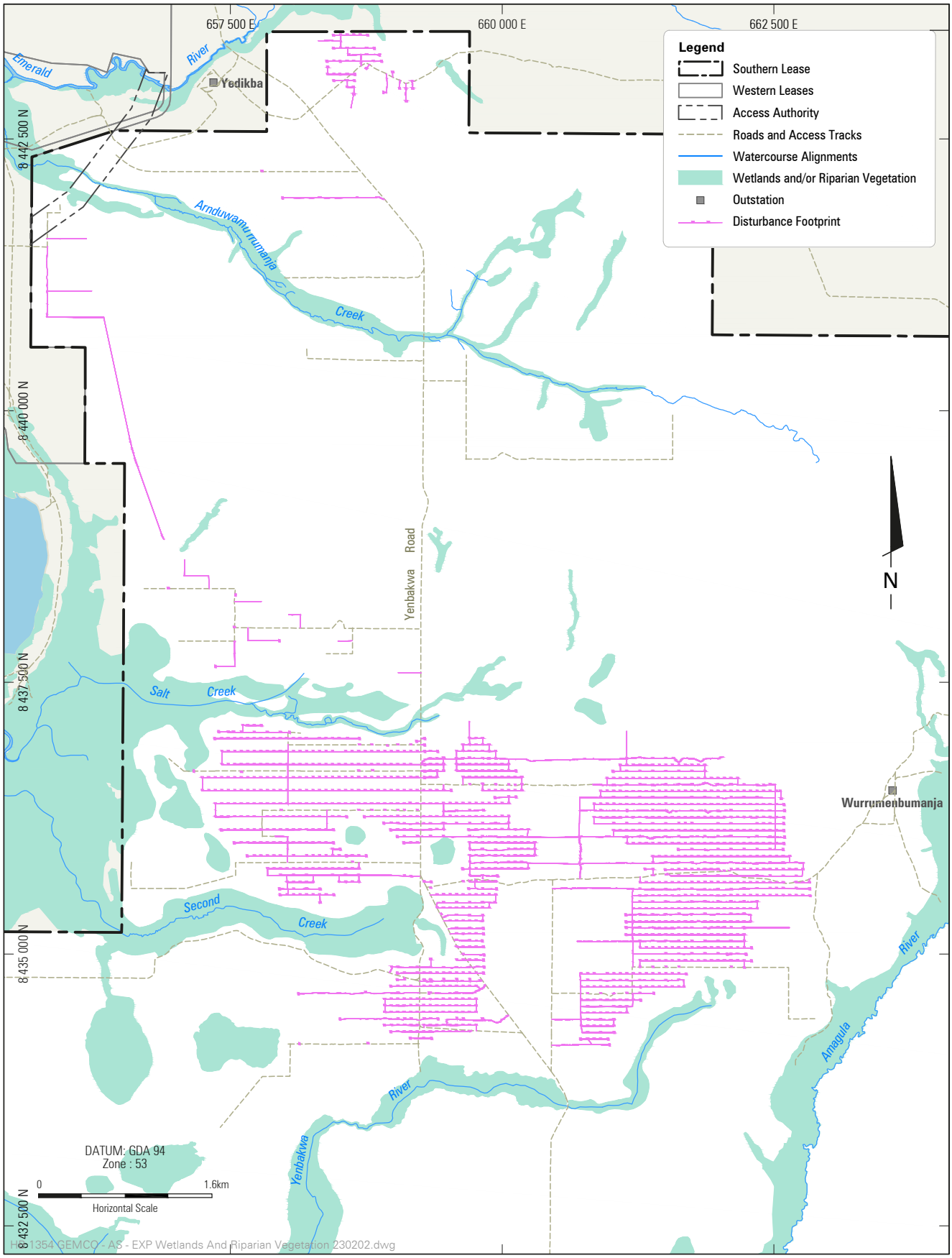
FIGURE 3



SOUTHERN LEASE EXPLORATION PROGRAM

Exploration Program (2023-2025)
Indicative Layout Plan

FIGURE 4



SOUTHERN LEASE EXPLORATION PROGRAM

Exploration Program Disturbance Footprint

FIGURE 5