BHP

Olympic Dam Smelter and Refinery Expansion Project

Environmental Impact Statement

Main Document

October 2026

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Currency

Where possible, the contents of the Olympic Dam Smelter and Refinery Expansion (SRE) Project Environmental Impact Statement (EIS) (Document) are up to date as at 14 October 2026. This was not possible where parts of the Document were prepared from information provided by third parties (as discussed below) prior to the third-party documents being finalised.

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The SRE Project EIS (Document) has been prepared for submission to the South Australian Minister for Energy and Mining (Indenture Minister) under the *Planning, Development and Infrastructure Act 2016* (SA), having regard to Clause 28 of the Olympic Dam and Stuart Shelf Indenture scheduled to the *Roxby Downs (Indenture Ratification) Act 1982* (SA) and the declaration under section 108 of the *Planning, Development and Infrastructure Act 2016* (SA) gazetted on 29 August 2024. No one other than the Minister for Energy and Mining (as the final decision maker), should rely on the information contained in this Document to make, or refrain from making, any decision. In preparing the Document, BHP Olympic Dam Corporation Pty Ltd (BHP) has relied, in part, on information provided by specialist consultants, government agencies and other third parties. BHP has not fully verified the accuracy or completeness of that information, except where expressly acknowledged in the Document.

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BHP

OD SRE EIS

Executive summary

EXECUTIVE SUMMARY

ES1 Introduction

BHP Olympic Dam Corporation Pty Ltd (BHP) is proposing to develop the Smelter and Refinery Expansion Project (SRE Project) at the Olympic Dam mining operation, located on Kokatha Country in the Far North of South Australia.

The objective of the SRE Project is to expand BHP's smelter and refinery capacity, enabling the Copper South Australia (Copper SA) growth plan by:

- increasing copper production capacity up to an average of 650,000 tonnes per annum (tpa) of total copper plus associated products from the current average production of approximately 200,000 tpa
- delivering a sustainable, highly productive, and more resilient smelting and refining flowsheet
- ensuring the copper-to-sulphur ratio (Cu:S) ratio constraint is resolved at Olympic Dam for copper concentrate production
- delivering reliable and predictable production outcomes following the 2023 acquisition of OZ Minerals' Carrapateena and Prominent Hill mining operations to realise Copper SA province opportunities.

Key elements of the SRE Project are:

- expansion of, and additions to, the existing smelter and refinery to enable total production of up to 650,000 tpa copper plus associated products, including approximately:
    - 893,000 ounces per annum of gold
    - 3,950,000 ounces per annum of silver
    - 4,900 tpa of uranium oxide – noting that the SRE Project does not materially change existing uranium production, with an increase of approximately 1% expected as a result of the leaching of Prominent Hill concentrate to remove fluoride
    - 1,700,000 to 1,900,000 tpa of 98% sulphuric acid
- introduction of two-stage smelting, involving the installation of a new primary flash-smelting furnace (FSF) to produce copper matte, providing increased concentrate smelting capacity
- conversion of the existing direct-to-blister flash furnace (DBF) to a flash-converting furnace (FCF), which would process the matte into blister
- addition of an acid plant of similar nature and scale to the existing acid plant, and subsequent upgrade of the existing acid plant
- expansion of the electrorefinery and precious-metals refinery (PMR) facilities to produce cathode copper, gold, and silver.

The SRE Project is projected to generate a net benefit to Australia of $3,195 million in present value terms, including $963 million in producer surplus, $1,730 million in company income tax, $154 million in labour surplus, and $29 million in royalties, partially offset by $200 million in externality costs. The share of these benefits attributable to South Australia is estimated at $342 million in present value terms.

The SRE Project's key elements are primarily located on the existing Special Mining Lease (SML) (Figure ES1.1). The SRE Project would require new supporting facilities, infrastructure and services, and the upgrade, removal and/or relocation of existing facilities and services within the SRE Project Area referred to as the SML Area (Figure ES1.2).

The SRE Project would utilise the existing 275 kilovolt (kV) transmission line from Davenport substation (near Port Augusta) to Olympic Dam mine, located within Clause 28 land[1]. Increased electricity loads may require isolated areas of land disturbance and associated vegetation clearance to maintain electrical clearance within designated Electricity Infrastructure Ground Re-profiling Areas (EIGR Areas). These locations are shown on Figure ES1.3.

The SRE Project would be constructed and operated in a staged manner to enable production capacity up to 650,000 tpa of total copper and associated products. The stages are as follows:

- Stage 1a: an increase of smelter throughput to approximately 1,100,000 tpa of concentrate producing an output of approximately 390,000 tpa of total copper (anticipated construction timing 2028 to 2032)
- Stage 1b: an increase in smelter throughput to approximately 1,400,000 tpa of concentrate producing an output of approximately 500,000 tpa of total copper (anticipated construction timing 2032 to 2036)
- Stage 2: an increase in smelter throughput to approximately 2,000,000 tpa of concentrate producing an output of approximately 650,000 tpa of total copper (anticipated construction timing 2036 to closure).

This Environmental Impact Statement (EIS) is seeking a decision to allow the commencement of the SRE Project under the *Planning, Development and Infrastructure Act 2016* (SA) (PDI Act).

[1] Land as described in Clause 28, *Roxby Downs (Indenture Ratification) Act 1982* (SA)

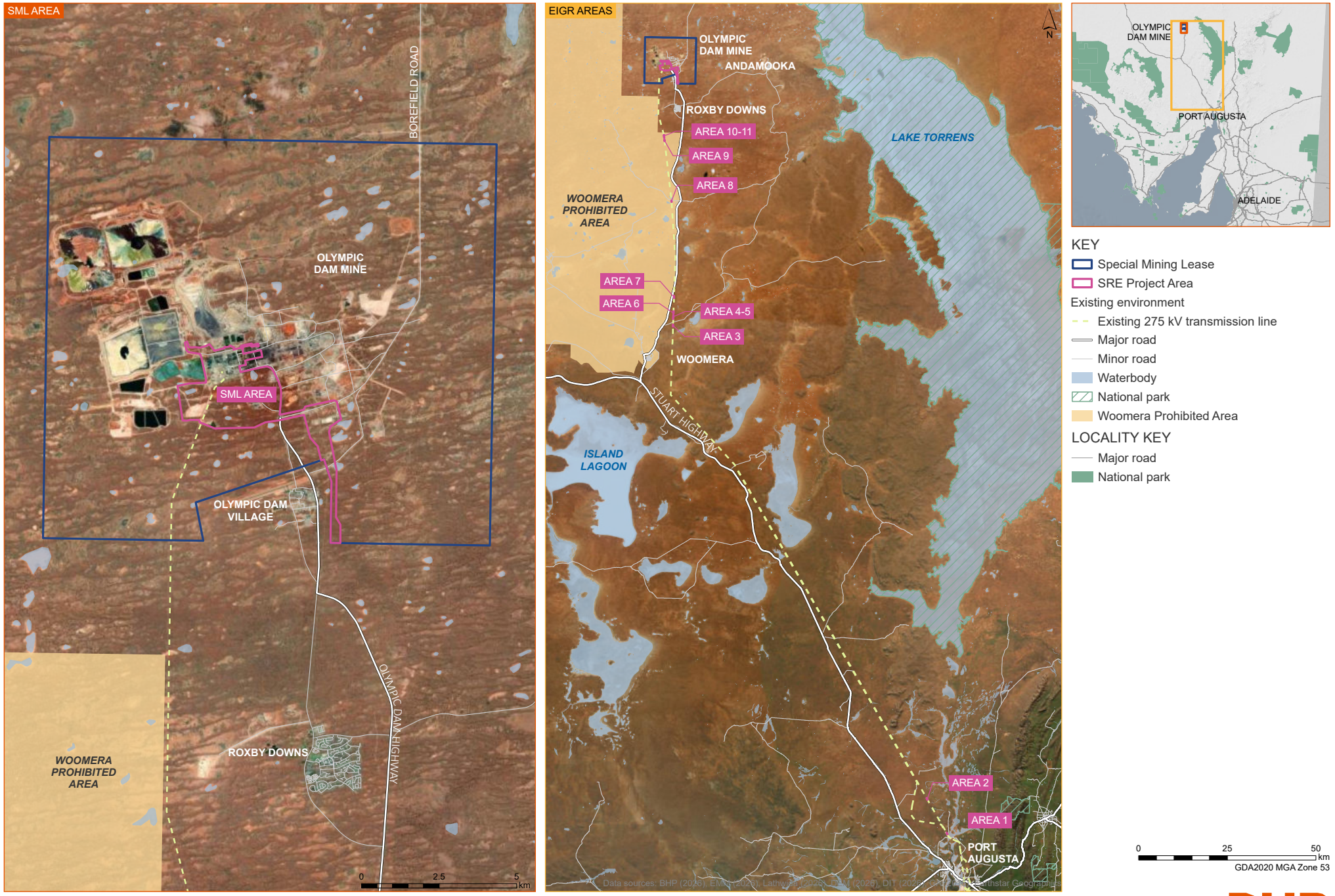


Figure ES1.1 | SRE Project location context

SRE Project BHP

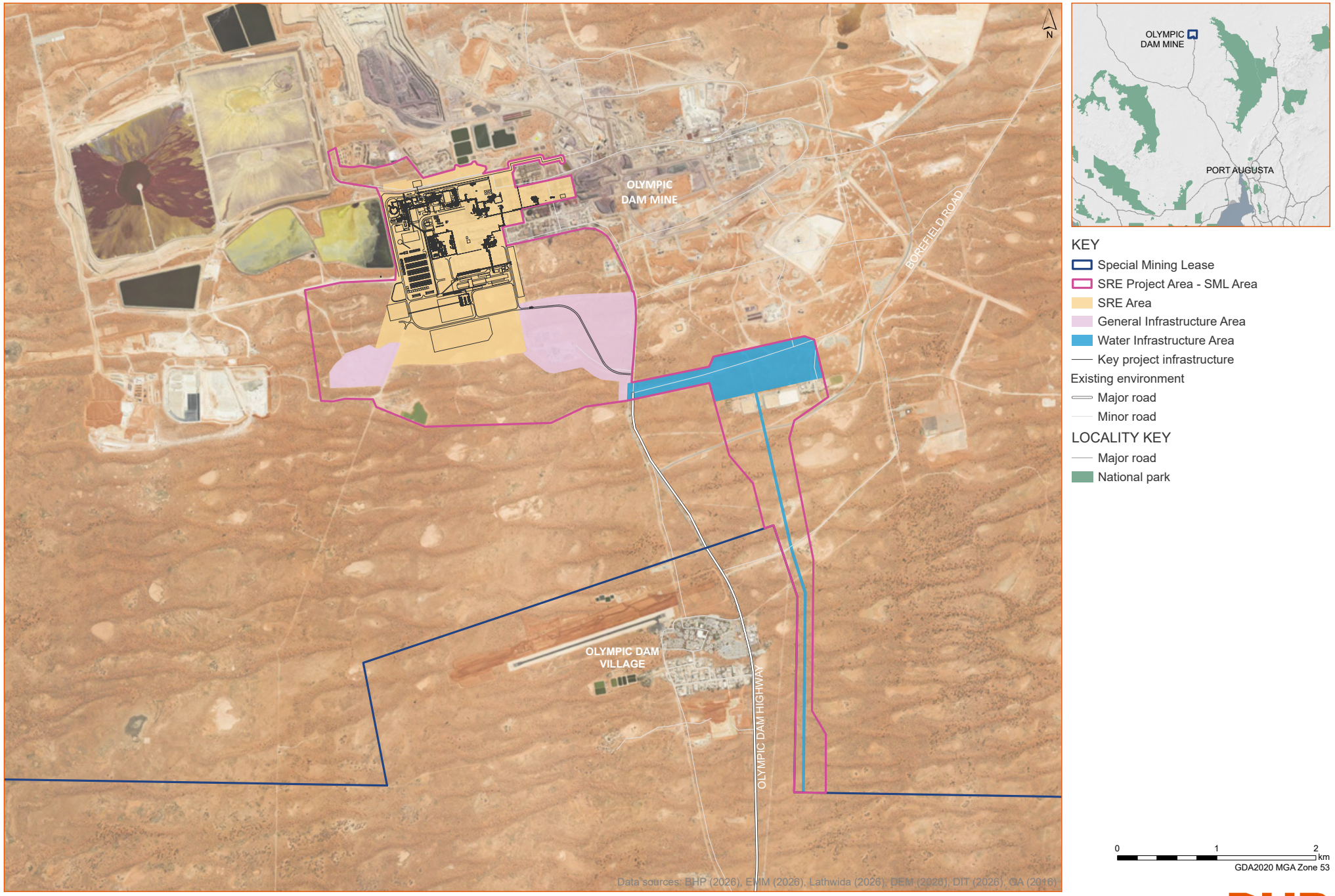


Figure ES1.2 | SRE Project Area - SML Area

SRE Project BHP

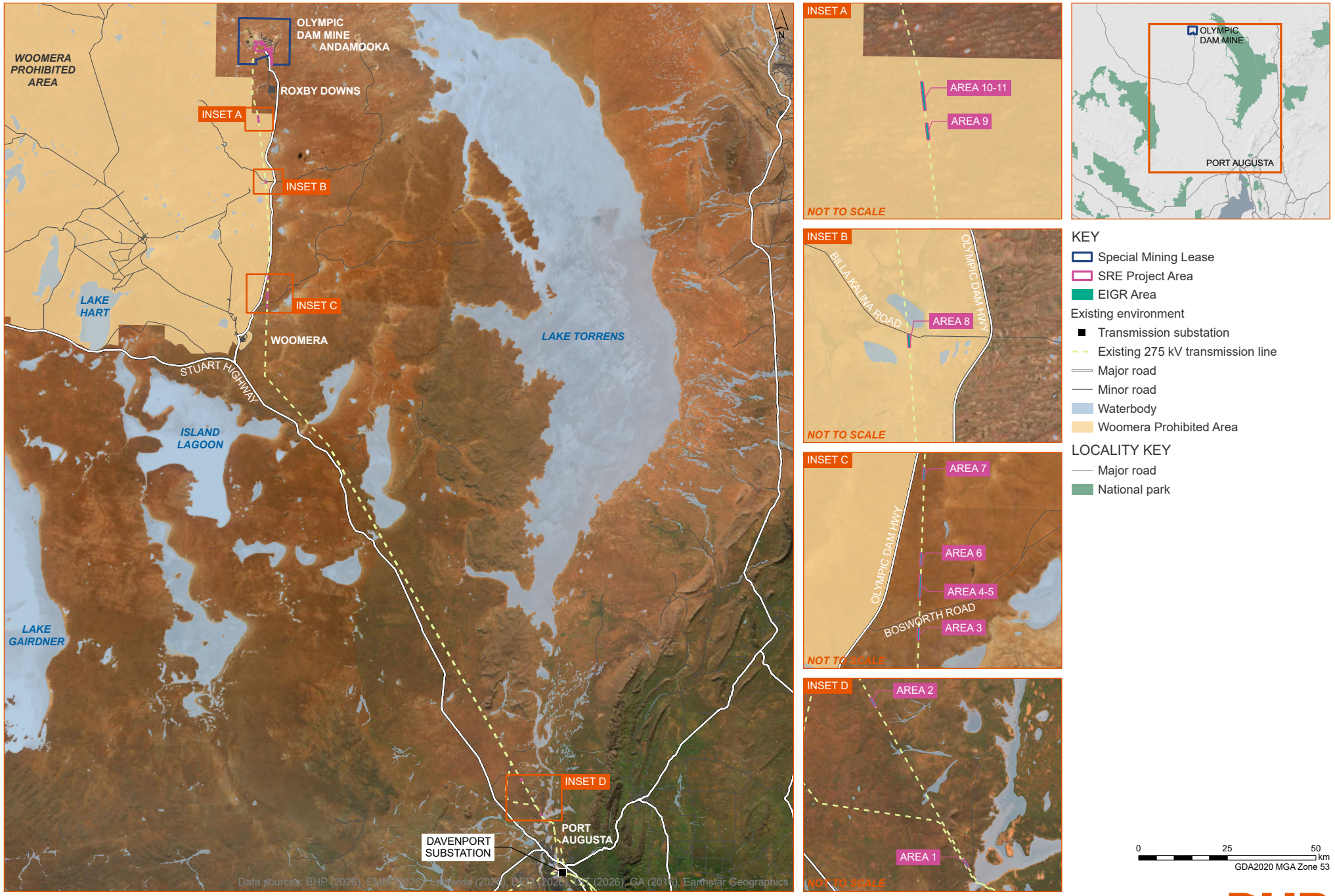


Figure ES1.3 | SRE Project Area - EIGR Areas

SRE Project BHP

ES1.1 Project context

The status of existing Olympic Dam mining and smelter operations and BHP's 2023 acquisition of additional copper assets, located on the Traditional Lands of the Kokatha People in the Far North region of South Australia provide important context and background for the objectives and key elements of proposed SRE Project.

ES1.1.1 Olympic Dam operations (existing)

ES1.1.2 Background

BHP's Olympic Dam mining operations commenced in 1988 following State and Commonwealth regulatory approval of an EIS (1982 EIS). The EIS approved underground mining and production of up to 150,000 tpa of total copper and associated products.

In 1995 an Environment Review addressed several variations to the original 1982 EIS, while an additional EIS was completed in 1997 (1997 EIS) for a phased expansion of underground mining and surface processing facilities of up to 350,000 tpa of total copper and associated products.

The 1997 EIS expansion was proposed to be completed in two phases:

- first phase – increasing mining and production up to approximately 200,000 tpa total copper and associated products
- second phase – increasing mining and production up to approximately 350,000 tpa total copper.

Since 1997, BHP has implemented the first phase and undertaken mining and processing optimisations to reliably produce the nameplate capacity of approximately 200,000 tpa total copper and associated products. The second phase expansion, considered in the 1997 EIS, was subject to potential additional assessment requirements and has not yet been implemented.

ES1.1.3 Underground mining operations

The Olympic Dam orebody resource is located approximately 300 metres (m) below the surface and continues to a depth of over 1 kilometre (km).

The existing underground mining operation uses a sub-level open stope (SLOS) mining method. The mine includes crushing stations, vertical ventilation shafts, and a materials handling system consisting of an automated rail network, hoists and declines used to transport crushed ore to the surface, where it is moved along conveyors to the processing plant.

The current smelting process has suited Olympic Dam's high (greater than 1.5) Cu:S ratio Northern Mining Area (NMA) resource since the expanded mine and surface operation was commissioned in 1998. Since 2017, mining has gradually moved away from the NMA into the Southern Mining Area (SMA).

This different part of the orebody provides a lower Cu:S ratio ore feed. Mining from higher Cu:S ratio areas in the NMA will occur for the life-of-asset, however the NMA volumes will reduce in proportion to the increase in SMA volumes over time.

Further drilling since 2021 within the SMA, and associated mineralogy studies, has confirmed that the Cu:S ratio of the smelter feed will decline as mining progresses, to a point where a change in configuration of the smelter is required to maintain the current process efficiency. This is a key driver for the proposed SRE Project.

ES1.1.4 Minerals processing operations

Olympic Dam surface infrastructure includes a processing plant comprising a concentrator, hydrometallurgical plant, smelter and refinery operations and associated infrastructure to produce final copper, uranium oxide, gold and silver products.

When the ore reaches the processing plant, it is sent to a concentrator, where it is milled, and water added to form a slurry, which is passed through a series of flotation stages to separate the minerals, producing a copper-rich concentrate and uranium-rich tailings.

The concentrate is leached in acid to remove residual fluorine and uranium to tails and produce a neutral slurry, which is dried before being fed into the smelter to produce copper anodes. The existing smelter treats high-grade copper concentrates through a single-stage DBF smelter.

The copper anodes are then processed in the refinery to produce high-purity copper cathodes. The residue from the refining process is treated separately to recover gold and silver. In the past, concentrate and/or anode copper has also been intermittently imported to the site for processing.

The tails from the concentrator pass into the hydrometallurgical plant to extract uranium, which is then precipitated from solution before being heated and dried to produce uranium oxide concentrate. The hydrometallurgical circuit includes a solvent extraction plant to selectively extract and upgrade copper from leach solutions. Tailings from the hydrometallurgical process are deposited to the tailings retention system (TRS), comprising tailings storage facility (TSF) cells and evaporation ponds, for the management of solid and liquid components of the tailings, respectively.

ES1.1.5 Copper SA province

BHP's copper commodity strategy is focused on both organic growth from existing assets, including implementation of innovation and technology initiatives, and discovering, acquiring and developing resources to significantly increase copper production by 2040.

BHP's Copper SA province includes the Olympic Dam mine, Carrapateena mine, Prominent Hill mine and Oak Dam exploration sites (Figure ES1.4). Copper SA has a mineral resource base of approximately 14.1 billion tonnes (Bt), with a contained 101.8 million tonnes (Mt) of copper metal. This resource base presents potentially attractive economic returns, with provincial-scale synergies, through multiple mines and resource opportunities to supply copper concentrate into a single smelting and refining facility at Olympic Dam.

As part of the establishment of the Copper SA province, the SRE Project would enable Olympic Dam to receive, blend and smelt copper concentrates from Carrapateena and Prominent Hill mining operations. The Oak Dam advanced exploration site is also a potential future source of copper, should it progress into a mining operation. The SRE Project may also provide the capacity to receive copper concentrate from other third-party suppliers. Copper concentrate feed sources, which Olympic Dam would be able to receive due to the SRE Project, are illustrated in Figure ES1.4.

Copper SA copper production was 316,000 tonnes (t) in the financial year FY25. The SRE Project, as a component of the Copper SA growth plan, has the potential to increase copper production capacity to up to 650,000 tpa of total copper plus associated products.

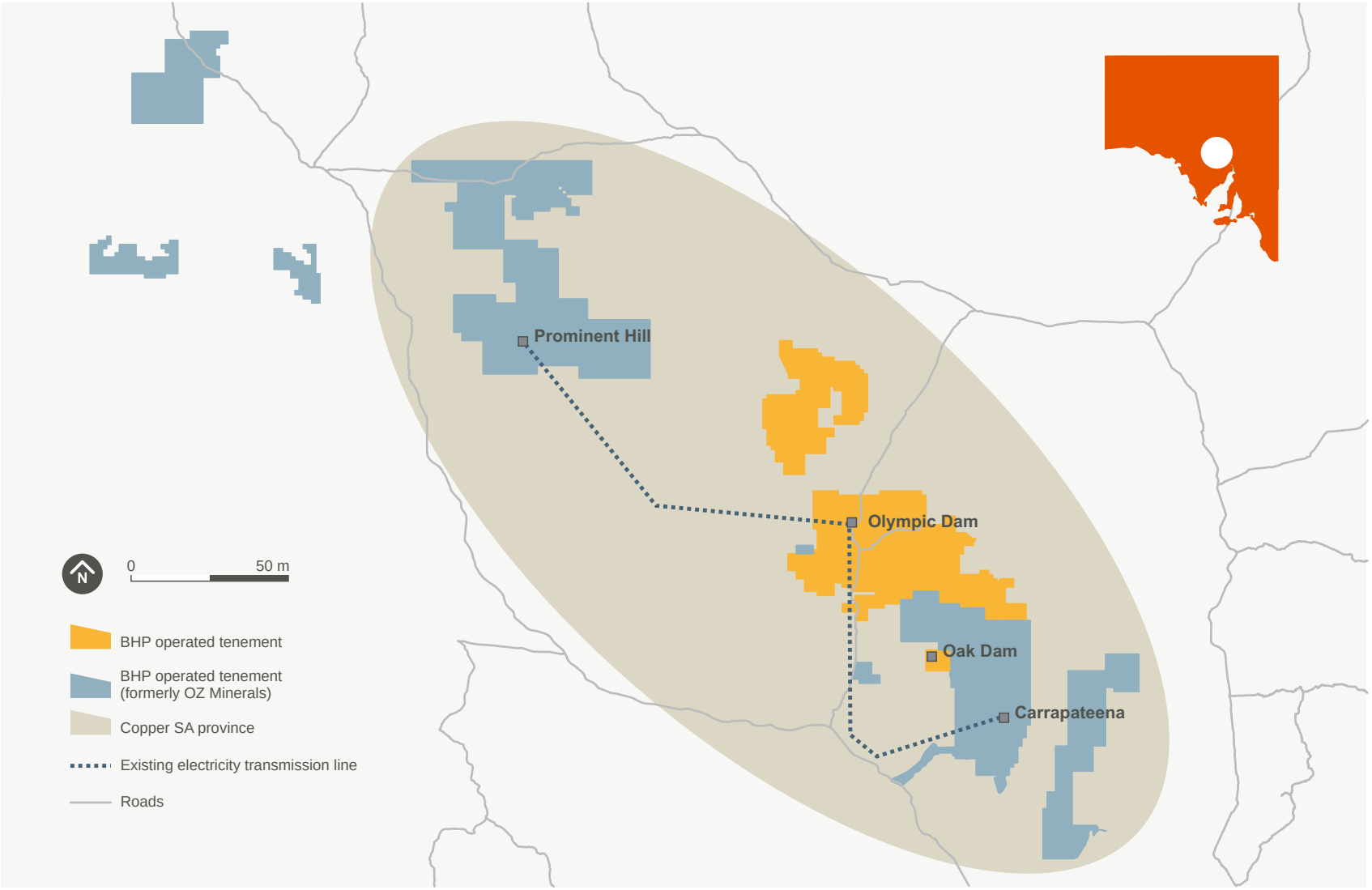


Figure ES1.4 | Copper SA province

ES1.2 Approval pathway

ES1.2.1 *Planning, Development and Infrastructure Act 2016* (SA)

The SRE Project was declared an 'impact assessed development' pursuant to section 108(1)(c) and 108(7) of the PDI Act on 26 August 2024. Impact assessed development is the most rigorous level of development assessment prescribed under the PDI Act. The declaration reflects the nature, scale and significance of the SRE Project to South Australia.

Specifically, the Minister for Energy and Mining (the Indenture Minister) made the following declaration:

> *Pursuant to Section 108(1)(c) and Section 108(7) of the Planning Development and Infrastructure Act 2016, having taken into account those principles prescribed under Regulation 27(2) of the Planning, Development and Infrastructure (General) Regulations 2017 (the Regulations) and having given consideration to the matters under Regulation 27(3) of the Regulations, I declare that all development of a kind specified in the Schedule to this Notice, to the extent that it is undertaken on land identified in Clause 28(1) of the Indenture as impact assessed development and that references to "development" include a project.*

The majority of SRE Project's key elements (Section ES1.1) are located within the existing SML but does not include the following activities, which are subject to separate regulation and approval:

- business-as-usual (BAU) operations, which are operations and activities which enable production of up to the approved total copper production (approximately 200,000 tpa), or
- activities associated with BHP's scheduled campaign maintenance 2027 (SCM27) shutdown.

The SRE Project may also be supported by low impact development outside the SML, which could include, for example, minor road works and upgrades to accommodation infrastructure. It is proposed that any approvals required for these activities would be sought on an as-needs basis, meeting the requirements of the respective legislation, standards and guidelines.

To meet the requirements of an impact assessed development, the Assessment Requirements for the SRE Project EIS (Assessment Requirements), dated September 2025, were published by the Department for Housing and Urban Development (DHUD) on the PlanSA website on 5 November 2025.

Since the Assessment Requirements were prepared in September 2025, the following minor project changes have occurred during the ongoing engineering design for the SRE Project:

- Increased smelter throughput to approximately 2,000,000 tpa of concentrate (from 1,700,000 tpa) to enable resolution of the copper-to-sulphur ratio and production capacity up to 650,000 tpa of total copper.
- Optimised capital investment by constructing and operating the SRE Project in a staged manner via Stage 1a (new), Stage 1b (new) and Stage 2.
- Inclusion of an option to leach other third-party concentrates to remove deleterious elements (e.g. fluorides) prior to smelter feed preparation.
- Upgrade of the existing slag concentrator circuit within the existing (brownfields) processing plant footprint and the development of an interim slag stockpile to support the slag concentrator operations during Stage 1a.
- Minor process flow revisions designed to optimise production and aid efficiencies, none of which require additional vegetation or habitat disturbance or result in increased emissions or other waste generation.

- Increased raw water demand, from 10 ML/d to approximately 16 ML/d, to be supplied by the Government of South Australia, via the Department for Infrastructure and Transport (DIT) Northern Water Project (NWP)[2].
- Changes to the construction and operation workforce profile to reflect the staged manner of development.
- Changes to the SRE Project Area to include the whole of the existing (brownfields) processing plant to allow for upgrades to infrastructure and equipment within these areas as necessary to support the SRE Project (e.g. development of a brownfield slag concentrator) and inclusion of a stormwater overflow pipeline corridor. These changes do not result in additional native vegetation clearance or habitat disturbance.

Key differences between the SRE Project initial project description, from the April 2025 Scoping Application, and the description of the project presented in the SRE Project EIS, have been reviewed against the Assessment Requirements. The review, which has been discussed and provided to the Government of South Australia, indicated that the issued EIS Assessment Requirements remain adequate for the characterisation of potential SRE Project impacts.

ES1.2.2 *Roxby Downs (Indenture Ratification) Act 1982* (SA)

The Olympic Dam mine operates under the Olympic Dam and Stuart Shelf Indenture (Indenture), ratified by the *Roxby Downs (Indenture Ratification) Act 1982* (SA) (Ratification Act) by the Government of South Australia in 1982 and most recently amended in 2026.

Under the provisions of the Indenture the South Australian Minister for Energy and Mining must adopt the provisions contained in Part 7 of the PDI Act. Under the Indenture, the Minister for Energy and Mining made a declaration on 26 August 2024 that the SRE Project is to be assessed as an 'impact assessed development' requiring the preparation and submission of an EIS. The Minister for Energy and Mining adopts the role of the State Planning Commission (SPC) in developing the Assessment Requirements and is the responsible decision-maker under the Government of South Australia's process.

ES1.2.3 *Environment Protection and Biodiversity Conservation Act 1999* (Cth)

The SRE Project was referred to Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) on 23 December 2024 (EPBC 2024/10096) and determined to be not a controlled action via a Decision Notice on 29 April 2025. The referral and not controlled action determination considered all potential impacts to MNES protected under the EPBC Act.

Since the EPBC Referral determination in April 2025, minor project changes have occurred during development of the SRE Project (described in ES1.2.1). Key differences between the SRE Project as referred, and the minor project changes have been considered by undertaking an EPBC Act Significant Impact Assessment/Self-Assessment in accordance with the EPBC Act, EPBC Regulations, and Significant Impact Assessment Guidelines 1.1.

Assessment of these changes, with respect to the potential for significant impacts to matters of national environmental significance (MNES) and, where relevant, the whole-of-the-environment, demonstrated that the changes do not materially change the impact profile of the referred SRE Project and do not change the conclusion that the SRE Project is unlikely to have a significant impact on MNES.

The EPBC Act Significant Impact Assessment/Self-Assessment was discussed and provided to DCCEEW.

[2] Under the EPBC Act the Department for Infrastructure and Transport are the proponent for the Northern Water Desalination Plant and Water Transfer System Infrastructure Project (EPBC 2025/10397)

ES1.2.4 *Native Vegetation Act 1991* (SA)

The SRE Project would require some clearance of remnant native vegetation. As part of the assessment of the SRE Project, the Native Vegetation Council (NVC) would be provided with an opportunity to comment on this EIS, related to:

- whether the proposed development avoids or minimises clearance as far as practicable
- whether there are alternatives that involve no clearance, less clearance or clearance of more degraded vegetation than the vegetation proposed to be cleared
- determining the significant environmental benefit (SEB) required to offset the impact of clearance.

Where possible, infrastructure would be strategically placed to minimise vegetation clearance, however, where avoidance is not possible, an SEB offset would be required to lead to long-term increase in biodiversity values in the local area. BHP would determine the proposed SEB option(s) in consultation with the NVC, which may include the expansion of existing on-ground offset areas (e.g. the existing Emerald Springs SEB area established on Stuart Creek Station in Far North South Australia).

ES1.2.5 Aboriginal heritage

Aboriginal heritage management activities associated with the Olympic Dam operations are primarily undertaken pursuant to the Indenture, the Ratification Act and the Olympic Dam Agreement (ODA). Historical approvals for Olympic Dam have included authorisations obtained under the *Aboriginal Heritage Act 1979* (SA) (AH Act 1979), which applies to Olympic Dam's operations within the Olympic Dam and Stuart Shelf Areas under the Indenture and Ratification Act.

The SRE Project has been designed, assessed and consulted on having regard to both the existing heritage management arrangements applicable to Olympic Dam and the contemporary Aboriginal heritage protection framework in South Australia.

The *Aboriginal Heritage Act 1988* (SA) (AH Act 1988) provides protection for Aboriginal sites, objects and remains in South Australia. The AH Act 1988 currently applies to activities undertaken outside the legislated Olympic Dam and Stuart Shelf Areas and to activities otherwise required by law to be undertaken in accordance with that Act.

Accordingly, for activities proposed within the SML and the EIGR Areas, BHP will continue to comply with the ODA, applicable legislation, approved heritage management procedures and any heritage approvals or authorisations required at the time the activity is undertaken. Where an activity cannot avoid potential impacts to Aboriginal heritage values, BHP will determine the appropriate authorisation pathway in consultation with Traditional Owners and the Government of South Australia, having regard to the legislative framework then in force.

For activities proposed outside of the Olympic Dam and Stuart Shelf Areas, including in EIGR Areas outside of these areas, these will be undertaken in accordance with the requirements of the AH Act 1988 and any authorisations required under that Act.

No construction activity that has the potential to disturb Aboriginal heritage values will occur unless the necessary heritage assessments, consultation processes and approvals or authorisations have first been completed.

ES1.2.6 *Native Title Act 1993* (Cth)

The *Native Title Act 1993* (Cth) (Native Title Act) recognises and protects Native Title, being the rights and interests in land and waters that Aboriginal and Torres Strait Islanders have under their traditional laws and customs.

Under the Native Title Act, Native Title is extinguished by various tenures, including freehold land and gazetted public roads. As the SRE Project Area is located within the SML (SML Area), which overlaps freehold title held by BHP, and within freehold Clause 28 land (EIGR Areas), there are no legal Native Title Act implications associated with the SRE Project.

ES1.3 Project description

In order to maintain consistency throughout this EIS, the following terminology related to project infrastructure has been defined for the SRE Project, where the **SRE Project Area** (Figure ES1.1) is defined as the boundary around the SRE Project for which BHP is seeking approval, including:

- **SML Area**, located within the SML, which is further delineated by the following areas (Figure ES1.2):
  - **SRE Area**: the extent of the proposed SRE Project infrastructure required for construction and operation of the SRE Project within the SML. Includes the existing brownfield plant area, proposed facility relocation(s), proposed plant and laydown areas.
  - **General Infrastructure Area**: the extent of the proposed ancillary infrastructure and ancillary activities required for construction and operation within the SML. Includes the proposed infrastructure laydown areas, proposed stormwater dam location, proposed topsoil and subsoil storage areas.
  - **Water Infrastructure Area**: the extent of the proposed water infrastructure and ancillary activities required for construction and operation within the SML. Includes the proposed water pipeline and water storage dam locations.
- **EIGR Areas**: the extent of the isolated proposed vegetation disturbance required to maintain regulatory clearance distances between the 275 kV transmission line and the ground surface within Clause 28 land (Figure ES1.3).

The key characteristics of the SRE Project are summarised in Table ES1.1.

Table ES1.1 | Key characteristics of the SRE Project

Project element	Summary
SRE Project activities and infrastructure	
Smelter and refinery expansion and additions	Expansion of, and additions to, the existing smelter and refinery to enable production of up to 650,000 tpa copper plus associated products (gold, silver and acid). This would include: • a new concentrate handling and blending facility • additional concentrate leach capacity • upgrade and expansion of the existing smelter feed preparation • installation of a new primary FSF to produce copper matte and conversion of the existing DBF to a FCF to convert matte to blister, including matte handling and grinding infrastructure and additional anode furnace and anode casting infrastructure • upgrade of the existing slag concentrator circuit and subsequent development of a new slag concentrator circuit • new off-gas management infrastructure, including additional gas and dust handling equipment • a new acid plant and upgrade of the existing acid plant, and the addition of a new acid export facility • a new oxygen plant and expansion of existing oxygen plant capacities • a new electrorefinery, associated anode preparation infrastructure and slimes handling infrastructure • expansion of the PMR facility • slag stockpile and treatment.
Electricity demand, supply and distribution	An electricity demand of up to 68 megavolt-amperes (MVA) net load increase would be required for the SRE Project. The additional electrical demand due to the SRE Project would be met by capacity from the national grid via the existing 275 kV transmission line (noting potential for below-line land disturbance and associated vegetation clearance outside of the SML). Minor augmentation of existing onsite electricity supply infrastructure at Olympic Dam within the SML would be required to ensure the additional capacity could be achieved and maintained. New high voltage and low voltage power supply and reticulation infrastructure would be required to all smelter infrastructure on the SML.
Water demand	Water demand of between 2 and 16 megalitres per day (ML/d) is required for the SRE Project in addition to the existing supply for current operations.
Water supply and distribution	The SRE Project proposes no additional water abstraction from the Great Artesian Basin (GAB) above daily average BAU volumes. Water supply for the SRE Project would nominally be provided from the DIT NWP infrastructure, following commissioning of the initial 90 ML/d capacity of the NWP. This would require new water storage and distribution infrastructure to connect the SRE Project to the NWP connection point at the SML boundary. The NWP water supply may be supplemented or offset by the provision of local groundwater supply on the SML. This water supply would occur via existing process storage dams, the desalination plant at the Olympic Dam site, and/or through the distribution of the existing water supply within daily average BAU volumes. The additional water supplies are likely to require augmentation of the existing desalination water treatment plant and water distribution network, and a demineralised water plant would be required to support the SRE Project operations.

Project element	Summary
Supporting infrastructure	Supporting infrastructure includes: • civil infrastructure works, such as roads and stormwater infrastructure • new offices and crib rooms • new workshops • new laydown areas • process control system upgrades • concrete batching • other supporting infrastructure as required to facilitate the implementation and operation of the SRE Project.
Waste management	Development of the SRE Project may require decommissioning of the existing processing plant components including dryers, the electric furnace and the existing concentrate storage and transfer system. Some of the decommissioned infrastructure would be retained in-situ to preserve operational flexibility or for future management under the site Closure and Rehabilitation Management Plan, however some elements may require disposal as a component of the SRE Project. Waste generated during construction would be managed as follows: • where practicable, demolition materials would be removed from site and recycled • materials not suitable for removal from site would be managed on the SML via existing waste management facilities. All waste generated from construction of the SRE Project would be managed in accordance with existing site procedures and approved management plans. Operational wastes associated with the SRE Project consist of processing and non-processing wastes where: • processing wastes are limited to low-copper slags generated from the smelting and slag concentrator operations that are not suitable for reprocessing and effluent streams from various process operations that are directed to tailings, including from the PMR and smelter off-gas systems • non-processing wastes including reagent packaging wastes and operational consumables.

<table>
<tr><th>Project element</th><th>Summary</th></tr>
<tr><td>Workforce</td><td>100% fly-in/fly-out (FIFO) workforce is assumed for construction and the SRE Project operational workforce. Estimated peak construction workforce numbers (in full time equivalents (FTE)) are summarised below.
<table>
<tr><th>Construction stage</th><th>Average FTE</th><th>Peak FTE</th></tr>
<tr><td>Stage 1a</td><td>~708</td><td>~1,313</td></tr>
<tr><td>Stage 1b</td><td>~260</td><td>~515</td></tr>
<tr><td>Stage 2</td><td>~519</td><td>~978</td></tr>
</table>
Following construction, the SRE Project would require a permanent operational workforce summarised below.
<table>
<tr><th>Operational stage</th><th>Additional SRE Project operational workforce</th><th>Total Olympic Dam smelter and refinery workforce</th></tr>
<tr><td>Stage 1a</td><td>~207</td><td>~766</td></tr>
<tr><td>Stage 1b</td><td>~57 (additional to Stage 1a)</td><td>~823</td></tr>
<tr><td>Stage 2</td><td>~244 (additional to Stage 1b)</td><td>~1,067</td></tr>
</table>
SRE Project construction and operational workforce is proposed to utilise existing and new accommodation to be established by BHP for the SCM27 shutdown, Olympic Dam future campaign maintenance accommodation, and/or greenfield accommodation (subject to separate approvals).</td></tr>
<tr><td>Concentrate import</td><td>Import of copper concentrate from Prominent Hill and Carrapateena mining operations, as well as possible future mining operations (e.g. Oak Dam), and maintain the ability to receive copper concentrate from other third-party suppliers.
Prominent Hill concentrate may be passed through concentrate leach to remove fluorides prior to smelter feed preparation. Carrapateena concentrate is expected to pass directly to smelter feed preparation. Other, third-party concentrates may be passed through concentrate leach to remove deleterious elements (e.g. fluorides) prior to smelter feed preparation as required.</td></tr>
<tr><td>Production and export</td><td>Total production volumes of up to:
~650,000 tpa of cathode copper
~893,000 ounces per annum of gold
~3,950,000 ounces per annum of silver
~4,900 tpa of uranium oxide concentrate; note that the SRE Project does not materially change existing uranium production, with an increase of approximately 1% expected as a result of the leaching of Prominent Hill concentrate to remove fluoride. No upgrade or modification of uranium production facilities is proposed as a part of the SRE Project.
~1,700,000 – 1,900,000 tpa of 98% sulphuric acid of which up to approximately 810,000 tpa may be exported from Olympic Dam (i.e. operations become net sulphuric acid producer).</td></tr>
</table>

ES1.4 Benefits of the SRE Project

ES1.4.1 Benefits for local and regional communities

BHP is committed to maximising economic benefits for the region wherever possible. The SRE Project would contribute to this by:

- directly employing or contracting up to approximately 1,313 people during peak construction, and up to approximately 508 additional SRE Project workforce during operation, indirectly contributing to the South Australian economy
- supporting outcomes for Traditional Owners and Indigenous people though employment and procurement opportunities
- increasing the net benefits of local employment, defined as the additional employment income in excess of average wages in the local Outback SA – North and East region, by between $1 million to $4 million a year over the life of the project
- supporting ongoing non-labour expenditure to the local Outback SA – North and East region, such as materials and equipment, fuel and utilities, estimated to be $66 million a year during construction and $39 million a year during operations
- providing value-add regional processing which supports increasing South Australia's economic complexity
- provisioning capital expenditure for infrastructure, plant and equipment, a proportion of which would be sourced from local and regional providers.

In addition, BHP would continue with regional community events, training and education programs established to support the existing Olympic Dam operations. These programs would assist in up-skilling Indigenous and local communities and providing employment opportunities that would help maintain regional populations.

ES1.4.2 Benefits for South Australia

The SRE Project is expected to have positive economic benefits for the local, regional and state economies with direct and indirect benefits including:

- Increased labour force participation, indirectly enhancing socio-economic wellbeing of individuals and communities.
- Strengthening of the regional economy through contribution to Gross Regional Product (GRP) and to the State, indirectly supporting economic diversification and providing greater resilience to economic downturns.
- Increased economic productivity and prosperity for local and regional businesses (e.g. civil and engineering construction, professional, technical and scientific services, freight and logistics) due to increased demand for goods and services, indirectly leading to potential generation of further employment opportunities.
- Increased social capital due to population retention or growth driven by SRE Project employment and business opportunities, indirectly contributing to improved community cohesion and connectedness and enhanced community vitality.

ES1.5 Partnerships and community engagement

BHP's approach to partnerships and community engagement aligns with BHP's partnering approach, the Better Together engagement principles, and State Planning Commission Community Engagement Charter, which applies in circumstances where consultation is required on an Impact Assessed development application that is subject to an EIS.

BHP uses informative and inclusive practices to support maintaining and enhancement of partnership and community interest and confidence. BHP's engagement approach is underpinned by BHP's Indigenous People policy and working with partners and stakeholders to ensure their needs, views and concerns are heard and documented.

During the preparation of this EIS, BHP has undertaken engagement and will continue to undertake engagement with the following key partners:

- Kokatha Aboriginal Corporation as the Registered Native Title Body Corporate
- Native Title Party Representative Corporation (NTPRC)
- local communities
- local government entities
- local business community and industry bodies
- government authorities and boards with local interests
- environmental interest groups
- Copper SA employees and contractors.

The Indenture Minister will place this EIS on public exhibition for a period of at least 30 business days. The public exhibition process is the government's formal consultation with partners, providing an opportunity for all interested parties to read about the SRE Project and submit feedback to both the regulatory authorities and BHP regarding the SRE Project.

During the public exhibition phase, BHP propose to hold in-person and online information sessions regarding the SRE Project.

ES2 Assessment of potential environmental impacts

ES2.1 Impact assessment methodology

Relevant to the SRE Project, Section 113(4) of the PDI Act requires that an EIS must include a statement of:

- the expected environmental, social and economic effects of the development
- the expected effects of the development on the climate and any proposed measures designed to mitigate or address those effects
- the extent to which the expected effects of the development are consistent with the provisions of any relevant state planning policy, regional plan, the Planning and Design Code, and any matters prescribed by the regulations
- the extent to which the expected effects of the development are consistent with the *Environment Protection Act 1993* (SA) (EP Act)
- commitments to avoid, mitigate or satisfactorily manage and control any potentially adverse effects of the development on the environment.

BHP has developed an Environmental Impact Assessment Framework (EIAF) to identify and, wherever possible, quantify, the potential environmental and social impacts associated with the SRE Project in a consistent and repeatable manner, ensuring community feedback and knowledge is embedded. The SRE Project EIAF has been used to inform the preparation of this EIS.

The EIAF provides a systematic approach to identify and evaluate potential environmental and social impacts associated with the SRE Project through the project life cycle (construction, operations and closure) in a consistent, repeatable and transparent manner, ensuring community feedback and knowledge is embedded. This allows focus on the appropriate avoidance, mitigation and management measures to meet the environmental objectives.

The EIAF is used to:

- determine which combinations of sources and pathways are likely to result in impacts to receptors
- make consistent and repeatable determinations of the impact to receptors across multiple pathways
- understand the uncertainties, and resultant sensitivities, associated with the determination of impact
- allow consideration of perspectives that arise from stakeholder consultation about the SRE Project activities and the potential for impacts
- determine where controls, if any, are required to reduce impacts to as low as reasonably practicable (ALARP) in accordance with a mitigation hierarchy.

The SRE Project EIAF is summarised in Figure ES1.5.

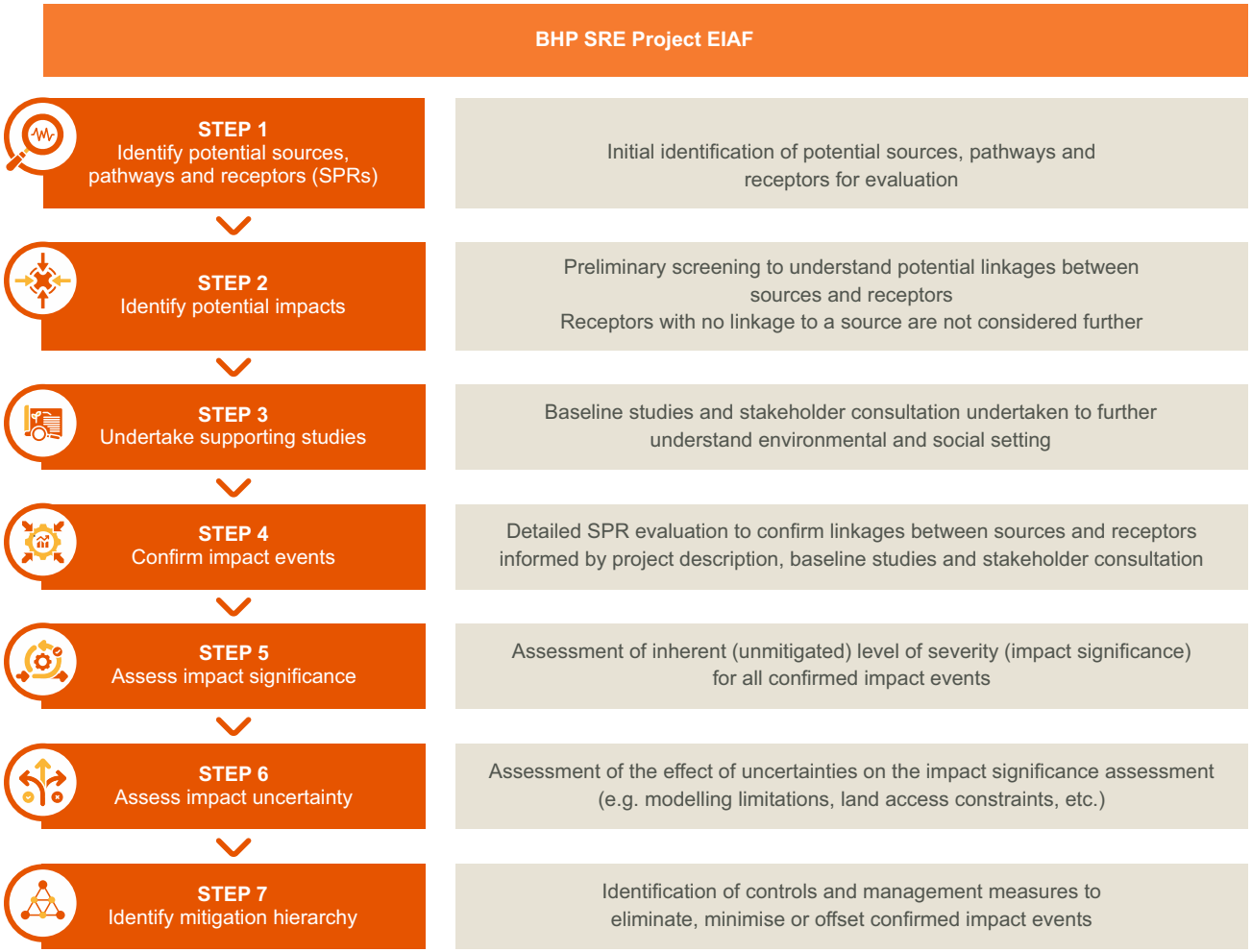


Figure ES1.5 | Environmental Impact Assessment Framework

ES2.1.1 Identification of sources, pathways and receptors

An evaluation is undertaken for initial identification of potential source-pathway-receptors (SPRs) for the SRE Project (Step 1, Figure ES1.5). The identified sources, pathways and receptors for the SRE Project are described as Table ES1.2.

Table ES1.2 | Sources, pathways and receptors under the EIAF

Element	Description
Sources	All proposed SRE Project activities or actions, in whole or in part, and categorised by the timeframe at which the activity or action would be undertaken (i.e. construction, operation, and closure). This includes: • actual and reasonably foreseeable activities under BHP control (i.e. construction, operation, and closure) • associated activities that are essential for the SRE Project, but may not be directly owned, operated or managed by BHP • actual and reasonably foreseeable activities of others that may materially contribute to the severity of the impacts
Pathways	Air – air quality, noise, vibration, light, radiation and greenhouse gases (GHG)
	Surface water – quality and quantity
	Groundwater – quality and quantity
	Land – quality
	Socio-economic – infrastructure, economy
Receptors	Ecology – terrestrial flora (including vegetation) and fauna (including habitat), aquatic ecology, groundwater dependent ecosystems (GDEs), South Australian listed threatened species, EPBC Act listed threatened species
	Cultural amenity – historic heritage, cultural heritage, Indigenous communities
	Local community – health and safety, amenity, community values
	Third-party users – change in resource availability
	Future users – recognises the inherent environmental value of the pathways
	State and Commonwealth matters – economy, climate change

ES2.1.2 Identification of potential impact events

The PDI Act requires that the EIAF describe potential impact events associated with each phase of the proposed operations (construction, operation, and closure) and relevant to each element of the environment. Noting that, for the purpose of the impact assessment, a potential impact event is the combination of a (planned or unplanned) source, a pathway and a receptor, and is identified in the absence of the implementation of engineering or administrative control measures.

The SRE Project's EIAF identifies potential impact events through completion of a preliminary (screening) SPR evaluation. This is undertaken to identify linkages between project sources (i.e. proposed activities or project elements), pathways and receptors. This considers potential linkages for the full project life cycle (construction, operation, and closure). This preliminary screening identifies where potential impacts may occur (Step 2, Figure ES1.5). Receptors with no linkage to a source are not considered further.

In addition to the SPR screening of potential impact events, stakeholder engagement also informs which of the potential impact events are progressed to confirmed impact events, and therefore to the impact assessment stage of the EIAF (Step 3, Figure ES1.5). In these instances, a potential impact event may have been determined to have no SPR linkage but may be progressed based on the stakeholder's perceived potential for impacts to occur as a result of proposed project activities.

ES2.1.3 Supporting studies

The preliminary SPR outputs are used to inform scopes for further technical and supporting studies (Step 3, Figure ES1.5). The supporting studies are designed to provide the information necessary to classify uncertain or unconfirmed linkages and to support the effects and or impact assessment stages of the EIAF for the confirmed impact events.

Supporting studies for the SRE Project included:

- engineering studies describing the specifics of proposed site activities, actions and infrastructure (sources)
- baseline social and/or environment studies (i.e. noise and vibration, air quality, radiation, greenhouse gas, soil and groundwater, surface water, ecology, land use and planning, visual, social, traffic, historic heritage (non-indigenous), economic) (pathways and receptors)
- assessment of effects studies, describing and quantifying the likely change in the pathway values as a result of proposed project activities (e.g. air quality modelling, noise and vibration modelling) (pathways)
- impact assessment studies, describing and quantifying how the changed pathway values may impact the receptor (e.g. how a change in air quality may result in health or amenity impacts, or how land disturbance may reduce the abundance or diversity of flora, vegetation and/or fauna habitat) (receptors).

ES2.1.4 Confirmation of impact events

Outcomes of the supporting studies undertaken on sources and pathways determine potential impact events to either have no linkage, a possible linkage, or a confirmed linkage (Step 4, Figure ES1.5). Potential impact events that remain uncertain or unconfirmed following the completion of supporting studies shall be subject to the precautionary principle and carried forward assuming that a linkage exists.

ES2.1.5 Determination of impact significance

Confirmed impact events (i.e. those determined to have an SPR linkage and those other events carried forward as a result of the outcomes of stakeholder consultation) are subject to an impact assessment under the EIAF to determine the significance of the impact in the absence of controls (Step 5, Figure ES1.5).

In determining the impact significance, consideration is given to the:

- type of impact, including direct, indirect, cumulative and/or perceived
- geographic extent, size and scale
- duration, frequency, reversibility of the potential impact
- whether the potential impact is from a planned or unplanned event
- uncertainty associated with the determination of impact significance, and subsequently the sensitivity to change).

For the purposes of the EIS, an EIAF, including an impact significance determination matrix, was developed specifically for the SRE Project, with consideration to significance requirements under the PDI Act, other relevant state legislation and BHP's internal risk management classifications. Consequence definitions, severity levels and significance determinations under the EIAF relate specifically to the SRE Project and use different, and distinct, criteria from those assignments of significance under the EPBC Act. The SRE Project EIAF refers to 5 severity levels (Level 1 to Level 5), with severity of impact categorised as 'not significant' for Level 1 to Level 2, and as 'significant' for Level 3 to Level 5. Confirmed impact events are assessed against the consequence definitions to determine the severity level and allow a determination of impact significance.

Events determined to have an uncontrolled impact consequence of greater than or equal to Level 3, are considered significant and require the application of controls to reduce the consequence severity in keeping with the environmental objectives.

Alternatively, a confirmed impact event may be determined to be significant as an outcome of stakeholder engagement and may also necessitate the application of controls to eliminate or otherwise reduce the impact to ALARP.

Assessment outcomes of 'significant' under the EIAF also allow for the development of relevant environmental outcomes and associated compliance, which may subsequently be incorporated into the Olympic Dam Environmental Protection and Management Program (EPMP) and regulated under the Indenture. This provides assurance regarding the requirements for implementation of mitigation and management measures to reduce impact significance.

ES2.1.6 Control and management strategies

Control and management strategies are then identified which can be implemented to ensure the potential of adverse impacts is ALARP, that Environmental Outcomes are complied with, and where possible, positive impacts are realised (Step 7, Figure ES1.5).

The EIAF specifically aims to identify control and management strategies where the impact assessment has determined that the uncontrolled impact is significant, or where such uncertainty exists that a significant impact may occur.

When developing control and management strategies for the SRE Project, the following mitigation hierarchy of controls is considered:

- Avoid: Adjust a project layout or eliminate the effect of the proposed project on the receptor by design. Significant avoidance and minimisation measures have been incorporated into decision making and project design
- Minimise: Measures that minimise or reduce an impact (e.g. reducing speed limits to reduce dust emissions from vehicle travel on unsealed roads)
- Rehabilitate: Measures that rectify, repair, rehabilitate or restore an impact
- Offset: Required if significant residual environmental impacts remain following the application of the above measures.

Control and management strategies should be developed with consideration to any significant uncertainties and assumptions regarding the likely effectiveness of proposed control measures in managing and mitigating impacts and achieving Environmental Outcomes for operations and closure.

ES2.2 Assessment of effects

The identified potential impact events, summarised by pathway, represent scenarios for which there is, or is likely to be, a linkage between SRE Project activities and infrastructure (sources), the relevant pathways, and the identified receptors.

A total of 141 potential impact events were identified during initial impact identification studies. A subsequent preliminary SPR assessment identified 131 of the potential impact events as having, or potentially having, a linkage between source and receptor as a result of the SRE Project. These identified potential impact events (i.e. those that have either a confirmed linkage or unconfirmed linkage) have been carried forward to the assessment of effects presented within this chapter.

Assessment of effects studies, comprising noise and vibration, air quality, radiation, greenhouse gas, soil and groundwater, surface water, ecology, land use and planning, visual, social, traffic, historic heritage (non-indigenous), and economic, have been undertaken to quantify the change in the existing (baseline) pathway environment as a result of SRE Project activities and infrastructure. This allows both the confirmation of any potential impact events with an unconfirmed linkage and informs a subsequent assessment of the likely impact significance.

Confirmed impact events for the SRE Project, determined following completion of the assessment of effects studies, are summarised in the following sections.

ES2.2.1 Noise and vibration

There were 10 confirmed impact events associated with noise and vibration, specifically:

- Project-related construction activities result in the generation of noise and vibration that is audible above baseline noise levels and impacts the amenity of the local community and fauna (5 confirmed impact events).
- Project-related operational activities result in the generation of noise and vibration that is audible above baseline noise levels and impacts the amenity of the local community and fauna (5 confirmed impact events).

The noise and vibration impact assessment, using 3D noise modelling software ‘SoundPLAN version 9.1’, predicts that under worst-case noise enhancing conditions, the baseline, construction and operational scenarios comply with the Environment Protection (Commercial and Industrial Noise) Policy 2023 (Noise EPP) at all sensitive receptor locations.

Construction and operational vibration sources are not expected to generate perceptible levels of vibration at distances greater than a few hundred metres from the source. As the nearest sensitive receptor is approximately 3 km from any potential vibration sources, vibration levels from activities are considered to be negligible.

ES2.2.2 Light

There were 2 confirmed impact events associated with light, specifically:

- Project-related operational activities result in emissions of light leading to changes in visual amenity and impacts to the local community and fauna.

The visual impact assessment determined the existing Olympic Dam mine has a landscape with a high visual absorption capacity rating. This is due to the site being an established mining industrial setting within the SML, which is considered capable of absorbing a higher degree of modification or addition, as proposed by the SRE Project, without significantly changing the landscape character for the local community.

The SRE Project would adopt Australian Standard (AS 4282:2023) 'Control of the obtrusive effects of outdoor lighting') for lighting that would shield the lights and minimise light spill directly from light sources. As no State or Nationally listed species which are identified as potentially present in the SRE Area are nocturnal, no impacts through behavioural change to these species are anticipated.

ES2.2.3 Air quality

There were 17 confirmed impact events associated with air quality, specifically:

- Operational activities release emissions of off-gases and fugitive gases that affect air quality, resulting in impacts to the health and safety, and amenity of the local community (2 confirmed impact events).
- During operation, emission of off-gases and fugitive gases from smelting, acid plant and refinery operations results in concentrations that impact terrestrial flora and vegetation, fauna and habitat and State and Commonwealth threatened species (3 confirmed impact events).
- Operational activities release emission of off-gases and fugitive gases that generates odour, resulting in impacts to the health and safety, and amenity of the local community (2 confirmed impact events).
- Project-related construction activities release emissions of particulate matter that affect air quality, resulting in impacts to the amenity of the local community, flora and vegetation (2 confirmed impact events).
- During construction, the movement of soil materials and the creation of cleared areas subject to wind erosion results in the emission of dust that reduces air quality, impacting the abundance and diversity of terrestrial flora and vegetation, habitat and State and Nationally threatened flora species (3 confirmed impact events).
- Project-related operational activities release emissions of particulate matter that affect air quality, resulting in impacts to the health and safety, and amenity of the local community (2 confirmed impact events).
- During operation, the emission of particulate matter from stacks or material handling activities results in concentrations that impact terrestrial flora and vegetation, fauna and habitat and State and Commonwealth threatened species (3 confirmed impact events).

The air quality impact assessment, using the AMS/USEPA regulatory model AERMOD (model version v24142), predicts the SRE Project to increase air quality impacts at neighbouring sensitive receptor locations relative to BAU operations. However, despite the predicted increase in air quality emissions, the predicted concentrations for all pollutants, including PM_{10}, $PM_{2.5}$, sulphur dioxide, and nitrogen dioxide, and for all averaging periods are below the applicable ground-level concentration limits listed in Schedule 2 and Schedule 4 of the Environment Protection (Air Quality) Policy 2016 (Air Quality EPP) at all sensitive receptor locations (Olympic Dam Village and Roxby Downs) for the SRE Project.

The predicted in-stack emission concentration for hydrogen sulphide is above the relevant Air Quality EPP stack emission concentration limit for the tails leach hygiene stack and roaster scrubber (hydrosonic scrubber) stack. Despite this, no exceedance of the ground-level concentration criteria for hydrogen sulphide is predicted at any sensitive receptor.

ES2.2.4 Radiation

There were 4 confirmed impact events associated with radiation, specifically:

- Project-related operational activities release emissions of radon and/or radionuclide bearing materials that result in radiation exposure to the local community, impacting health and safety (1 confirmed impact event).
- During operations, the emission of radon and/or radionuclides (e.g. from stacks or materials handling activities) results in concentrations that impact terrestrial flora and vegetation, habitat and threatened species (3 confirmed impact events).

The radiological impact assessment determined potential radiological impacts due to the SRE Project during construction are expected to be insignificant and able to be appropriately managed in accordance with existing site radiation management practices. During operations, the handling of copper concentrate containing elevated concentrations of radionuclides results in an increased potential for emissions of radon and radionuclides leading to potential changes in airborne concentrations in local communities and residences. Gamma radiation and groundwater pathways were not assessed to be credible exposure pathways.

The conservative estimates of potential total radiation doses to humans at the receptors, due to the SRE Project, are low and below the recognised public dose limit of 1 millisieverts per year (mSv/y) and dose constraint of 0.3 mSv/y. The radiological impact to flora and fauna, as assessed using the ERICA tool, showed dose rates well below the screening level of 10 micrograys per hour (µGy/h), with the maximum absorbed dose rate being 6.93 µGy/h for Australian reptiles.

ES2.2.5 Greenhouse gases and climate change

There were 2 confirmed impact events associated with the emission of greenhouse gases, specifically:

- During construction, the combustion of fossil fuels leads to the emission of GHGs which impacts State and Commonwealth matters (1 confirmed impact event).
- During operation, the combustion of fossil fuels leads directly to the emission of GHGs from combustion of fossil fuels in smelting activities and indirectly via the consumption of purchased non-renewable electricity from the National Electricity Market impacting on State and Commonwealth matters (1 confirmed impact event).

The greenhouse gas impact assessment calculated annual average Scope 1 and Scope 2 emissions during the staged development of the SRE Project to be:

- 160,218 t of carbon dioxide equivalent (CO_2-e) per year for Stage 1a
- 182,697 t CO_2-e/year for Stage 1b
- 192,524 t CO_2-e/year for Stage 2.

Overall, Scope 1 emissions from the SRE Project when combined with Olympic Dam BAU projected whole-of-site operations are estimated to be 253,029 t CO_2-e/year for Stage 1a, 279,696 t CO_2-e/year for Stage 1b and 256,891 t CO_2-e/year for Stage 2, or approximately 9% higher, 21% higher and 11% higher respectively.

Scope 2 emissions from the SRE Project when combined with Olympic Dam BAU projected whole-of-site operations are estimated to be 91,834 t CO_2-e/year for Stage 1a, 98,684 t CO_2-e/year for Stage 1b and 122,952 t CO_2-e/year for Stage 2, or approximately 26% lower, 20% lower and 1% lower respectively.

When considering Scope 2 emissions, it is noted that no consideration of sourcing of additional renewable energy via power purchasing agreements has been made in the calculations. Scope 2 emission calculations are therefore highly conservative.

ES2.2.6 Groundwater quality and quantity

There were no confirmed impacts to groundwater quality and quantity.

The soil and groundwater impact assessment, comprising preliminary site investigation and associated targeted soils and geochemistry sampling, concluded the following:

- No exceedances of contaminants of potential concern above the adopted human health and ecological site assessment criteria were identified within the 19 test pits investigated locations for the SRE Project. All soils assessed were classified as non-acid forming, with generally low metal and metalloid concentrations.
- Baseline and post-baseline groundwater quality data indicate that groundwater within and down-gradient of the SRE Area has remained generally consistent over time. Groundwater in the shallow Andamooka Limestone Aquifer and the deeper Tent Hill Aquifer is naturally saline to hypersaline, with neutral to slightly alkaline pH and generally low dissolved metal concentrations.
- The conceptual site model did not identify any complete SPR linkages related to the SRE Area, being the primary location for proposed smelter and refinery expansion infrastructure for the SRE Project.
- The potential contamination risk related SRE Project operations and construction are considered low risk and can be appropriately mitigated and managed in accordance with best practice to relevant Australian Standards, construction environmental management and operational control measures to relevant environmental legislation, guidelines and policies.
- Any leaching from material disturbed by SRE Project activities is likely to have less of an impact on the receiving environment than mine affected water already present on site (such as the TSF) and can be appropriately management in accordance with Olympic Dam's waste management plan.
- The potential for SRE Project activities to increase exposure to, or mobilise existing, per- and polyfluoroalkyl substances (PFAS) chemicals can be appropriately managed through targeted investigation of work areas during construction.

ES2.2.7 Surface water quality and quantity

There were 15 confirmed impact events associated with surface water quality and quantity, specifically:

- During construction and operations, placement of SRE Project infrastructure and associated surface water management infrastructure disrupts, reduces or increases surface water flows, impacting abundance and diversity of native vegetation, habitat, threatened species and aquatic species (3 confirmed impact events).
- During construction, placement of SRE Project infrastructure and associated surface water management infrastructure results in the sedimentation of the downstream environment, impacting the abundance and diversity of native vegetation, habitat and threatened species (3 confirmed impact events).

- During construction and operation, the release of chemicals or hydrocarbons used in SRE Project operations, including metals mobilised via acid rock drainage from stockpiles and/or the TSF or effluent released from wastewater treatment plants (WWTPs), results in impacts to the downstream environment, impacting the abundance and diversity of native vegetation, habitat and threatened species (6 confirmed impact events).
- During closure, erosion of closed structures and rehabilitated areas results in the sedimentation of the downstream environment (3 confirmed impact events).

The surface water impact assessment concluded that construction of the SRE Project infrastructure would result in collection of stormwater from some areas which currently exist as natural swales and banking up of water against the edge of proposed bunds, roads and raised pads.

Flood modelling, using TUFLOW release 2023-AB, indicated that 27 dune swales may have altered flood hydrology for a 1% annual exceedance probability event following SRE Project development. There was a negligible difference in wet and dry areas in each modelled scenario. These are predominantly located south of the existing Olympic Dam mine process plant infrastructure pad and result in increases and decreases to water levels either side of a bund or access road. The addition of culverts to the access road in detailed design is predicted to return many of these to near-baseline conditions.

Pooling and depth increases also occurred next to the southern pad surface, however detailed design of the drainage system in this area will be able to at least partially ameliorate this. In each case, the change in water level is not expected to result in an impact to sensitive receptors.

ES2.2.8 Landscape values, vegetation and habitat

There were 32 confirmed impact events associated with landscape values, vegetation and habitat, specifically:

- During construction, clearing of native vegetation for SRE Project infrastructure results in a reduction in abundance and diversity of native vegetation, habitat and threatened species (3 confirmed impact events).
- During construction, land clearing associated with the construction of SRE Project infrastructure results in disturbance to an unknown non-Indigenous heritage site (1 confirmed impact event).
- During construction, land clearing associated with the construction of SRE Project infrastructure results in disturbance, removal or damage to cultural artefacts (1 confirmed impact event).
- During construction, land clearing associated with the construction of SRE Project compromises Aboriginal intangible ethnographic values of an area through alteration or damage to the cultural landscape/features (1 confirmed impact event).
- During construction, land clearing associated with the construction of SRE Project infrastructure results in conditions that are favourable for an increase in the abundance and diversity of weed species and an associated reduction in abundance and diversity of native vegetation, habitat and threatened species (3 confirmed impact events).
- During construction, placement of SRE Project infrastructure and associated surface water management infrastructure results in the sedimentation of the downstream environment, with changes to the prevailing surface water catchments resulting in a reduction in abundance and diversity of native vegetation, habitat and threatened species (3 confirmed impact events).

- Placement of SRE Project infrastructure changes the prevailing visual amenity of the area (1 confirmed impact event).
- During operations the operations increases occupancy of Olympic Dam accommodation due to the SRE Project workforce results in an increase in feral/pest fauna numbers that results in a decrease in native fauna abundance and diversity (1 confirmed impact event).
- During construction, operation and closure project activities, including planned construction and maintenance activities and unplanned equipment and plant failures, create conditions that result in a bushfire, resulting in destruction of habitat and vegetation and impacting the abundance and diversity of flora, fauna, State and Nationally threatened species and protected areas (12 confirmed impact events).
- During construction and operation, the release of chemicals or hydrocarbons used in the SRE Project, including temporary storages, transport and unloading/loading activities, metals mobilised via acid rock drainage from stockpiles and/or the TSF or effluent released from WWTPs, results in the contamination of land, impacting the abundance and diversity of native vegetation, habitat and threatened species (3 confirmed impact events).
- During closure, the rehabilitation of cleared land following closure results in conditions that are favourable for an increase in the abundance and diversity of weed species resulting in a reduction in the abundance and diversity of native vegetation, habitat and threatened species (3 confirmed impact events).

The ecological impact assessment determined vegetation communities identified within the SRE Project Area are well represented within the wider region.

Where clearance of land, and consequently habitat, is proposed to occur, there would be localised impacts on both flora and fauna species within that immediate area. Home ranges of many small mammals and reptiles are small and therefore those individuals within the clearance area are likely to be directly impacted, however, vegetation (and thus habitat clearance) is not expected to have significant impacts to those species at a local population, or species as a whole, level (i.e. it is clearance of non-essential, or not critical habitat only).

The SRE Project is expected to result in a total disturbance footprint (excluding existing disturbance) of 234.04 ha, comprising 101.71 ha for the SRE Area, 64.01 ha for the General Infrastructure Area, 39.82 ha for the Water Infrastructure Area and 28.50 ha for the EIGR Areas.

Localised land clearing is expected to have minor impacts on local and commonly occurring habitat types and therefore local populations of fauna species. The removal of habitat may result in a short-term reduction in abundance of those species, if present. No critical threatened species habitat, or habitat which any common or conservation significant fauna are reliant on, has been identified in the SRE Project Area. One EPBC listed (Vulnerable) species, the Southern Whiteface, is known to occur within the SRE Project Area, with several State listed species considered likely to be present, or potentially present. Impacts to threatened fauna have been conservatively assessed; due to the potential short-term removal of non-essential habitat for Southern Whiteface.

Impacts to non-threatened fauna species are not expected to have a significant effect on either abundance or diversity of species present in the region. Impacts to common flora and fauna species are therefore considered to be localised only, and short-term during construction where rehabilitation following construction is proposed (e.g. over the buried water pipeline).

ES2.2.9 Social environment

There were 16 confirmed impact events associated with the social environment, specifically:

- Increases in vehicle traffic associated with the movement of construction materials, general travel, including oversized and restricted movements, leads to degradation, increasing the risk to public health and safety (1 confirmed impact event).
- Increases in vehicle traffic associated with the movement of construction materials, general travel, including oversized and restricted movements, results in an increase in likelihood of traffic accidents, impacting on the health and safety of the local community (1 confirmed impact event).
- Increases in heavy vehicle traffic associated with the movement of construction materials, including oversized and restricted movements, leads to increase travel times affects road users, impacting on the social value of the local community (1 confirmed impact event).
- During operations, increases in heavy vehicle traffic associated with the movement of operational reagents and concentrates affects road users and impacts on the health and safety of the local community (1 confirmed impact event).
- During operations, increase in road traffic results in the degradation of the roads and increases risk to the public health and safety (1 confirmed impact event).
- During operations, the increased movement of heavy vehicles results in increases in travel times within the local and regional areas, impacting existing social values (1 confirmed impact event).
- During construction and operation, the SRE Project results in reduced access to emergency services for existing residents in nearby communities due to increased demand for emergency services to respond to increased risk of traffic accidents and workplace accidents at Project site and on Olympic Dam Highway (2 confirmed impact events).
- Increased labour force participation and reduced unemployment during the SRE Project, contributes to enhanced socio-economic wellbeing in FIFO source communities, including those within the regional study area (2 confirmed impact events).
- The SRE Project results in enhanced economic prosperity for local businesses through increased engagement from non-resident workers in the local economy, alongside new business and supply chain opportunities generated by the SRE Project (2 confirmed impact events).
- During construction and operation, the workforce demand reduces the availability of flights due to increased demand driven by SRE Project workforce, indirectly increasing flight fares (2 confirmed impact events).
- The SRE Project results in potential community impacts (e.g. cohesion and vitality) in Roxby Downs due to an increase in non-resident workers (2 confirmed impact events).

The social impact assessment identified both negative and positive social impacts of the SRE Project on local and regional communities. Key negative impacts relate to perceived increased traffic delays and a perceived heightened risk of road incidents, reduced access to emergency services, and community cohesion in Roxby Downs, along with concerns about a potential rise in crime and antisocial behaviour associated with a larger transient workforce. To mitigate the negative effects, measures such as implementation of traffic management strategies, continued collaboration with local emergency service providers to update emergency response plans where required, and the ongoing use of a community grievance mechanism to address concerns as they arise.

Despite these challenges, the SRE Project is expected to generate significant socio-economic benefits, including increased labour force participation, enhanced business opportunities, and strengthened local economic resilience. With proactive engagement and mitigation strategies, the SRE Project is expected to balance potential risks while delivering long-term socio-economic benefits to the region.

ES2.2.10 Economic environment

There were 2 confirmed impact events associated with the economic environment, specifically

- Construction of the SRE Project results in strengthening of the regional economy through contribution to GRP and to the State, indirectly supporting economic diversification and providing greater resilience to economic downturns (1 confirmed impact event).
- Operation of the SRE Project results in strengthening of the regional economy through contribution to GRP and to the State, indirectly supporting economic diversification and providing greater resilience to economic downturns (1 confirmed impact event).

The economic assessment concluded that the SRE Project is estimated to deliver a net incremental economic benefit to the South Australian community of approximately $342 million in present value terms over the period of FY27 to FY76, or a benefit-cost ratio (BCR) of 18.4. Including a potential economic benefit to suppliers, the net benefit could reach up to $763 million in present value terms attributed to the SRE Project.

One of the primary effects of the SRE Project on the local area is generating employment. Overall, the economic assessment estimates additional wages to workers to total an incremental benefit to South Australia of $147 million in present value terms (or $771 million in undiscounted terms). Employment is expected to peak during the construction period, where the SRE Project is expected to generate up to 1,313 FTE positions in Stage 1a. Further, the SRE Project Stage 2 operational workforce will support 508 additional FTEs.

Locally, 10% of operations positions are expected to reside in Roxby Downs. Further to this, it has been estimated that 96% of direct employment will be supplied by South Australia, with 22% of total direct employment supplied by the local region.

As a result, the total economic benefit to workers is estimated to be driven by BHP's internal operational workforce. This is due to the high-skill requirements needed to operate the smelter and refinery. The economic benefit to South Australian workers is estimated to be $147 million in present value terms (or $771 million in undiscounted terms). This is in addition to an estimated economic benefit to South Australian suppliers of $421 million in present value terms above the base case (or $1,174 million in undiscounted terms).

Within the local region, the wage premiums paid to workers during the SRE Project are estimated to generate a total increase in net income of $1 million per year (equivalent to 8 new FTEs) over the construction phase and $4 million per year (equivalent of 38 new FTEs) over the operations phase.

ES2.3 Assessment of impact significance

Following an assessment of impact significance of the confirmed impact events, it was determined that:

- The following impact events were assessed to have a significance Level 2 or below (not significant):
  - One construction phase impact event for GHG emissions has a significance Level 1 (not significant). This relates to Scope 1 and Scope 2 emissions impacts from fuel combustion.
  - Seventeen local community-related impact events were significance Level 1 (not significant). Twelve of these are related to air quality, radiation and noise impacts to amenity and safety associated with air quality emissions, radiation, noise and light, with the remaining 5 related to labour force participation, socio-economic wellbeing and enhanced economic prosperity.
  - Two economic impacts to the State have been assessed with a significance Level 1 (not significant). These relate to economic impacts to the local and regional communities and the state.
  - All 63 flora, vegetation, fauna and habitat-related impact events were significance Level 2 (not significant) or below and no significant impacts are predicted.
  - Nine local community-related impact events were significance Level 2 (not significant). These are related to visual impacts to amenity, traffic impacts to social values, and health and safety, and impacts to social values from an increase in the non-resident population.
  - Two cultural heritage-related impact events were assessed as significance Level 2 or below (not significant). These relate to continuing to minimise impacts by managing cultural heritage in accordance with the ODA.
- The following impact events were assessed to have a significance level of Level 3 or above (significant):
  - Four local community-related impacts were significance Level 3 (significant). These are related to impacts to social values from increased potential for road and workplace accidents and potential impacts to community from an increase in the non-resident population.
  - One cultural heritage-related impact event was assessed as significance Level 3 (significant), with project-related disturbance resulting in impact requiring cultural materials to be relocated via salvage prior to disturbance.
  - One operational phase impact event for GHG emissions has an assessed impact significance Level 5 (significant). These are related to Scope 1 emissions impacts from fuel combustion being greater than 100,000 t CO_2-e/annum.

ES2.4 Assessment of hazards and risks

A hazards and risk assessment was undertaken for the SRE Project in accordance with BHP's risk framework and the relevant EIS assessment requirements. This EIS considered credible unplanned events during construction and operation, evaluated their likelihood and maximum foreseeable consequences, and identified controls to prevent events occurring to ensure potential impacts are minimised as far as practicable through design, construction, operations, monitoring and emergency responses.

Key identified hazards and risks associated with the SRE Project are:

- Hazardous materials and major incident hazards: potential loss of containment from storage and handling of fuels, reagents and process chemicals (including acid), with consequences managed through engineered containment, inventory controls and emergency response.
- Fire and explosion: risks associated with combustible materials and process operations, managed through design standards, ignition control, fire detection/suppression and emergency management.
- Process upset and emissions: unplanned process upsets (including off-gas and acid plant systems) that could increase emissions or affect air quality, managed through process controls, alarms/interlocks, maintenance and contingency operating procedures.
- Transport and logistics incidents: construction traffic and delivery of large components, and operational concentrate transport, with risks managed through route planning, traffic management, contractor controls and incident response.
- Spills and contamination: spills during storage/transfer and wastewater management with potential impacts to land and water, managed through bunding, separation of clean/dirty water, monitoring and cleanup procedures.
- Power and utilities reliability: reliance on secure power supply and supporting utilities, managed through system redundancy, protection systems and operational planning for outages.
- Extreme weather and natural hazards: heat, wind, storm and flooding events that may affect safety and operations, managed through design allowances, flood modelling inputs, operational triggers and emergency response.
- Workforce health and safety: construction and operational safety risks (including working at heights, confined spaces and mobile equipment interactions), managed through safety management systems, training, supervision and verification of critical controls.

ES3 Management of environmental impacts

Environmental management for the SRE Project is proposed to be implemented through BHP's existing environmental management system at Olympic Dam, supported by updated environmental outcomes, compliance criteria and monitoring designed to verify performance and inform adaptive management.

Key changes include proposed integration of the SRE Project into the existing EPMP to reflect the expanded smelter and refinery configuration and increased throughput and ensuring potential impacts arising from the SRE Project and identified in this EIS are adequately addressed. The management framework is intended to consolidate commitments and controls, identify all impact events requiring management focus, and provide clear processes for reporting, corrective actions and continuous improvement through construction and operations.

Specifically, the EPMP would be updated following approval and implementation of the SRE Project. Should the SRE Project approval be granted, the update to the EPMP would broadly require revision of:

- descriptive elements of the EPMP to reflect the additional scope (i.e. infrastructure and activities) associated with the SRE Project
- Environmental Outcomes and associated aspects within the EPMP to reflect the impacts and risks identified and assessed within this EIS
- administrative elements of the EPMP to reflect the conditions of approval associated with the SRE Project.

BHP

OD SRE EIS



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BHP

OD SRE EIS

1. Introduction

1. INTRODUCTION

BHP Olympic Dam Corporation Pty Ltd (BHP/Company) is proposing to develop the Smelter and Refinery Expansion Project (SRE Project) at the Olympic Dam mining operations, located on Kokatha Country in the Far North of South Australia.

1.1 Project context

The status of existing Olympic Dam mining and smelter operations and BHP's 2023 acquisition of additional copper assets, located on the Traditional Lands of the Kokatha People in the Far North region of South Australia provide important context and background for the objectives and key elements of proposed SRE Project.

1.1.1 Olympic Dam operations (existing)

1.1.1.1 Background

BHP's Olympic Dam operations commenced in 1988 following State and Commonwealth regulatory approval of an Environmental Impact Statement (EIS). The EIS approved underground mining and production of up to 150,000 tonnes per annum (tpa) of total copper and associated products (Kinhill-Stearns Roger Joint Venture 1982 (1982 EIS)).

In 1995 an Environment Review addressed several variations to the original 1982 EIS, while an additional EIS was completed in 1997 (Kinhill Engineers Pty Ltd 1997 (1997 EIS)) for a phased expansion of underground mining and surface processing facilities of up to 350,000 tpa of total copper (and associated products).

The 1997 EIS expansion was proposed to be completed in two phases:

- first phase – increasing mining and production up to approximately 200,000 tpa total copper (and associated products)
- second phase – increasing mining and production up to approximately 350,000 tpa total copper (Kinhill Engineers Pty Ltd 1997).

Since 1997, BHP has implemented the first phase and undertaken mining and processing optimisations to reliably produce the nameplate capacity of approximately 200,000 tpa total copper (and associated products). The second phase expansion considered in the 1997 EIS was subject to potential additional assessment requirements and has not yet been implemented.

1.1.1.2 Underground mining operations

The Olympic Dam orebody resource is located approximately 300 metres (m) below the surface and continues to a depth of over 1 kilometre (km).

The existing underground mining operation employs a sub-level open stope (SLOS) method and includes crushing stations, vertical ventilation shafts, and a materials handling system consisting of an automated rail network, hoists, and declines used to transport crushed ore to the surface, where it is moved along conveyors to the processing plant.

The current smelting process has suited Olympic Dam's high (greater than 1.5) copper-to-sulphur ratio (Cu:S) Northern Mining Area (NMA) resource since the expanded mine and surface operation was commissioned in 1998. Since 2017, mining has gradually moved away from the NMA into the Southern Mining Area (SMA).

This different part of the orebody provides a lower Cu:S ratio ore feed. Mining from higher Cu:S ratio areas in the NMA will occur for the life-of-asset, however the NMA volumes will reduce in proportion to the increase in SMA volumes over time.

Further drilling since 2021 within the SMA, and associated mineralogy studies, has confirmed that the Cu:S ratios of the smelter feed will decline as mining progresses, to a point where a change in configuration of the smelter is required to maintain the current process efficiency. This is a key driver for the proposed SRE Project.

1.1.1.3 Minerals processing operations

Olympic Dam surface infrastructure includes a processing plant comprising a concentrator, hydrometallurgical plant, smelter and refinery operations and associated infrastructure to produce final copper, uranium oxide, gold and silver products.

When the ore reaches the processing plant, it is sent to a concentrator, where it is milled, and water added to form a slurry, which is passed through a series of flotation stages to separate the minerals, producing a copper-rich concentrate and uranium-rich tailings.

The concentrate is leached in acid to remove residual fluorine and uranium to tails and produce a neutral slurry, which is dried before being fed into the smelter to produce copper anodes. The existing smelter treats high-grade copper concentrates through a single-stage direct-to-blister flash furnace (DBF) smelter.

The copper anodes are then processed in the refinery to produce high purity copper cathodes. The residue from the refining process is treated separately to recover gold and silver. In the past, concentrate and/or anode copper has also been intermittently imported to the site for processing.

The tails from the concentrator pass into the hydrometallurgical plant to extract uranium, which is then precipitated from solution before being heated and dried to produce uranium oxide concentrate (UOC). The hydrometallurgical circuit includes a solvent extraction plant to selectively extract and upgrade copper from leach solutions. Tailings from the hydrometallurgical process are deposited to the tailings retention system (TRS), comprising tailings storage facility (TSF) cells and evaporation ponds for the management of solid and liquid components of the tailings, respectively.

1.1.2 Copper South Australia province

1.1.2.1 Copper SA structure

BHP's copper commodity strategy is focused on both organic growth from existing assets, including implementation of innovation and technology initiatives, and discovering, acquiring and developing resources to significantly increase copper production by 2040.

BHP's Copper South Australia (Copper SA) province includes the Olympic Dam mine, Carrapateena mine, Prominent Hill mine and Oak Dam[3] exploration sites (Figure 1.1). Copper SA falls under the BHP

[3] At the time of preparing this EIS, the project area of 'Oak Dam' is in the process of transitioning to 'Ankata'. BHP is committed to a full transition to the name Ankata.

Minerals Australia business portfolio which also incorporates Western Australia Iron Ore, Western Australia Nickel, Queensland Coal, and New South Wales Energy Coal.

Copper SA has a mineral resource base of approximately 14.1 billion tonnes (Bt), with contained 101.8 million tonnes (Mt) of copper metal (BHP 2025a). This resource base presents potentially attractive economic returns with provincial-scale synergies through multiple mines and resource opportunities to supply copper concentrate into a single smelting and refining facility at Olympic Dam.

As part of the establishment of the Copper SA province, and subject to approvals, the SRE Project would enable Olympic Dam to receive, blend and smelt copper concentrates from Carrapateena and Prominent Hill mining operations. The Oak Dam advanced exploration site is also a potential future source of copper, should it progress into a mining operation. The SRE Project may also provide the capacity to receive copper concentrate from other third-party suppliers. Copper concentrate feed sources, which Olympic Dam would be able to receive due to the SRE Project, are illustrated in Figure 1.2.

Copper SA copper production was 316,000 tonnes (t) in the financial year FY25 (BHP 2025a). The SRE Project, as a component of the Copper SA growth plan, has the potential to increase copper production capacity to up to 650,000 tpa of total copper plus associated products.

1.1.2.2 Copper concentrate feed sources

The SRE Project concentrate feed would be supplied from the following sources within the Copper SA province:

- Olympic Dam – approximately 500,000 tpa of copper concentrate under existing State and Commonwealth approvals.
- Carrapateena – approximately 260,000 tpa copper concentrate under existing State and Commonwealth approvals. BHP is currently applying for a Change in Operations under the *Mining Act 1971* (SA) (Mining Act) to allow for an increase in copper concentrate production, peaking at approximately 480,000 tpa with an annualised average copper concentrate production of approximately 330,000 tpa.
- Prominent Hill – approximately 150,000 tpa copper concentrate under existing State and Commonwealth approvals.
- The above sources would produce approximately 450,000 tpa total copper.

The remaining latent capacity for the SRE Project would, subject to separate State and Commonwealth approvals, be supplied from the following additional sources:

- Oak Dam – resource development currently in BHP's initial Identification Phase Study (IPS) (i.e. concept stage) with early indications demonstrating approximately 450,000 tpa copper concentrate feed.
- Olympic Dam – potential future underground expansion, which is currently in BHP's initial IPS, with early indications suggesting an increase in copper concentrate production of approximately 340,000 tpa.
- Third-party concentrate import as required to maximise utilisation of latent capacity.

Table 1.1 provides a summary of the current and future concentrate feed to the smelter and associated current and future copper at Olympic Dam.

Table 1.1 | Olympic Dam current and future concentrate feed and copper production

Concentrate sources	Total concentrate to smelter feed (tpa)	Copper production (tpa)[1]
Existing		
Olympic Dam (approved)	~500,000	~200,000
Prominent Hill (approved)[2]		
Carrapateena (approved)[2]		
Proposed SRE Project		
Prominent Hill mine (approved)	~150,000	~60,000
Carrapateena (approved and Change in Operations)	~269,000 to 480,000	~190,000
Future (subject to State and Commonwealth approvals)		
Potential Oak Dam	~450,000	~180,000
Potential Olympic Dam expansion	~340,000	~130,000
Potential third-party	Up to ~800,000 should Oak Dam and or Olympic Dam expansion not progress	~300,000
Totals	**~1,709,000 to ~1,920,000**	**~650,000 average annual**

Note: 1. tpa reflects peak copper concentrate production based on nameplate capacity.
2. Incidental amounts of concentrate from Prominent Hill and Carrapateena are currently imported to Olympic Dam for processing. This activity is approved via Project Notices under the Olympic Dam and Stuart Shelf Indenture.

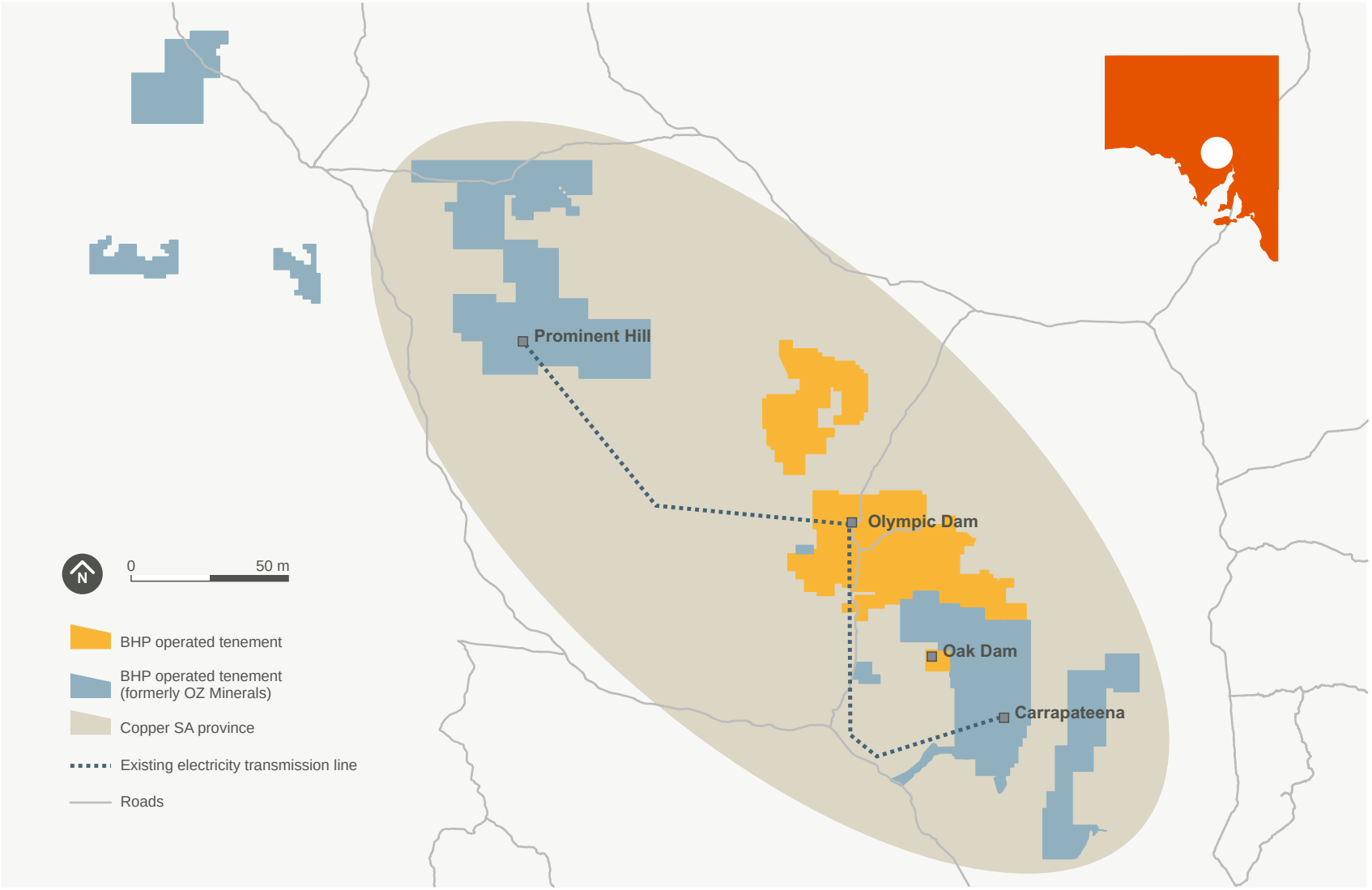


Figure 1.1 | Copper SA province

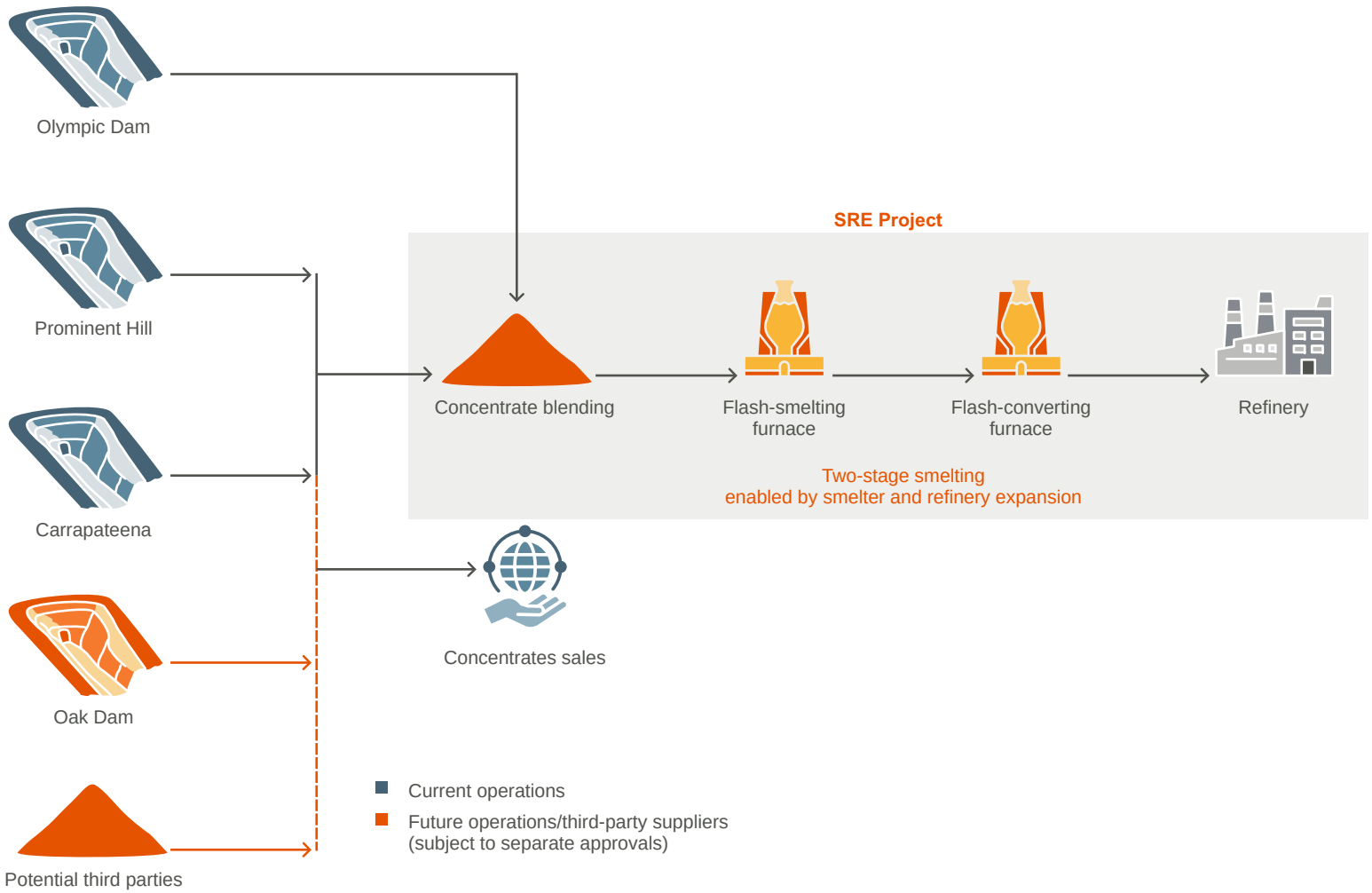


Figure 1.2 | Copper SA province flowsheet

1.1.3 SRE Project

1.1.3.1 Project overview

The objective of the SRE Project is to expand BHP's smelter and refinery capacity, enabling the Copper SA growth plan by:

- increasing copper production capacity up to an average of 650,000 tpa of total copper plus associated products from the current average production of approximately 200,000 tpa
- delivering a sustainable, highly productive, and more resilient smelting and refining flowsheet
- ensuring the Cu:S ratio constraint is resolved at Olympic Dam for copper concentrate production
- delivering reliable and predictable production outcomes following the 2023 acquisition of OZ Minerals' Carrapateena and Prominent Hill mining operations to realise Copper SA province opportunities.

Key elements of the SRE Project are:

- expansion of, and additions to, the existing smelter and refinery to enable total production of up to 650,000 tpa copper plus associated products, including approximately 893,000 ounces per annum of gold, approximately 3,950,000 ounces per annum of silver, approximately 4,900 tpa of uranium oxide, and approximately 1,700,000 to 1,900,000 tpa of 98% sulphuric acid (H_2SO_4)
- introduction of two-stage smelting, involving the installation of a new primary flash-smelting furnace (FSF) to produce copper matte, providing increased concentrate smelting capacity
- conversion of the existing DBF to a flash-converting furnace (FCF), which would process the matte into blister
- addition of an acid plant of similar nature and scale to the existing acid plant and subsequent upgrade of the existing acid plant
- expansion of the electrorefinery and precious-metals refinery (PMR) facilities to produce cathode copper, gold, and silver.

Associated with these key elements, primarily on the existing Special Mining Lease (SML) (Figure 1.3), the SRE Project would require new supporting facilities, infrastructure and services and the upgrade, removal and/or relocation of existing facilities and services within the SRE Project Area referred to as the SML Area (Figure 1.4).

External to the SML Area, electricity would be supplied to the SRE Project through the existing 275 kilovolt (kV) line from Davenport substation (near Port Augusta) to Olympic Dam mine, located within Clause 28 land[4]. Whilst the transmission line and infrastructure are already in place, additional electricity loads required for the SRE Project would result in increased transmission line temperature and more pronounced line sagging, reducing the existing electrical clearances that are required to enable safe operation. The maintenance of the required electrical clearances between the 275 kV line and the ground surface would necessitate isolated areas of land disturbance and associated vegetation clearance. These locations are shown on Figure 1.5, referred to as the Electricity Infrastructure Ground Re-profiling Areas (EIGR Areas).

[4] Land as described in Clause 28, *Roxby Downs (Indenture Ratification) Act 1982* (SA)

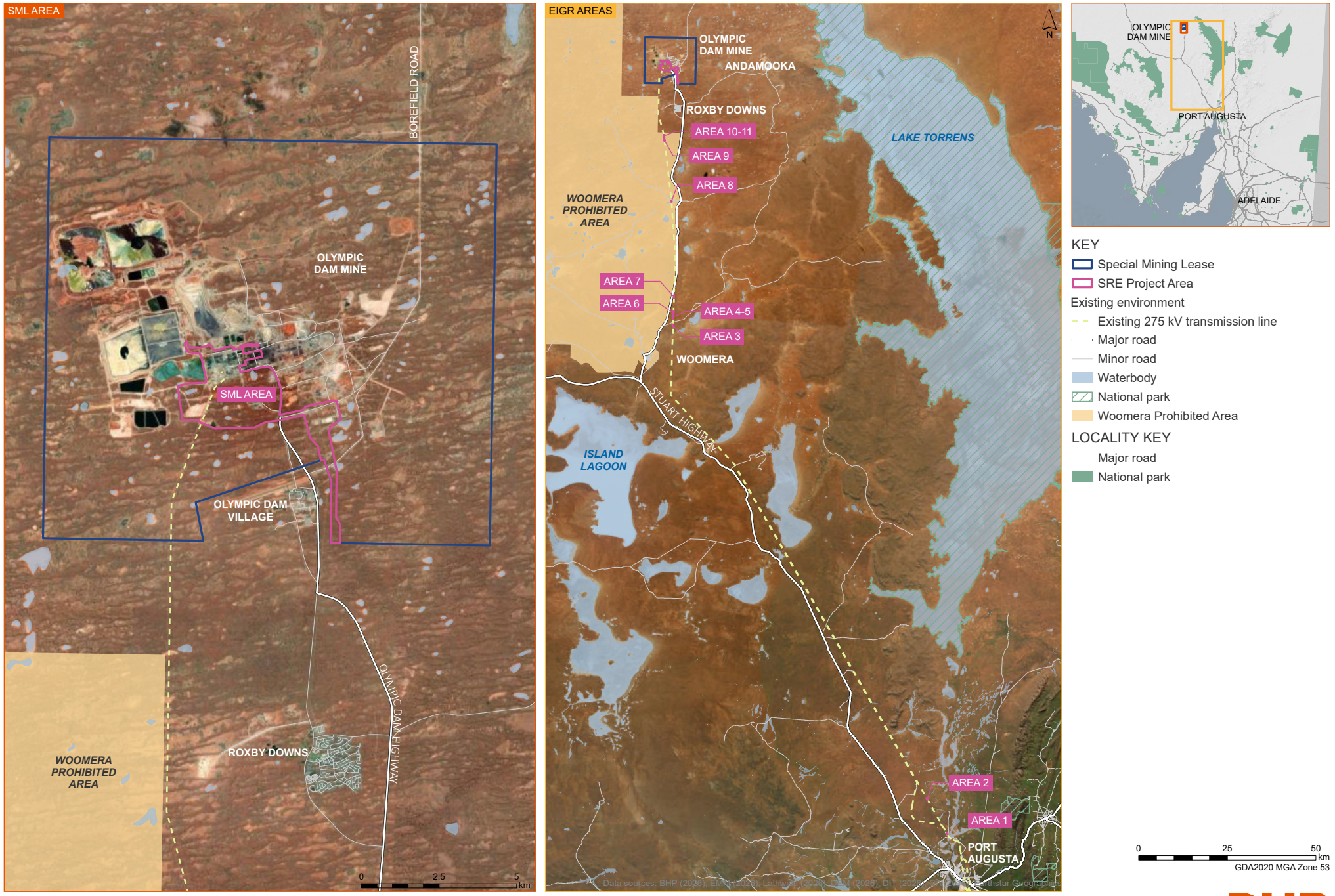


Figure 1.3 | SRE Project location context

SRE Project BHP

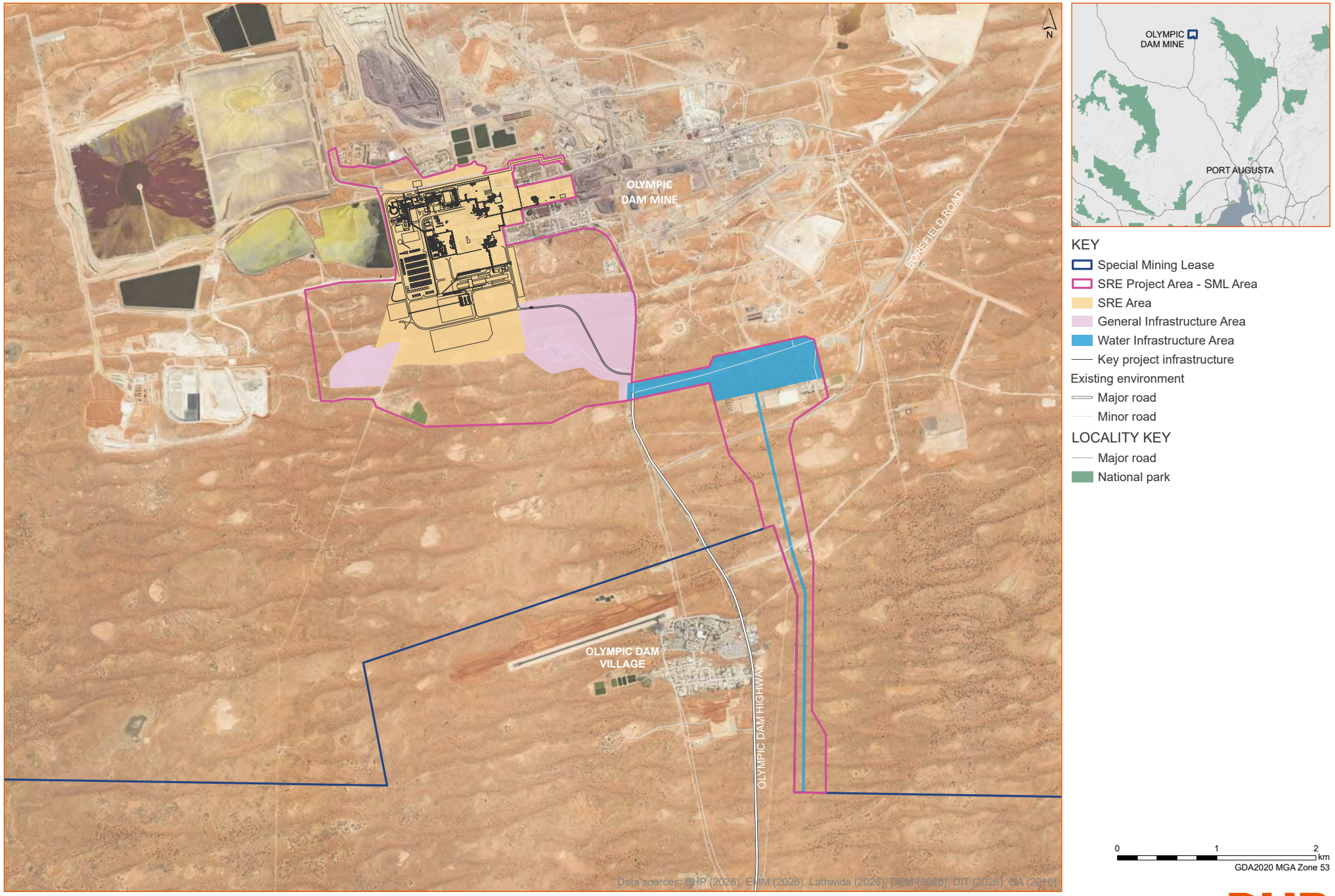


Figure 1.4 | SRE Project Area - SML Area

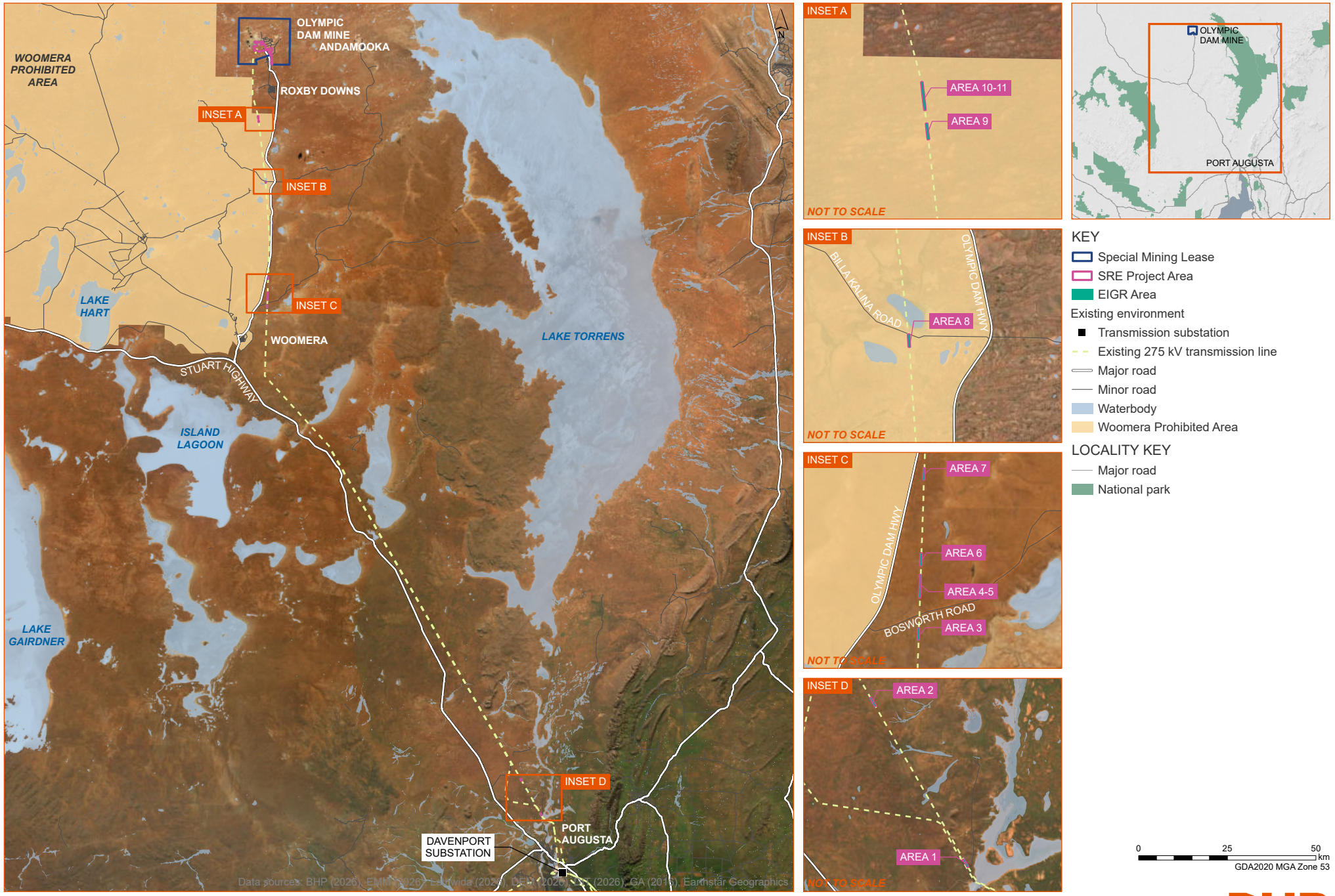


Figure 1.5 | SRE Project Area - EIGR Areas

SRE Project BHP

1.1.3.2 Project staging

Olympic Dam's existing smelter throughput is approximately 500,000 tpa of concentrate producing an average output of approximately 200,000 tpa of total copper and associated products.

The SRE Project would be constructed and operated in a staged manner to enable production capacity up to 650,000 tpa of total copper and associated products, with stages detailed in Table 1.2.

For the purposes of the EIS, BHP has taken a conservative approach and assessed the SRE Project based upon the maximum potential impacts associated with the proposed staging (i.e. the greatest impact scenario) to ensure the full extent of all potential impacts is identified and assessed. In general, this means that impacts have been assessed based on Stage 2 of the project, however, in some instances, impacts have been assessed at the interim stages where these are considered to represent a greater potential for impact.

Table 1.2 | Project stages and timing

Stage	Smelter concentrate throughput (tpa)	Description	Anticipated construction timing
1a	1,100,000	Stage 1a includes: • an increase of smelter throughput to approximately 1,100,000 tpa of concentrate producing an output of approximately 390,000 tpa of total copper • a new regional concentrate receiving, handling and blending facility • upgrade and expansion of the existing smelter feed preparation, including additional concentrate storage, blending and a new steam dryer • installation of a new primary FSF to produce copper matte and conversion of the existing DBF to an FCF to convert matte to blister, including matte handling and grinding infrastructure, additional anode furnace and anode casting infrastructure and decommissioning of the existing electric slag reduction furnace (EF) if required • expansion of the brownfield slag concentrator, supported by FSF slag cooling pits, a new interim slag stockpile and associated environmental management infrastructure • new off-gas management infrastructure, including additional gas and dust handling equipment • a new acid plant, additional acid storage and an associated acid loading station to allow the export of acid • a new oxygen plant and associated distribution infrastructure • a new electrorefinery, associated anode preparation infrastructure and slimes handling infrastructure • expansion of the PMR facility	2028 to 2032
1b	1,400,000	Stage 1b includes: • an increase in smelter throughput to approximately 1,400,000 tpa of concentrate producing an output of approximately 500,000 tpa of total copper • installation of additional concentrate leach thickening, filtration and drying infrastructure • development of greenfield slag concentrator, associated stockpile, and decommissioning of the brownfield slag concentrator • incremental expansion of Stage 1a infrastructure and services, including: o the installation of an additional electrorefinery module o expansion of feed preparation, FCF feed system (including lime addition), off-gas management, acid plant, oxygen plants, slimes treatment and PMR capacities	2032 to 2036

Stage	Smelter concentrate throughput (tpa)	Description	Anticipated construction timing
2	2,000,000	Stage 2 includes: • an increase in smelter throughput to approximately 2,000,000 tpa of concentrate producing an output of approximately 650,000 tpa of total copper • installation of new concentrate leach circuit for treatment of imported concentrate • incremental expansion of Stage 1b infrastructure and services, including: o the installation of additional electrorefinery modules o the installation of an additional anode furnace and associated off-gas management infrastructure o expansion of feed preparation, FSF and FCF feed systems, off-gas and slag management, acid plant, slimes treatment and PMR capacities	2036 to closure

1.2 Project location

1.2.1 Physical location

The majority of the SRE Project would be located within the Olympic Dam SML for the Olympic Dam mine (Figure 1.3), 580 km north of Adelaide in the Far North of South Australia within the SRE Project Area (Figure 1.4). The remaining elements, associated with the EIGR Areas would be located along the 275 kV transmission line between Port Augusta (Davenport substation) and Olympic Dam mine on Clause 28 land (Figure 1.5).

1.2.2 Project area definitions

In order to maintain consistency throughout the EIS, the following terminology related to project infrastructure has been defined for the SRE Project, where the **SRE Project Area** is defined as the boundary around the SRE Project for which BHP is seeking approval, including:

- **SML Area**, located within the SML, which is further delineated by the following areas (Figure 1.4):
  - **SRE Area**: the extent of the proposed SRE Project infrastructure required for construction and operation of the SRE Project within the SML. Includes the existing brownfield plant area, proposed facility relocation(s), proposed plant and laydown areas.
  - **General Infrastructure Area**: the extent of the proposed ancillary infrastructure and ancillary activities required for construction and operation within the SML. Includes the proposed infrastructure laydown areas, proposed stormwater dam location, proposed topsoil and subsoil storage areas.
  - **Water Infrastructure Area**: the extent of the proposed water infrastructure and ancillary activities required for construction and operation within the SML. Includes the proposed water pipeline and water storage dam locations.
- **EIGR Areas**: the extent of the isolated proposed vegetation disturbance required to maintain regulatory clearance distances between the 275 kV transmission line and the ground surface within Clause 28 land (Figure 1.5).

1.3 Key project elements

The key characteristics of the SRE Project are summarised in Table 1.3.

Table 1.3 | Key characteristics of the SRE Project

Project element	Summary
SRE Project activities and infrastructure	
Smelter and refinery expansion and additions	Expansion of, and additions to, the existing smelter and refinery to enable production of up to 650,000 tpa copper plus associated products (gold, silver and acid). This would include: • a new concentrate handling and blending facility • additional concentrate leach capacity • upgrade and expansion of the existing smelter feed preparation • installation of a new primary FSF to produce copper matte and conversion of the existing DBF to a FCF to convert matte to blister, including matte handling and grinding infrastructure and additional anode furnace and anode casting infrastructure • upgrade of the existing slag concentrator circuit and subsequent development of a new slag concentrator circuit • new off-gas management infrastructure, including additional gas and dust handling equipment • a new acid plant and upgrade of the existing acid plant, and the addition of a new acid export facility • a new oxygen plant and expansion of existing oxygen plant capacities • a new electrorefinery, associated anode preparation infrastructure and slimes handling infrastructure • expansion of the PMR facility • slag stockpile and treatment.
Electricity demand, supply and distribution	An electricity demand of up to 68 megavolt-amperes (MVA) net load increase would be required for the SRE Project. The additional electrical demand due to the SRE Project would be met by capacity from the national grid via the existing 275 kV transmission line (noting potential for below-line land disturbance and associated vegetation clearance outside of the SML). Minor augmentation of existing onsite electricity supply infrastructure at Olympic Dam within the SML would be required to ensure the additional capacity could be achieved and maintained. New high voltage and low voltage power supply and reticulation infrastructure would be required to all smelter infrastructure on the SML.
Water demand	Water demand of between 2 and 16 megalitres per day (ML/d) is required for the SRE Project in addition to the existing supply for current operations.
Water supply and distribution	The SRE Project proposes no additional water abstraction from the Great Artesian Basin (GAB) above daily average business-as-usual (BAU) volumes. Water supply for the SRE Project would nominally be provided by the Government of South Australia, via the Department for Infrastructure

Project element	Summary
	and Transport (DIT) Northern Water Project (NWP) infrastructure[5], following commissioning of the initial 90 ML/d capacity of the NWP. This would require new water storage and distribution infrastructure to connect the SRE Project to the NWP connection point at the SML boundary. The NWP water supply may be supplemented or offset by the provision of local groundwater supply on the SML. This water supply would occur via existing process storage dams, the desalination plant at the Olympic Dam site, and/or through the distribution of the existing water supply within daily average BAU volumes. The additional water supplies are likely to require augmentation of the existing desalination water treatment plant and water distribution network, and a demineralised water plant would be required to support the SRE Project operations.
Supporting infrastructure	Supporting infrastructure includes: • civil infrastructure works, such as roads and stormwater infrastructure • new offices and crib rooms • new workshops • new laydown areas • process control system upgrades • concrete batching • other supporting infrastructure as required to facilitate the implementation and operation of the SRE Project.
Waste management	Development of the SRE Project may require decommissioning of the existing processing plant components including dryers, the electric furnace and the existing concentrate storage and transfer system. Some of the decommissioned infrastructure would be retained in-situ to preserve operational flexibility or for future management under the site Closure and Rehabilitation Management Plan, however some elements may require disposal as a component of the SRE Project. Waste generated during construction would be managed as follows: • where practicable, demolition materials would be removed from site and recycled • materials not suitable for removal from site would be managed on the SML via existing waste management facilities. All waste generated from construction of the SRE Project would be managed in accordance with existing site procedures and approved management plans. Operational wastes associated with the SRE Project consist of processing and non-processing wastes where: • processing wastes are limited to low-copper slags generated from the smelting and slag concentrator operations that are not suitable for reprocessing and effluent streams from various process operations that are directed to tailings, including from the PMR and smelter off-gas systems • non-processing wastes including reagent packaging wastes and operational consumables.

[5] Under the EPBC Act the Department for Transport and Infrastructure are the proponent for the Northern Water Desalination Plant and Water Transfer System Infrastructure Project (EPBC 2025/10397

<table>
<tr><th>Project element</th><th>Summary</th></tr>
<tr><td>Workforce</td><td>100% fly-in/fly-out (FIFO) workforce is assumed for construction and the SRE Project operational workforce. Estimated peak construction workforce numbers (in full time equivalents (FTE)) are summarised below.
<table>
<tr><th>Construction stage</th><th>Average FTE</th><th>Peak FTE</th></tr>
<tr><td>Stage 1a</td><td>~708</td><td>~1,313</td></tr>
<tr><td>Stage 1b</td><td>~260</td><td>~515</td></tr>
<tr><td>Stage 2</td><td>~519</td><td>~978</td></tr>
</table>
Following construction, the SRE Project would require a permanent operational workforce summarised below.
<table>
<tr><th>Operational stage</th><th>Additional SRE Project operational workforce</th><th>Total Olympic Dam smelter and refinery workforce</th></tr>
<tr><td>Stage 1a</td><td>~207</td><td>~766</td></tr>
<tr><td>Stage 1b</td><td>~57 (additional to Stage 1a)</td><td>~823</td></tr>
<tr><td>Stage 2</td><td>~244 (additional to Stage 1b)</td><td>~1,067</td></tr>
</table>
SRE Project construction and operational workforce is proposed to utilise existing and new accommodation to be established by BHP for the scheduled campaign maintenance 2027 (SCM27) shutdown, Olympic Dam future campaign maintenance accommodation, and/or greenfield accommodation (subject to separate approvals).</td></tr>
<tr><td>Concentrate import</td><td>Import of copper concentrate from Prominent Hill and Carrapateena mining operations, as well as possible future mining operations (e.g. Oak Dam), and maintain the ability to receive copper concentrate from other third-party suppliers.
Prominent Hill concentrate may be passed through concentrate leach to remove fluorides prior to smelter feed preparation. Carrapateena concentrate is expected to pass directly to smelter feed preparation. Other, third-party concentrates may be passed through concentrate leach to remove deleterious elements (e.g. fluorides) prior to smelter feed preparation as required.</td></tr>
<tr><td>Production and export</td><td>Total production volumes of up to:
~650,000 tpa of cathode copper
~893,000 ounces per annum of gold
~3,950,000 ounces per annum of silver
~4,900 tpa of uranium oxide concentrate; note that the SRE Project does not materially change existing uranium production, with an increase of approximately 1% expected as a result of the leaching of Prominent Hill concentrate to remove fluoride. No upgrade or modification of uranium production facilities is proposed as a part of the SRE Project).
~1,700,000 – 1,900,000 tpa of 98% sulphuric acid (H_2SO_4), of which up to approximately 810,000 tpa may be exported from Olympic Dam (i.e. operations become net sulphuric acid producer).</td></tr>
</table>

1.4 Approvals pathway

The SRE Project was declared an 'impact assessed development' pursuant to section 108(1)(c) and 108(7) of the *Planning, Development and Infrastructure Act 2016* (SA) (PDI Act) on 26 August 2024 (Government of South Australia 2024).

Impact assessed development is the most rigorous level of development assessment prescribed under the PDI Act. The declaration reflects the nature, scale and significance of the SRE Project to South Australia.

Specifically, the Minister for Energy and Mining (the Indenture Minister) made the following declaration:

> *Pursuant to Section 108(1)(c) and Section 108(7) of the* Planning Development and Infrastructure Act 2016*, having taken into account those principles prescribed under Regulation 27(2) of the* Planning, Development and Infrastructure (General) Regulations 2017 *(the Regulations) and having given consideration to the matters under Regulation 27(3) of the Regulations, I declare that all development of a kind specified in the Schedule to this Notice, to the extent that it is undertaken on land identified in Clause 28(1) of the Indenture as impact assessed development and that references to "development" include a project.*

The majority of SRE Project's key elements (Section 1.3) are located within the existing SML but does not include business-as-usual operations (operations and activities which enable production of up to the approved total copper production) or activities associated with BHP's SCM27 shutdown. These activities are subject to separate regulation and approval.

The SRE Project may also be supported by low impact development outside the SML, which could include, for example, minor road works and upgrades to accommodation infrastructure. It is proposed that any approvals required for these activities would be sought on an as-needs basis, meeting the requirements of the respective legislation, standards and guidelines.

1.4.1 Schedule to the Gazette Notice

The Schedule to the Gazette Notice defines the SRE Project as development to utilise, upgrade, replace, amend, expand or develop new facilities, services, infrastructure and operations and support the increased smelting capacity in associated facilities, services and infrastructure for a proposed increase in production up to 650,000 tpa of total copper and associated products at Olympic Dam (including in stages), including development of the following kinds:

a) works to increase smelting and refining capacity through the introduction of a two-stage smelting process, including a new primary smelting furnace to produce copper matter and utilising the existing furnace to convert the matte to blister

b) works to increase the capacity of associated smelting activities, including concentrate storage and feed area, processing plant, acid plant(s) and refinery

c) utilising, expanding, replacing and amending facilities, services, transport, infrastructure and operations for the above purposes

d) works to facilitate receipt, storage and treatment of copper concentrate from third party suppliers

e) works to facilitate export of saleable co-products (e.g. sulfuric acid) resulting from the increased smelting capacity

f) utilising, replacing, amending, or expanding the capacity of ancillary infrastructure and services, including, but not limited to, transport, laydown areas, electricity transmission infrastructure and other services

g) construction and operation of water supply and storage infrastructure to the onsite Reverse Osmosis (RO) plant from the Northern Water Project

h) new facilities, services, infrastructure and operations for the above purposes

i) any purpose related to or ancillary to any of the above purposes.

1.4.2 Exclusions

The Schedule to the Gazette Notice notes the following exclusions from the scope of the SRE Project:

a) any investigation activities relating to the assessment of development enabling a proposed increase in production from 200,000 to up to 650,000 tpa of total copper cathode and associated products

b) any operations, discrete projects, shut down and scheduled campaign maintenance activities and studies associated with enabling continued production of up to approximately 200,000 tpa of total copper cathode and associated products, such as:

   i. projects associated with the progress of mining activities into the SMA, including development of underground activities and surface infrastructure such as additional declines and stockpiling of mined material including ore and waste rock

   ii. waste treatment, storage and disposal including, but not limited to, Tailings Storage Facilities Evaporation Ponds, additional cells for the contaminated waste disposal facility, expansion of the general waste landfill and continued management of low-level radioactive materials

   iii. demolition and replacement of plant and equipment

   iv. provision of ancillary infrastructure to support existing and ongoing mining and production operations, including, but not limited to, sewage treatment plant upgrade, dam barrier wall, hoist and transfer system upgrades, new ore stackers and M6 pipeline upgrade/replacement

   v. ongoing operations and repair and maintenance, including, but not limited to, the smelter campaign maintenance 2027 program

   vi. any new facilities, services, infrastructure, and operations associated with enabling production of up to approximately 200,000 tpa of total copper cathode and associated products, including ducts and works, repairs or maintenance related to any of the preceding purposes

   vii. any activities ancillary to those referred to in (i) to (vi) above.

1.4.3 Assessment Requirements

To meet the requirements of an impact assessed development, the Assessment Requirements for the SRE Project EIS (Assessment Requirements), dated September 2025, were published by the Department for Housing and Urban Development (DHUD) on the PlanSA website on 5 November 2025 (Government of South Australia 2025). The Assessment Requirements are provided in Appendix A2, and are discussed in detail in Section 3.2.2.2.

1.5 Structure of the EIS

This EIS provides:

- contextual information for the assessment of the SRE Project:
  - Chapter 1 Introduction – provides high level details about the SRE Project and approvals pathway
  - Chapter 2 Project context – details of the applicant, land access and tenure
  - Chapter 3 Legislative requirements and planning framework – describes the legislative and policy considerations governing regulatory approval to construct and operate the SRE Project
  - Chapter 4 Project need, benefits and alternatives – provides justification for the SRE Project
- Chapter 5 Environmental context – a detailed description of the subject site including physical, environmental, social and economic setting
- Chapter 6 Description of the project – a detailed description of the proposed SRE Project
- Chapter 7 Stakeholder and community engagement – a summary of the consultation process and outcomes
- Chapter 8 Impact assessment methodology – a description of the environmental impacts assessment methodology applied throughout the EIS
- a systematic assessment of impacts, hazards and risks for each environmental attribute identified by the Assessment Requirements:
  - Chapter 9 Assessment of effects – to confirm impact events
  - Chapter 10 Assessment of impact significance – to assess the level of impact of each impact event
  - Chapter 11 Assessment of hazards and risks – to assess a range of potential and perceived hazards associated with unplanned events
- Chapter 12 Management of environmental impacts – provides a discussion of the following:
  - outcomes of the impact assessment process and identification of environmental outcomes and criteria
  - a description of the existing BHP environmental management system (EMS)
  - proposed changes to the existing Olympic Dam EMS to incorporate management and monitoring of the SRE Project to achieve the identified environmental outcomes
- Chapter 13 Supporting information – supporting information including references, abbreviated terms and glossary.

The appendices to the EIS contain regulatory framework information, specialist technical reports, consolidated impact assessment and other information commissioned by BHP to investigate and report on the environmental, social and economic impacts of the SRE Project and to address the Assessment Requirements (Appendix A2; Government of South Australia 2025). The reports provide additional detail and analysis to that summarised in this EIS Main Document.

BHP

OD SRE EIS



2. Project context

2. PROJECT CONTEXT

This chapter summarises the SRE Project proponent, land tenure and the land use.

2.1 Project proponent details

The proponent for the proposed SRE Project is BHP Olympic Dam Corporation Pty Ltd. Proponent details are summarised in Table 2.1.

Table 2.1 | Proponent details

Operation Name	SRE Project
Location	Olympic Dam mine and Clause 28 land (refer land tenure provided in Table 2.2 and Table 2.3)
Applicant (Lease/Licence Holder and Operator)	BHP Olympic Dam Corporation Pty Ltd
Australian Business Number	99 007 835 761
Site Contact	Anna Wiley
Position	Asset President Copper South Australia
Address	10 Franklin Street, Adelaide, South Australia, 5000
Telephone Number	03 9609 3333

2.2 Proponent capability

BHP Group Limited (BHP Group) is a world-leading resources company headquartered in Melbourne, Australia. BHP Group products are sold worldwide with sales and marketing led through the Singapore location. BHP Group has approximately 80,000 employees and contractors and works in over 90 locations worldwide.

BHP Group is focused on the resources the world needs to grow and decarbonise, including:

- copper for renewable energy
- nickel for electric vehicles (EVs)
- potash for sustainable farming
- iron ore and metallurgical coal for the steel needed for global infrastructure and the energy transition.

2.2.1 History

BHP Billiton Limited was formed from a merger between BHP Limited and Billiton PLC in 2001, built from valued heritage and strong foundations in mining. From two small mining companies founded in the mid-1800s.

BHP Group's rich history began as Broken Hill Proprietary's in a silver, lead and zinc mine in Broken Hill, Australia. Incorporated in 1885, BHP Limited engaged in the discovery, development, production and marketing of iron ore, copper, oil and gas, diamonds, silver, lead, zinc and a range of other natural resources, and was also a market leader in value-added flat steel products.

Billiton PLC's (Billiton) roots trace back to 1851 and a tin mine on a little-known island in Indonesia, Billiton (Belitung) island. Billiton became a global leader in the metals and mining sector and a major producer of aluminium and alumina, chrome and manganese ores and alloys, steaming coal, nickel and titanium minerals. Billiton also developed a substantial and growing copper portfolio.

In 2018, BHP Billiton Limited changed the company name to BHP Group Limited (BHP Group), which has become a world leader in the diversified resources industry.

2.2.2 Assets

BHP Group's assets are a set of one or more geographically close operations, including open-cut and underground mines, and gas production and processing facilities. BHP Group produce essential commodities through assets including iron ore, copper, nickel, potash and metallurgical coal. Operated assets are wholly owned and operated by BHP Group or owned as a joint venture and operated by BHP Group. BHP Group also hold interests in assets that are owned as a joint venture but are not operated by BHP Group.

At the location of the SRE Project, BHP operates the Olympic Dam mine, one of the world's most significant deposits of copper, gold, and uranium. Located 580 km north of Adelaide, South Australia, Olympic Dam is a part of BHP Group's Minerals Australia operation. It's made up of underground and surface operations and operates a fully integrated processing facility from ore to metal. Ore mined underground is hauled by an automated train system to crushing, storage and ore hoisting facilities, or trucked directly to the surface via declines. The metallurgical complex consists of grinding, flotation and leach circuits, a hydrometallurgical plant incorporating solvent extraction circuits for copper and uranium, copper smelter, copper refinery and a recovery circuit for precious metals.

BHP Group's acquisition of OZ Minerals Limited on 2 May 2023 added the Prominent Hill and Carrapateena assets to its portfolio, providing an opportunity to create an integrated copper province in South Australia – driving further efficiencies in resource exploration and production. BHP Group's investment in the SRE Project represents a potential further growth opportunity in this location.

2.2.3 Strategy

BHP seek to responsibly manage the most resilient long-term portfolio of assets, in highly attractive commodities, and aim to grow value through being excellent at operations, discovering and developing resources, acquiring the right assets and options, and capital allocation, maximising value and returns.

BHP aim to do this through:

- Development and mining: BHP strives to achieve the industry's best performance in safety, operational excellence, project management and allocation of capital.

- Process and logistics: BHP processes and refines ore, safely manages waste, and efficiently and sustainably transports their products to customers.
- Sales, marketing and procurement: BHP seek to maximise value through their centralised marketing and procurement organisations, commercial expertise, understanding of markets, customers and suppliers.
- Closure and rehabilitation: BHP consider closure and rehabilitation throughout the asset life cycle to help minimise their impact and optimise post-closure value for all.
- Exploration and acquisition: BHP seek to add high-quality Tier 1 copper interests through their exploration activities and early-stage entry and acquisition options.

BHP produce some of the essential resources needed to support global megatrends, such as decarbonisation, and strive to produce them sustainably, efficiently and ethically. They bring together essential resources, a strong balance sheet and a differentiated operating capability underpinned by BHP Group technical Centres of Excellence and the BHP Group Operating System (BOS). This combination of operational excellence, a strong portfolio of large, long-life, quality assets and focus on social value assists BHP to grow value more consistently for all stakeholders and underpin continued attractive returns and long-term value for BHP Group shareholders.

2.2.4 Finances

Investment capital for the SRE Project is approximately US$3.5 billion and would be financed by BHP. BHP has operated the Olympic Dam mine, where the SRE Project is located, since 2005.

Financial results and operational reviews are presented at quarterly, half yearly and annual periods, and published via the BHP Group website (www.bhp.com/investors/financial-results-operational-reviews). BHP Group maintains an A1 (stable) and A- (stable) long-term credit rating and outlook from Moody's and Standard & Poor's, respectively.

2.2.5 Structure

BHP Group is the parent company, headquartered in Melbourne, Australia. BHP Group is incorporated in Australia and has a primary listing on the Australian Securities Exchange, an international secondary listing on the London Stock Exchange, a secondary listing on the Johannesburg Stock Exchange and an American Depositary Receipt program listed on the New York Stock Exchange. The BHP Group is led by BHP Group's Board of Directors and management team.

In the financial year FY25, BHP Group operated the business under three main divisions:

- Minerals Australia, comprising BHP Group's iron ore, coal and nickel assets in Western Australia, Queensland and New South Wales
- Copper South Australia, comprising BHP Group's copper assets in South Australia
- Minerals Americas, comprising BHP Group's copper assets in Chile and potash project in Canada.

BHP Olympic Dam Corporation Pty Ltd (BHP) is a wholly owned subsidiary of BHP Group and owns and operates BHP Group's Olympic Dam asset (BHP 2025a).

2.3 Land access and tenure

This section summarises the SRE Project land tenure and interests in the land for the project and surrounds. A summary of land tenure is presented in Figure 2.1.

2.3.1 Land tenure

The Olympic Dam mine is located on freehold land held by BHP subject to an SML, granted to BHP under the Olympic Dam and Stuart Shelf Indenture (Indenture) and the ratifying *Roxby Downs (Indenture Ratification) Act 1982* (SA) (Ratification Act).

The majority of the SRE Project would be located within the Olympic Dam SML. The land tenure details are summarised in Table 2.2.

Table 2.2 | Land tenure associated with the SRE Project within the SML

Tenement type	SML
Tenure description	SML1 overlays the freehold tenure (CT 5140/575)
Tenure holder	BHP Olympic Dam Corporation Pty Ltd
Purpose	Operating Olympic Dam mine (Copper; Uranium Oxide; Dolomite; Sand; Gold; Silver; Limestone)
Location of land	580 km north of Adelaide in the Far North of South Australia
Area	Approximately 17,800 hectares (ha)

The land tenure details for the SRE Project aspects associated with the electricity transmission line are summarised in Table 2.3.

Table 2.3 | Land tenure associated with the SRE Project within the EIGR Areas

Tenure description	• CT5439/775 • CT5441/913 • CT5441/914 • CT5480/470 • CT5480/618
Tenure holder	WMC Corporation (now BHP Olympic Dam Corporation Pty Ltd)
Purpose	Transmission line
Location of land	275 kV transmission line between Port Augusta (Davenport substation) and Olympic Dam mine in the Far North of South Australia
Area	Approximately 87.45 ha

2.3.2 Native title holders

The SML Area and the northern portion of the EIGR Areas (CT5441/913, CT5441/914) are located within the Native Title determination boundary of the Kokatha People (Part A), tribunal file number SCD2014/004 determined in September 2014.

The southern portion of the EIGR Areas (CT 5480/470, CT 5439/775) are located within the Native Title determination boundary of the Barngarla People, tribunal file number SCD2016/001 determined in June 2016.

With respect to cultural values, BHP has undertaken, and would continue to undertake:

- identification of Aboriginal cultural heritage values compiled through background research, Aboriginal consultation, archaeological field investigations and anthropological assessments
- cultural heritage surveys in accordance with the Olympic Dam Agreement (ODA).

The presence of any artefacts or identified Aboriginal cultural heritage values, including landscape features, within the SRE Project will be handled in accordance with legislation and the agreed procedures and protocols for heritage management with the Kokatha Aboriginal Corporation (KAC), Kuyani Yartah Association (KYA) and Barngarla Determination Aboriginal Corporation (BDAC) Indigenous Groups.

2.3.3 Pastoral leases, crown land and freehold land

Located to the south and east of the Olympic Dam SML is Crown Land. The SML is also bounded to the west and north by Roxby Downs Pastoral Station and to the north-east, east and south-east by Andamooka Pastoral Station. The leases associated with both Roxby Downs Pastoral Station and Andamooka Pastoral Station are currently held by BHP and are sub-leased to Kokatha Pastoral Pty Ltd for the ongoing management of pastoral activities.

The EIGR Areas are located on the following freehold held by WMC Corporation (now BHP Olympic Dam Corporation Pty Ltd), CT5439/775, CT5441/913, CT5441/914, CT4580/470 and CT5480/618, held for the purpose of electricity transmission infrastructure (Table 2.3)

2.3.4 Easements and other interests in the land

The area surrounding the SML is subject to an exploration licence (EL), EL 5941, covering approximately 1,751 square kilometres (km^2) and currently held by BHP. The EIGR Areas overlap with the ELs described in Table 2.4, petroleum exploration licence applications (PELAs) described in Table 2.5 and geothermal exploration licences (GELs) described in Table 2.6. Land tenure for the SRE Project is presented in Figure 2.1.

There are no easements or other overlapping interests relevant to the SRE Project.

Table 2.4 | SRE Project overlapping exploration licences

EL No.	EL holder	Expiry date
EL 5835	OZ Exploration Pty Ltd (100%)	30/06/2027
EL 5941	BHP Olympic Dam Corporation Pty Ltd (100%)	21/02/2028
EL 5959	BHP Olympic Dam Corporation Pty Ltd (100%)	03/05/2028
EL 6707	Petratherm Ltd (100%)	30/03/2028

Table 2.5 | SRE Project overlapping petroleum exploration licence applications

PELA No.	Applicant	Application date
PELA 601	Gehyra Exploration Pty Ltd	14/11/2011
PELA 644	Banjo Energy Pty Ltd	15/07/2014
PELA 748	Cryptid Clean Energy Pty Ltd	22/02/2022

Table 2.6 | SRE Project overlapping geothermal exploration licences

GEL No.	Licensee	Expiry Date
GEL 692	Volt Geothermal Pty Ltd	11/12/2027
GEL 693	Volt Geothermal Pty Ltd	11/12/2027
GEL 694	Volt Geothermal Pty Ltd	11/12/2027

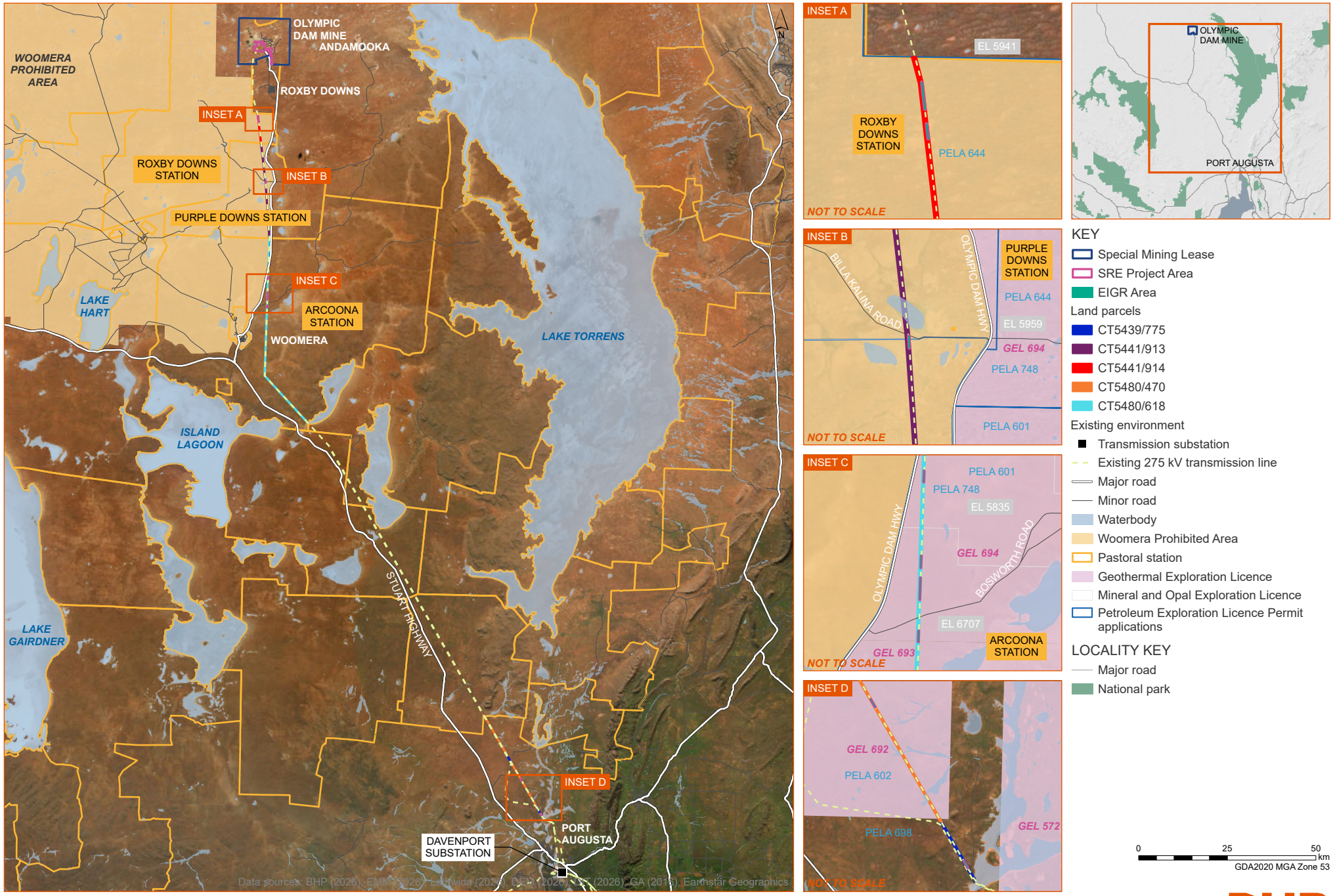


Figure 2.1 | Land tenure at the SRE Project



BHP

OD SRE EIS

3. Legislative requirements and planning framework

3. LEGISLATIVE REQUIREMENTS AND PLANNING FRAMEWORK

This section describes the legislative, regulatory and policy context for the SRE Project. It also identifies the key primary regulatory approvals and secondary approvals and permitting requirements for the SRE Project and related activities.

3.1 Legislative context

3.1.1 *Roxby Downs (Indenture Ratification) Act 1982* (SA)

The Olympic Dam mine operates under the Olympic Dam and Stuart Shelf Indenture (Indenture), ratified by the Ratification Act by the Government of South Australian in 1982 and most recently amended in 2026.

Under the provisions of the Indenture the South Australian Minister for Energy and Mining must adopt the provisions contained in Part 7 of the PDI Act. Under the Indenture, the Minister for Energy and Mining made a declaration on 26 August 2024 that the SRE Project is to be assessed as an 'impact assessed development' requiring the preparation and submission of an EIS (Government of South Australia 2024). The Minister for Energy and Mining adopts the role of the State Planning Commission (SPC) in developing the Assessment Requirements and is the responsible decision-maker under the Government of South Australia's process.

3.1.2 *Planning, Development and Infrastructure Act 2016* (SA)

The PDI Act establishes a development assessment system in South Australia to streamline the assessment process. The PDI Act is supported by subordinate regulations, as well as practice directions and guidelines which are issued by the SPC, South Australia's independent principal planning body.

The planning system, established by the PDI Act, includes five assessment pathways:

- Accepted development (Subdivision 2): minor development that needs to be structurally sound.
- Code assessed development (Subdivision 3): development that is assessed against the policies within the Planning and Design Code (PlanSA 2025). There are two possible code assessed development assessment pathways:
    - deemed to satisfy assessment, which applies to developments that are straightforward and envisaged for their location
    - performance assessed development, which applies to developments that are generally more complex in nature but envisaged for their location.
- Impact assessed development (Subdivision 4): development that requires thorough assessment to ensure potential impacts are adequately understood and considered. There are two possible impact assessed development assessment pathways:

- restricted development, which is defined by the Planning and Design Code (PlanSA 2025) and generally applies to development that requires consideration of strategic impacts or requires detailed investigation and assessment beyond that provided through the performance-assessed development pathway
- impact assessed development, which applies to developments that are considered to be of state significance.

Impact assessed development is the most rigorous level of development assessment prescribed under the PDI Act.

The SRE Project is being assessed as an impact assessed development, as declared by the Minister for Energy and Mining (Government of South Australia 2024), and is considered to be of significance to South Australia.

3.1.3 *Environment Protection and Biodiversity Conservation Act 1999* (Cth)

The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) is the Australian Government's primary environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places — defined in the EPBC Act as Matters of National Environmental Significance (MNES). Under the environmental provisions of the EPBC Act, actions that are likely to have a significant impact on an MNES cannot be undertaken without referral to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for consideration and approval under the EPBC Act.

The nine MNES (DoE 2013) are:

- world heritage properties
- national heritage places
- wetlands of international importance (listed under the Ramsar Convention)
- nationally threatened species and ecological communities
- migratory species (protected under international agreements)
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mining)
- a water resource, in relation to coal seam gas development and large coal mining development.

When a project, a development, an undertaking, an activity or a series of activities, or alteration of any of these things occur, a self-assessment is required to be conducted to assess the significance of any potential impacts to MNES protected under the EPBC Act to determine whether referral to DCCEEW may be required.

The SRE Project was referred to DCCEEW under the EPBC Act on 23 December 2024 (EPBC 2024/10096) (BHP 2024d) and determined to be not a controlled action via a Decision Notice on 29 April 2025 (DCCEEW 2025a) (Appendix F1 EPBC Act Notice of Referral Decision). The referral and not controlled action determination considered all potential impacts to MNES protected under the EPBC Act.

Since the EPBC Referral determination in April 2025, the following minor project changes have occurred during the ongoing engineering design for the SRE Project:

- Increased smelter throughput to approximately 2,000,000 tpa of concentrate (from 1,700,000 tpa) to enable resolution of the copper-to-sulphur ratio and production capacity up to 650,000 tpa of total copper.
- Optimised capital investment by constructing and operating the SRE Project in a staged manner via Stage 1a (new), Stage 1b (new) and Stage 2.
- Inclusion of an option to leach other third-party concentrates to remove deleterious elements (e.g. fluorides) prior to smelter feed preparation.
- Upgrade of the existing slag concentrator circuit within the existing (brownfields) processing plant footprint and the development of an interim slag stockpile to support the slag concentrator operations during Stage 1a.
- Minor process flow revisions designed to optimise production and aid efficiencies, none of which require additional vegetation or habitat disturbance or result in increased emissions or other waste generation.
- Increased raw water demand, from 10 ML/d to approximately 16 ML/d, to be supplied via DIT's NWP.
- Changes to the construction and operation workforce profile to reflect the staged manner of development.
- Changes to the SRE Project Area to include the whole of the existing (brownfields) processing plant to allow for upgrades to infrastructure and equipment within these areas as necessary to support the SRE Project (e.g. development of a brownfield slag concentrator) and inclusion of a stormwater overflow pipeline corridor. These changes do not result in additional native vegetation clearance or habitat disturbance.

Key differences between the SRE Project as referred and these minor changes have been considered by undertaking an EPBC Act Significant Impact Assessment/Self-Assessment in accordance with the EPBC Act, EPBC Regulations, and Significant Impact Assessment Guidelines 1.1 (DoE 2013).

Assessment of these changes with respect to the potential for significant impacts to MNES and, where relevant, the whole of the environment, demonstrated that the changes do not materially change the impact profile of the referred SRE Project and do not change the conclusion that the SRE Project is unlikely to have a significant impact on MNES.

The EPBC Act Significant Impact Assessment/Self-Assessment was discussed and provided to DCCEEW.

3.1.4 Aboriginal heritage

Aboriginal heritage management activities associated with the Olympic Dam operations are primarily undertaken pursuant to the Indenture, the Ratification Act and the ODA. Historical approvals for Olympic Dam have included authorisations obtained under the *Aboriginal Heritage Act 1979* (SA) (AH Act 1979), which applies to Olympic Dam's operations within the Olympic Dam and Stuart Shelf Areas under the Indenture and Ratification Act.

The SRE Project has been designed, assessed and consulted on having regard to both the existing heritage management arrangements applicable to Olympic Dam and the contemporary Aboriginal heritage protection framework in South Australia.

The *Aboriginal Heritage Act 1988* (SA) (AH Act 1988) provides protection for Aboriginal sites, objects and remains in South Australia. The AH Act 1988 currently applies to activities undertaken outside the legislated Olympic Dam and Stuart Shelf Areas and to activities otherwise required by law to be undertaken in accordance with that Act.

Accordingly, for activities proposed within the SML and the EIGR Areas, BHP will continue to comply with the ODA, applicable legislation, approved heritage management procedures and any heritage approvals or authorisations required at the time the activity is undertaken. Where an activity cannot avoid potential impacts to Aboriginal heritage values, BHP will determine the appropriate authorisation pathway in consultation with Traditional Owners and the Government of South Australia, having regard to the legislative framework then in force.

For activities proposed outside of the Olympic Dam and Stuart Shelf Areas, including in EIGR Areas outside of these areas, these will be undertaken in accordance with the requirements of the AH Act 1988 and any authorisations required under that Act.

No construction activity that has the potential to disturb Aboriginal heritage values will occur unless the necessary heritage assessments, consultation processes and approvals or authorisations have first been completed.

3.1.4.1 Heritage authorisation framework

The authorisation pathway for Aboriginal heritage management associated with the SRE Project is dependent upon:

- the location of the activity
- the nature of the heritage value potentially affected
- whether avoidance can be achieved
- the legislative framework applicable at the time the activity is undertaken
- any approved procedures, agreements or management arrangements in place between BHP, Traditional Owners and the State.

The intended heritage authorisation framework is summarised in Table 3.1.

Table 3.1 | Heritage authorisation framework

Activity type	Heritage authorisation framework
Activities within the SML with no identified heritage impact	Proceed in accordance with approved heritage procedures and management controls
Activities within the SML where heritage values are identified but avoided	Avoidance measures implemented and verified prior to disturbance
Activities wholly within EIGR Areas	Consultation, impact assessment and authorisation process determined in accordance with the applicable legislative framework and approved heritage management arrangements
Activities where avoidance cannot be achieved	Consultation, impact assessment and authorisation process determined in accordance with the applicable legislative framework and approved heritage management arrangements

3.1.5 *Native Title Act 1993* (Cth)

The *Native Title Act 1993* (Cth) recognises and protects Native Title, being the rights and interests in land and waters that Aboriginal and Torres Strait Islanders have under their traditional laws and customs.

Under the Native Title Act, Native Title is extinguished by various tenures, including freehold land and gazetted public roads. As the SRE Project Area is located within the SML (SML Area), which overlaps freehold title held by BHP, and within freehold Clause 28 land (EIGR Areas), there are no legal Native Title Act implications associated with the SRE Project.

3.1.6 Other relevant legislation

The design, construction, operation and decommissioning of the SRE Project would be undertaken in accordance with the requirements of other relevant legislation, which is outlined below. In addition, specific aspects of the SRE Project may trigger secondary permitting, approvals and licensing requirements. The key legislation relevant to these secondary processes are also summarised in this section.

Aspects of the SRE Project that may trigger secondary permitting, approvals and licensing requirements include (but are not limited to):

- approval to clear native vegetation under the *Native Vegetation Act 1991* (SA) (NV Act)
- variation of the existing licence under the *Environment Protection Act 1993* (SA) (EP Act) to undertake prescribed activities of environmental significance
- permit for road infrastructure works under the *Road Traffic Act 1961* (SA) and *Highways Act 1926* (SA)
- licence variation under the *Radiation Protection and Control Act 2021* (SA) (RPC Act) for radiation sources and or protection of people and the environment from the effects of radiation
- application for water affecting activity permits under the *Landscape South Australia Act 2019* (SA) (LSA Act)
- application for a licence/permit if removal of, or interference with, protected plants or animals under the *National Parks and Wildlife Act 1972* (SA) (NPW Act) is required.

3.1.6.1 *Native Vegetation Act 1991* (SA)

Native vegetation is defined as any naturally occurring local plant species that is indigenous to South Australia, from small ground covers and native grasses to large trees and water plants. It also includes naturally occurring regrowth and in certain circumstances, dead trees.

The SRE Project would require some clearance of remnant native vegetation (Section 10.1.8). The NV Act provides protection for native vegetation in South Australia and sets out a process for applying to clear vegetation. Approval to clear native vegetation in South Australia is required under the NV Act or Native Vegetation Regulations 2017 depending on the activity and approval pathway.

As part of the assessment of the SRE Project, the Native Vegetation Council (NVC) would be provided with an opportunity to comment on the EIS, related to:

- whether the proposed development avoids or minimises clearance as far as practicable
- whether there are alternatives that involve no clearance, less clearance or clearance of more degraded vegetation than the vegetation proposed to be cleared
- determining the significant environmental benefit (SEB) required to offset the impact of clearance.

3.1.6.2 *Environment Protection Act 1993* (SA)

The EP Act provides the regulatory framework to protect South Australia's environment, including land, air and water.

The EP Act sets up a framework that imposes both a general environmental duty and a licensing regime where prescribed activities of environmental significance require a licence from the South Australian Environment Protection Authority (EPA) to operate. A valid development approval or EPA-issued Works Approval is required prior to granting a licence for a new development.

Olympic Dam currently operates under an existing EPA licence (EPA 1301) for the following prescribed activities of environmental significance:

- chemical storage and warehousing facilities
- chemical works (inorganic)
- coal handling and storage
- abrasive blasting
- concrete batching works
- ferrous and non-ferrous metal melting works
- metallurgical works
- mineral works
- extractive industries
- fuel burning not coal or wood
- desalination plant that discharges wastewater to inland waters or land (other than to a wastewater lagoon)
- hydrocarbon storage
- waste recovery facility
- wastewater treatment works (outside Mount Lofty Ranges Water Protection Area (MLR WPA))
- activity producing listed waste
- landfill depot.

It is envisaged that additional licensing requirements for the SRE Project (if any) would be incorporated into the existing licence(s) as required in accordance with Section 46 of the EP Act. The potential impacts of the SRE Project, as outlined in this EIS, can be appropriately managed and mitigated to satisfy the EP Act, general environmental duty (GED), and relevant environment protection policies.

3.1.6.3 *Road Traffic Act 1961* (SA) and *Highways Act 1926* (SA)

The *Road Traffic Act 1961* (SA) details traffic control devices, road closing provisions, vehicle standards and heavy vehicles.

The *Highways Act 1926 (SA)* provides for the appointment of a Commissioner of Highways and makes provision for the construction and maintenance of roads and works.

The construction and operation of the SRE Project is unlikely to impact on the Olympic Dam Highway. However, should transport logistics (e.g. oversize over mass) identify the need for road network upgrades or safety issues, the Government of South Australia's DIT, being the body responsible for the construction, safe and efficient operation and maintenance of the road system, will be consulted.

3.1.6.4 *Radiation Protection and Control Act 2021* (SA)

The RPC Act, regulated by the EPA came into effect on 11 February 2023, and introduced several key changes to the way radiation safety is regulated in South Australia. The objectives of the RPC Act include to control activities involving radiation sources and to provide for the protection of people and the environment from the effects of radiation. The RPC Act introduced a general duty of care, a risk-based harms approach and established the offence of causing radiation harm.

BHP holds current radiation licences for Olympic Dam operations, which will be reviewed and conditions amended to reflect the proposed SRE Project, as applicable.

3.1.6.5 *Landscape South Australia Act 2019* (SA)

The LSA Act is the key legislation for managing the state's land, water, pest plants and animals, and biodiversity across the state and is administered by regional Landscapes Boards South Australia. The SRE Project falls under the South Australian Arid Lands Landscape Board.

The LSA Act seeks to ensure natural resources such as land, soil, native vegetation, animals and ecosystems are afforded appropriate protections while also building a sustainable economy, resilient communities and a vibrant biodiversity.

The SRE Project will take into consideration potential impacts (e.g. siting, design and construction) on natural resources, including land, soil, watercourses, native vegetation, animals and ecosystems.

3.1.6.6 *National Parks and Wildlife Act 1972* (SA)

The NPW Act protects vegetation located within conservation parks, conservation reserves and any state-listed endangered, rare or threatened species. The NPW Act also provides for the protection of native animals, and it is an offence to take, injure or kill protected animals anywhere in the state unless a permit has been obtained.

The SRE Project will take into consideration potential impacts (e.g. siting, design and construction) of all relevant state-listed endangered, rare or threatened flora and fauna species. A secondary licence/permit would need to be obtained if removal of, or interference with, protected plants or animals is proposed.

3.2 Approvals context

To proceed, the SRE Project requires approval under the South Australian planning system. This section identifies the processes, procedures, and policies under which the application must be assessed and determined under the South Australian planning system.

3.2.1 Planning framework

The South Australian planning system, established by the PDI Act, has set up various planning instruments which provide controls to ensure development is appropriately located, designed and considered across the state. These include state planning policies, regional plans and the Planning and Design Code.

Practice Direction 17 Impact Assessed Development (SPC 2023) requires an EIS to be prepared in support of impact assessed development to, among other things, address the extent to which the development is consistent with these planning instruments.

3.2.1.1 State planning policies

The state planning policies are the highest order policy document in the South Australian planning system, outlining matters of importance to the state in land use planning and development. State planning policies are given effect through the creation of planning instruments, such as Regional Plans and the Planning and Design Code as well as when preparing an EIS for impact assessable development such as the SRE Project.

The State Planning Policies (SPC 2025a) identified as relevant to the SRE Project are:

- State Planning Policy 4: Biodiversity
- State Planning Policy 5: Climate Change
- State Planning Policy 7: Cultural Heritage
- State Planning Policy 9: Employment Lands
- State Planning Policy 10: Mineral and Energy Resources
- State Planning Policy 15: Natural Hazards
- State Planning Policy 16: Emissions and Hazardous Activities.

An assessment of the SRE Project against the relevant state planning policies is provided in Table 3.2. The assessment shows that the SRE Project would be generally consistent with the state planning policies.

Table 3.2 | SRE Project alignment with State Planning Policies

State Planning Policy	Summary	Relevant policy objectives	Relevant SRE Project aspects
4 (Biodiversity)	South Australia's unique biodiversity contributes to our quality of life, supports our economy and provides life-supporting functions such as clean air, water, sea and land. Maintaining and enhancing a healthy, biologically diverse environment ensures greater resilience to climate change, increases productivity and supports a healthy society.	4.1 – Minimise impacts of development on areas with recognised natural character and values, such as native vegetation and critical habitat so that critical life-supporting functions to our state can be maintained. 4.2 – Recognise the value of modified landscapes and allow appropriately scaled development that can co-exist with and safeguard biodiversity values and critical functions 4.5 – Where impacts to biodiversity cannot be avoided, these impacts should be minimised and where possible, offset. 4.7 – Assess and manage risk posed by known or potential biosecurity threats to enable the sustainable development and use of terrestrial and marine environments.	In accordance with Assessment Requirement BE3, BHP has undertaken an Ecological Impact Assessment to identify State and Nationally threatened species, threatened ecological communities, vegetation and fauna habitat potentially impacted by the SRE Project, assess impacts to these ecological values and develop mitigation measures. All native vegetation clearance associated with the SRE Project has been assessed in accordance with the NV Act. This data will be used to determine an appropriate SEB for proposed vegetation clearance under the NV Act and regulations. Refer to Section 5.5, Section 9.8, Section 10.1, and Appendix D1 Ecological Impact Assessment.
5 (Climate change)	Climate change will impact all areas of our society. Our future prosperity, the liveability of our cities and towns, the health and wellbeing of our communities and the resilience of our built and natural environment all depend on how well we adapt to and mitigate the impacts of climate change.	5.6 – Facilitate green technologies and industries that reduce reliance on carbon-based energy supplies and directly or indirectly reduce our greenhouse gas emissions. 5.9 – Encourage development that does not increase our vulnerability to, or exacerbate the impacts of, climate change and which makes the fullest possible contribution to mitigation. 5.10 – Support the transition of traditional industries that rely on fossil fuels to climate smart initiatives to reduce greenhouse gas emissions.	In accordance with Assessment Requirement CCRE1 and CCRE1, BHP has undertaken a climate change adaptation risk assessment (Section 11.3.2) and greenhouse gas assessment which consider alternative fuel strategies (e.g. bio-LPG and bio-diesel) currently under consideration under the preferred pathway to net zero (P2NZ) roadmap. In accordance with Assessment Requirements HR2 and PE3, BHP has also undertaken a Surface Water Impact Assessment, which reports on modelled climate change flood scenarios to confirm the proposed development would not be vulnerable to the impacts of climate change. Refer to Appendix C6 Surface Water Impact Assessment.
7 (Cultural heritage)	South Australia's cultural heritage reflects the diversity, unique features and key moments in our state's history and contributes to our community's understanding of its sense of place and identity. The enduring, living, spiritual and cultural connection to the land by South Australia's First Peoples is recognised and acknowledged as an essential part of our cultural heritage.	7.1 – The sensitive and respectful use of our culturally and historically significant places. 7.2 – Recognise and protect Indigenous cultural heritage sites and areas of significance. 7.3 – Recognise and protect places and areas of acknowledged heritage value for future generations. 7.4 – The appropriate conservation, continuing use, and as appropriate, adaptive reuse of our heritage places and heritage areas of value to the community. 7.5 – Maintain the context of a place or area of heritage value through appropriate design guidelines that encourage compatible design solutions.	In accordance with Assessment Requirement SC1, BHP has undertaken: • identification of Aboriginal cultural heritage values compiled through background research, Aboriginal consultation, archaeological field investigations and anthropological assessments • cultural heritage surveys in accordance with the ODA. The presence of any artefacts or identified Aboriginal cultural heritage values, including landscape features, within the SRE Project would be handled in accordance with legislation and the agreed procedures and protocols for heritage management with KAC, KYA and BDAC Indigenous Groups (Section 5.6.9.1).
9 (Employment lands)	Providing a suitable supply of land for employment uses is critical to support job growth and the economic prosperity of the communities. The planning system needs to support the diversification of our economy and remove barriers to innovation. It is critical that the right signals are sent to the market to attract interest, investment and tourism opportunities across South Australia.	9.1 – Support the expansion and clustering of key economic growth areas including health; education; tourism; energy and resources; primary industry; defence; and knowledge and creative industries. 9.3 – Support state-significant operations and industries and protect them from encroachment by incompatible and/ or more sensitive land uses.	In accordance with Assessment Requirement LUSC1, BHP has undertaken a Land Use and Planning Assessment to assess whether the scale, function, character and intensity of the SRE Project is compatible with existing land uses and surrounding areas which predominantly comprises mining related activities for the Olympic Dam mine (within the SML) and transmission line infrastructure (within Clause 28 land). Refer to Section 5.6, Section 9.9, Section 10.4, and Appendix C7 Land Use and Planning Impact Assessment.
10 (Mineral and energy resources)	Our valuable mineral and energy resources are the property of the Crown and are managed by the state on behalf of all South Australians. The mineral and energy resource sectors will continue to fuel economic development, support the growth and development of our communities, and provide an income stream to help fund infrastructure and support construction affordability.	10.1 – Define and protect mineral resources operations, associated infrastructure and undeveloped mineral resources from encroachment by incompatible land uses. 10.3 – Identify and maintain key infrastructure that supports mineral and energy resource activities and supply chains, including strategic transport corridors and pipelines used for energy transportation. 10.4 – Consider the impacts of mining and exploration on the growth of towns and settlements and ensure an appropriate form of housing for workers and their families. 10.5 – Promote decision making that maximises the long-term benefits of different land uses to the economy, communities and the environment.	In accordance with Assessment Requirements LRSE1 and SC2, BHP has undertaken an Economic Impact Assessment and Social Impact Assessment to identify the socio-economic costs and benefits of the SRE Project. Refer to Section 5.6, Section 9.9, Section 10.4, Section 10.5, Appendix D2 Social Impact Assessment, and Appendix D3 Economic Assessment.
14 (Water security and quality)	Water is one of South Australia's most valuable natural resources. Access to a safe and reliable water supply is essential to support our communities and our diverse economy. Our water dependent ecosystems also rely on access to water so that they can continue to provide cultural, aesthetic, amenity, recreational and tourism benefits. It is therefore vital that we continue to protect and plan for our water now and into the future.	14.1 – Protect the state's water supply to support a healthy environment, vibrant communities and a strong economy. 14.5 – Support development that does not adversely impact on water quality.	In accordance with Assessment Requirement PE3, BHP has undertaken a Surface Water Impact Assessment and associated flood modelling to assess potential surface water quantity and quality impacts of the SRE Project. The SRE Project proposes no additional water abstraction from the GAB above Olympic Dam mine's current daily average business-as-usual volumes. The SRE Project would be supplied water through existing water supply infrastructure and, when this reaches current capacities, through either or both: • local groundwater supply via existing process storage dams and the desalination plant at the Olympic Dam site • connection to the proposed NWP. Refer to Appendix C6 Surface Water Impact Assessment.

State Planning Policy	Summary	Relevant policy objectives	Relevant SRE Project aspects
15 (Natural hazards)	Natural hazards are an integral part of the South Australian landscape and have the potential to impact on people, property, infrastructure, our economy and the environment. As we continue to grow and develop we need to plan for and mitigate risks from these hazards.	15.1 – Identify and minimise the risk to people, property and the environment from exposure to natural hazards including extreme heat events; bushfire; terrestrial and coastal flooding; soil erosion; drought; dune drift; acid sulphate soils; including taking into account the impacts of climate change.	In accordance with Assessment Requirement HR1, BHP has undertaken an assessment of hazards and risks which is presented in Chapter 11. Potential impact events associated with natural hazards have also been considered as part of technical assessments for the SRE Project as follows: • Appendix C1 Soil and Groundwater Impact Assessment confirmed soils in the SRE Area are non-acid forming. • Appendix C6 Surface Water Impact Assessment has modelled climate change flood scenarios to confirm the proposed development would not be vulnerable to the impacts of climate change. • Appendix D1 Ecological Impact Assessment has assessed potential impacts to flora and fauna due to bushfire.
16 (Emissions and hazardous activities)	Protecting communities and the environment from exposure to industrial emissions and hazards and site contamination is fundamental to the creation of healthy cities and regions. At the same time, it is critical that South Australia's industrial and infrastructure capacity and employment levels are preserved.	16.1 – Protect communities and the environment from risks associated with industrial emissions and hazards (including radiation) while ensuring that industrial and infrastructure development remains strong through: • supporting a compatible land use mix through appropriate zoning controls • appropriate separation distances between industrial sites that are incompatible with sensitive land uses • controlling or minimising emissions at the source, or where emissions or impacts are unavoidable, at the receiver. 16.2 – Assess and manage risks posed by known or potential site contamination to enable the safe development and use of land.	In accordance with Assessment Requirement AEQ1, BHP has undertaken an Air Quality Impact Assessment, Greenhouse Gas Impact Assessment, Noise and Vibration Impact Assessment, Radiological Impact Assessment and Soil and Groundwater Impact Assessment to determine if the SRE Project has the potential to results in significant emissions and hazardous activities, including radiation as referenced in the following sections: • Section 5.1 for the baseline air environment • Section 9.1, Section 9.2, Section 9.3, Section 9.4 and Section 9.5 for the assessment of air-related effects • Section 10.4 for the assessment of air-related impact significance. Refer to the following appendices: • Appendix C1 Soil and Groundwater Impact Assessment • Appendix C2 Noise and Vibration Impact Assessment • Appendix C3 Air Quality Impact Assessment • Appendix C4 Radiological Impact Assessment • Appendix C5 Greenhouse Gas Impact Assessment.

3.2.1.2 State planning strategy and regional plans

The Far North Regional Plan (DHUD 2026) is one of seven regional volumes that, together with the 30-Year Plan for Greater Adelaide (DPTI 2017), make up the South Australian Planning Strategy. These plans play an important role in guiding sustainable growth by identifying land use and long-term infrastructure over a 15 to 30-year period. They outline where new housing and employment areas will be located, how services will be delivered, and what infrastructure is needed while exploring different growth scenarios. The Far North Regional Plan maps the Government of South Australia's planning vision for the region to 2051 and beyond. It provides governments, businesses, industry and not-for-profit organisations with the data and direction to better align, plan for and respond to growth and change in our community and towns, while achieving state conservation goals.

The Far North Regional Plan identifies five key priorities:

- People, housing and liveability: enhancing housing diversity to support an ageing population, smaller households and seasonal workers.
- Productive economy: futureproofing the economy by aligning land-use planning with infrastructure, housing needs and workforce attraction. Capitalising on mining in areas such as Olympic Dam, expanding the renewables energy sector, and diversifying employment and rural business through ecotourism in the Far North's outback and Ikara-Flinders Ranges. Expanding housing options to support an ageing population and attracting younger workers in healthcare and tourism sectors. Safeguarding agricultural land and supporting climate-resilient projects like the NWP to diversify the economy and create jobs.
- Natural resources, environment and landscapes: preserving biodiversity, protecting vulnerable species, and managing ecologically significant areas such as Lake Eyre Basin, supporting Aboriginal cultural heritage through careful management of culturally significant sites and implementing actions for coastal protection, water security, and climate resilience to support environmental health and regional liveability.
- Transport and infrastructure: strengthening connectivity for remote townships to improve access to services and social infrastructure and investing in infrastructure to support economic growth and employment opportunities. Expanding public and active transport networks within key population centres to reduce isolation and promote sustainable travel options.
- Implementation and delivery: utilising climate data to inform planning that addresses increased temperatures, reduced rainfall, and associated risks such as heatwaves, bushfires and floods. Identifying long-term land supply areas to accommodate permanent and short-term housing needs and ensuring sustainable land supply to support population growth, with zoning for residential expansion aligned with employment areas, health and community services. Ongoing collaboration between local, regional and state authorities to ensure infrastructure is in place to support population growth.

Under the Far North Regional Plan, several long-term strategic objectives are proposed, and the SRE Project and BHP's Oak Dam[6] exploration project are identified as two of the key projects for the Far North (DHUD 2025). An assessment of the SRE Project against the relevant long-term objectives within the Far North Regional Plan shows the SRE Project is generally consistent with the Far North Regional Plan because it would facilitate compliance with the following objectives:

[6] At the time of preparing this EIS, the project area of 'Oak Dam' is in the process of transitioning to 'Ankata'. BHP is committed to a full transition to the name Ankata

- Protect and expand well-serviced and strategically located employment land to support economic growth and productivity.
- Support the growth of local employment precincts through strategic planning and investment.
- Promote strategic investment in activity and township centres across the region to ensure equitable access to economic, employment, and business opportunities, particularly in remote communities.
- Safeguard and enhance water security and quality to support the growth, diversification and resilience of the region's primary industry sector.
- Promote best practice waste management (including segregated collection systems) in industrial and mixed-use developments to support resource recovery activities.
- Promote the adaptive re-use and retrofitting of existing building stock as well as designing new buildings for adaptability and/or disassembly.
- Protect key infrastructure, including associated strategic access routes, transport corridors and pipelines, that contribute to the region's economy and establish infrastructure corridors that support infrastructure such as transport, pipelines and energy infrastructure provision to key resource areas.
- Maintain adequate separation distances between mining activities, housing and other incompatible development.
- Encourage co-existence and equitably manage the interface between mining and other land uses, including environmental protection and facilitate appropriate post-mining land uses.
- Identify areas of high biodiversity value and determine what types of sensitive development, if any, they could accommodate, and encourage sensitive development with minimal impact and protect areas with recognised biodiversity value, native vegetation and habitat so that critical life-supporting functions can be maintained.
- Protect and enhance native vegetation, habitats and areas of high biodiversity value and that provide ecological services, while implementing a project that minimises and offsets unavoidable impacts, and identify and protect modified landscapes which have significant environmental value and can co-exist with other land uses.
- Ensure development is climate-ready to support a resilient economy, community and environment and actively investigate, monitor and review the impact of climate change on hazard risk.
- Consider decarbonisation investment and climate change adaptation strategies in the early planning phases and promote opportunities for green technologies and industries that reduce reliance on carbon-based energy supplies and ensure developments avoid or minimise lifecycle greenhouse gas (GHG) emissions to align with SA's climate targets.
- Protect communities and the environment from risks associated with emissions and hazardous activities, and assess and manage risks posed by known or potential site contamination to enable the safe development and use of land.
- Ensure the Far North Region's water resources support a healthy environment, vibrant communities and a strong economy, and the region's water sources and supporting infrastructure are resilient and meet the needs of the population and economy.
- Minimise the impacts of encroachments by incompatible land uses near energy supply infrastructure and corridors taking a risk-based approach that supports public safety and security of energy supply.

3.2.1.3 Roxby Council Strategic Plan 2021 – 2025

The aspiration of the Roxby Council's Strategic Plan 2021 – 2025 is that Roxby Downs is Australia's most highly regarded mining town (Municipal Council of Roxby Downs 2021).

The Strategic Plan is based on the following community foundations:

- Leadership and governance: an organisation that has a culture of accountability, improvement and acts with a set of shared values and behavioural standards.
- Health and wellbeing: a place that provides services and facilities to assist our community to achieve positive wellbeing outcomes.
- Community vibrancy: a vibrant, active, inclusive and engaging community that fosters connections between community members.
- Environment and sustainability: a town which respects its natural heritage and offers practical initiatives that benefit the community and preserve the environment.
- Economic development: provides efficient services to the business sector which will contribute to its success in our local economy.
- Infrastructure and essential services: provide quality, contemporary, value for money community assets and services on sustainable infrastructure and essential services.
- Community services: the needs of our diverse community are supported by the delivery of responsive and relevant community services.
- Communication: timely and consistent professional communication that engages community, business and other stakeholders. Facilitate opportunity for comment and input in decision-making.

BHP's SRE Project provides an opportunity for the Olympic Dam operation to continue to support the aspiration of Roxby Council's Strategic Plan and the surrounding region to continue to be a sustainable and thriving regional community.

3.2.1.4 Planning and Design Code

South Australia's Planning and Design Code (PlanSA 2025) is the single source of planning policy for South Australia. Policies in the Planning and Design Code are articulated spatially, in relation to zones, sub-zones and overlays.

The SRE Project is located within the Remote Areas Zone of the Code. Two southern EIGR Areas, located near Port Augusta (associated with certificate of title (CT) 5439/775) are within the Rural Zone. Activities in these two EIGR Areas would be limited to vegetation disturbance and are not considered development under the PDI Act. The Planning and Design Code zoning of the SRE Project is shown in Figure 3.1.

The Desired Outcome (DO) of Remote Areas Zone, being DO 1, is a zone that includes a diverse range of uses, including mining and workers' accommodation. Overlays of relevance are hazards, including bushfire and flooding, key outback and rural routes, native vegetation and water resources.

An assessment of the SRE Project against the overlays of the Planning and Design Code is presented in Appendix C7 Land Use and Planning Impact Assessment.

The assessment demonstrates that the SRE Project would be consistent with the Planning and Design Code because it would:

- be in line with the nature and scale of development envisaged in the region and involves the efficient use of suitably zoned land
- would not be proximate to sensitive receptors and would be designed and constructed to minimise potential impacts
- avoid interference with airfield operations
- provide for emergency services access
- be sited, designed and constructed to minimise the threat of hazards including bushfire and flooding
- provide for safe and efficient vehicle movement and access throughout construction and operation, with Appendix C8 Traffic Impact Assessment identifying the level of service would be maintained
- maintain surface water quality and avoid impacts on watercourses (Appendix C6 Surface Water Impact Assessment)
- minimise native vegetation and habitat clearance and provide an SEB offset.

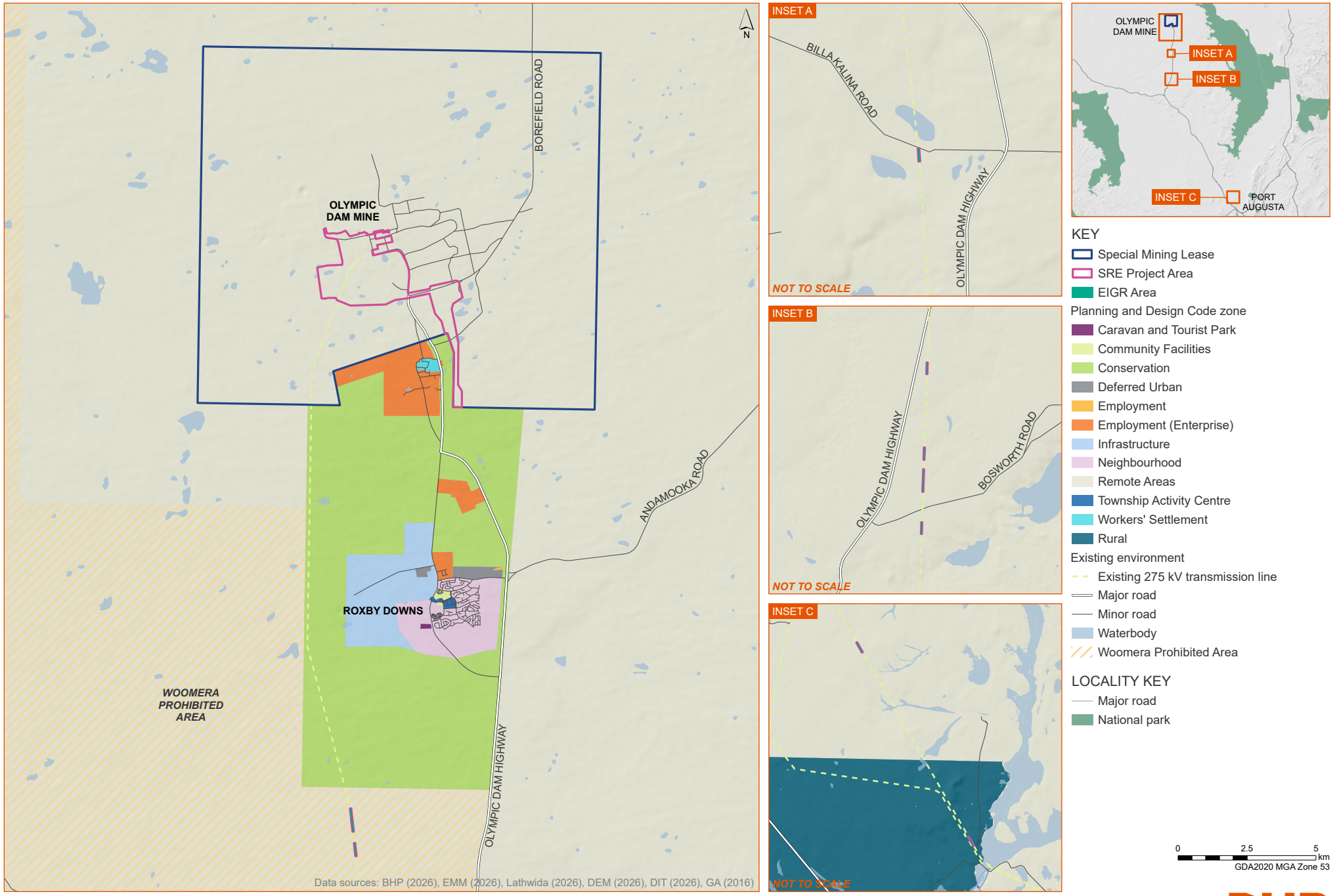


Figure 3.1 | SRE Project Planning and Design Code Zones

3.2.2 Environmental Impact Statement

3.2.2.1 Purpose of the EIS

The purpose of this EIS is to provide information relevant to the assessment of the environmental, social and economic impacts of the proposed SRE Project. The EIS has been prepared in accordance with Practice Direction 17 Impact Assessed Development (SPC 2023) and the Assessment Requirements issued by the SPC (Appendix A2; Government of South Australia 2025), which determine the minimum level of assessment required for environmental attributes relevant to the SRE Project.

The EIS will be made available for public exhibition and referred to council(s) and relevant government agencies for comment. The EIS will form the basis of the assessment of the proposed SRE Project by the Indenture Minister, including reference to any of the SRE Project's public submissions, government agency comments and the Response Document prepared by BHP to address matters raised during the consultation period.

3.2.2.2 Assessment Requirements

A Scoping Application was submitted to the Indenture Minister in December 2024 (BHP 2024g). The Scoping Application addressed the requirements of the SPC Practice Direction 17 Impact Assessed Development (SPC 2023), intended to assist the SPC to identify social, environmental and economic issues relevant to the proposed SRE Project, and develop the EIS Assessment Requirements. The Assessment Requirements for the SRE Project, dated September 2025, were published by the DHUD on the PlanSA website on 5 November 2025 (Appendix A2; Government of South Australia 2025).

The Assessment Requirements are provided in Appendix A2, and identify the following key issues associated with the development:

- employment opportunities and economic benefits for the local/regional community and the state
- direct, indirect and cumulative impacts from the smelting process as it relates to emissions and their effect on air quality (and any consequent impacts on the local community and the environment)
- increased greenhouse gas emissions
- direct and indirect impacts on local surface water and groundwater
- increased traffic during construction (especially the delivery of materials and large components) and operation (especially the transport of feed materials, such as copper concentrate, and products, such as copper cathode and sulphuric acid), including the impact on regional road networks (especially through Port Augusta)
- effect of additional demand on accommodation and services in the Roxby Downs township
- effects of additional demand on infrastructure and services in the region, especially Port Augusta.

Since the Assessment Requirements were prepared in September 2025, the following minor project changes have occurred during the ongoing engineering design for the SRE Project:

- Increased smelter throughput to approximately 2,000,000 tpa of concentrate (from 1,700,000 tpa) to enable resolution of the copper-to-sulphur ratio and production capacity up to 650,000 tpa of total copper.
- Optimised capital investment by constructing and operating the SRE Project in a staged manner via Stage 1a (new), Stage 1b (new) and Stage 2.

- Inclusion of an option to leach other third-party concentrates to remove deleterious elements (e.g. fluorides) prior to smelter feed preparation.
- Upgrade of the existing slag concentrator circuit within the existing (brownfields) processing plant footprint and the development of an interim slag stockpile to support the slag concentrator operations during Stage 1a.
- Minor process flow revisions designed to optimise production and aid efficiencies, none of which require additional vegetation or habitat disturbance or result in increased emissions or other waste generation.
- Increased raw water demand, from 10 ML/d to approximately 16 ML/d, to be supplied via DIT's NWP.
- Changes to the construction and operation workforce profile to reflect the staged manner of development.
- Changes to the SRE Project Area to include the whole of the existing (brownfields) processing plant to allow for upgrades to infrastructure and equipment within these areas as necessary to support the SRE Project (e.g. development of a brownfield slag concentrator) and inclusion of a stormwater overflow pipeline corridor. These changes do not result in additional native vegetation clearance or habitat disturbance.

Key differences between the project description for the SRE Project from the April 2025 Scoping Application (BHP 2025a) and the description of the project presented in Chapter 6 have been reviewed against the Assessment Requirements (Appendix A2; Government of South Australia 2025). The review, which has been discussed and provided to the Government of South Australia, indicated that the issued Assessment Requirements remain adequate for the characterisation of potential SRE Project impacts.

The Assessment Requirements detail the level of assessment required for the various environmental attributes, summarised in Table 3.3.

Table 3.3 | Determined assessment level for environmental attributes

Reference	Environmental attribute	Level of assessment
Overview		
AA1	Project design and alternatives	Standard
Amenity and Environmental Quality (AEQ)		
AEQ1	Air quality	Detailed
AEQ2	Noise and vibration	Standard
AEQ3	Transport and traffic	Detailed
AEQ4	Visual amenity	Standard
Biological Environment (BE)		
BE1	Biosecurity	Standard
BE3	Terrestrial flora and fauna	Standard

Reference	Environmental attribute	Level of assessment
Climate Change and Resource Efficiency (CCRE)		
CCRE1	Climate Change Adaptation	Standard
CCRE2	Greenhouse Gas Emissions	Detailed
CCRE3	Sustainable Use of Resources	Standard
CCRE4	Waste Management	Detailed
Land, Regional and State Economics (LRSE)		
LRSE1	Local, Regional and State Economies	Detailed
Hazards and Risks (HR)		
HR1	Hazard Assessment and Management	Detailed
HR2	Flooding	Standard
HR3	Site and Groundwater Contamination	Detailed
HR4	Dangerous Substances (excluding Nuclear)	Standard
Land Use and Site Conditions (LUSC)		
LUSC1	Land Tenure, Protected Areas and Land Use	Standard
Physical Environment (PE)		
PE2	Soils, Landform and Geology	Standard
PE3	Surface Water and Groundwater	Detailed
Social and Community (SC)		
SC1	Aboriginal Cultural Heritage	Detailed
SC2	Community Wellbeing / Social Impact Assessment	Detailed

3.2.2.3 Consultation

The SRE Project EIS is subject to statutory consultation, in accordance with section 113 of the PDI Act and Practice Direction 17, as follows:

- The public will be provided with an opportunity to comment on the EIS during public exhibition, undertaken for a period of 30 business days. An advertisement will be placed in The Advertiser and local newspapers inviting submissions. A copy of the EIS will be published on the PlanSA Portal and made available for public inspection for the duration of the exhibition period.
- The EIS will be referred to the relevant council (or councils), and to any prescribed authority or body.
- The EIS will be referred to the EPA and relevant government agencies as required by the Act and Regulations, or as determined by the Minister.

In addition to consultation on the EIS, stakeholder and community engagement has been undertaken throughout EIS development, with ongoing consultation proposed as outlined in Chapter 7.

BHP

OD SRE EIS



4. Project need, benefits and alternatives

4. PROJECT NEED, BENEFITS AND ALTERNATIVES

4.1 Project objectives

The objective of the SRE Project is to expand BHP's smelter and refinery capacity, enabling the Copper SA growth plan by:

- increasing copper production capacity up to 650,000 tpa of total copper plus associated products from the current average production of approximately 200,000 tpa
- delivering a sustainable, highly productive, and more resilient smelting and refining flowsheet
- ensuring the Cu:S ratio constraint is resolved at Olympic Dam for copper concentrate production
- delivering reliable and predictable production outcomes following the 2023 acquisition of OZ Minerals' Carrapateena and Prominent Hill mining operations to realise SA Copper province opportunities.

4.2 Market requirements

This section outlines the market and government policy drivers supporting the SRE Project.

4.2.1 Market context

BHP's economic and commodity outlook for financial year FY25 (BHP 2025c) identifies that demand for BHP commodities has been resilient, with copper demand being higher than previously expected despite the fiscal year being dominated by policy uncertainty, including tariffs. This short-term volatility and uncertainty has not altered the longer-term outlook, which anticipates:

- The world's population is expected to approach 10 billion by 2050 (with more than half residing in Asia), requiring vast investment in housing, schools, hospitals, road and rail infrastructure and electrification which are all resource intensive.
- Urbanisation and general population growth are expected to add 2.5 billion people to the world's cities, where steel and copper intensity is significantly higher than in rural areas. Copper is identified as a critical enabler of this transition due to its role in wiring, plumbing and communications infrastructure.
- Copper will be the biggest beneficiary of the energy transition and digitalisation trend. China's recent new energy technology push is identified as one factor shifting demand towards copper. While some policy changes in advanced economies such as the roll-back of the US Inflation Reduction Act subsidies are likely to create some near-term uncertainty, this is considered a cyclical slowdown rather than a structural shift. Near-term weakness in the energy transition in these advanced economies could also be partially offset by higher-than-expected power demand growth from data centres and digitalisation.

BHP (2025b) maintains the long-term view that global demand is expected to grow from 32 million tonnes currently to over 50 million tonnes by 2050. In the medium term, it is expected that a further mine supply will be required to keep pace with growing demand, with supply from current and committed mines peaking in the late 2020s.

Analysis of the role of copper into the future (BHP 2024a) identifies copper reserves and production are concentrated in Latin America, Australia and Africa. The last 30 years has seen impressive supply growth globally, with production doubling to around 22 Mtpa today, primarily due to increases from Latin America (particularly Chile), the Asia Pacific region and Africa (over the last 10 years). This has been achieved through significant investment in greenfield projects and the widespread adoption of the leach-solvent extraction-electrowinning process from the mid-1980s, which unlocked previously uneconomic copper supply low-grade oxide ores. This process now accounts for 20% of copper supply.

The industry's current challenge is to repeat this substantial volume growth in less than half the time (BHP 2024a). Assisting this growth, the SRE Project would enable BHP to process significantly more concentrate from across its Copper SA assets.

4.2.2 Government policies

Several state government strategic plans and policy documents are of relevance in providing context and justification for the SRE Project. These are summarised below.

4.2.2.1 South Australia's Copper Strategy

South Australia has a long-term strategy to significantly increase the state's copper production by:

- accelerating exploration, discovery and information
- developing innovative infrastructure, services and research
- building industry and community capacity.

Through the its copper strategy, the Government of South Australia aims to:

- set South Australia's ambition for copper production, exploration and benefit sharing
- establish performance success targets for the sector across a range of outcomes including production, investment, and environment, social and governance (ESG) objectives
- position the state to achieve sustained growth in production from our planned and existing mines
- integrate the copper strategy into broader state priorities and major projects such as the State Prosperity Project and NWP
- identify opportunities to accelerate or support copper exploration and further resource identification
- identify new opportunities to capture additional value from the growth in the copper sector within our state's borders.

The SRE Project supports South Australia's copper ambitions by enabling the unlocking of copper resources already identified in Olympic Dam mine resources, taking an integrated, provincial approach to copper production and investing in processing infrastructure to increase production.

4.2.2.2 Australian Government Strategic Minerals List

The Australian Government maintains two lists of minerals that are important for Australia's modern technologies, economies and national security: the Critical Minerals List and the Strategic Minerals List (DISR 2024). The lists are reviewed by the government at least every three years, and may be updated in response to global, strategic, technological, economic or policy changes.

Both the Critical Minerals List and the Strategic Minerals List contain minerals:

- that are important for the global transition to net zero and broader strategic applications, specifically the priority technologies set out in the Critical Minerals Strategy
- for which Australia has geological potential for resources
- in demand from our strategic international partners.

The key difference between the two lists is that the Critical Minerals List contains minerals that are vulnerable to supply chain disruption whereas the supply chains for minerals on the Strategic Minerals List are not currently vulnerable enough to meet the criteria for the Critical Minerals List. Copper is one of five minerals identified on the Strategic Minerals List.

BHP's SRE Project proposes to further strengthen the supply chain for copper by supporting the development of a new copper province in South Australia.

4.2.3 Projected future copper demand

Total global copper demand has grown at a 3.1% compound annual growth rate over the last 75 years – but this growth rate has been slowing. It was only 1.9% over the 15 years to 2021. Looking to 2035, however, BHP expects this growth rate to jump back to 2.6% annually (BHP 2024a).

BHP expects that this reversal will come from a combination of three key themes:

- traditional economic growth
- energy transition
- digital infrastructure.

4.2.3.1 Traditional economic growth

Traditional demand refers to the basic relationship between economic growth, electricity consumption and copper. Through the 20th century and into the 21st century, as countries developed, electricity became accessible to industry and homes and led to the creation of products that lifted living standards: lighting, washing machines, refrigerators, air conditioners, radio and television, computers and smartphones. It is not only these products that need copper; so do the factories and supply chains that produce and deliver them, and the power infrastructure keeping them all running. Copper's broad application across multiple end-uses has made it resilient and less-exposed to single point failures of demand.

Traditional demand in the developed world is expected to remain strong and as living standards rise globally, the demand for copper is expected to follow suit. Developing economies, which have nearly five times the population of high-income economies, will increasingly strive to achieve the same high standard of living. This transition will lead to a greater need for copper.

4.2.3.2 Energy transition

Since the Industrial Revolution, the use of fossil fuels has helped the world unlock greater levels of productivity. As the world seeks to rein in the use of these fuels (and their related carbon emissions), it will need more electricity (mainly from renewable sources) to keep everything running. Most energy modellers agree that electrification will be a major enabler of the decarbonisation of transport, buildings and large parts of industry. Under BHP's base case, electricity demand will roughly double from today to 2050, as electricity's share of total energy consumption also doubles to around 40% by 2050 (BHP 2024a).

4.2.3.3 Digital infrastructure

Digital demand refers to the growth from the expected ramp-up in demand for digital infrastructure, as the world creates and consumes massive amounts of data, enabled by copper-intensive data centres. Artificial Intelligence (AI)-enabled technology requires vast amounts of data and processing capability, which in turn needs larger and faster computers consuming more electricity (BHP 2024a).

4.2.3.4 Future demand

Due to the concurrent adoption of new copper-intensive technologies, as well as support from the broad-based traditional development across end-uses in emerging economies, BHP anticipate a re-acceleration of copper demand to 2035 of 2.6% compound annual growth rate, versus a 1.9% compound annual growth rate over the past 15 years. In absolute terms, this is roughly 1 Mt copper demand growth per year, every year, until 2035 – double the 0.5 Mt annual growth volume of the past 15 years. BHP further project global copper demand to grow by around 70% to over 50 Mt per annum by 2050 – an average growth rate of 2% per year (BHP 2024a).

4.2.4 Projected future copper supply

As with demand, there are different drivers of copper supply. First and foremost, primary supply comes from mines and processing facilities such as those that BHP operates. Secondary, or scrap, copper is also an important source of supply. Copper can be recycled from end-of-life products ('old scrap') or from waste generated in the manufacturing process ('new scrap'), reducing the need for primary copper from mining.

4.2.4.1 Scrap and recycling

Recycled copper is expected to be an important source of supply to meet the large copper demand growth over the next 30 years (BHP 2024a).

The main barrier to recycled copper supply is the availability of scrap. The pool of old scrap is principally determined by the average lifetime of an end-use product. These lifetimes can range from weeks or months for some consumer products (e.g. from batteries, headphones, charging cables) up to several decades (e.g. from construction and infrastructure), with an average life of copper in-use of around 20 years (BHP 2024a).

Much of this old scrap is also not recovered. In 2021 only approximately 43% of available old scrap was collected and recovered for re-use, falling to 40% in 2023 as lower prices, slowing economic activity and regulatory changes acted as headwinds (BHP 2024a). Rising scrap nationalism to preserve the local use of secondary material and restrictions in cross-regional waste trade have also acted as a drag on growth

for global scrap collection and recovery and may affect the availability of scrap in developing countries who have not yet built up their own substantial pool of copper in-use.

Nevertheless, BHP expect the increased focus on copper as a critical or strategic raw material will lift copper scrap collection and recovery rates from their current levels to 56% by 2035 and even higher longer term (BHP 2024a).

With the growing scrap pool, we estimate that scrap supply will increase from around one third of global copper today to around 40% by 2035, and reach around a half of total copper consumption by 2050.

4.2.4.2 Mine supply

Copper reserves and production are concentrated in Latin America, Australia and Africa. The last 30 years has seen impressive supply growth globally, with production doubling to around 22 Mtpa today, primarily due to increases from Latin America (particularly Chile), the Asia Pacific region and Africa (over the last 10 years). This has been achieved through significant investment in greenfield projects and the wide-spread adoption of the leach-solvent extraction-electrowinning process from the mid-1980s, which unlocked previously uneconomic copper supply low grade oxide ores.

Currently operating copper mines are expected to provide more than half of the copper required to meet future global demand over the next decade. Even so, BHP estimate existing mines to be producing around 15% less copper in 2035 than they do today as a result of declining grades, aging infrastructure and the requirement to meet every more stringent ESG expectations.

BHP expect supply growth over the next 10 years to be dominated by the same regions – Latin America Africa and Asia Pacific – with Africa having the highest growth rate (albeit off a much lower base than Latin America), and Latin America continuing to make the most significant contribution in absolute terms. Brownfields supply (i.e. expansions of existing operations, such as proposed at Olympic Dam via the SRE Project) are expected to contribute up to 30% of total copper supply by 2035, benefiting from the use of existing infrastructure, workforce and knowledge and less technical risk and uncertainty. Greenfields projects, in contrast, are expected to make up around 14% of supply by 2035, constrained by a slowing rate of significant deposit discoveries, increasing regulatory oversight, shifts in community expectations and the uncertainties associated with operating in new jurisdictions.

Against optimistic supply forecasts, which include the development of all (current) probable copper projects, a significant gap to expected demand in 2035 is evident, even with the expected increase in copper scrap supply (BHP 2024a).

4.3 Benefits of the project

4.3.1 Benefits for local and regional communities

BHP is committed to maximising economic benefits for the region wherever possible. The SRE Project would contribute to this by:

- directly employing or contracting up to approximately 1,313 people during peak construction, and up to approximately 508 additional SRE Project workforce during operation, indirectly contributing to the South Australian economy
- supporting outcomes for Traditional Owners and Indigenous people though employment and procurement opportunities

- increasing the net benefits of local employment, defined as the additional employment income in excess of average wages in the local Outback SA – North and East region, by between $1 million to $4 million a year over the life of the project (Appendix D3 Economic Assessment)
- supporting ongoing non-labour expenditure to the local Outback SA – North and East region, such as materials and equipment, fuel and utilities, estimated to be $66 million a year during construction and $39 million a year during operations (Appendix D3 Economic Assessment)
- providing value-add regional processing which supports increasing South Australia's economic complexity
- provisioning capital expenditure for infrastructure, plant and equipment, a proportion of which would be sourced from local and regional providers.

In addition, BHP would continue with regional community events, training and education programs established to support the existing Olympic Dam operations. These programs would assist in up-skilling indigenous and local communities and providing employment opportunities that would help maintain regional populations.

4.3.2 Benefits for South Australia

The SRE Project is expected to have positive economic benefits for the local, regional and state economies with direct and indirect benefits including:

- increased labour force participation, indirectly enhancing socio-economic wellbeing of individuals and communities
- strengthening of the regional economy through contribution to Gross Regional Product (GRP) and to the State, indirectly supporting economic diversification and providing greater resilience to economic downturns
- increased economic productivity and prosperity for local and regional businesses (e.g. civil and engineering construction, professional, technical and scientific services, freight and logistics) due to increased demand for goods and services, indirectly leading to potential generation of further employment opportunities
- increased social capital due to population retention or growth driven by SRE Project employment and business opportunities, indirectly contributing to improved community cohesion and connectedness and enhanced community vitality.

The cost-benefit analysis (CBA) indicates that the SRE Project is expected to generate a net benefit of approximately $342 million in net present value (NPV) terms (FY26 AUD$) to South Australia over the 50-year evaluation period (FY27 to FY76), or a BCR of 18.4, assuming a 6% real discount rate (Appendix D3 Economic Assessment). This net benefit reflects:

- net producer surplus attributable to South Australia of $66 million, reflecting efficiency benefits for both mining and smelting and refining operations at Olympic Dam from resolving the current copper-to-sulphur limitation of the smelter and refinery
- an increase in royalties to the Government of South Australia of $29 million, reflecting higher-value output from existing mining activities and a greater recovery rate from the new smelter and refinery
- an increase in company income tax attributable to South Australia of $119 million, related to a higher forecast producer surplus from BHP

- an expected economic benefit to South Australian workers of $147 million, attributed to a wage premium paid by smelter and refinery operations at Olympic Dam compared to alternatives
- externality costs attributable to South Australia as a result of ambient noise and vibration, air quality, traffic, and greenhouse gas emission changes, valued at $20 million.

Further, the economic assessment also recognises the following unquantified strategic benefits of the Project:

- The SRE Project would provide a supply chain resilience benefit to BHP. While BHP can export copper concentrate at almost the same price as refined products currently, with gross smelting and refining margins as low as 5%, this is contingent on continued access to largely China-based smelters and refineries that can process concentrate cheaply. There is a degree of risk associated with the use of global facilities. Potential trade barriers, or the closure of key processors, could result in significant increases in treatment and refining charges which increase the value proposition of onshore smelting and refining capability.
- The SRE Project may enable the future expansion of other projects across BHP's Copper SA. The economic assessment only considers copper projects currently in feasibility or financing stages. However, the SRE Project could also increase the feasibility of new and emerging projects, including further production at Olympic Dam, where the uranium content of copper concentrate means that it would not be saleable on the market. In the absence of the SRE Project, the ability of the South Australian copper mining industry to leverage these opportunities would be constrained.

A sustained increase in commodity prices could also result in substantially higher producer surpluses and, consequently, a significant net benefit to South Australia. A copy of the Economic Assessment is provided as Appendix D3.

4.3.3 Benefits for Australia

Investment capital for the SRE Project is approximately greater than US$3.5 billion (Stage 1a). The SRE Project is projected to generate a net benefit to Australia of $3,195 million in present value terms, including $963 million in producer surplus, $1,730 million in company income tax, $154 million in labour surplus, and $29 million in royalties, partially offset by $200 million in externality costs.

BHP's current Carrapateena and Prominent Hill operations produce copper concentrate that is exported to established markets both within and external to Australia.

The SRE Project proposes to import these concentrates, together with concentrates produced via third parties, potential future Oak Dam operations and potential future expanded Olympic Dam operations, which represents an opportunity to add significant value to Australia's resources through processing of concentrates to produce cathode copper, and gold and silver bullion at Olympic Dam.

4.3.4 Global benefits

Copper produced by the expanded Olympic Dam will help to meet current and future global demands as described in Section 4.2.3, supporting globally-important development associated with increased living standards, the energy transition and the growth of digital infrastructure.

4.3.5 Economic benefits

Economic benefits of the SRE Project (Appendix D3 Economic Assessment) include:

- gross production revenue
- royalties paid to the Government of South Australia due to increase in smelter and refinery production
- rates paid to local government
- increase in BHP's payroll tax paid to South Australia
- increase in BHP's income tax paid that is apportioned to South Australia
- benefits to South Australian workers in wage premium paid above what they could receive elsewhere
- benefits to South Australia suppliers in a rate/margin above market rates they would otherwise receive.

4.4 Alternatives to the project

BHP has been considering potential growth pathways for Olympic Dam and the greater Gawler Craton copper province for many years. This section outlines historical projects and non-preferred alternatives to the SRE Project.

4.4.1 Previous major projects

BHP has previously considered options for the expansion of production capacity at Olympic Dam, all of which were previously coupled with a change in the nature and/or scale of mining operations in addition to increased minerals processing throughput.

These historical projects have provided years of studies, investigations and assessment, increasing understanding of the Olympic Dam mine. This experience sets up BHP to be as well-informed as possible for the SRE Project and beyond.

4.4.1.1 Olympic Dam Expansion Project (ODX)

The Olympic Dam Expansion Project (ODX) was a proposed open-pit mining operation with associated supporting infrastructure that provided for the production of an additional 515,000 tpa of copper and associated products, increasing the total production of the operation to 750,000 tpa.

The EIS for ODX was submitted for Commonwealth and State assessment (BHP Billiton 2009 and BHP Billiton 2011). On 10 October 2011 the Minister for Mineral Resources Development granted development authorisation in the State Government Gazette for the proposed development (Government of South Australia 2011). The Australian Government also published the decision to approve on 10 October 2011 (DSEWPaC 2011) based on EPBC Act Referral 2005/2270.

On 22 August 2012 BHP announced that ODX would not proceed (BHP 2012), suggesting that future studies would investigate an alternative, less capital-intensive design of the Olympic Dam open pit, involving new technologies, to substantially improve the economics of the project. Factors contributing to this decision included then-current market conditions, including subdued commodity prices, and higher capital costs.

4.4.1.2 Olympic Dam Resource Development Strategy (OD RDS)

In 2018 the Olympic Dam Resource Development Strategy (OD RDS) approval project commenced to support and enable the Olympic Dam Brownfield Expansion (BFX) project, nominally targeting expanded surface infrastructure and the extraction of higher-grade ore and high Cu:S ore from the SMA.

On 14 February 2019, OD RDS was declared a Major Development (Government of South Australia 2019). On 19 March 2020, the project was declared a controlled action by the Commonwealth under the EPBC Act, subsequent to the submission of referral EPBC 2019/8570 (DAWE 2020).

On 20 October 2020, BHP announced that the results of over 400 km of underground drilling associated with BFX project studies had provided an improved knowledge of the variability within the orebody. Subsequently, this variability provided economic challenges to the BFX project, and therefore BHP preferred not progressing in favour of targeted debottlenecking investments, plant upgrades and infrastructure modernisation (BHP 2020).

In August 2021, following BHP's decision to not proceed with the BFX project, BHP requested that the State and Commonwealth Governments pause assessment of the OD RDS applications. In November 2021, BHP formally requested that the OD RDS major development application under the Development Act 1993 (SA) [ceased] and referral of OD RDS under the Commonwealth EPBC Act be withdrawn. On 7 July 2022 the Notice of Revocation of the Major Development Declaration was published in the State Government Gazette (Government of South Australia 2022).

4.4.2 Alternatives considered

Alternatives to the SRE Project considered by BHP include siting, surface processing solutions and the scale of proposed smelting and refining facilities. The details and merits of these alternatives are discussed below.

4.4.2.1 Location options

A location study was completed to evaluate alternative locations for an expanded smelter and refinery, which considered two locations in detail, Olympic Dam mine and a South Australian coastal location.

The study determined that the coastal location would introduce operational duplications, significant freight movements and have a larger environmental footprint compared to the same infrastructure located at Olympic Dam. The Olympic Dam location was further supported by existing onsite options for the use and or storage of products (e.g. acid) and management of waste streams. Based on this study, the Olympic Dam mine location option was progressed.

4.4.2.2 Surface processing solutions

BHP undertook a study to investigate surface processing solutions to improve throughput and efficiency at Olympic Dam and identify a preferred option for addressing the operation's Cu:S ratio constraint. A series of hydrometallurgical and smelting processing solutions were investigated to confirm the optimal solution for addressing the:

- declining ore/feed grade at Olympic Dam
- growth options in the region including the potential development of the Oak Dam exploration target
- potential for the incorporation of third-party feeds.

The study considered smelting scenarios including the traditional industry solution for lower grade concentrates; two-stage smelting. Other alternative, non-smelting, processing solutions were also considered in the study including:

- atmospheric hydrometallurgy processes
- atmospheric chloride hydrometallurgy processes
- heap leach hydrometallurgy processes.

These alternatives have seen some minor adoption in industry, however, they are not the standard for high-grade sulphide deposits where a concentrate can be economically produced and sold to the toll smelting market. The study identified that a two-stage smelter flowsheet was favoured when growth was considered, as this option best leverages the existing Olympic Dam smelting asset, has pathways enabling staged growth, has the lowest technical risk in addressing the Cu:S ratio constraint, and avoids capital requirements associated with the management of radionuclides and additional tailings volumes.

4.4.2.3 SRE Project size options

Following selection of the preferred processing solution, a range of initial size options for the SRE Project were investigated to determine the preferred alternative to meet BHP's strategic objectives, categorised as no change, small growth (sustain), medium growth (staged) and large growth (not staged). The relative merits of each option are summarised in Table 4.1. It is noted that Table 4.1 provides point-in-time information about the alternatives considered. As such, as further data has become available, SRE Project details such as timing for increased production and concentrate throughput have evolved since the size option assessment was completed.

A staged smelter and refinery expansion, initially starting at a medium size, was identified as the preferred option. This alternative would unlock the lower Cu:S ratio resource at Olympic Dam mine and allow for processing of concentrate produced from Carrapateena mine and Prominent Hill mine to a cathode product.

4.4.2.4 SRE Project staging options

Following selection of the medium growth option, a value optimisation process was undertaken to refine project staging; balancing timing of capital expenditure with environmental and other risks. This resulted in some refinements to the SRE Project including the optimisation of Stage 1 into Stage 1a and Stage 1b, aligned to concentrate supply.

The SRE Project staging is outlined in Section 1.1.3.2, and detailed in Section 6.2.5.

4.4.2.5 Alternative regulatory approvals pathway

BHP explored the use of the Mining Act as a potential alternative South Australian regulatory approvals pathway for the SRE Project. However, Clause 28 of the Indenture, and the provisions of the associated Ratification Act, defines the process for development within the SML and confirms that BHP cannot use the Mining Act to secure its primary approvals.

Table 4.1 | SRE Project initial size options investigated

Element	No change	Small growth (sustain)	Medium growth (staged)	Large growth (not staged)
Throughput	No change	Sustain Copper SA province (i.e. provide sufficient capacity to process all of the current copper concentrate output from the Copper SA province assets)	Staged to 1,700,000 tpa (i.e. provide sufficient capacity for current and expected future copper concentrate production from Copper SA province assets and/or third-party concentrates)	1,700,000 tpa
Description and smelting capacity	DBF continues ~550,000 tpa concentrate ~200,000 tpa product	Two-stage smelter of up to 850,000 tpa concentrate throughput producing up to 310,000 tpa product	Two-stage smelter of up to 1,700,000 tpa throughput across two stages: • Stage 1 o 1,100,000 to 1,400,000 tpa concentrate o 320,000 to 500,000 tpa product • Stage 2 o ~1,700,000 tpa concentrate o 460,000 to 650,000 tpa product	Two-stage smelter up to 1,700,000 tpa throughput producing up to 460,000 – 650,000 tpa product
Unlocks Olympic Dam resource constraint	No	Yes	Yes	Yes
Capture value from regional assets	None	Limited to existing concentrate production rates	Full	Full
Provides a growth pathway	No viable growth option	Sustains existing Copper SA mine plan rates	Yes, with staging to align with Copper SA growth	Yes, but Copper SA would need to grow to utilise latent capacity
Production interruption	Nil	Major (~3 to 6 months)	Minor (0 to 30 days)	Major (~3 months)
Timing for increased copper production	Not applicable	FY32	FY31	FY32

4.5 Consequences of not proceeding with the project

The no change case (continue with current operations) would continue the current Olympic Dam operation of the existing DBF furnace and the continued export of Carrapateena and Prominent Hill concentrates.

4.5.1 Olympic Dam

BHP expect that not proceeding with the SRE Project would result, over time, in reduced feed rates as the Olympic Dam mine becomes increasingly constrained by the DBF smelter and its technical Cu:S ratio limits. Without expansion and upgrade of the smelter, this may only be overcome through the importation and blending of concentrates with the required characteristics to offset these Cu:S ratio constraints, increasing the costs associated with copper production at Olympic Dam.

4.5.2 Copper SA province

Not proceeding with the SRE Project would result in a failure to achieve the synergies that Copper SA province may provide. Prominent Hill and Carrapateena operations would continue to operate independently and export their concentrates to market, however, as these orebodies have been developed further, the produced concentrates reflect some of the deleterious elements within the ore, in some cases limiting their market and/or reducing their economic value. Without treatment at Olympic Dam, this may affect the economics of these operations and future decisions to expand.

4.5.3 Employment and local industry

There are employment and local industry implications in a case where the SRE Project does not proceed. Olympic Dam's existing smelter and refinery operational workforce is approximately 559 FTE employees. In absence of the SRE Project, staffing at this level would be expected to continue until mine closure in FY65, after which operational employment would cease.

In addition to an earlier cessation of employment at the smelter and refinery, the level of average operational employment is around 508 FTE employees lower than proposed for the SRE Project.

The earlier closure of the smelter and refinery would also have significant impacts on the Roxby Downs area, which is a town purpose-built to service operations at Olympic Dam.



BHP

OD SRE EIS

5. Environmental context

5. ENVIRONMENTAL CONTEXT

This chapter provides a summary of the existing environment (i.e. baseline conditions) for the SRE Project and surrounds.

The baseline conditions have been established through a combination of specific and targeted environmental data collection activities, interrogation of routine operational environmental monitoring outputs and desktop studies including:

- review of environmental baseline studies undertaken in support of the ODX Project (Section 4.4.1.1) and OD RDS (Section 4.4.1.2)
- air quality and noise monitoring
- surface water numerical modelling
- soil and geochemistry desktop assessments and in-field investigations
- groundwater monitoring
- ecology desktop assessments and seasonal field surveys
- socio-economic environment assessments
- ongoing stakeholder consultation activities.

The assessment of baseline conditions has focussed on the SML Area and surrounds where the potential impacts of the SRE Project are expected to occur. Assessments specific to the EIGR Areas have been undertaken for the ecological environment, reflecting that land disturbance-related effects would occur over the whole SRE Project Area.

Baseline conditions have been validated as part of the relevant environmental assessments undertaken for EIS development.

5.1 Air

This section summarises the baseline aspects of the air pathway. This is made up of the following aspects with their respective appendices to the EIS where they are discussed in further detail:

- noise and vibration (Appendix C2 Noise and Vibration Impact Assessment)
- air quality (Appendix C3 Air Quality Impact Assessment)
- radiation (Appendix C4 Radiological Impact Assessment)
- greenhouse gas (Appendix C5 Greenhouse Gas Impact Assessment)
- climate (Appendix C3 Air Quality Impact Assessment and Appendix D1 Ecological Impact Assessment).

The information presented is derived from independent assessments that were undertaken for the SRE Project. The assessments were supported by observations from site personnel, and desktop investigations and use of publicly available data to assist in characterising the regional air-related environment.

5.1.1 Noise and vibration

Baseline noise monitoring for the SRE Project was undertaken at three locations, R2 (Lavricks Roadhouse) and R6 (Olympic Dam Village (ODV)) near the SML boundary, and at R10 (Roxby Downs Village) located approximately 15 km south of the SML Area (Figure 5.1). Noise monitoring occurred in November 2024, with the results summarised in Table 5.1, where the defined unit L_{Aeq} refers to A-weighted, equivalent continuous sound level, in decibels (dB) having the same total sound energy as the fluctuating level measured.

Noise monitoring results indicate that the existing noise environment is generally dominated by existing activities associated with Olympic Dam operations, including mining, smelting and refining, road traffic and aircraft movements.

Baseline noise considerations are further discussion in Appendix C2 Noise and Vibration Impact Assessment.

Table 5.1 | Summary of noise monitoring results

Monitoring location	Measured noise level, dB					
	Median daily L_{Aeq}		Median daily maximum L_{Aeq}		Median daily minimum L_{Aeq}	
	Day	Night	Day	Night	Day	Night
R2 (Lavricks Roadhouse)	56	50	62	58	42	36
R6 (ODV)	53	41	65	49	32	31
R10 (Roxby Downs Village)	55	51	59	58	41	42

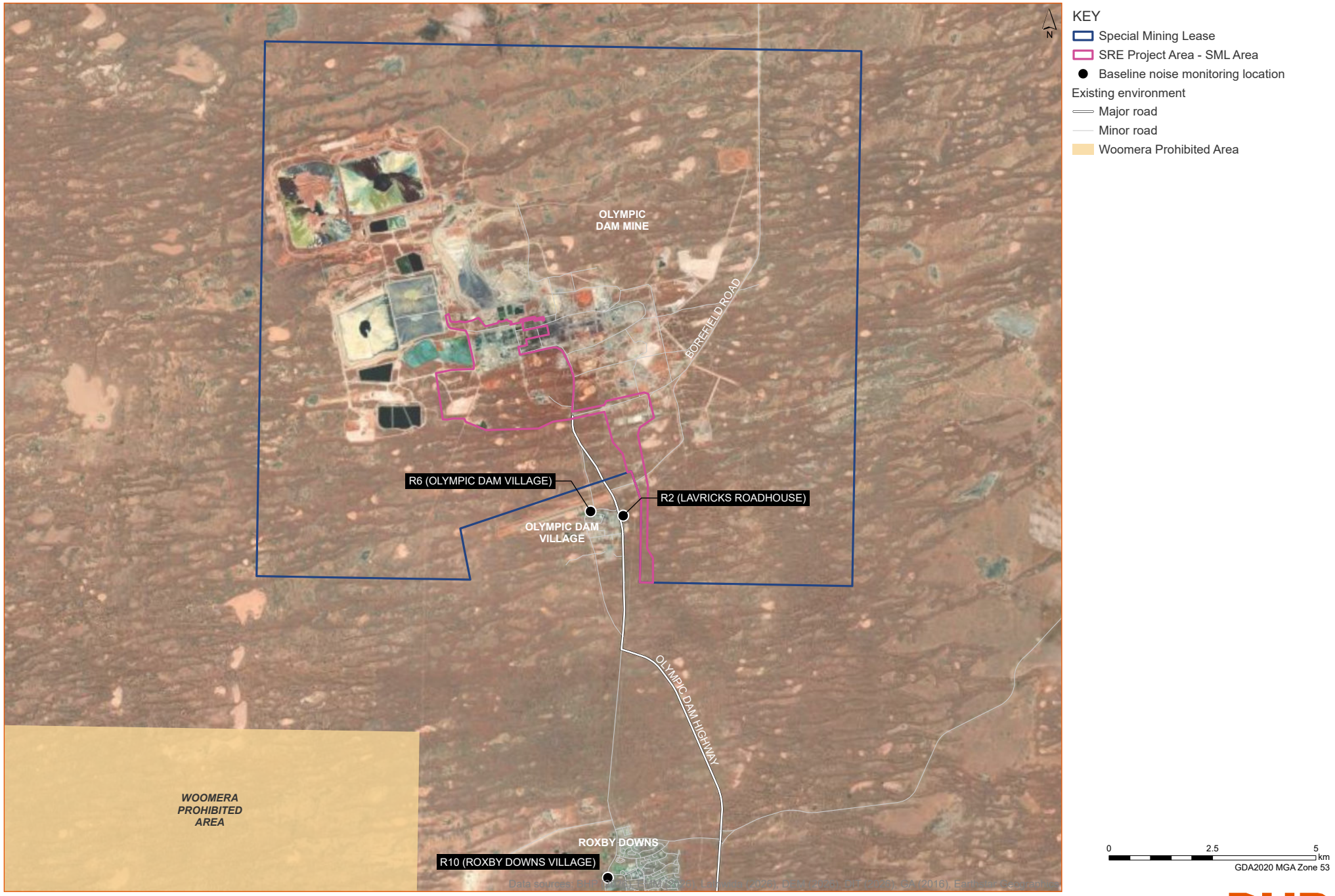


Figure 5.1 | Noise monitoring locations

SRE Project BHP

5.1.2 Light

The SRE Project is proximate to the existing Olympic Dam mine, Olympic Dam Airport and ODV accommodation which are well-lit environments.

5.1.3 Air quality

Existing operations at the Olympic Dam mine are considered to be a primary air pollutant source in the SML Area. BHP reports annual emissions to air from point sources (i.e. stack releases) and fugitive sources (e.g. mining operations, truck movements, material handling and processing, windblown dust) to the National Pollutant Inventory (NPI). The reported NPI emission data for financial year FY24 has been used to characterise the contribution from existing sources to air quality impacts at sensitive receptors.

Beyond the existing operational emissions at the Olympic Dam mine, the SRE Project is located in remote South Australia, with the predominant surrounding land being outback and desert. Baseline air quality in the local airshed is influenced by:

- dust entrainment due to vehicle movements along unsealed and sealed town and rural roads with high silt loadings
- minor industrial operations in the BHP and Roxby Downs industrial precincts
- fuel combustion-related emissions from on-road and non-road engines
- long range transport of fine particles into the region
- wind generated dust from exposed areas within the surrounding region
- more remote sources which contribute episodically to suspended particles in the region including dust storms and bushfires.

The air pollutants that are of most relevance to the SRE Project, in terms of emission sources, air quality effects and the potential to exceed air quality criteria, and potential health impacts, are:

- particulate matter, specifically:
    - o total suspended particulate (TSP)
    - o particulate matter less than 10 micrometres in aerodynamic equivalent diameter (PM_{10})
    - o particulate matter less than 2.5 micrometres in aerodynamic equivalent diameter ($PM_{2.5}$)
- sulphur dioxide (SO_2)
- sulphur trioxide (SO_3)
- oxides of nitrogen (NO_X), including nitrogen dioxide (NO_2)
- carbon monoxide (CO)
- hydrogen chloride (HCl)
- fluoride compounds
- metals and metalloids
- volatile organic compounds (VOCs).

The baseline air quality environment has been characterised based on measurements from surrounding air quality monitoring stations (AQMS), which are shown in Figure 5.2.

Background concentrations for PM_{10} and SO_2 were obtained from the AQMS network at Olympic Dam mine, and are located as follows:

- ODV, located approximately 700 m south of the SML boundary, records continuous measurements of PM_{10} and SO_2.
- Roxby Downs, located approximately 6.5 km south of the SML boundary, records continuous measurements of PM_{10} and SO_2.
- Northern Background, located approximately 11.0 km north of the SML boundary, records continuous measurements of PM_{10} only.

The existing Olympic Dam monitoring stations do not measure ambient $PM_{2.5}$ concentrations. Data for this metric were therefore derived using concurrent measurements of PM_{10} and $PM_{2.5}$ from the now decommissioned Olympic Dam Western Background and Hiltaba Village monitoring stations, which were located approximately 8 km south-west and 14 km south-east of the SML Area, respectively. The relationship between PM_{10} and $PM_{2.5}$ from these two sites were applied to the PM_{10} concentration measurements from the three operational Olympic Dam AQMS sites.

In the absence of local monitoring data for NO_x and NO_2, historical EPA ambient NO_x/NO_2 monitoring results from Whyalla, located approximately 290 km south-south-east of the SML Area, recorded between March 2004 and June 2006 have been adopted to represent background at the Air Quality Study Area which covers the SML Area, ODV and Roxby Downs. The use of the historical Whyalla data to represent background NO_2 concentrations is a highly conservative approach.

Baseline air quality concentrations for the SML Area were derived from BHP air quality monitoring data as follows:

- 24-hour PM_{10} concentration – 70th percentile of ~10.9 µg/m^3
- 24-hour $PM_{2.5}$ concentration – 70th percentile of ~5.6 µg/m^3
- annual average $PM_{2.5}$ concentration – ~5.3 µg/m^3
- annual average SO_2 – ~0.0007 ppm.

In the absence of local NO_2 monitoring data, historical ambient EPA monitoring results from Whyalla was derived as follows:

- annual average NO_2 – ~6.2 µg/m^3.

It is considered that the use of the historical Whyalla data to represent background NO_2 concentrations is highly conservative (worst case). Whyalla features a semi-arid environment (noting coastal proximity), higher urban development than Olympic Dam and significant industrial sources, and therefore is considered to be conservative for representing background NO_2 concentrations (i.e. without Olympic Dam emissions).

Baseline concentrations for all other pollutants, considered in Appendix C3 Air Quality Impact Assessment, were accounted for by the modelling of existing operational emissions.

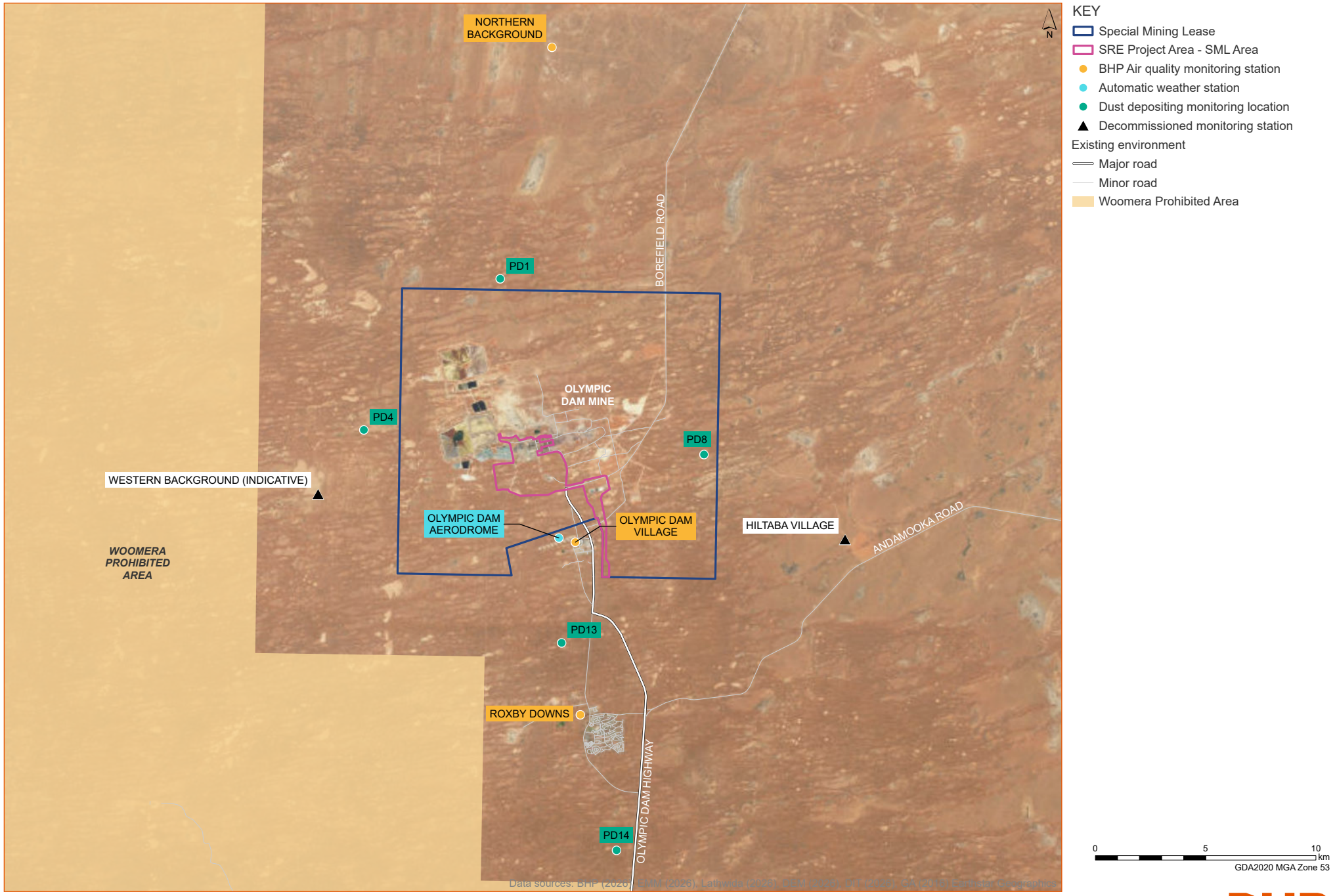


Figure 5.2 | Air quality monitoring station locations

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5.1.3.1 PM_{10}

The Northern Background AQMS (PD1, Figure 5.2) is currently used by BHP as a control site for ambient PM_{10} concentrations, with the 2024 calendar year adopted to represent baseline conditions (Table 5.2).

Table 5.2 I Summary statistics for total PM_{10} (background plus operations) – Northern Background AQMS

Year	Maximum 24-hour average concentration (µg/m³)	70th percentile 24-hour concentration (µg/m³)	Annual average concentration (µg/m³)	Number of days greater than 50 (µg/m³)
2016	213.8	12.8	12.5	3
2017	63.5	10.9	10.8	3
2018	77.7	11.3	12.1	7
2019	896.0	18.4	24.2	22
2020	342.3	18.5	21.3	23
2021	139.3	12.5	12.7	8
2022	96.7	11.4	11.1	4
2023	57.3	11.2	11.4	3
2024	105.2	10.9	10.3	4

5.1.3.2 $PM_{2.5}$

$PM_{2.5}$ baseline was derived using concurrent measurements of PM_{10} and $PM_{2.5}$ from the now-decommissioned Olympic Dam Western Background and Hiltaba Village (Figure 5.2) monitoring stations, which were located approximately 8 km south-west and 14 km south-east of the SML Area, respectively.

The relationship between PM_{10} and $PM_{2.5}$ recorded from these two monitoring stations was calculated to be 0.5. This ratio was applied to the adopted baseline PM_{10} to obtain an estimate of local $PM_{2.5}$ concentrations (Table 5.3) in the absence of actual measurements.

Table 5.3 I Summary statistics for baseline $PM_{2.5}$

Year	Maximum 24-hour average concentration (µg/m³)	70th percentile 24-hour concentration (µg/m³)	Annual average concentration (µg/m³)	Number of days greater than 25 (µg/m³)
2016	109.8	6.6	6.4	3
2017	32.6	5.6	5.5	3
2018	39.9	5.8	6.2	8
2019	460.0	9.5	12.4	22
2020	175.7	9.5	10.9	24
2021	71.5	6.4	6.5	8
2022	49.6	5.9	5.7	4
2023	29.4	5.8	5.8	3
2024	54.0	5.6	5.3	4

Consistent with PM_{10} the 2024 calendar year $PM_{2.5}$ dataset was adopted to represent baseline conditions.

5.1.3.3 SO_2

SO_2 concentrations were derived from the Olympic Dam Village AQMS (Figure 5.2) with the 2024 calendar year monitoring dataset selected to characterise local baseline concentrations (Table 5.4).

Table 5.4 I Summary statistics for baseline SO_2

Year	Maximum 1-hour average concentration (ppm)	70th percentile 1 hour concentration (ppm)	Maximum 24-hour concentration (ppm)	Annual average concentration (ppm)
2016	0.013	<0.001	0.003	<0.0001
2017	0.017	0.001	0.005	0.0002
2018	0.010	0.001	0.003	0.0004
2019	0.043	<0.001	0.004	0.0001
2020	0.034	0.001	0.003	0.0006
2021	0.004	0.002	0.003	0.0012
2022	0.006	0.001	0.003	0.0011
2023	0.003	0.001	0.003	0.0005
2024	0.004	0.001	0.002	0.0007

5.1.3.4 NO_2

No ambient monitoring of NO_x or NO_2 is conducted at the Olympic Dam mine. The closest current EPA NO_2 monitoring location is in Adelaide. Historically, the EPA completed an ambient air quality monitoring campaign at Whyalla between March 2004 and June 2006 which included measurements of NO_2. During this campaign, the recorded average NO_2 concentration was 6.2 µg/m³. In the absence of site-specific NO_2 measurements, this concentration from Whyalla was used to represent background NO_2 concentrations for the baseline conditions.

5.1.4 Radiation

The baseline radiological characteristics are based on 5 years of monitoring data from several sources including:

- continuous radon and radon decay product concentrations at the Olympic Village and Roxby Downs AQMS
- continuous high volume dust concentrations in air monitoring (with a PM_{10} prefilter) at the Olympic Village and Roxby Downs AQMS
- passive dust deposition monitoring at 5 monitoring sites located on the northern, eastern, western SML boundaries, one south of Olympic Village, and one south of Roxby Downs.

The monitoring results, along with dust radionuclide composition data, are used to quantify the radiological impacts to workers and members of the public.

The radionuclide content of the copper concentrates depends upon the mineralogy of the mined material and copper concentrate production process.

Baseline radiological considerations are further discussed in Appendix C4 Radiological Impact Assessment, including radionuclides in groundwater which do not constitute a radiological hazard to people or flora and fauna.

5.1.4.1 Radon and radon decay products

Full year data for radon decay products (RnDP), measured in micro joules per cubic metre (µJ/m^3), and radon, measured in becquerel per cubic metre (Bq/m^3), from the ODV and Roxby Downs AQMS locations were analysed, with a summary is shown in Table 5.5 and Figure 5.3 (BHP 2025b). The results show significant variation from year to year.

The raw concentrations do not represent doses.

Table 5.5 | Annual average radon and radon decay product concentrations

Calendar year	RnDP concentration (µJ/m^3)		Radon concentration (Bq/m^3)	
	Roxby Downs	ODV	Roxby Downs	ODV
2017	0.024	0.029	12.2	8.9
2018	0.036	0.032	17.0	7.8
2019	0.028	0.031	13.9	12.0
2020	0.019	0.028	14.4	15.4
2021	0.025	0.022	16.7	14.4
2022	0.021	0.022	16.8	8.4

5.1.4.2 Radionuclides in dust

High volume dust sampling is conducted using a respirable dust PM_{10} prefilter, which removes dust particles that are greater than 10 microns (µm). Dust samples were collected on filters which were analysed for a range of contaminants including long-lived radionuclides.

Summary data is shown in Table 5.6. Monthly concentrations for the long-lived radionuclides for the 5-year period are shown in Figure 5.4.

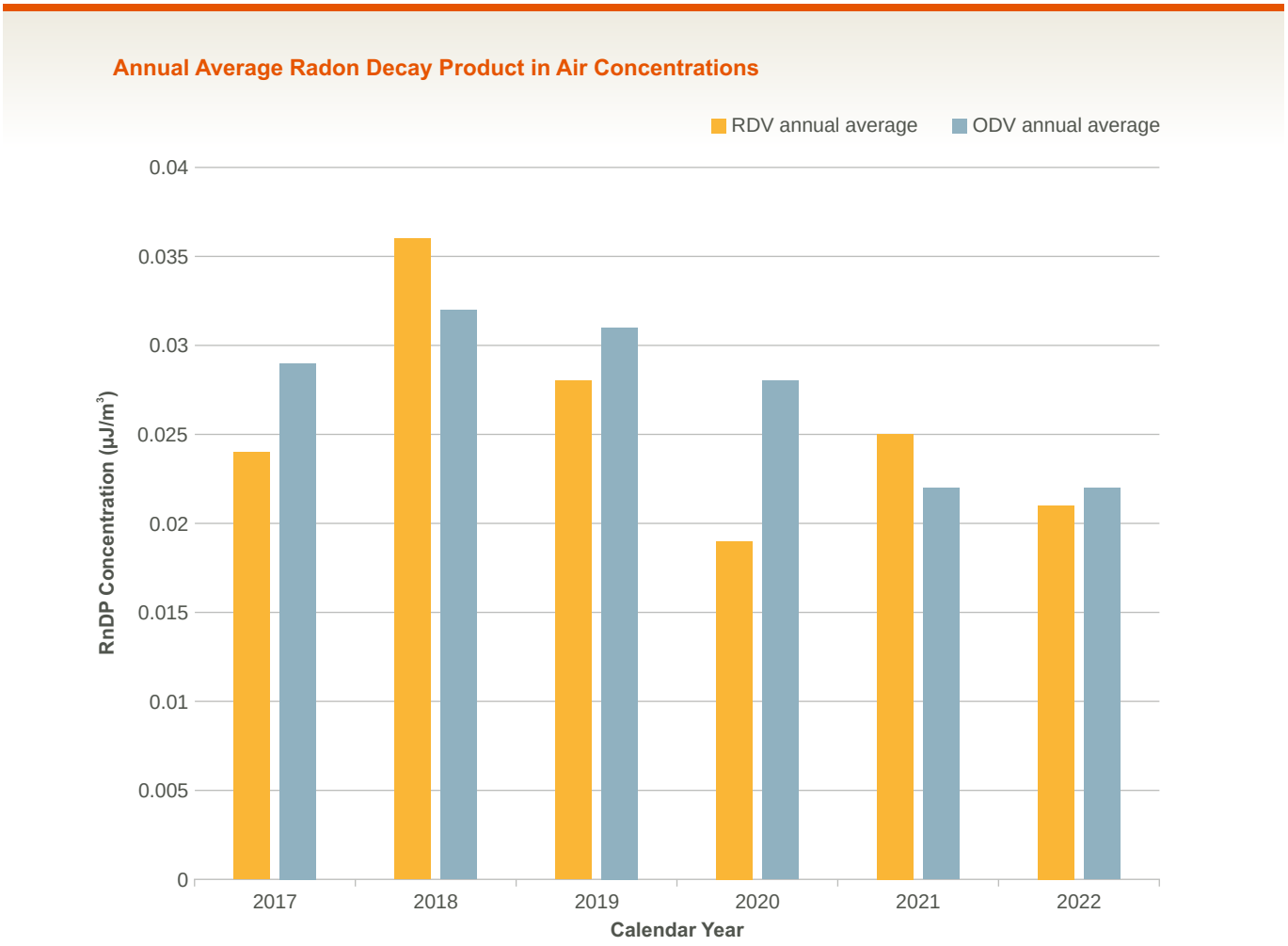
Table 5.6 | Annual average radionuclide concentrations in high volume dust samples (µBq/m^3)

Year	U238		Th230		Ra226		Pb210		Po210	
	OV	RD	OV	RD	OV	RD	OV	RD	OV	RD
2018–2019	3.3	1.8	2.5	1.7	22.4	27.7	287	318	11.1	13.4
2019–2020	7.3	4.6	4.7	2.1	14.1	12.2	355	285	29.6	12.1
2020–2021	3.5	1.7	3.1	1.1	4.7	2.9	348	317	44.4	37.5
2021–2022	3.3	1.4	3.9	2.2	7.7	4.9	301	286	15.0	3.3
2022–2023	2.8	1.5	2.9	1.6	6.6	9.1	270	309	98.9	26.1
2023–2024	3.5	1.4	3.7	1.8	8.6	6.6	322	371	15.3	9.8
2024–2025	5.6	2.8	4.7	2.3	7.3	5.9	334	334	16.8	4.9
Background[1]	0.6	0.6	0.7	0.7	1.5	1.5	318	318	36.3	36.3

OV: Olympic Village AQMS, RD: Roxby Downs AQMS

1. Background values are the previously established BHP values for the Roxby Downs Homestead in 2006 and 2007

The monitoring data shows that average concentrations for U238, Th230 and Ra226 are consistently greater than the background values, while Pb210 and Po210 values are consistent with the background values. While the measured values represent an increase in background concentrations, the total inhalation dose from the dusts is less than 0.0010 millisievert per year (mSv/y) at both ODV and Roxby Downs, and well below the public dose limit of 1 mSv/y.



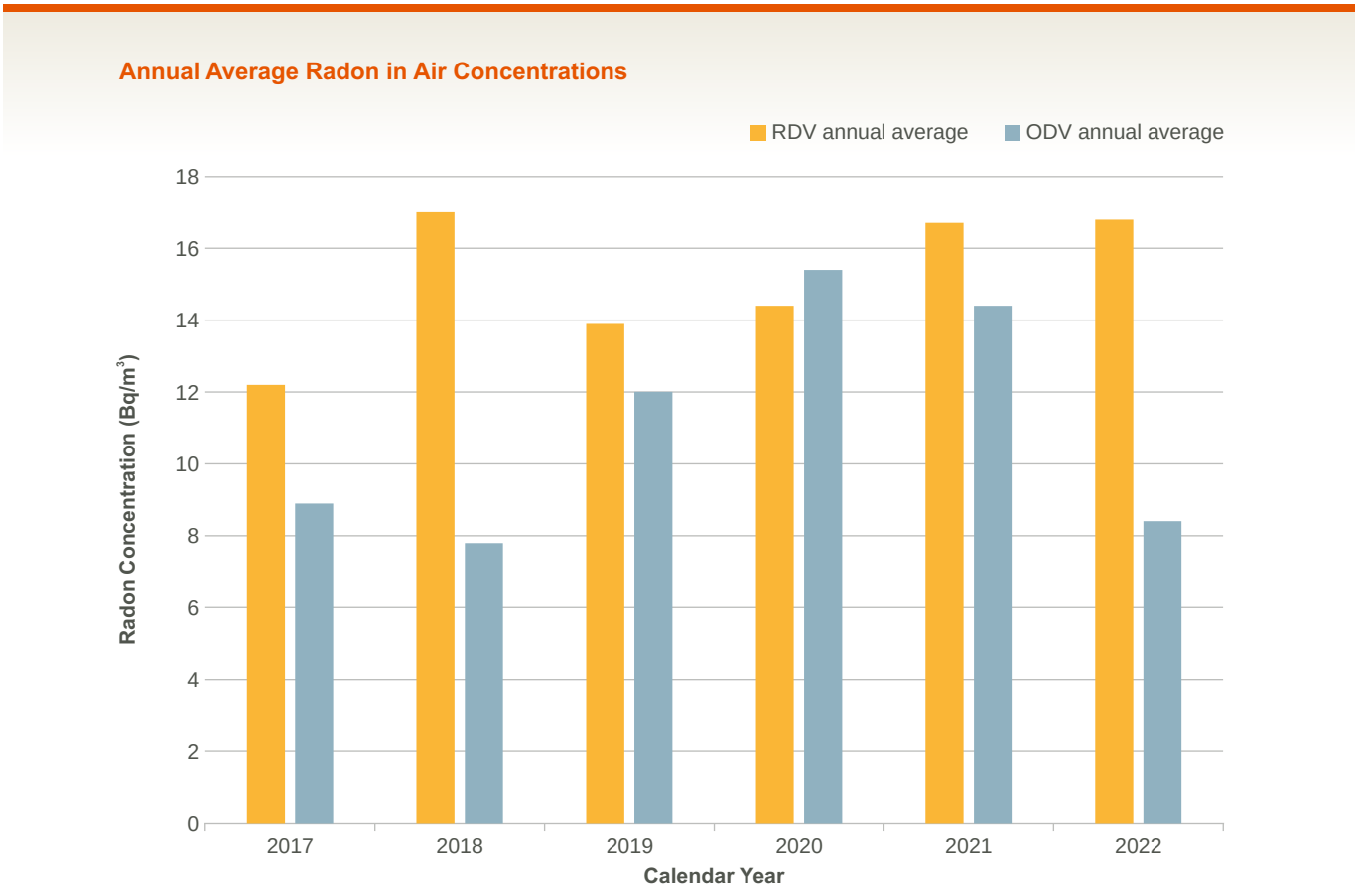


Figure 5.3 | Annual average radon and radon decay product concentrations

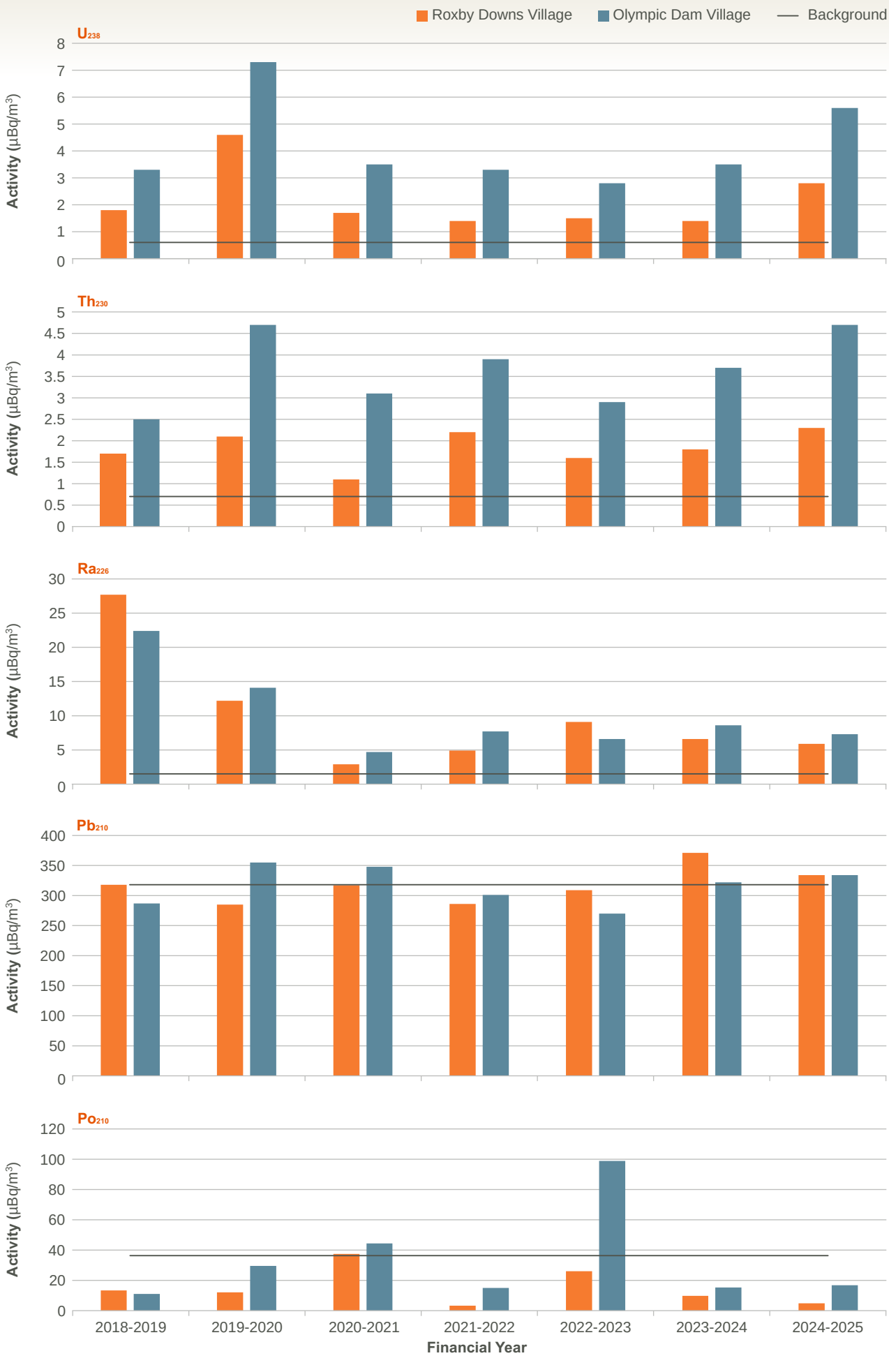


Figure 5.4 | Measured radionuclide in dust concentration trends

5.1.4.3 Dust deposition results

Dust deposition monitoring was undertaken at 5 monitoring sites (Figure 5.2) as follow:

- PD1, located on the northern boundary of the SML
- PD4, located 1 km west of the western boundary of the SML
- PD8, located on the eastern boundary of the SML
- PD13, located south of the SML, halfway between ODV and Roxby Downs
- PD14, located approximately 5 km south of Roxby Downs.

Samples were collected in deposition gauges (glass jars) with monthly changeover. The samples were composited for each monitoring site through the year and then gravimetrically and radiometrically analysed. The radionuclide deposition results are used to assess radiological impacts to flora and fauna and also for human ingestion dose assessment.

Table 5.7 to Table 5.11 provide a summary of the radionuclide deposition by dust deposition monitoring site. Note that the Po210 values are 'corrected' values, accounting for the in-growth of Po210 from Pb210 in the sample.

The results indicate a large variation within each radionuclide deposition rate, with Pb210 and Po210 deposition rates higher than other radionuclide rates due to the decay of radon and its decay products. This is a well-documented naturally occurring phenomenon which is also apparent in measured radionuclide concentrations in dust.

Table 5.7 | Annual radionuclide deposition – PD1

Financial year	PD1 – northern boundary of SML (mBq/m^2/month)				
	U238	Th230	Ra226	Pb210	Po210
2018–2019	100	80	91	1109	407
2019–2020	85	119	12	858	3491
2020–2021	78	67	68	1,116	<MDL
2021–2022	29	21	66	870	146
2022–2023	54	66	103	852	596
2023–2024	94	140	26	971	372
2024–2025	159	97	232	1,180	453

MDL: minimum detectable limit, mBq: milli becquerel

Table 5.8 | Annual radionuclide deposition – PD4

Financial year	PD4 – 1 km west of western boundary of SML (mBq/m^2/month)				
	U238	Th230	Ra226	Pb210	Po210
2018–2019	41	41	<MDL	1,218	85
2019–2020	52	31	<MDL	729	3,078
2020–2021	38	44	57	881	111
2021–2022	27	10	34	941	<MDL
2022–2023	24	32	75	816	191
2023–2024	44	48	100	777	257
2024–2025	74	41	42	893	427

Table 5.9 | Annual radionuclide deposition – PD8

Financial year	PD8 – eastern boundary of SML (mBq/m^2/month)				
	U238	Th230	Ra226	Pb210	Po210
2018–2019	26	16	<MDL	1,062	48
2019–2020	41	70	<MDL	983	622
2020–2021	10	27	2	1197	<MDL
2021–2022	10	<MDL	28	707	197
2022–2023	16	20	79	931	<MDL
2023–2024	16	13	16	913	75
2024–2025	30	32	66	1436	298

Table 5.10 | Annual radionuclide deposition – PD13

Financial year	PD13 – south of SML halfway between ODV and Roxby Downs (mBq/m^2/month)				
	U238	Th230	Ra226	Pb210	Po210
2018–2019	45	32	<MDL	982	5
2019–2020	59	55	26	607	4,182
2020–2021	33	19	33	949	<MDL
2021–2022	27	14	43	1,133	357
2022–2023	18	27	243	998	479
2023–2024	13	27	26	788	213
2024–2025	31	14	87	4221	<MDL

Table 5.11 | Annual radionuclide deposition – PD14

Financial year	PD14 – approximately 5 km south of Roxby Downs (mBq/m^2/month)				
	U238	Th230	Ra226	Pb210	Po210
2018–2019	40	43	<MDL	1,009	<MDL
2019–2020	43	15	27	867	201
2020–2021	7	11	25	1,051	130
2021–2022	9	<MDL	11	1,165	<MDL
2022–2023	13	16	40	1,055	750
2023–2024	5	23	28	820	1,654
2024–2025	20	20	57	224	<MDL

Note that the deposition rates are well below the licence condition of 25 Bq/m^2/y for U238. This is the level at which the reference level of 10 µGy/h for impacts on non-human biota above natural background may be exceeded.

5.1.4.4 Review of public doses

Every year BHP publishes estimates of total radiation doses to members of the public at Roxby Downs and Olympic Village as a result of operations and based on monitoring results. The annual dose attributable to radon decay products and radionuclides in dust is calculated and added to determine the total annual effective dose for members of the public. The underlying calculation for each radionuclide is:

Dose = net concentration × dose conversion factor × hours per year

Where the concentration is in nano joules per cubic metre (nJ/m^3) for radon decay products or micro becquerels per cubic metre ($\mu Bq/m^3$) for radionuclides in dust and there are 8,760 hours in a regular year. The dose conversion factor is different for each radionuclide.

The average annual dose estimates over recent years are summarised in Table 5.12, which shows the total estimated dose contributed by the Olympic Dam operations to members of the public at Roxby Downs and Olympic Village is well below the 1 mSv/y public dose limit and Olympic Dam's dose constraint of 0.3 mSv/y.

Table 5.12 | Average annual total dose estimates (mSv/y)

Financial year	ODV	Roxby Downs
2018–2019	0.034	0.033
2019–2020	0.073	0.059
2020–2021	0.066	0.039
2021–2022	0.053	0.053

Member of the public doses from current operations has remained consistent over recent years. This would be expected given the minimal changes in operating parameters.

5.1.4.5 Radiological characteristics of produced concentrate

The radiological characteristics of the Olympic Dam copper concentrate and their processing are well known (for example, BHP Billiton 2009, BHP Billiton 2011, BHP 2023c) with the uranium decay chain radionuclides in the copper concentrate not in secular equilibrium[7].

There is evidence that some loss in secular equilibrium occurs during the mining, milling and flotation of copper concentrates produced at Carrapateena and Prominent Hill; however, radionuclide concentration test work is ongoing. For the purpose of the EIS, it is conservatively assumed that the radionuclide concentrations in the Carrapateena, Prominent Hill and Oak Dam copper concentrates are in the same ratio as that of the Olympic Dam copper concentrate.

The indicative radionuclide concentrations based on the uranium content of the copper concentrates are shown in Table 5.13.

Note that radionuclides from the naturally-occurring Th232 and U235 decay chains are present in the copper concentrates. Analysis has shown that natural thorium in all copper concentrates is between approximately 10 and 20 parts per million (ppm) (equivalent to 0.001 to 0.002% by mass), representing 0.05 to 0.1 becquerel per gram (Bq/g) for the Th232 radioisotope and all Th232 decay products (which are in approximate secular equilibrium). U235 exists naturally, with U238 at a mass ratio of approximately 0.7% and activity ratio of approximately 4%. The Th232 and U235 concentrations have been confirmed in sample analyses. The activities of the U235 and Th232

[7] Secular equilibrium occurs when the radionuclides have the same activity concentration

radionuclides are minor compared to the U238 decay chain radionuclides and have therefore been excluded from the assessments.

Table 5.13 | Indicative radionuclide concentration of copper concentrate

Sample description	Annual mass	Uranium	U238 and U234	Th230	Ra226	Pb210	Po210
	Mtpa	ppm	Bq/g	Bq/g	Bq/g	Bq/g	Bq/g
Olympic Dam copper concentrate to smelter	0.9	220	2.8	2.1	10.0	15.0	30.5
Carrapateena[1]	0.15	200	2.5	1.9	9.1	13.6	27.7
Prominent Hill[1]	0.15	200	2.5	1.9	9.1	13.6	27.7
Weighted average radionuclide concentrations	-	-	2.7	2.0	9.6	14.4	29.3

Note: 1. Carrapateena and Prominent Hill radionuclide concentrations are inferred based on Olympic Dam ratios

5.1.5 Climate

BHP maintain three AQMS as part of the air quality monitoring network for the operations of the Olympic Dam site (Section 12.1.2 for further discussion on the monitoring network):

- ODV, located approximately 700 m south of the SML boundary
- Roxby Downs, located approximately 6.5 km south of the SML boundary
- Northern Background, located approximately 11.0 km north of the SML boundary.

ODV AQMS and Roxby Downs AQMS are classed as sensitive receptor monitoring locations. The Northern Background AQMS is a background monitoring location. Each of these AQMS locations are co-located with a weather station to record meteorological parameters.

In addition to the three BHP AQMS locations, the Bureau of Meteorology (BoM) maintain the Roxby Downs (Olympic Dam Aerodrome) automatic weather station (AWS) (station 016096), located approximately 300 m south of the SML boundary. The BoM Olympic Dam Aerodrome AWS records measurements of wind speed, wind direction, standard deviation of wind direction, temperature, relative humidity, station-level barometric pressure and cloud observations.

On the basis of similarities in inter-annual trends of wind speed and direction, air temperature and relative humidity, the BoM Olympic Dam Aerodrome AWS dataset for 2024 was considered to be suitably representative for use (Appendix C3 Air Quality Impact Assessment).

5.1.5.1 Temperature

The SRE Project lies in an arid to semi-arid region, subject to hot summers and cool to mild winters. Temperatures are consistently higher in the north, with long-term average maximum and minimum annual temperature are 27.8°C and 12.7°C respectively (BoM 2025a). As shown in Figure 5.5, January is the hottest month (mean maximum 37ºC) and July the coldest month (mean minimum 4.3ºC).

5.1.5.2 Rainfall and evaporation

Rainfall in the region of the SRE Project is low, with no clear seasonal pattern (Figure 5.6). Rainfall is unpredictable and sporadic throughout the year, often occurring in intense short bursts. The SML Area receives approximately 151.7 millimetres (mm) of annual rainfall, with the highest average rainfall between 1997 and 2025 occurring in January (17.1 mm) (BoM 2025a).

Evaporation data is not available for Olympic Dam or Andamooka. Data from Woomera Aerodrome indicates evaporation is consistently an order of magnitude higher than rainfall, and peaks in the summer months. Mean daily evaporation at Woomera Aerodrome ranges from 3 mm in June to 14.5 mm in January (BoM 2025a). Figure 5.7 shows the monthly rainfall statistics for the location of the SML Area from 1965 to 2025.

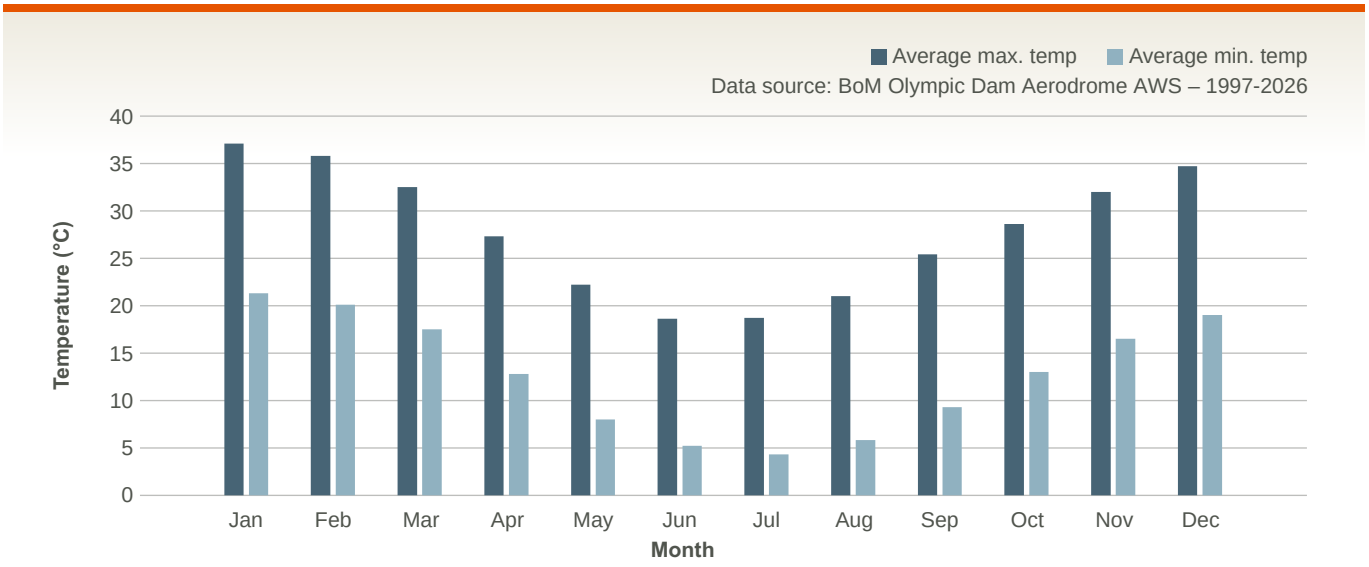


Figure 5.5 | Average monthly temperature

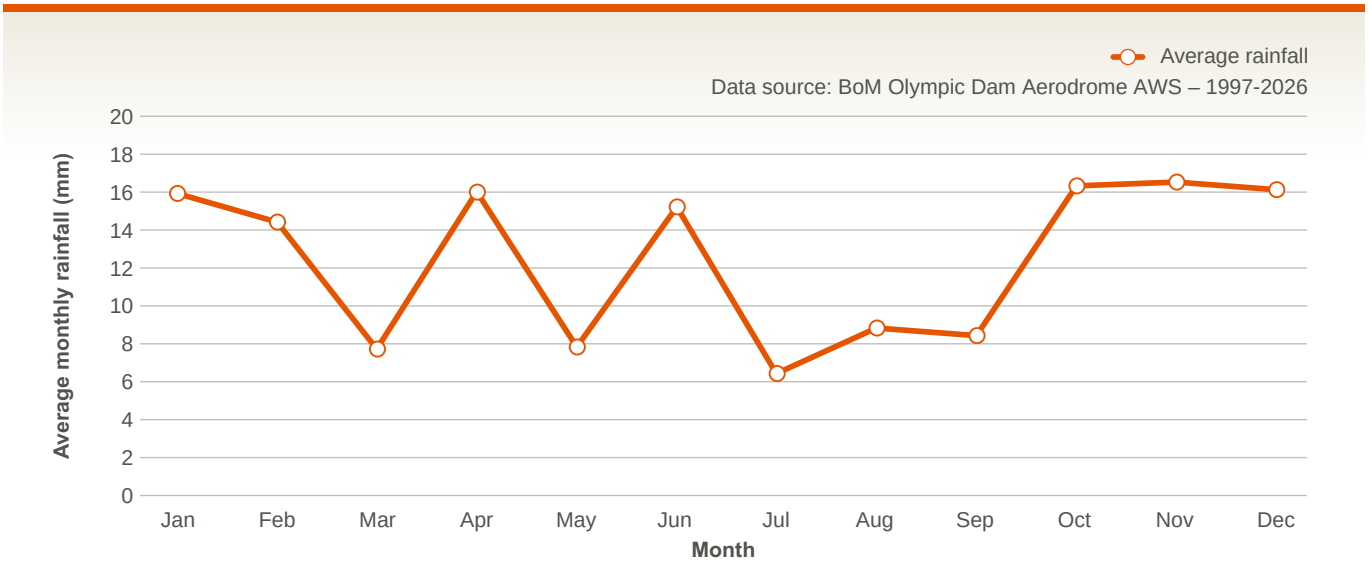


Figure 5.6 | Average monthly rainfall

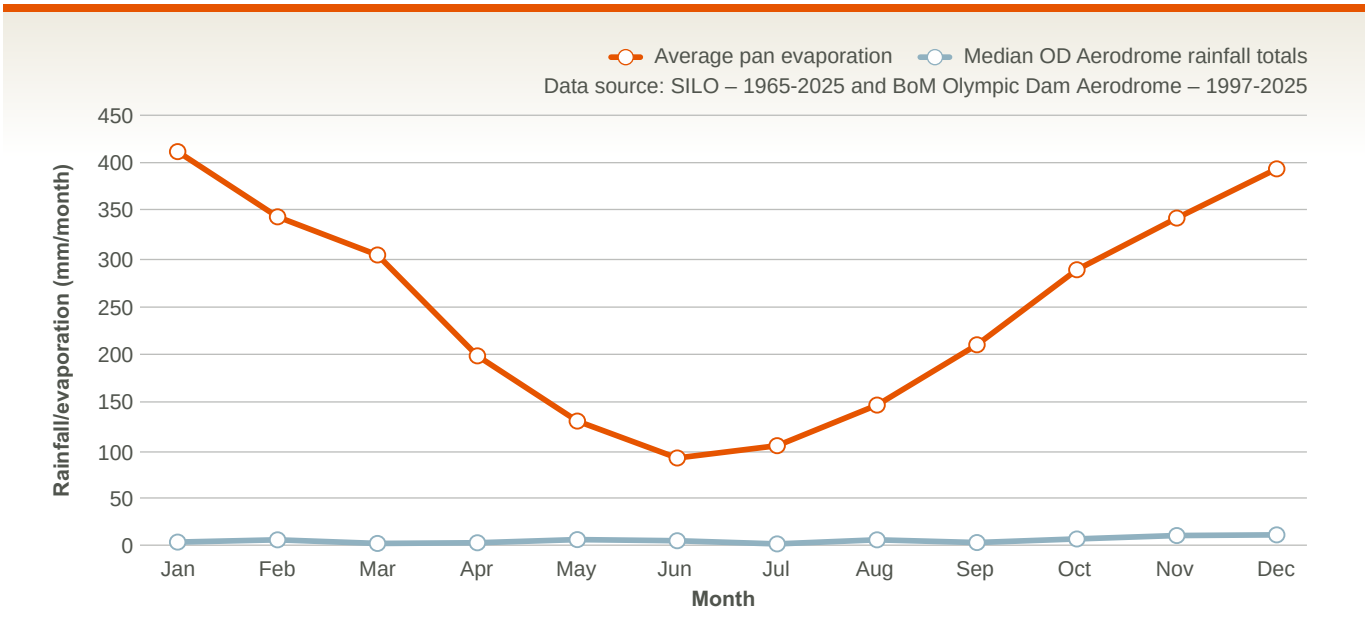


Figure 5.7 | Monthly rainfall statistics

5.1.5.3 Wind speed and direction

An annual wind rose showing the wind speed and wind direction recorded at BoM Olympic Dam Aerodrome AWS in 2024 is presented in Figure 5.8. The wind rose shows that the prevailing winds were from the southern quadrant (south-east to south-west), with a lower frequency northern component. The annual average wind speed in 2024 was 4.3 m/s, with a frequency of calm conditions of 1.7%.

Average wind roses for the daytime and night-time periods are shown in Figure 5.9. The wind patterns during the night-time hours were dominated by air flow from the south, while a more even distribution between southerly and northerly air flow is experienced during the day. Average wind speeds and frequency of calm conditions are comparable between day and night periods.

Seasonal wind roses for the BoM Olympic Dam Aerodrome AWS 2024 dataset are shown in Figure 5.10. The mean wind speed ranged from 3.8 m/s in autumn to 4.7 m/s in summer. The frequency of calm conditions ranged from 0.8% in summer to 3.2% in winter. The spring, summer and autumn months featured a higher proportion of wind from the southern quadrant, while winds from the north-east were more common in winter.

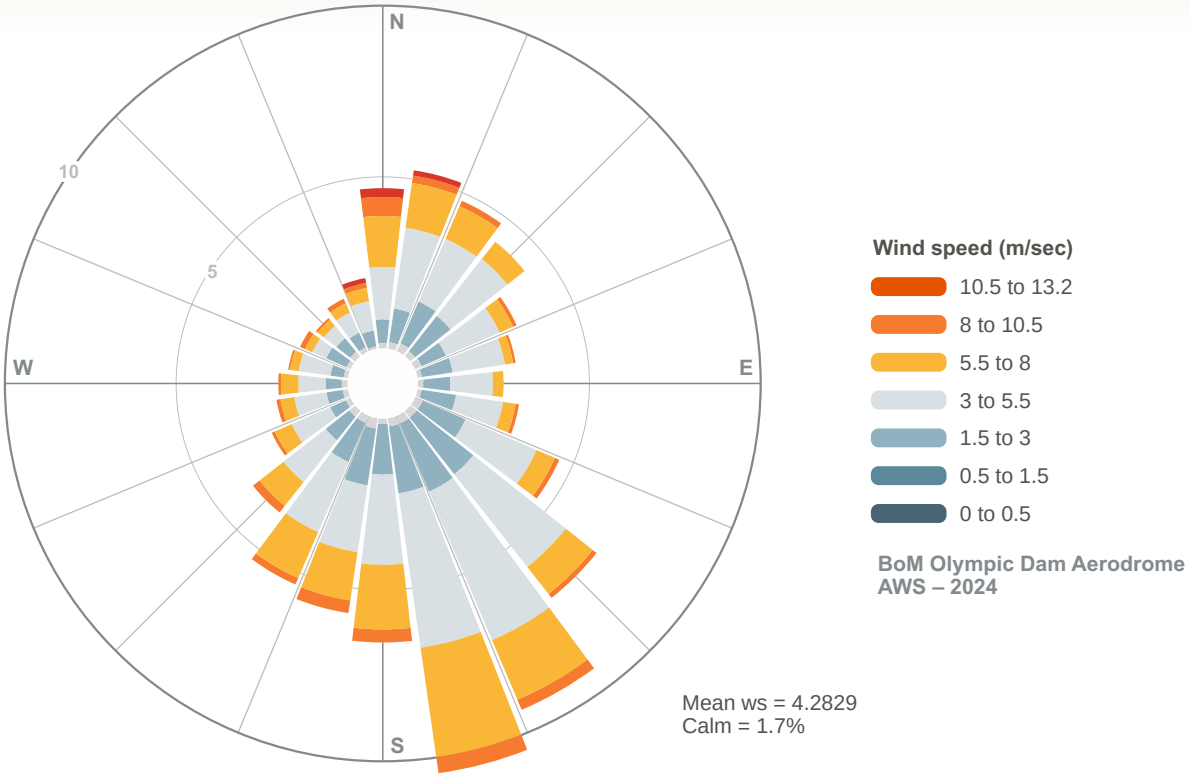


Figure 5.8 | Recorded wind speed and direction

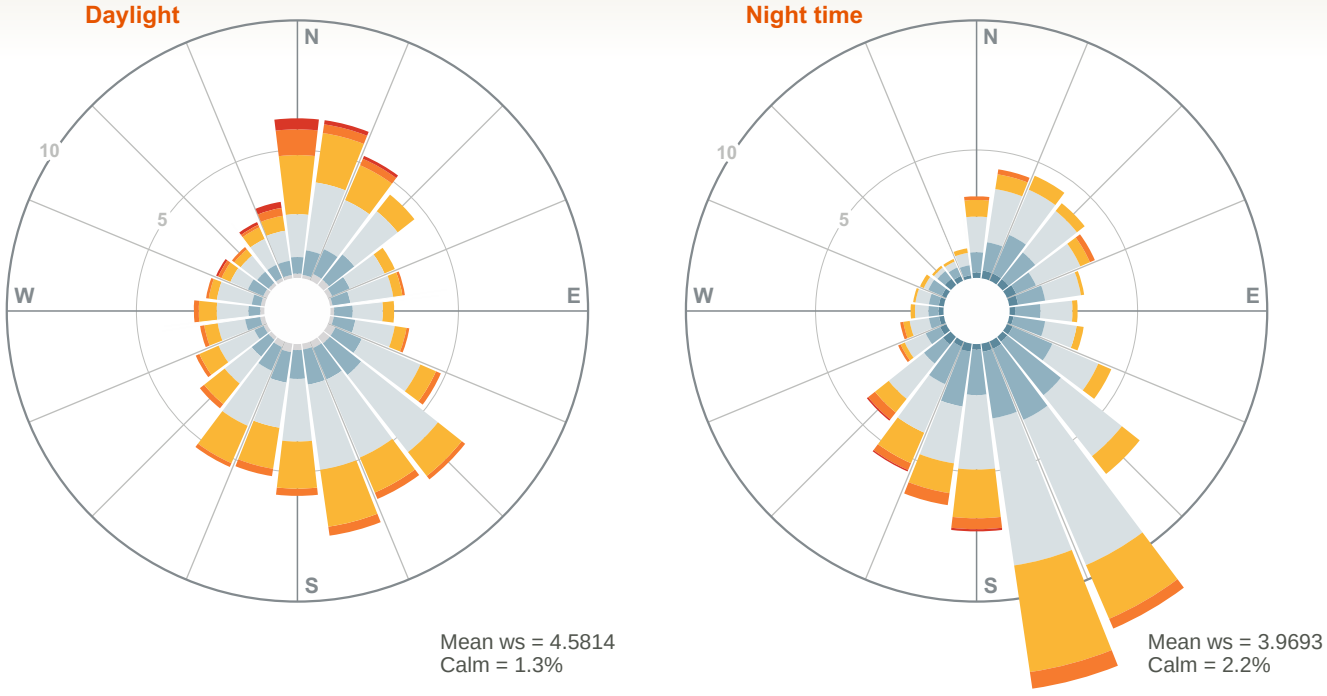


Figure 5.9 | Diurnal wind speed and direction

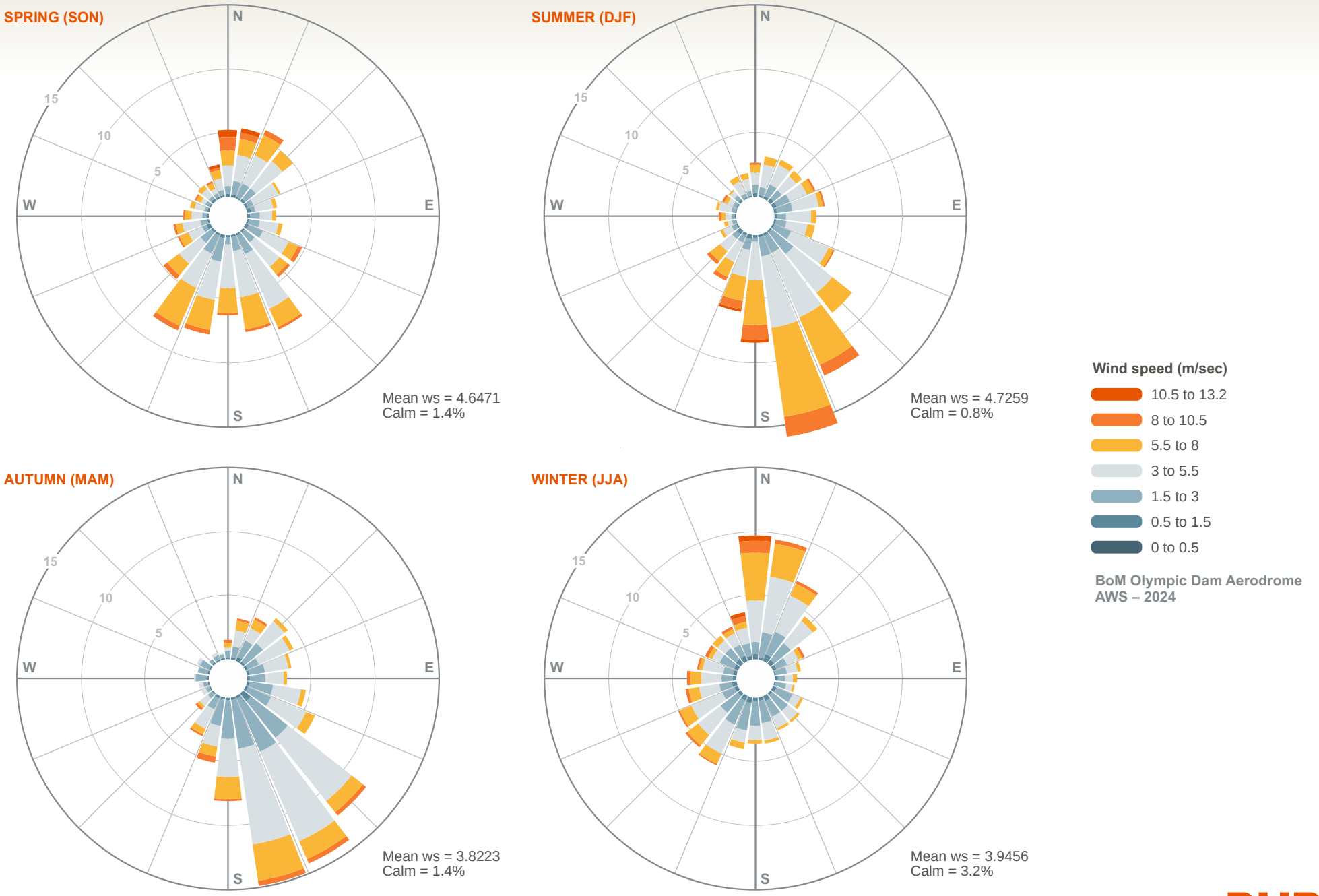


Figure 5.10 | Seasonal wind speed and direction

5.1.5.4 Climate change and projections of future climate

Climate change context

Observations, reconstructions and climate modelling consistently conclude ongoing, long-term climate change interacting with underlying natural variability. Associated changes in weather and climate extremes (such as extreme heat, heavy rainfall and coastal inundation, fire weather and drought) have a large impact on the health and wellbeing of our communities and ecosystems. A summary of observed climate change was presented in the State of the Climate 2024 report (CSIRO and BoM 2024). The most significant observed changes include:

- Australia's climate has warmed by an average of 1.51 ± 0.23°C since national records began in 1910, leading to an increase in the frequency of extreme heat events.
- Sea surface temperatures have increased by an average of 1.08°C since 1900.
- The warming has led to an increase in the frequency of extreme heat events over land and in the oceans.
- In the south-west of Australia there has been a decline of around 16% in April to October rainfall since 1970. Across the same region, May to July rainfall has seen the largest reduction, by around 20% since 1970.
- In south-east of Australia, there has been a decrease of around 9% in April to October rainfall since 1994.
- Heavy short-term rainfall events are becoming more intense.
- There has been a decrease in streamflow at the majority of streamflow gauges across Australia since 1970.
- Rainfall and streamflow have increased across parts of northern Australia since the 1970s.
- There has been an increase in extreme fire weather, and in the length of the fire season, across large parts of the country since the 1950s.
- There has been a decrease in the number of tropical cyclones observed in the Australian region since 1982.
- Snow depth, snow cover and number of snow days have decreased in alpine regions since the late 1950s.
- Oceans around Australia are acidifying, with changes happening faster in recent decades.
- Sea levels are rising around Australia, including more frequent extreme high levels, that are increasing the risk of inundation and damage to coastal infrastructure and communities.

Local climate change – temperature

The South Australian Arid Lands (SAAL) landscape region has experienced more hot days in the past 30 years compared to historical data. Observations of a typical SAAL township (i.e. Marree) show that Marree experienced an average of 54 days per year above 38°C between 1989 and 2018, compared to an average of 41 days per year above 38°C between 1959 and 1988. Since 1989, temperatures of 47°C have been recorded for Marree 19 times, including 6 times in 2019. A temperature of 47°C had not been recorded at Marree before 1989. Instances of consecutive days above 40°C have also been more frequent in the past 30 years. In 2001 and 2004, Marree experienced periods of 16 or more days in a row above 40°C. While there is some missing data,

January 2019 also likely had a run of 16 or more days above 40°C. A run of 16 days above 40°C is unusual at Marree and had only happened once before, in 1979.

Local climate change – rainfall

Annual rainfall in the SAAL landscape region has been relatively stable, recording an average of around 180 mm for the past 60 years (1959 to 2018). Although individual sites vary, averaged over the wider region, annual rainfall has been relatively stable over the past 30 years. Noting that, variability from year-to-year is very high.

Climate change projections

Changes to the climate across the Far North region is projected in the coming decades, including warmer temperatures, reductions in total annual rainfall, and increased intensity during large storms.

DEW (2022) outlines the projected change in climate variables for three locations in South Australia to represent north, south and the most-populated areas. These correspond to projections surrounding the township of Woomera, and the cities of Adelaide and Mount Gambier. To most accurately display projections associated with the northern portion of the SRE Project, Woomera has been summarised in Table 5.14.

Table 5.14 | Climate change projections for Woomera

Climate Variable	Aspect	1981–2010 Baseline	Mean Estimate of Change	
			2030	2050
Mean annual temperature (°C)	Mean daily max	26.0	+1.3	+2.1
	Mean daily min	13.0	+1.1	+1.8
Summer temperature (°C)	Mean daily max	33.8	+1.2	+2.0
	Mean daily min	19.2	+1.2	+2.0
Autumn temperature (°C)	Mean daily max	25.8	+1.3	+2.1
	Mean daily min	13.4	+1.1	+2.0
Winter temperature (°C)	Mean daily max	17.9	+1.2	+1.9
	Mean daily min	6.6	+0.8	+1.4
Spring temperature (°C)	Mean daily max	16.6	+1.4	+2.4
	Mean daily min	12.8	+1.2	+2.0
Mean annual rainfall (mm)		166	-5.2%	-10.6%
Summer rainfall (mm)		44	+2.3%	-3.1%
Autumn rainfall (mm)		38	-12.0%	-8.1%
Winter rainfall (mm)		42	-3.1%	-11.8%
Spring rainfall (mm)		42	-8.0%	-18.4%
Mean number of very hot days (over 40°C) per year		15.1	22.9	30.8
Mean number of very cold nights (less than 2°C) per year		2.53	1.37	0.69
Heavy rainfall (mean days per year above 99.9th percentile)		0.34	0.49	0.41

5.2 Groundwater

This section summarises the baseline aspects of the groundwater. This comprises:

- hydrogeology
- social (potential groundwater users)
- baseline groundwater environment.

The information presented is derived from independent desktop investigations including literature review and use of publicly available data to assist in characterising the regional groundwater.

5.2.1 Hydrogeology

Groundwater within the broader Olympic Dam region generally occurs in the fractured rocks tens of metres below the surface. Groundwater generally moves very slowly, from west to east, and ultimately discharges to Lake Torrens, a regional evaporative sink approximately 30 km to the east (BHP Billiton 2009).

Although the Olympic Dam orebody is located within the fractured basement of the Gawler Craton, it is the Stuart Shelf that is the important hydrogeological unit (BHP Billiton 2009). Within the SML, the two primary aquifers with the ability to transmit groundwater, are the Andamooka Limestone Aquifer (ALA) and the deeper Tent Hill Aquifer (THA). The GAB aquifers, located approximately 100 km north of Olympic Dam, are regionally extensive, confined sandstone systems that are hydraulically distinct from the Stuart Shelf aquifers.

Similarly, the regionally extensive Pandurra Formation is a known fractured rock aquifer and is the source of the Carrapateena mine's water supply. It is located beneath the Tregolana/Woomera Shale; however, it is absent beneath Olympic Dam's SML, however is known to exist further south.

The primary aquitards which impeded groundwater flow beneath the SML are the Arcoona Quartzite and the Tregolana/Woomera Shale. Table 5.15 summarise the main hydrostratigraphic units (HSUs) within the Olympic Dam region, while Figure 5.11 (adapted from BHP Billiton 2009) illustrates the stratigraphy and hydrostratigraphy.

Table 5.15 | Key HSUs

Hydrostratigraphic Unit	Description
Stuart Shelf	
Andamooka Limestone Aquifer (ALA)	Limestone, grey, off-white, brown, buff, pink, recrystallised, commonly dolomitised, locally sandy or pyritic. Represents the regional water table, becoming confined by the Yarra Wurta and Bulldog Shale to the north. Typically, saline to hypersaline.
Arcoona Quartzite aquitard	Highly resistant, metamorphose sandstone composed predominantly of quartz grains. Considered a highly cemented aquitard which separates the ALA from the underlying THA but can yield water if secondary porosity is induced.
Tent Hill Aquifer (THA)	Collectively, includes the Corraberra Sandstone and lower (white) Arcoona Quartzite units, as well as transition zone in the upper Tregolana Shale and equivalents. Moderate permeability aquifer with variable degree of secondary porosity. Can be high yielding in association with major structures and high groundwater pressures. Provides saline water supply for Olympic Dam, typically ranging between 0.3 to 5.7 ML/day. Typically hosts saline groundwater but beneath and adjacent to Lake Torrens to the east, hosted groundwater can be hypersaline (brines).

Hydrostratigraphic Unit	Description
Tregolana Shale aquitard	Equivalent to the Woomera Shale, this unit comprises of reddish-brown laminated shale and siltstone, minor ripple cross-laminated sandstone, flute casts. Semi-confining unit that separates the THA from basement rocks.
Nuccaleena (Basal) aquifer	Laminated to well-bedded dolomicrite, pink and cream to buff-yellow, weathering to pale yellow-brown. Generally considered an aquifer which sits unconformably on basement.
Basement	
Olympic Dam Breccia Complex, Roxby Downs Granite and other HSUs, considered as aquitards	Typically, the crystalline basement rocks of the region form saline/hypersaline aquifers only where fractured. For the most part, basement rocks can be considered as aquitards.

5.2.2 Groundwater users

No third-party groundwater users or aquatic ecosystems are in proximity to the SRE Project. Existing third-party groundwater bores are shown in Figure 5.12.

The presence of groundwater dependent ecosystems (GDEs) was investigated and is discussed in detail in Section 5.5.5.

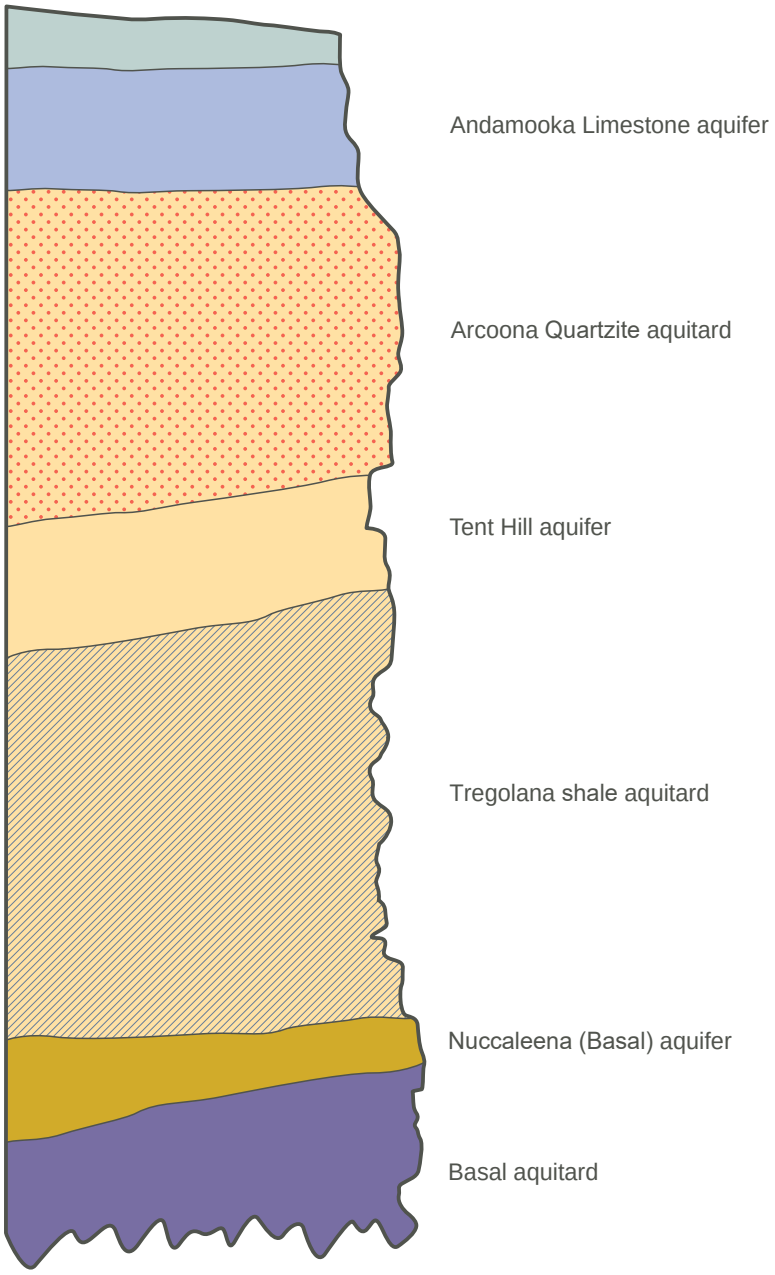


Figure 5.11 | Stuart Shelf hydrostratigraphy

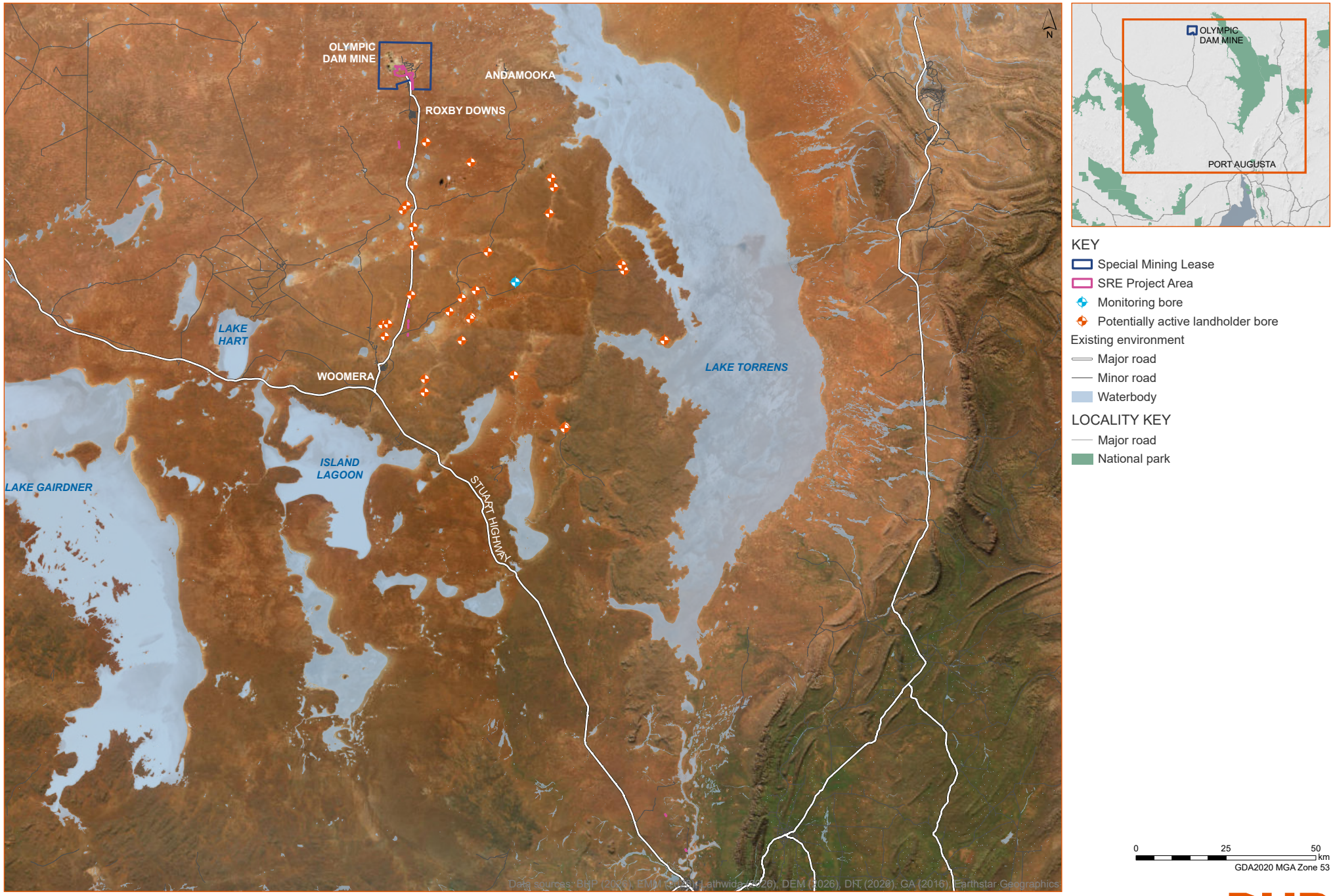


Figure 5.12 | Potential existing third-party groundwater bores

SRE Project BHP

5.2.3 Groundwater quantity

Groundwater-related data have been collected by BHP in the vicinity of Olympic Dam for more than 30 years. Groundwater levels are monitored annually via a network of groundwater monitoring bores in both the ALA and THA (Figure 5.13).

From a groundwater level and flow perspective, recent interpretation of groundwater levels within the shallow ALA shows groundwater mounding is present underneath and adjacent the TSF, approximately 10 to 20 m above pre-mining baseline levels, with the water table sitting at approximately 50 metres Australian Height Datum (mAHD) regionally, but up to approximately 70 mAHD locally adjacent to the perimeter embankment of the TSF facilities. In other areas beneath the SML, the ALA is considered dry, or at least to have negligible saturated thickness. Groundwater levels in the SRE Area are elevated due to mounding, depth to groundwater remains at approximately 35 to 48 m below ground level (mbgl) (Appendix C1 Soil and Groundwater Impact Assessment).

Within the THA, groundwater levels range between 40 and 50 mbgl (60 and 50 mAHD), with a large groundwater cone of depression developed due to underground mining. The underground mine acts as a regional sink below the SML, and drawdown within the THA has likely been exacerbated by drainage to raise bores intersecting the THA. Groundwater mounding within the ALA does not appear to interact with the groundwater pressures measured within the THA, suggesting that the Arcoona Quartzite is an effective aquitard, hydraulically isolating the two main aquifers from one another (Appendix C1 Soil and Groundwater Impact Assessment).

5.2.4 Groundwater quality

Monitoring of the ALA and THA aquifers includes annual groundwater quality measurements across an established network of bores, which are maintained and in suitable condition for sampling.

Key groundwater quality characteristics of the ALA, based on monitoring data, are summarised below:

- Median pH values is neutral with a pH value of 7.2.
- Median total alkalinity concentration is 226 milligrams per litre (mg/L) as calcium carbonate ($CaCO_3$), with concentrations ranging from 101 to 515 mg/L. The range of alkalinity concentrations for the bores demonstrate strong buffering capacity in the local groundwater system.
- Median total dissolved solids (TDS) concentration is 26,100 mg/L, with the range of TDS values representing a saline to hypersaline groundwater.
- Where measured, most metals were present in negligible concentrations which were usually near or below the laboratory limit of reporting (LOR). Notable exceptions include copper, manganese, uranium and zinc.
- For uranium concentrations, the 80th percentile and maximum uranium concentrations reported as 0.135 mg/L and 0.92 mg/L, respectively.

Key groundwater quality characteristics for the THA, based on monitoring data, are summarised below:

- Median pH value is slightly alkaline with a value of 7.5.
- Median total alkalinity concentrations is 238 mg/L as $CaCO_3$, with concentrations ranging from 50 to 302 mg/L.
- Median TDS concentration is 23,500 mg/L.
- Where measured, most metals were present in negligible concentrations which were usually near or below the laboratory LOR.

5.2.5 PFAS

Per- and polyfluoroalkyl substances (PFAS) investigations are being undertaken separately across Olympic Dam with a PFAS-specific preliminary site investigation (PSI) completed in 2019 (JBS&G 2026a), followed by a Stage 1 PFAS detailed site investigation (DSI) completed in 2026 (JBS&G 2026b).

PFAS concentrations were reported above laboratory LOR in 22 of the 24 monitoring bores sampled, indicating that PFAS is present in groundwater within and adjacent to the SRE Area. Of the bores sampled, 9 bores reported PFAS concentrations exceeding the National Environment Management Plan (NEMP) recreational water quality criteria (HEPA 2026), while 5 bores reported PFAS concentrations exceeding the NEMP marine water quality criteria for 90% species protection in highly disturbed ecosystems.

SA EPA was notified of these exceedances in June 2019 with an S83A notice, with updates provided as required and on completion of the PSI and DSI stages. Further investigation, separate to the SRE Project, is currently being undertaken to assess the nature, extent and potential significance of PFAS impacts in the area. Where findings from those investigations are relevant to the SRE Project they have been considered.

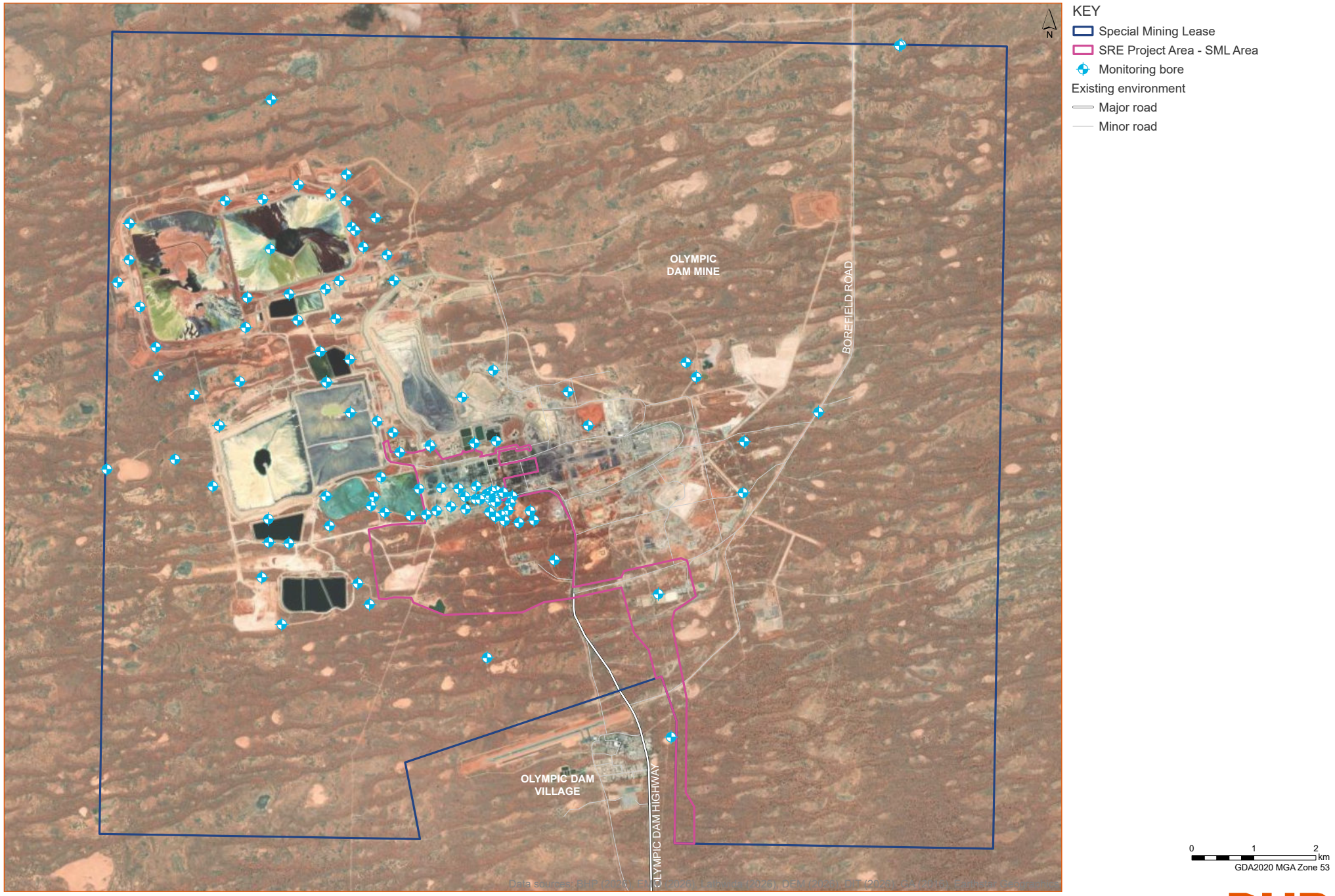


Figure 5.13 | Groundwater monitoring bore locations

5.3 Surface water

This section summarises the baseline aspects of the surface water pathway. This comprises an overview of the SRE Project's:

- hydrology
- baseline water quality
- flooding
- sensitive receptors.

Baseline surface water environment considerations are further discussed in Appendix C6 Surface Water Assessment.

5.3.1 Hydrology

There are no permanent surface water features in the SML, however, claypans and ephemeral lakes can fill after intense rainfall, with water remaining for several weeks before infiltrating or evaporating (Figure 5.14).

5.3.2 Surface water quality

Within dune environments in northern South Australia, salinity and turbidity of stormwater runoff is typically highly variable. Dust and salt can build up on the surface over time, and be transported to ponds in the dune swales when rainfall runoff occurs.

It is also common within northern South Australia for dust and soil to contain metals, such that metals concentrations in pooled water following rain will often exceed Australia and New Zealand freshwater guideline (ANZG 2018) values. This is generally not a concern, as pooled stormwater runoff does not support aquatic species, and downstream environments (where they exist) are typically salt lakes, not freshwater ecosystems.

All stormwater within the Olympic Dam mine and processing plant is managed and diverted to stormwater ponds to prevent discharge of contact water from the SML to the environment (Appendix C6 Surface Water Assessment).

5.3.3 Flooding

Flood behaviour in the SML was investigated by WSP (2023) using a flood model. Flood simulations using this model were undertaken for the SRE Project to characterise the current environment, and indicated that (Figure 5.15):

- Ponds form in dune swales during large storms, with deeper depths occurring during longer storms due to the larger volume of rain that falls during large storms. The dune system creates numerous internally draining catchments. Along the base of the dunes, low saddles separate the individual swale catchments. In very large storms, these saddles can become inundated, allowing pools from separate catchments to link up into larger pools.
- Stormwater is not expected to flow into the SML Area from external catchments.

- Stormwater runoff from the existing Olympic Dam mine (the land area covered by impermeable surfaces) within the SML are captured in a stormwater collection system. In very large storms, exceeding the design capacity of the system, excess stormwater pools within the existing development footprint of the SML but does not discharge to a downstream environment.

5.3.4 Surface water users

There are no waterways in the vicinity of the SRE Project and no permanent surface water features in the SML. Following intense rainfall events, pooled water may provide an opportunistic water source for terrestrial flora and fauna.

There are no other potential surface water users in the vicinity of the SRE Project.

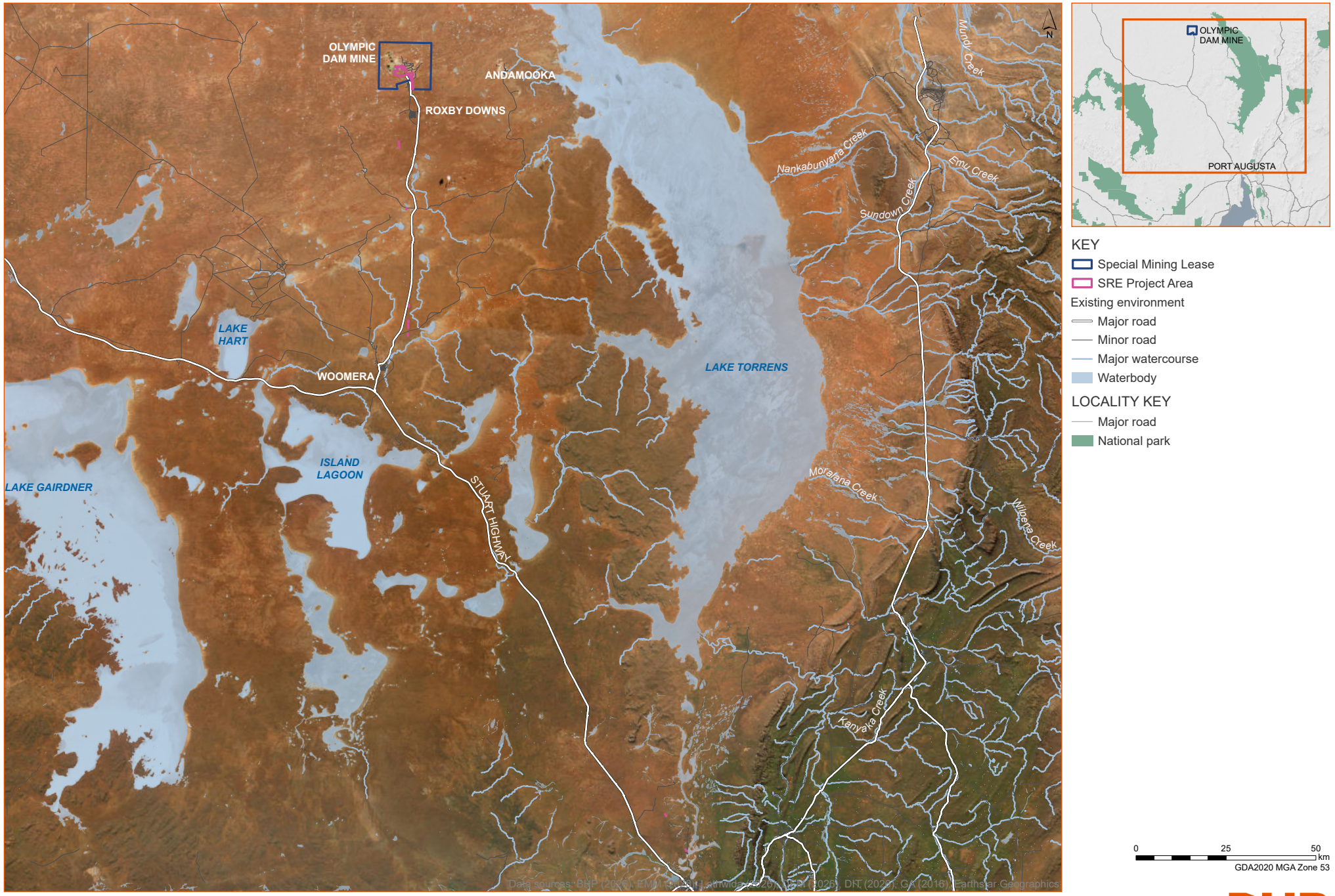


Figure 5.14 | Surface water features

SRE Project BHP

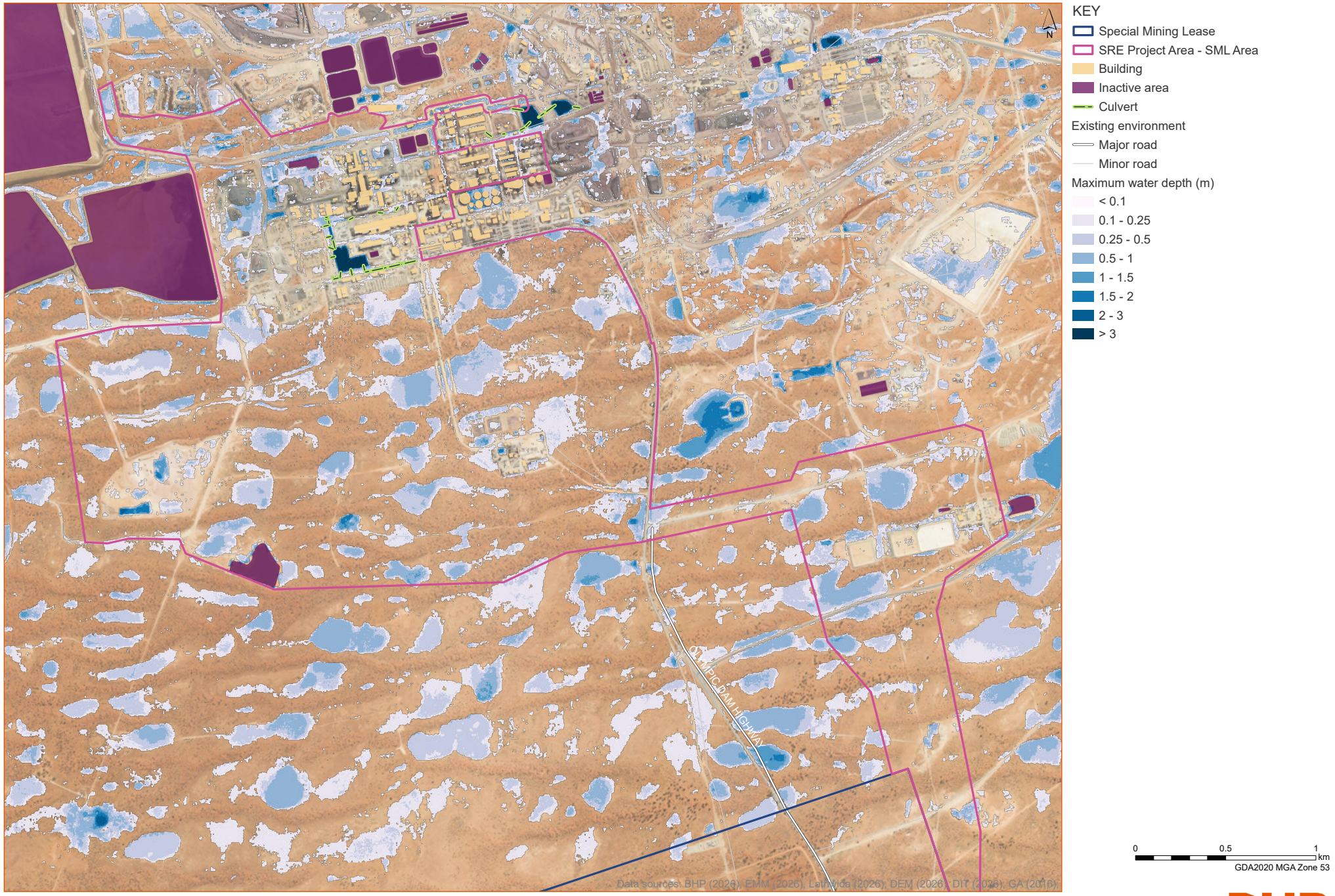


Figure 5.15 | SML Area existing flood conditions (1-in-100-year) 1% AEP storm

5.4 Land

This section summarises the baseline aspects of the land pathway. This is made up of:

- topography and landscape
- geological environment
- geochemical characteristics
- geotechnical characteristics
- geohazards
- land use and the local community.

The information presented is derived from independent assessments that were undertaken for the SRE Project. The assessments were supported by observations from site personnel, and desktop investigations including literature review and use of publicly available data to assist in characterising the regional land-related environment.

5.4.1 Topography and landscape values

The SRE Project Area is located within the Gawler Interim Biogeographic Regionalisation of Australia (IBRA) Bioregion. The Gawler IBRA bioregion, which covers over a quarter of South Australia's pastoral rangelands, is considered a complex landscape due to variations in geology and rainfall.

The Gawler Bioregion is characterised by semi-arid to arid flat to rounded landscapes, rocky hills, plains and salt-encrusted lake beds. Vegetation types across the bioregion include open woodlands of Black Oak (*Casuarina pauper*) and Wattles, open mallee scrub, chenopod shrublands (bluebush/saltbush) and tall Mulga (*Acacia aneura*) shrublands. The native vegetation across the area is generally relatively intact, but highly disturbed in some areas particularly near stock watering points or infrastructure.

Of the 8 IBRA subregions that occur within the Gawler IBRA bioregion, the majority of the SRE Project Area sits within the Roxby IBRA Subregion (SML Area and northern-most EIGR Areas, totalling approximately 11.3 ha). The Roxby IBRA Subregion is characterised by low sand dunes with low open woodland and mixed grasses, sandy interdune swales within Acacia low open woodland over Chenopod low open shrubland and interdune swales with clay soils supporting Cane-grass tall grasslands. The remaining southern EIGR Areas occur across the adjacent Arcoona Plateau Subregion (approximately 17.7 ha). The location of the SRE Project in the context of the IBRA Subregions is shown in Figure 5.16.

The surrounding landscape of the majority of SRE Project Area includes the Olympic Dam mine, Airport, and Village, and the nearby township of Roxby Downs which is connected by a network of established roads. Beyond this, there are large areas of native vegetation which are subject to pastoral leasing (with a long history of livestock grazing) and/or other land uses such as the Woomera Prohibited Area (Department of Defence).

The closest gazetted conservation area is Lake Torrens National Park, located approximately 40 km to the east of the SML Area.

There are no vegetation Heritage Agreements located within 50 km of the SRE Project Area, including the SML Area and the EIGR Areas.

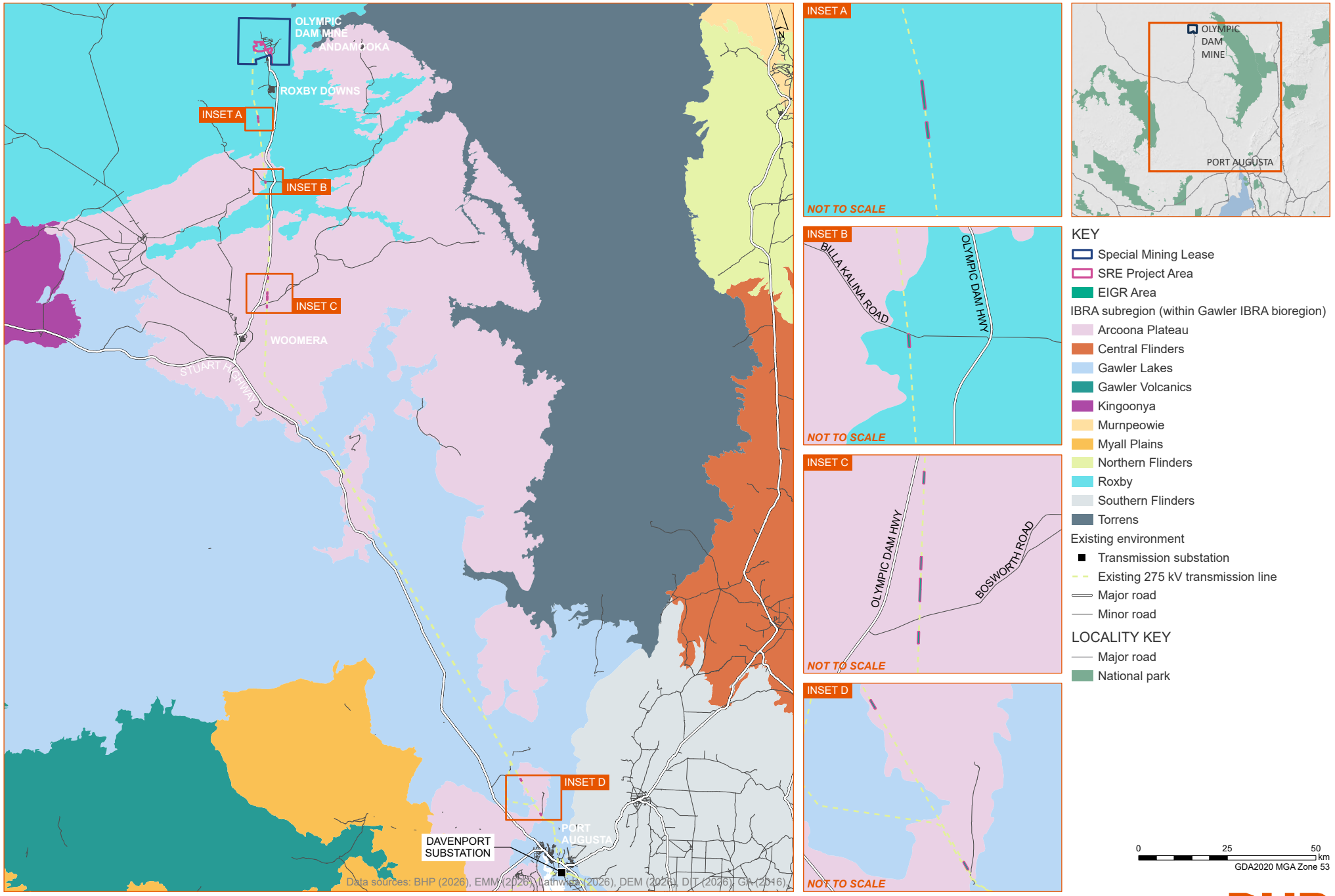


Figure 5.16 | IBRA subregions

SRE Project BHP

5.4.2 Geology

The geological environment is described in the following sections as it relates to the SRE Project and excludes detailed information related to orebody geology. Summaries of orebody geology are presented in the Olympic Dam Expansion Draft EIS (BHP Billiton 2009).

5.4.2.1 Regional geology

The Andamooka geological map sheet (Dalgarno 1982) indicates that the regional subsurface profile of the SML Area is likely to be as presented in Table 5.16.

Table 5.16 | Regional subsurface geological profile

Formation	Subgroup	Subgroup name	Description
Cainozoic (quaternary aged formations)	Qhs	Sand plains	Sand dunes with claypans
	Qhl	Lakes	Salt, gypsum, gypseous clays, silts and quartz sands
Mesozoic (Jurassic-cretaceous aged formations)	Kmb	Marree subgroup (bulldog shale)	White, kaolinitic siltstones with erratic rounded boulders, gravels, conglomerates. Shales and carbonaceous clays, lignite penetrates in bores. Aptian faunas. Formation includes precious opals
Palaeozoic (Cambrian aged formation)	Ca	Andamooka limestone	Cavernous, massive *Archaeocyatha* limestone and dolomite shale
Late protozoic (Adelaidean aged formation)	Pws	Arcoona quartzite	Cross-bedded flaggy quartzites and orthoquartzites with shale and clay gall casts

5.4.2.2 SRE Project geology

A generalised subsurface geological profile of the Olympic Dam area was developed by Golder (2017) during previous geotechnical investigations carried out in the region and is summarised in Table 5.17. Not all the geological units presented in the profile are present at all locations, and depths were noted to vary greatly across relatively short distances (Golder 2017).

A local geological stratigraphic profile, amended from BHP Billiton (2009), is provided in Figure 5.17.

Table 5.17 | Olympic Dam general subsurface geological profile

Unit	Description	Inferred geological age, origins and distribution
Fill	Variable mixture of clay, sand and gravel engineered fill present in the disturbed mine and plant areas. Clays are generally stiff to very stiff consistency and gravels/sand are of medium density. Inferred uncontrolled fill has been encountered in some areas	Recent, anthropogenic
A	**Topsoil/sand:** Fine to medium grained sand with between about 5 to 25% fines. Orange to red-brown, the density varies between loose and medium	Holocene, generally of aeolian origin, dune sand
B	**Sandy clay/clayey sand:** Grades from fine to coarse-grained clayey sand to sandy clay of medium plasticity. Orange-brown to red-brown and white. The unit is very stiff to hard or medium dense and generally calcareous. In parts of the SRE Area this unit contains silcrete/calcrete gravel, cobbles and boulders which can be cemented into a continuous rock mass	Holocene, most likely formed by a combination of alluvial and aeolian deposition. Generally present as near-surface soils on claypans
C	**Clayey sand:** Fine to medium grained orange-brown and brown clayey sand with about 25 to 50% low to medium plasticity fines. Generally moist and very hard/dense. May contain some silty white pockets, possibly comprising sulphates. Has been observed to contain pockets of gypsum crystals up to about 50 mm in size. May be calcareous near the top of the profile	Pleistocene, believed to be alluvial and irregularly present beneath dunes and clay pans
D1	**Calcareous sandstone/claystone/silcrete:** Encountered as between 10 to 90% gravel, cobbles and boulders in a clayey sand matrix or as a continuous rock mass, low-to-high strength and calcareous **Clayey sand/sandy clay:** Grades from fines to medium sand with few fines to sandy clay of medium plasticity, generally pale grey, pale brown and white although may be pockets of green, grey or purple clay near the base of the profile. May contain gypsum, mainly as pockets of crystals less than 50 mm in size but occasionally as larger crystal aggregations. Contains some fine to coarse subrounded gravel and cobbles. Sand may be weakly cemented or in some occurrences cemented to low strength boulders or a continuous rock mass	Late tertiary/Pleistocene, likely alluvial/lacustrine with minor aeolian input. Calcareous material near the upper extents of the profile may be due to leaching of calcium carbonate from overlying layers. Irregularly present to the north and west of the SML and believed to be too deep to have been identified elsewhere
D2	**Mixture of clay and gypsum:** Varies from 10 to 90% gypsum but generally less than 40%. Clay is mostly of high plasticity, grey or green with yellow and red staining. Consistency is hard with strength near that of very low strength rock in some places. Gypsum is present in pockets and near horizontal layers up to 200 mm in thickness of intergrown translucent crystals ranging from 5 to 200 mm in size. The clay can be fissured, breaking into aggregations of 3 to 50 mm in size	Late tertiary/Pleistocene, likely lacustrine in origin with minor alluvial input at lake margins. Irregularly present to the north and west of the SML and believed to be too deep to have been identified elsewhere
E	**Siltstone/sandstone:** Grades from siltstone to medium-grained sandstone, pale grey but generally stained yellow, dark red, brown or purple. Low to high strength, this unit has been observed to be near horizontally well bedded to laminated with some subvertical veins of gypsum	Early to mid-Tertiary, probably alluvial

Unit	Description	Inferred geological age, origins and distribution
F	**Calcrete/Limestone boulders/limestone:** Consists of rounded calcrete gravel near the surface, often with limestone cores, grading from sub-angular boulders up to 1.5 m in size with increasing depth. Most granular material occurs in a pale orange-brown, calcareous, clayey sand matrix. Boulders and the upper part of the parent rock are generally of low strength. Parent rock generally distinctly weathered. Soils generally friable. Some limestone has been silicified, however the soils associated with this unit are all calcareous. Parent rock known to contain voids of up to 0.4 m in vertical thickness at depths ranging between 11 to 20 m in the SRE Area	Weathered Andamooka Limestone of Cambrian age. The depth to the top of this unit varies across the SRE Area. To the west and north of the SML it can appear at surface and is generally within two metres of the surface in these areas. Further south and east within the SML it can vary between 7 m and greater than 13 m, however, is present across the whole SML
G	**Quartzite:** Cross-bedded flaggy quartzite and orthoquartzites with shell and clay gall casts	Arcoona Quartzite of Marinoan (Late Proterozoic) age, present under the entirety of the SML

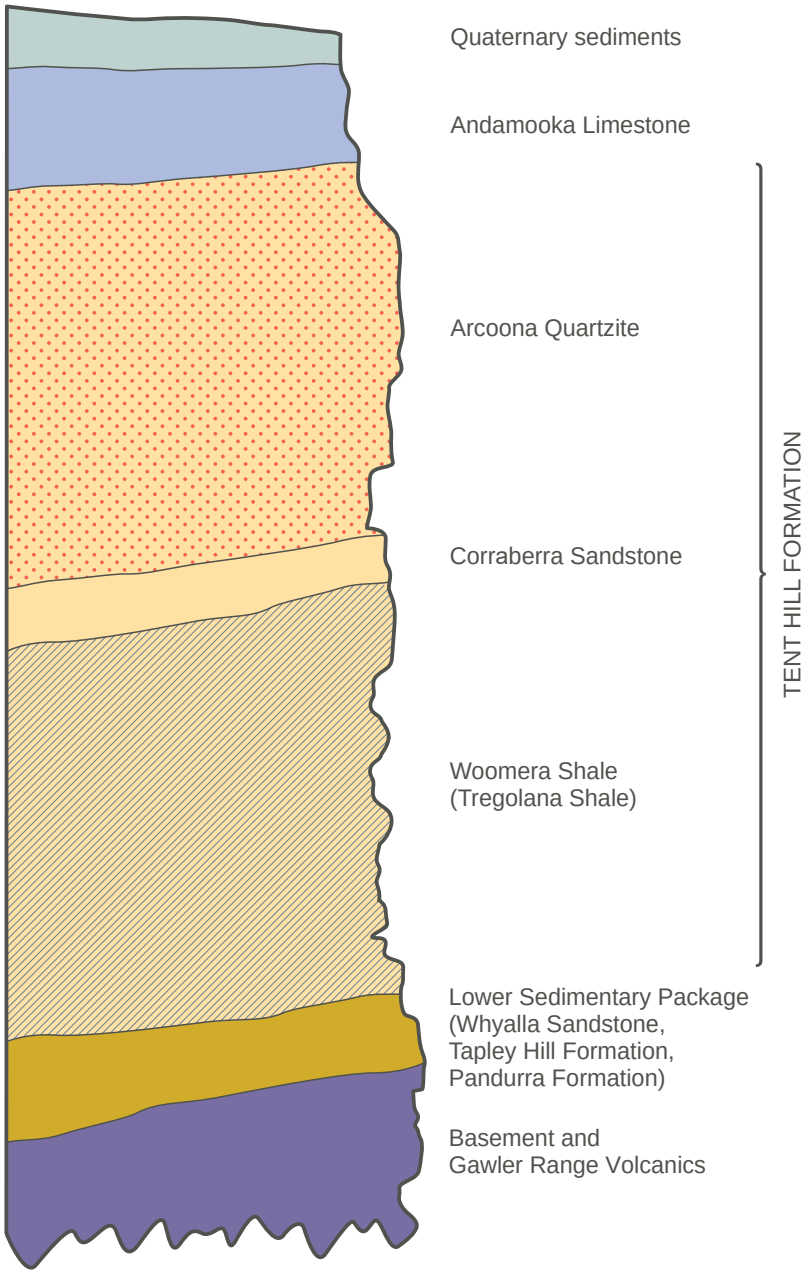


Figure 5.17 | Local stratigraphic profile

5.4.3 Geochemical environment

The geochemical characteristics of geological units within the SRE Project Area, specifically targeting the areas of the proposed SRE Project smelter, refinery and associated infrastructure have been outlined in the geochemistry baseline data presented in Appendix C1 Soil and Groundwater Impact Assessment. The results showed:

- No exceedances of the soil assessment criteria for contaminants of potential concern, based on the 19 test pit locations investigated.
- All samples analysed were non-acid forming with low metal and metalloid concentrations, with the exceptions of arsenic and copper contents. These were targeted during the leachate testing.
- Copper leachate concentrations displayed a reasonable correlation with the corresponding whole-sample (solid) copper content and suggested that leachate copper may become more significant as whole-sample copper concentrations reach and exceed ~ 5,000 mg/kg (0.5% Cu).
- All other analyte leachate concentrations, including arsenic concentrations, were reported at or below laboratory LORs (with the exception of two zinc leachate contents of 0.2 mg/L, which were marginally above the LOR of 0.1 mg/L), indicating that the overall risk of leachate from the disturbed material is low.

5.4.4 Geohazards

5.4.4.1 Seismic risk

The regional historic seismicity that includes all events recorded by the Australian seismological network (Geoscience Australia 2023) is presented in Figure 5.18. The figure includes all recorded earthquakes with a moment magnitude (Mw) range from Mw 0 to 2.8, and indicates seismic activity and earthquakes within this range may be considered as likely to occur for the broader region surrounding the SRE Project.

5.4.4.2 Faulting

Structural forces have resulted in regional and local faulting; the major faulting system within the region is the Torrens Fault associated with the Torrens Hinge Zone (Figure 5.19). This is an extensive zone of south-north faulting and deformation that coincides with Lake Torrens and forms the eastern boundary of the Gawler Craton (OZ Minerals 2017c).

There is a significant roughly north-south trending series of host blocks that have been uplifted to shallower depths associated with the Pernatty Upwarp (OZ Minerals 2017a, 2017b), which is a complex horst structure expressed as an uplift of the Pandurra Formation (Figure 5.19). It is likely to have led to a degree of geologic deformation, predominantly faulting, within the overburden Neoproterozoic and Mesoproterozoic sedimentary sequences (Kellett et al 1999). Inferred Gawler Craton geological features in the region are shown on Figure 5.19 and include:

- Stuart Shelf lineaments
- Archaean to Early Mesoproterozoic faults
- Middle Mesoproterozoic faults.

Local faults include:

- Billa Kallina Fault System
- Boorthanna Fault
- Mashers Fault
- Norwest Fault
- Torrens Fault (Torrens Hinge Zone).
- Faults and lineaments typically trend in two distinct directions: north-west to south-east, or north-east to south-west with their orientations and locations with respect to the SRE Project shown in Figure 5.19.

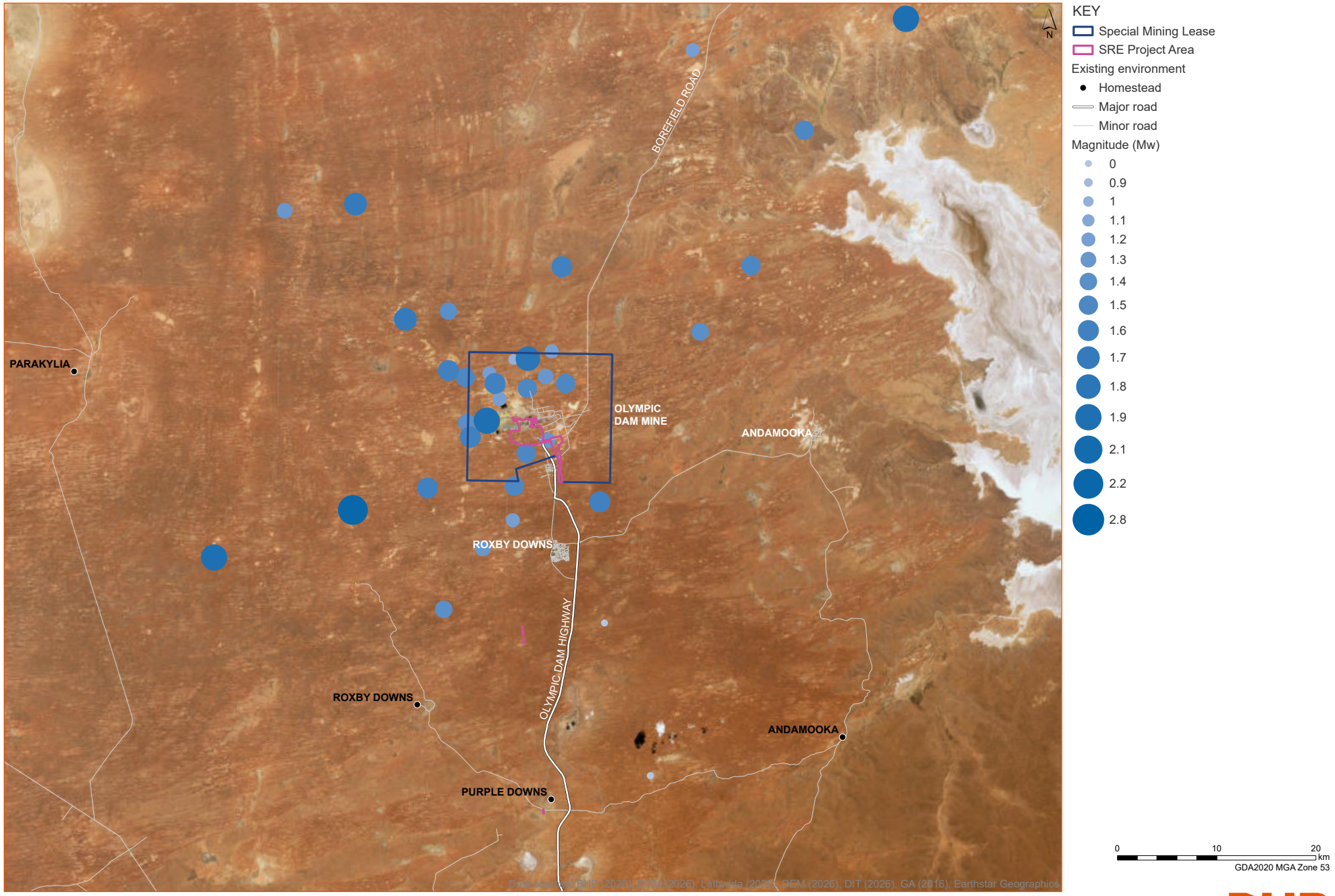


Figure 5.18 | Regional seismicity

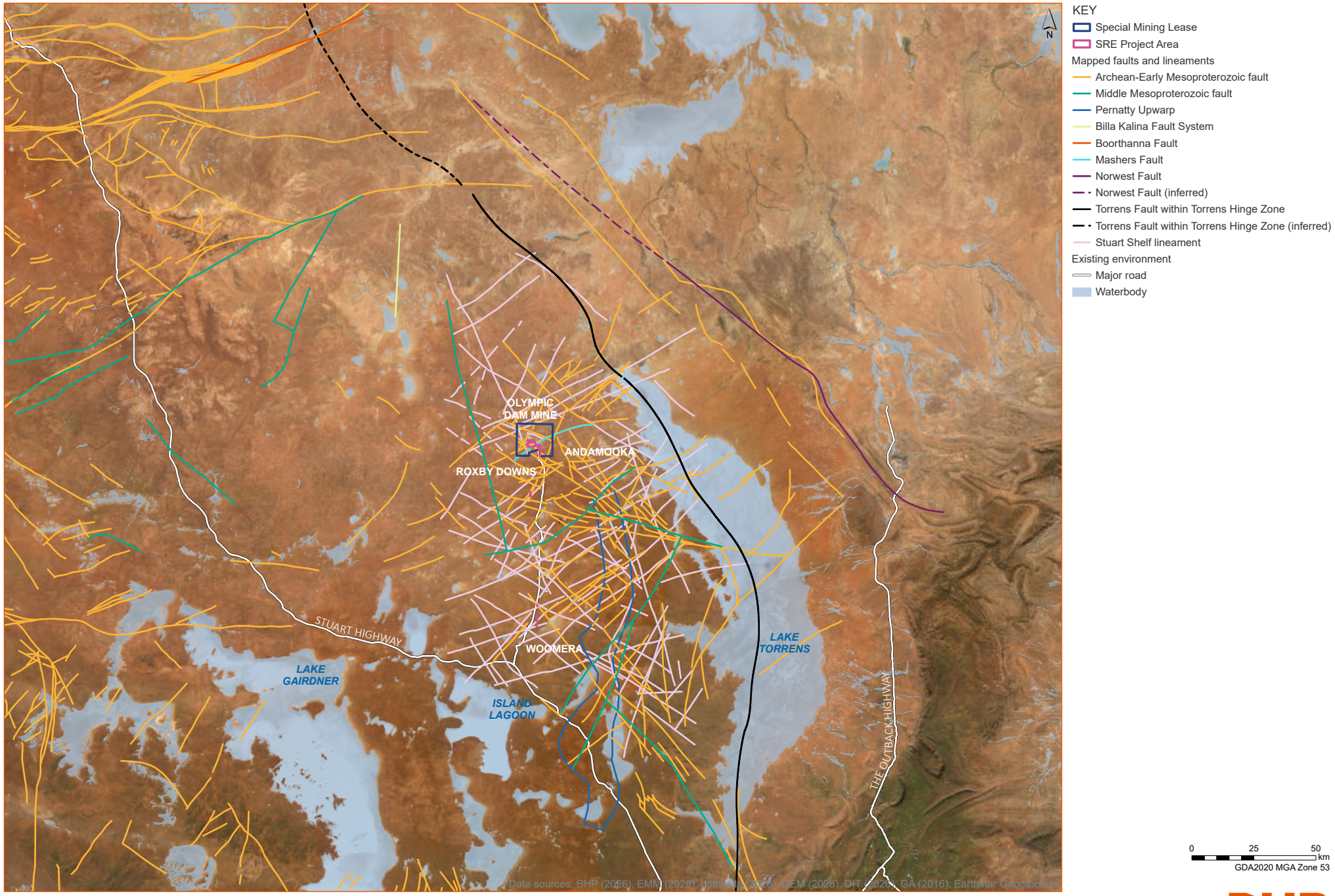


Figure 5.19 | Regional faulting and lineaments

5.4.5 Land use and local community

Landholders located within and adjacent to the SRE Project are discussed in Section 2.3 of this EIS. Land use and local community is discussed in detail in Appendix C7 Land Use and Planning Impact Assessment and summarised in this section.

5.4.5.1 Historical land use

Due to the sparsely populated nature of the region and the distance to the neighbouring major towns, most historical land use relates to the pastoral industry, mining, mineral exploration and transport.

The late 1800s saw the establishment of large pastoral leases in the region, including Arcoona, Purple Downs, Andamooka, Pernatty, and Bosworth operating as sheep and cattle stations.

The region also has a strong Indigenous cultural presence, which is discussed in Section 5.6.9.1.

5.4.5.2 Current land use

Activities within the SML are wholly associated with the ongoing Olympic Dam operations and associated mineral exploration and infrastructure maintenance activities (Plate 5.1). Electricity is supplied via an existing 275 kV transmission line connecting Olympic Dam to the Davenport substation near Port Augusta (Plate 5.2).

The neighbouring Purple Downs Pastoral Lease (owned by BHP) in conjunction with the Andamooka and Roxby Downs pastoral leases encompass over 5,000 km^2 of land that is sub-leased to, and managed by, KAC and currently stocked with around 2,000 head of cattle.

Towns surrounding Olympic Dam include ODV and Roxby Downs to the immediate south of the SML, Woomera and Pimba approximately 95 km and 105 km to the south of the SML respectively and Andamooka, approximately 35 km to the east of the SML; each of which was established within the last 90 years (Figure 5.20). Andamooka was established in 1933 to support opal mining, Woomera in 1947 to service the Woomera Rocket Range and Roxby Downs and ODV in 1986 to service the Olympic Dam operations.

5.4.5.3 Pre-existing site contamination

There is no pre-existing site contamination recorded within or near to the SML Area, based on the findings of the 1982 EIS (Kinhill-Stearns Roger Joint Venture 1982, ODX Draft EIS (BHP Billiton 2009) and targeted soil assessment undertaken within the SRE Area for the SRE Project (Appendix C1 Soil and Groundwater Impact Assessment). The soil sampling locations for the SRE Project targeted soil assessment are shown in Figure 5.21.

5.4.5.4 Pre-existing land disturbance

The SML Area includes substantial areas (almost 40%) of existing disturbance associated with clearance for existing Olympic Dam mine infrastructure including a pilot plant, tracks, borrow pits, transmission lines, turkey nests, historical grazing and areas of approved vegetation clearance (Plate 5.3, Plate 5.4 and Figure 5.23).

Outside of the SML Area, the 11 discrete locations that constitute the EIGR Areas are also subject to existing disturbance associated with maintenance of vegetation clearance distances for safe operation of the existing transmission line.

5.4.5.5 Industrial land

The existing Olympic Dam Industrial Estate, located adjacent ODV, is a commercial and industrial precinct accommodating third-party contractors, logistics providers, engineering firms and mining supply companies that support BHP's Olympic Dam mine operations.

The SRE Project does not propose changes or require additional industrial land within the Olympic Dam Industrial Estate. BHP will continue to engage with Roxby Downs Council and the State Government under the Indenture on the suitability of the current licencing of Crown Land comprising the Olympic Dam Industrial Estate and existing arrangements for tenants to determine suitability for enabling future supply of employment land, security of investment for tenants and infrastructure development long term.



Plate 5.1 | Existing Olympic Dam surface infrastructure



Plate 5.2 | Existing 275 kV transmission line

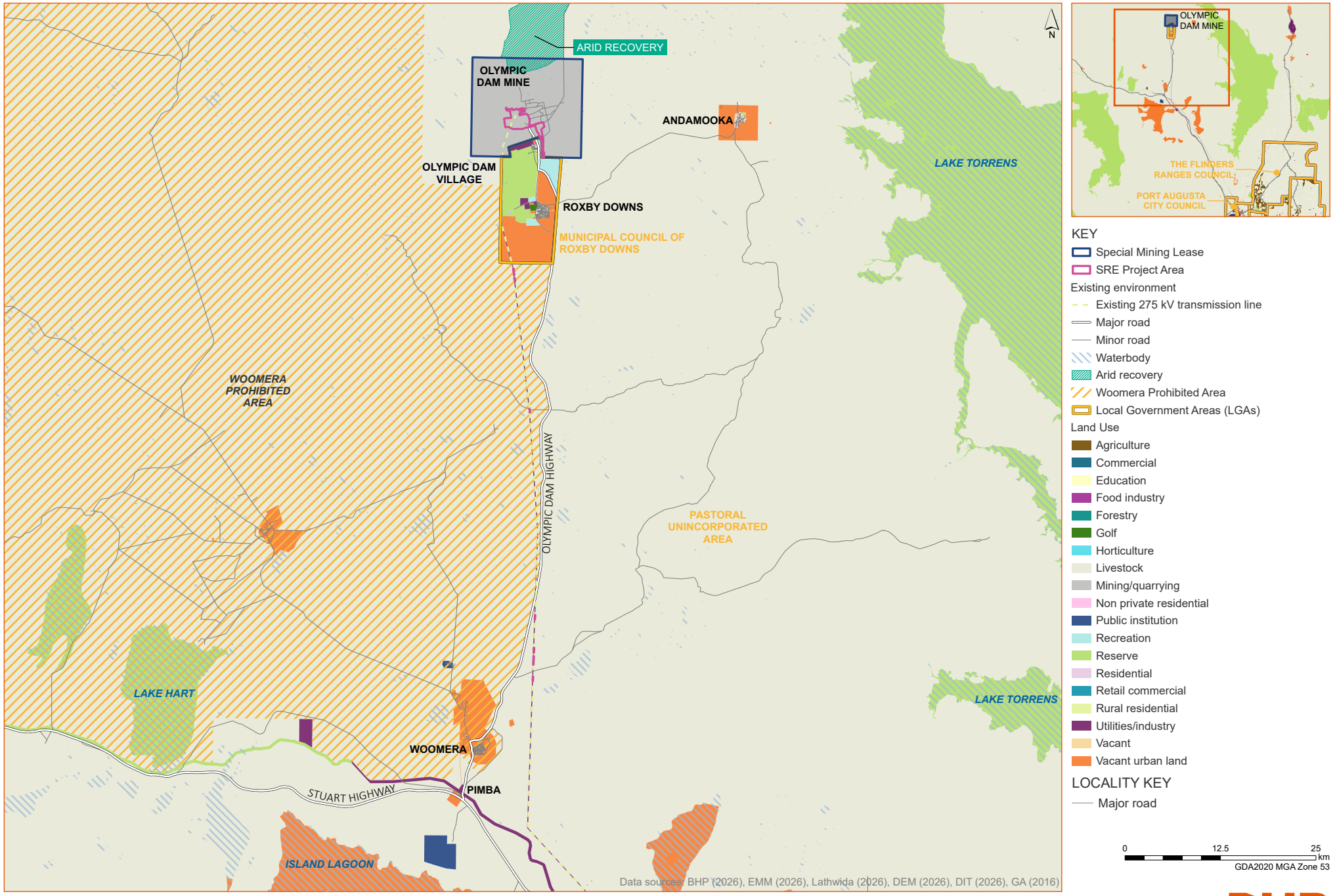
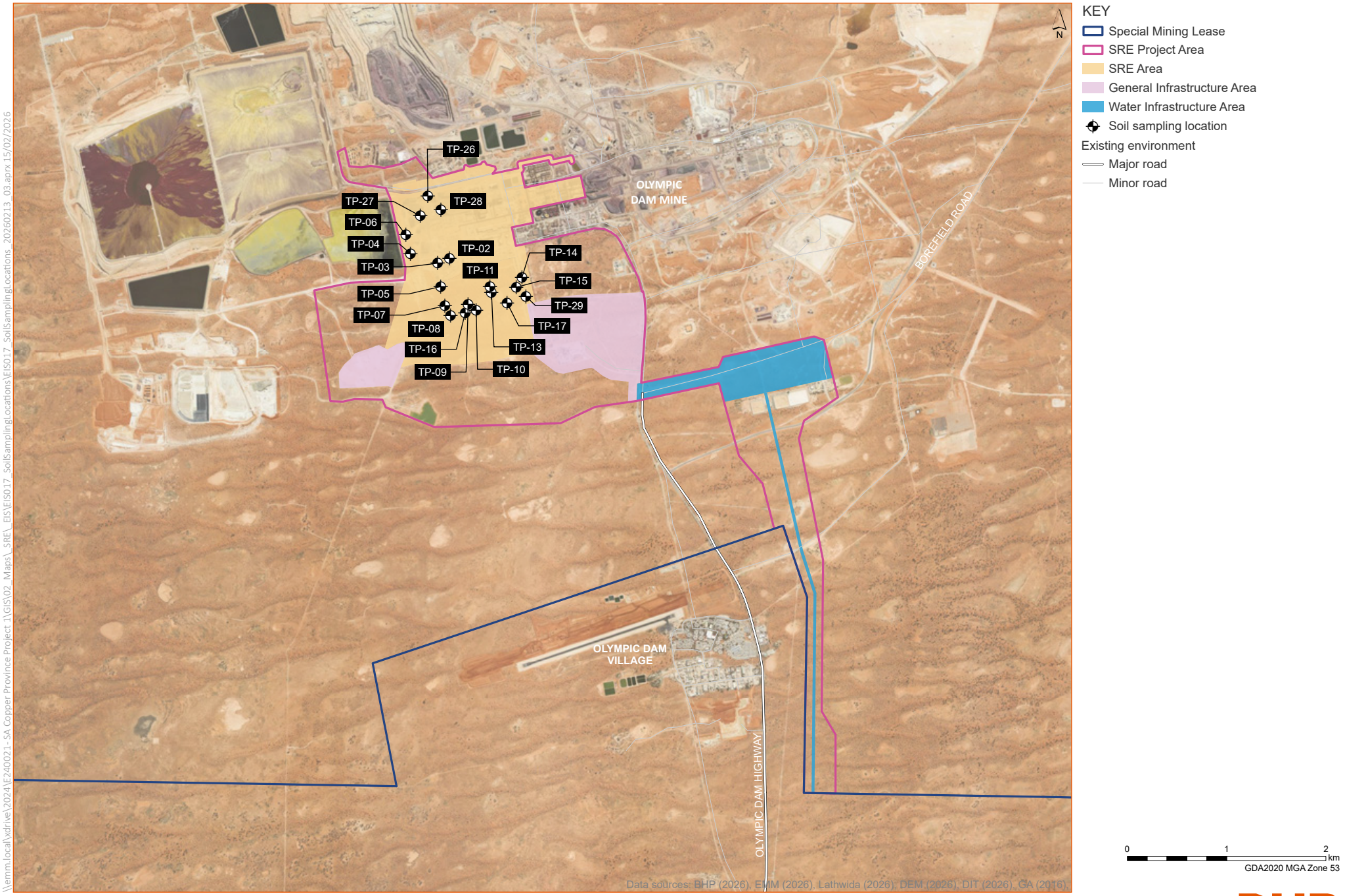


Figure 5.20 | Land use and local communities

SRE Project BHP



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Figure 5.21 | Soil sampling locations

SRE Project BHP



Plate 5.3 | Existing disturbance in the SML Area (borrow pit and tracks)



Plate 5.4 | Existing disturbance in the SML Area (transmission line and tracks)

5.4.5.6 Local community

Large scale pastoral stations surround the SML where (except for land disturbance) the construction and operational effects of the SRE Project would occur. Nearby communities include ODV, Roxby Downs, Woomera, Pimba and Andamooka (Figure 5.20). Descriptions of these communities are provided in Appendix D2 Social Impact Assessment (SIA). Current access to the Olympic Dam mine is via the sealed Olympic Dam Highway.

The SRE Project is situated within the Government of South Australia's defined region of Far North, which spans approximately 800,000 km^2 and has a population of approximately 25,560 people (ABS 2021a). The Far North region includes the following Local Government Areas (LGAs):

- Anangu Pitjantjatjara Yankunytjatjara
- City of Port Augusta
- District Council of Coober Pedy
- Flinders Ranges Council
- Roxby Downs Council.

Municipal services to communities located outside the above listed LGAs, but within the Far North region, are provided directly by the Government of South Australia via the Outback Communities Authority, which was created to assist with local governance across remote townships in South Australia. The Outback Communities Authority works in partnership with the peak community organisation of the individual townships to manage facilities and services.

5.4.5.7 Public infrastructure

Transport

Regionally significant road networks near to the SRE Project include:

- Olympic Dam Highway, connecting the Stuart Highway at Pimba to Roxby Downs via Woomera, also providing access to Olympic Dam mine
- Stuart Highway, connecting Port Augusta to Darwin via Alice Springs.

The Stuart Highway is the major inter-city linkage for the movement of freight and passengers between Adelaide and Darwin and provides access to mining operations, pastoral properties, tourist destinations, and rural and remote communities. The annual average daily traffic count along Olympic Dam Highway between Woomera and Roxby Downs was an average of 500 vehicles daily in 2018. Andamooka Road recorded an average of 310 vehicles in 2018 (Data SA 2023).

There is limited public transport across the nearby communities.

Nationally significant rail networks also traverse the Far North region, with the rail corridor running through Pimba. An intermodal terminal is being constructed at Pimba to facilitate the transfer of goods between road and rail, and vice versa. The Great Southern Railway operates The Ghan train from Adelaide to Darwin via Alice Springs twice weekly. It also operates the Indian Pacific train once or twice each week from Sydney to Perth, stopping enroute in Adelaide.

The nearest commercial airport is Olympic Dam Airport. Alliance Airlines operate a daily public transport service between Olympic Dam and Adelaide.

Electricity transmission

The following three high voltage electricity transmission lines connect the Far North region of South Australia to the Davenport substation, south of Port Augusta:

- BHP private transmission line (275 kV) to Olympic Dam mine
- BHP Hill-to-Hill (H2H) private transmission line (275 kV to Mount Gunson South Substation, 132 kV to Prominent Hill mine, with a 132 kV feeder line to Carrapateena mine from Mount Gunson South Substation)
- ElectraNet (132 kV) transmission line to Woomera, with a BHP private connection from Woomera to the Olympic Dam mine.

Water supply

The SA Water Port Augusta to Woomera water supply pipeline supplies treated River Murray water to Woomera, with some pastoral offtakes along the way.

The proposed NWP aims to develop a desalination plant on Eyre Peninsula and an associated water supply pipeline to Olympic Dam, with offtakes to pastoral operations, communities and industry along the route. Commissioning of the initial 90 ML/d capacity of the NWP is scheduled for 2032 and would involve connection to the SRE Project to the NWP connection point at the SML boundary.

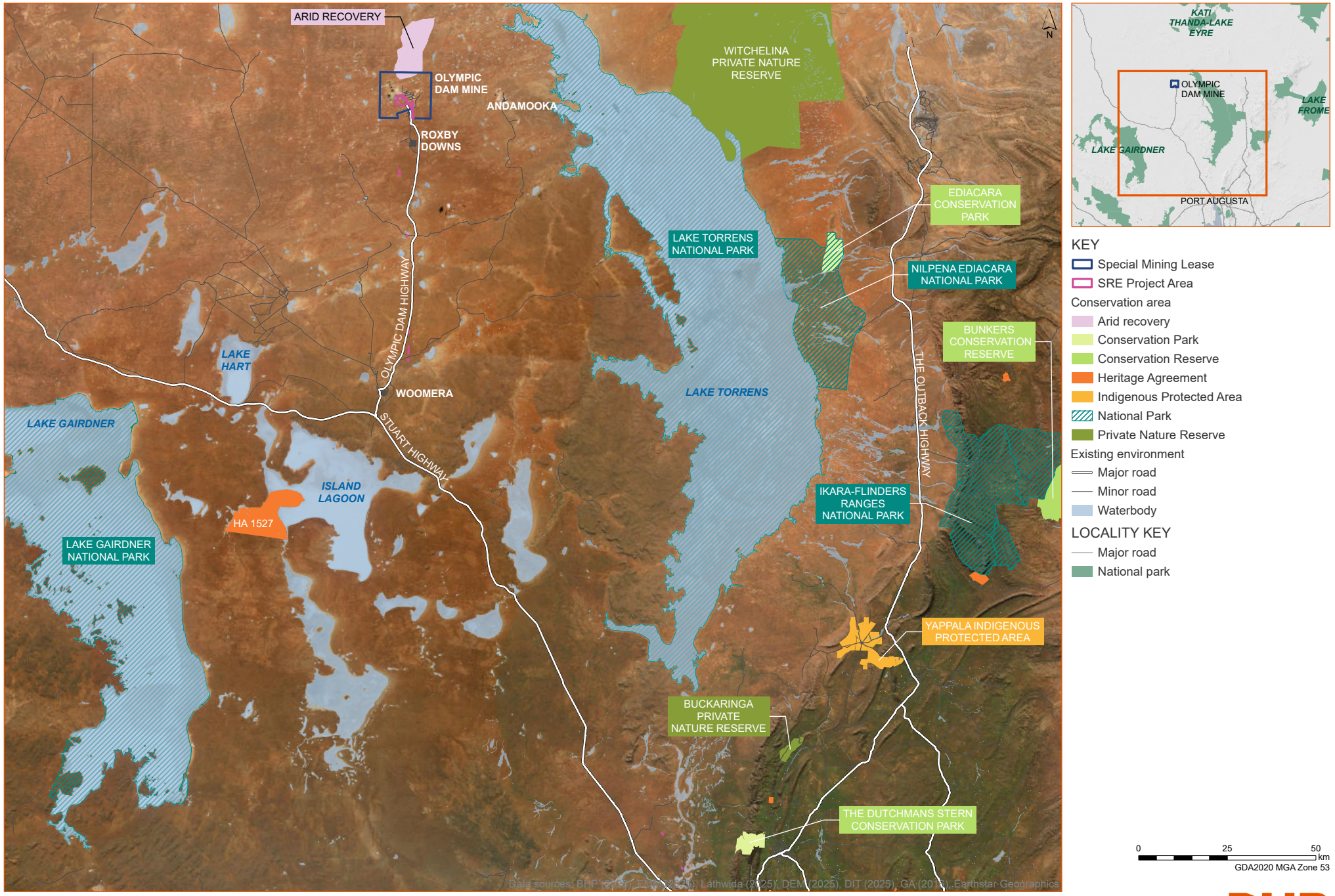
5.4.5.8 Proximity to conservation areas

The SRE Project does not overlap any national parks, reserves, private conservation areas, Commonwealth or State-recognised conservation areas, heritage agreement areas or geological heritage sites (Figure 5.22).

The closest gazetted conservation area is Lake Torrens National Park, located approximately 40 km to the east of the SML Area. There are no vegetation Heritage Agreements located within 50 km of the SML Area or EIGR Areas, with the nearest being HA 1572 west of Island Lagoon (just over 50 km from a central discrete EIGR Area) and HA 1573 (over 75 km north-west of Olympic Dam) (DEW 2025).

The Arid Recovery Reserve (ARR) is located 20 km north of Roxby Downs. The reserve spans a total of 12,300 ha across six large enclosures (or exclosures) and is Australia's largest feral-proof fenced reserve. It is located north of the Olympic Dam mine and spanning 4.7 to 21 km from the SML Area, and partially on the SML. The reserve is used to protect and research local native fauna including a number of national and state-listed fauna; Kowari, Western Quoll, Greater Bilby, Plains Mouse, Burrowing Bettong, Shark Bay Bandicoot, Greater Stick-nest Rat (Arid Recovery 2025, DEW 2025).

Within the wider region, arid inland lakes collectively form a 'Nationally Important Wetland' known as 'Inland Saline Lakes'. The collective wetland includes Lake Torrens (570,000 ha) and Lake Frome (259,000 ha).



Data sources: BHP (2025); ELVIS (2025); Lathwida (2025); DEM (2025); DIT (2025); GA (2019); Earthstar Geographics

Figure 5.22 | Location of conservation areas

SRE Project BHP

5.5 Ecological environment

This section summarises the baseline aspects of the receiving ecological environment (receptor). This comprises:

- vegetation
- flora
- habitat
- fauna
- groundwater dependent ecosystems
- environmentally significant areas.

The information presented is derived from independent assessments that were undertaken for the SRE Project. The assessments were supported by site observations and desktop investigations including literature review and use of publicly available data to assist in characterising the regional ecology.

Baseline ecological environment considerations are further discussed in Appendix D1 Ecological Impact Assessment.

5.5.1 Vegetation

Within the SML Area, five broad vegetation communities and unvegetated claypans were characterised and mapped as part of the site survey. The broad vegetation communities were represented by 10 vegetation associations. Outside of the SML, within the EIGR Areas, 5 broad vegetation communities were characterised, represented by 6 vegetation associations. Each vegetation association is defined as being associated with different landforms and soil characteristics.

The vegetation communities and vegetation associations identified are summarised in Table 5.18. Vegetation associations are mapped in Figure 5.23 and Figure 5.24.

Table 5.18 | Summary of the vegetation communities of the SRE Project

Broad vegetation community	Vegetation associations
SML Area	
Loamy swales with chenopod low open shrubland and emergent Mulga	Bladder Saltbush (*Atriplex vesicaria*)/Low Bluebush (*Maireana astrotricha*) low open shrubland and tussock grasses (interdune swale)
	Chenopod low open shrubland (degraded, interdune swale)
Sand dunes with Umbrella Bush /Bullock Bush tall shrubland over mixed shrubs/tussock grasses	Umbrella Bush (*Acacia ligulata*)/Bullock Bush (*Alectryon oleifolius*) tall open shrubland over Tall Kerosene Grass (*Aristida holathera*) (low dunes)
	Low sand dune with Umbrella Bush tall shrubland (degraded)
Sand dunes with White Cypress-pine open woodland over mixed tall shrubs/tussock grasses	White Cypress-pine (*Callitris glaucophylla*) open woodland +/- Umbrella Bush (*Acacia ligulata*)/Bullock Bush (*Alectryon oleifolius*) tall open shrubland +/- sparse tall shrubs and tussock grasses (tall dune)
	Sand dune with White Cypress-pine open woodland over Umbrella Bush/Bullock Bush tall open shrubland

Broad vegetation community	Vegetation associations
Sandy swales with mixed Acacia tall shrubland and tussock grasses	Slender Mulga (*Acacia aptaneura*) low open woodland over sparse Chenopods and tussock grasses +/- Umbrella Bush (*Acacia ligulata*) over a patchy mid-storey of woody forbs (interdune swales and dune foot slopes)
	Sandy interdune swales with Slender Mulga (*Acacia aptaneura*) low open woodland
Run-on depression with River Red Gum/Willow Wattle open woodland	Run on depression/drainage line with Northern River Red Gum (*Eucalyptus camaldulensis* ssp. *arida*)/Willow Wattle (*Acacia salicina*) +/- River Cooba (*A. stenophylla*) woodland over tall chenopods
Claypans	Small shallow unvegetated clay-based basins in interdune swales that may hold water for short-periods of time, no cracking clays present, some have small amount of salt crust
Planted vegetation	Roadside strip of mixed natives
EIGR Areas, outside SML	
Low open chenopod shrubland	Low Bluebush (*Maireana astrotricha*)/Bladder Saltbush (*Atriplex vesicaria*), low open shrubland over Woolly Bluebush (*M. eriantha*) and Bindyi (*Sclerolaena* sp.)
Stony plains with low open chenopod shrubland and minor shallow gilgai formations	Low Bluebush (*Maireana astrotricha*), Bladder Saltbush (*Atriplex vesicaria*), Samphire (*Tecticornia medullosa*) low shrubland (stony plains)
	Bladder Saltbush, Pale-fruit Bluebush (*Maireana apressa*) low open shrubland +/- Barley Mitchell Grass (*Astrebla pectinata*) (stony plains)
Stony plains with low open chenopod shrubland, minor gilgai formations and shallow drainage lines with Cotton-bush	Low open chenopod shrubland, minor gilgai formations, and shallow drainage lines +/- Cotton-bush (*Maireana aphylla*) (stony plains)
Chenopod low open shrubland and emergent Dead Finish	Dead Finish (*Acacia tetragonophylla*) and Senna (*Senna artemisioides* ssp. *petiolaris*) over Pearl Bluebush (*Maireana sedifolia*), Tate's Bindyi (*Sclerolaena tatei*), a Sea-heath (*Frankenia subteres*) and Bristly Love-grass (*Eragrostis setifolia*)
Sand dunes with mixed Acacia tall shrubland and tussock grasses	Mulga (*Acacia aneura*) and emergent White Cypress-pine (*Callitris glaucophylla*) over Bullock Bush (*Alectryon oleifolius*), Umbrella Bush (*Acacia ligulata*), and Curly Wire-grass (*Aristida contorta*) (low dunes)

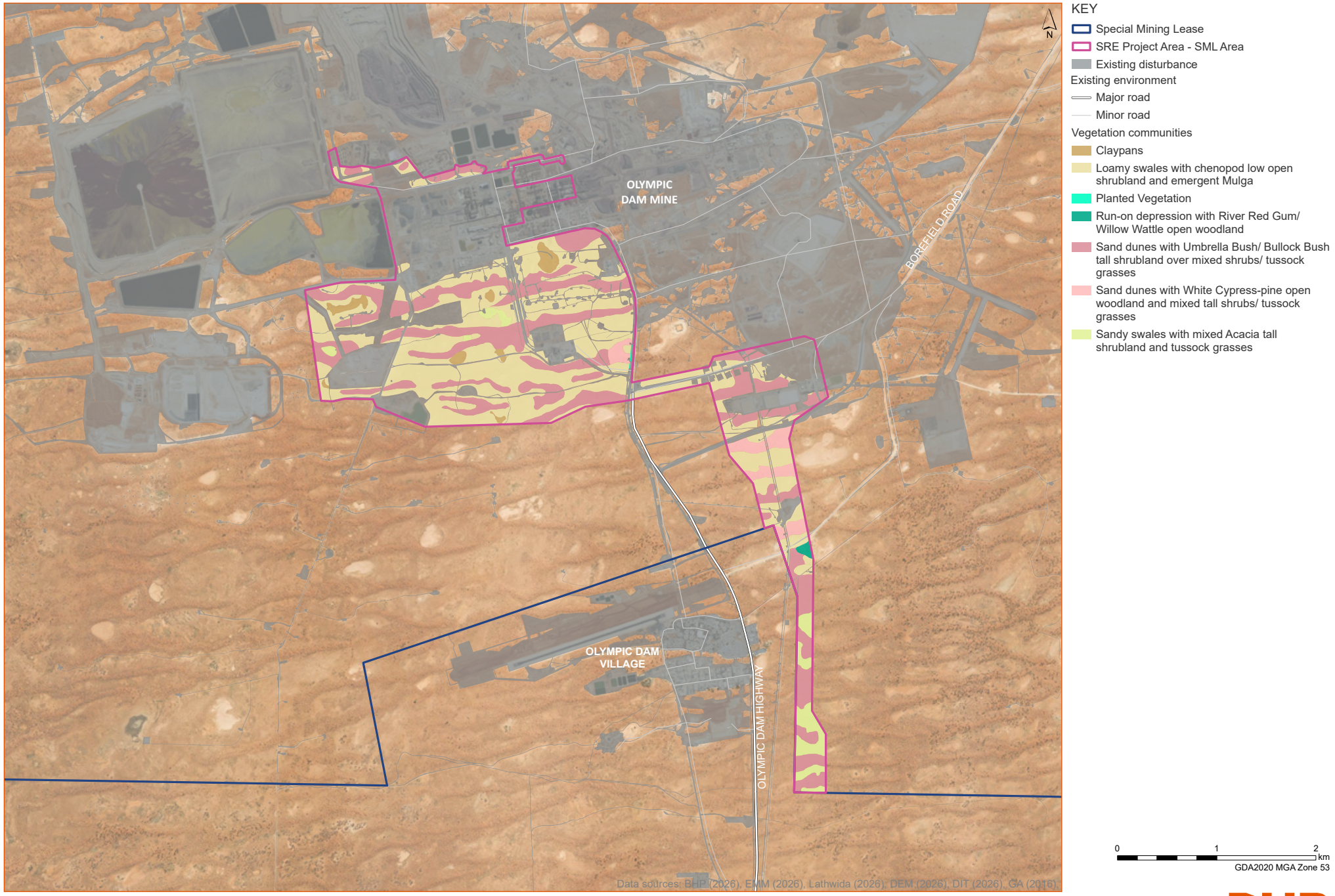


Figure 5.23 | Vegetation communities and existing disturbance in SML Area

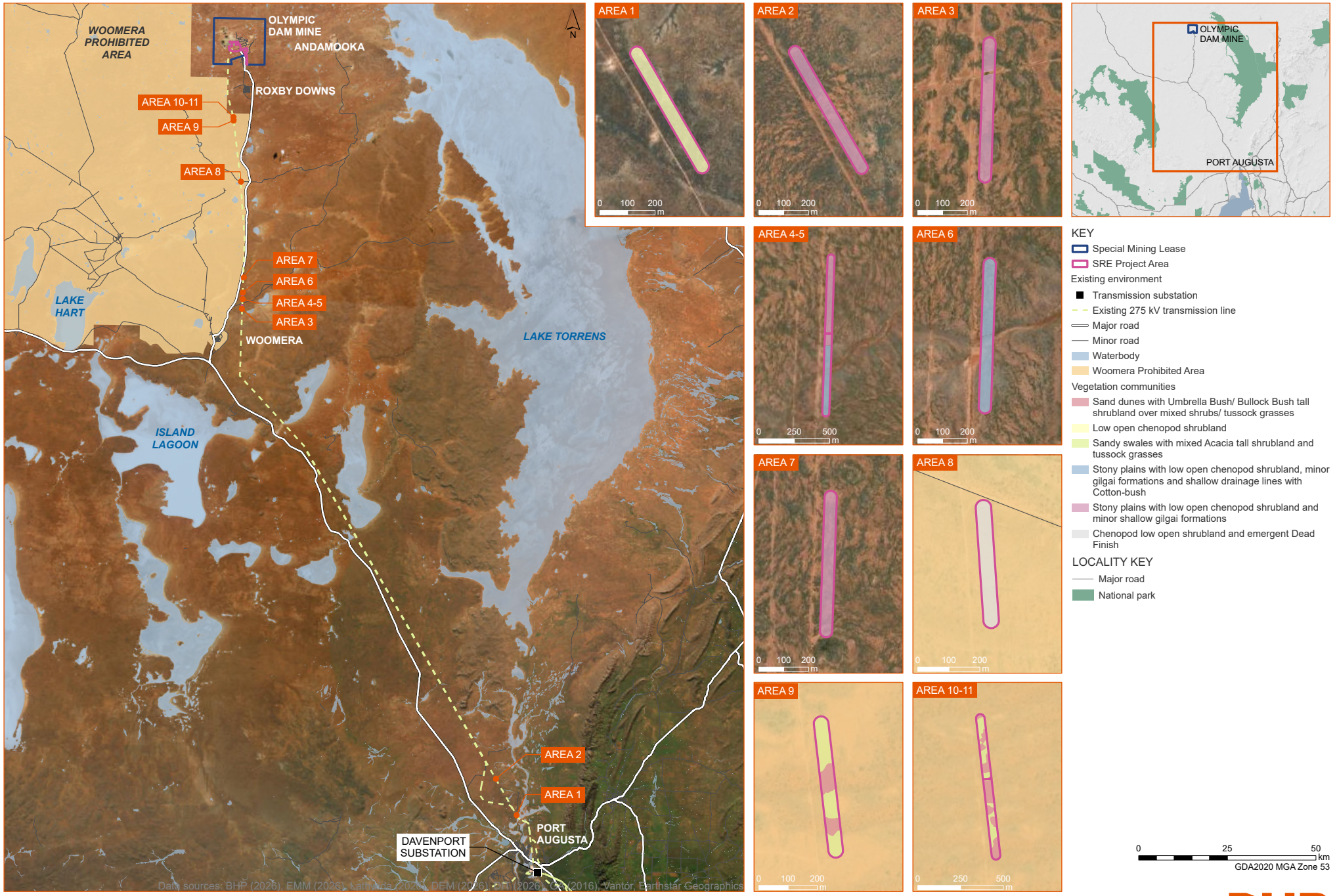


Figure 5.24 | Vegetation communities in EIGR Areas

5.5.2 EPBC Act-listed species and habitat

Protected Matter Search Tool (PMST) searches were undertaken for the Ecology Study Area comprising 'feature areas' (the SML Area and each EIGR Area) and buffers for each feature area (a 50 km buffer around the SML and a 5 km buffer around each EIGR Area). A summary of the number of MNES identified by the PMST searches for each area is presented in Table 5.19.

One EPBC threatened ecological community (TEC) and 41 EPBC listed flora and fauna species were considered (2 threatened flora, 32 threatened fauna and 7 migratory fauna that are not also listed as threatened). There are also 2 fauna that were not highlighted by the PMST search but had records within the Ecology Study Area. Of these species, only Southern Whiteface has been detected in the SRE Project Area, including as part of targeted surveys of the SML Area in July 2024. An additional 4 species have potential to occur; Plains Mouse (potential during irruptive years), Blue-winged Parrot (potential during non-breeding winter migration), Grey Falcon (potential overfly foraging) and Fork-tailed Swift (potential flyover species). The remaining species are considered unlikely or do not occur in the SML Area or EIGR Areas. A summary and likelihood of EPBC Act-listed species identified using the PMST search and Biological Database of South Australia (BDBSA) is presented in Table 5.19.

No TECs are considered relevant to the SRE Project, and none have been identified onsite. One TEC is considered for the EIGR Area (Table 5.19).

Table 5.19 | Summary and likelihood of occurrence EPBC Act-listed species and TEC in the SRE Project Area

Species	EPBC Act[1]	NPW Act[2]	Likelihood
Threatened Ecological Communities			
Subtropical and Temperate Coastal Saltmarsh	V	-	**Does not occur** within the SRE Project.
Threatened Flora			
Frankenia plicata	EN	V	**Unlikely to occur** within the SRE Project.
Desert Greenhood (*Pterostylis xerophila*)	VU	V	**Unlikely to occur** within the SRE Project.
Threatened mammals			
Australian Sea-lion (*Neophoca cinerea*)	EN	VU	**Does not occur** within the SRE Project.
Burrowing Bettong (Shark Bay), Boodie (*Bettongia lesueur lesueur*)	VU	-	**Unlikely to occur** within the SRE Project.
Chuditch, Western Quoll (*Dasyurus geoffroii*)	VU	E	**Unlikely to occur** within the SRE Project.
Dusky Hopping-mouse, Wilkiniti (*Notomys fuscus*)	VU	V	**Unlikely to occur** within the SRE Project.
Greater Bilby (*Macrotis lagotis*)	VU	E	**Unlikely to occur** within the SRE Project.
Kowari (*Dasyuroides byrnei*)	EN	E	**Unlikely to occur** within the SRE Project.
Numbat (*Myrmecobius fasciatus*)	EN	E	**Unlikely to occur** within the SRE Project.
Plains Rat, Palyoora, Plains Mouse (*Pseudomys australis*)	VU	V	**Possibly occurring** within the SRE Project.
Shark Bay (Western Barred) Bandicoot (*Perameles bougainville*)	EN	E	**Unlikely to occur** within the SRE Project.
Wopilkara, Greater Stick-nest Rat (*Leporillus conditor*)	VU	V	**Unlikely to occur** within the SRE Project.
Threatened fish			
Blue Warehou (*Seriolella brama*)	CD	-	**Does not occur** within the SRE Project.
Threatened reptiles			
Flinders Ranges Worm-lizard (*Aprasia pseudopulchella*)	VU	-	**Unlikely to occur** within the SRE Project.
Threatened birds			
Australian Fairy Tern (*Sternula nereis nereis*)	VU		**Unlikely to occur** within the SRE Project.
Australian Painted Snipe (*Rostratula australis*)	EN		**Unlikely to occur** within the SRE Project.

Species	EPBC Act[1]	NPW Act[2]	Likelihood
Blue-winged Parrot (*Neophema chrysostoma*)	VU	V	**Possibly occurring** within the SRE Project during winter migration (foraging only).
Common Greenshank, Greenshank (*Tringa nebularia*)	EN, MW	-	**Unlikely to occur** within the SRE Project.
Curlew Sandpiper (*Calidris ferruginea*)	CE, MW	E	**Unlikely to occur** within the SRE Project.
Diamond Firetail (*Stagonopleura guttata*)	VU	-	**Unlikely to occur** within the SRE Project.
Eastern Curlew Far Eastern Curlew (*Numenius madagascariensis*)	CE	-	**Does not occur** within the SRE Project.
Grey Falcon (*Falco hypoleucos*)	VU	R	**Possibly occurring** within the SRE Project (foraging only).
Latham's Snipe, Japanese Snipe (*Gallinago hardwickii*)	VU, MW		**Unlikely to occur** within the SRE Project.
Malleefowl (*Leipoa ocellata*)	VU	V	**Does not occur** within the SRE Project.
Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit (*Limosa lapponica baueri*)	EN		**Does not occur** within the SRE Project.
Painted Honeyeater (*Grantiella picta*)	VU		**Unlikely to occur** within the SRE Project.
Plains-wanderer (*Pedionomus torquatus*)	CE	E	**Unlikely to occur** within the SRE Project.
Princess Parrot, Alexandra's Parrot (*Polytelis alexandrae*)	VU	V	**Unlikely to occur** within the SRE Project.
Red Knot (*Calidiris canutus*)	VU, MW		**Unlikely to occur** within the SRE Project.
Sharp-tailed Sandpiper (*Calidris acuminata*)	VU, MW	-	**Unlikely to occur** within the SRE Project.
Southeastern Hooded Robin (*Melanodryas cucullata cucullata*)	EN		**Unlikely to occur** within the SRE Project.
Southern Whiteface (*Aphelocephala leucopsis*)	VU	-	**Known to occur** with the SRE Project Area
Thick-billed Grasswren (*Amytornis modestus*)	VU	V	**Unlikely to occur** within the SRE Project.
Western Graswren (*Amytornis textilis myall*)	VU	V	**Unlikely to occur** within the SRE Project.
Migratory species (not considered threatened species above)			
Migratory wetland (functional group – waders)			
Common Sandpiper (*Actitis hypoleucos*) (PMST suggests likely/known)	MW	R	**Unlikely to occur** within the SRE Project.
Pectoral Sandpiper (*Calidris melanotos*) (PMST suggests known/may)	MW	R	

Species	EPBC Act[1]	NPW Act[2]	Likelihood
Oriental Plover, Oriental Dotterel (*Charadrius veredus*) (PMST suggests may occur)	MW	-	
Migratory wetland			
Osprey (*Pandion haliaetus*)	MW	-	**Unlikely to occur** within the SRE Project.
Migratory wetland (terrestrial functional group)			
Grey Wagtail (*Motacilla cinerea*)	MT	-	**Unlikely to occur** within the SRE Project.
Yellow Wagtail (*Motacilla flava*)			
Migratory marine			
Fork-tailed Swift/Pacific Swift (*Apus pacificus*)	MM	R	**Possibly occurring** within the SRE Project as a flyover species as there is no suitable habitat in the SRE Project Area.

1 EPBC Act status: Critically Endangered (CE); Endangered (EN), Vulnerable (VU); Migratory Marine (MM), Migratory Wetland (MW).

2 NPW Act status: Endangered (E), Rare (R), Vulnerable (V)

5.5.3 State-listed species and habitat

Desktop and baseline studies specific to the SRE Project have been undertaken to identify and assess the ecological knowledge specific to the SRE Project Area, with a focus on South Australia's State-listed species under the NPW Act. A search of the BDBSA identified 10 NPW Act-listed flora species and 24 NPW Act-listed fauna that may occur within 50 km of the SML Area and 5 km of the EIGR Areas. Of those, 4 NPW Act listed flora species and 7 NPW Act-listed fauna species are considered likely or possible to occur within the SRE Project Area.

The likelihood of occurrence assessment was informed by vegetation assessments undertaken in July 2024 (SML Area) and October 2024 (EIGR Areas) to characterise the vegetation associations of the SRE Project Area (Appendix D1 Ecological Impact Assessment).

Whilst there are no records of NPW Act-listed flora species within the SRE Project Area (BDBSA 2024), NPW Act-listed flora species, additional to those that also have an EPBC Act rating, that are considered likely to occur or which may possibly occur within the SRE Project Area are:

- Cupped Sea-heath (*Frankenia cupularis*) (Rare, possible to occur)
- One-bristle Everlasting (*Gratwickia monochaeta*) (Rare, possible to occur)
- Sandalwood (*Santalum spicatum*) (Vulnerable, likely to occur)
- Clay-pan Swainson-pea (*Swainsona oligophylla*) (Rare, possible to occur).

Whilst there are no records of NPW Act-listed fauna species for the SRE Project Area (BDBSA 2024), NPW Act-listed fauna species, additional to those that also have an EPBC Act rating, that are considered likely to occur or which may possibly occur within the SRE Project Area are:

- Australian Bustard (*Ardeotis australis*) (vulnerable, possible to occur)
- Black Falcon (*Falco subniger*) (rare, likely to occur)
- Flock Bronzewing (*Phaps histrionica*) (rare, likely to occur)
- Little Eagle (*Hieraaetus morphnoides*) (vulnerable, likely to occur)
- Major Mitchell's Cockatoo (*Lophochroa leadbeateri*) (rare, possible to occur)
- Peregrine Falcon (*Falco peregrinus macropus*) (rare, likely to occur)
- Scarlet-chested Parrot (*Neophema splendida*) (rare, possible to occur).

5.5.4 Aquatic ecology

Aquatic ecology refers to the environmental values of temporary inland waters or wetlands within and adjoining the SRE Project Area. A baseline aquatic ecology assessment was undertaken for the Oak Dam Underground Access (OKDUGA) Project Retention Lease Proposal (BHP 2023d, Appendix E of Appendix D1). The OKDUGA Project is located approximately 65 km south-east of Olympic Dam.

The baseline aquatic ecology assessment took into consideration a desktop review including database searches of the Atlas of Living Australia, NatureMaps, the PMST, EPA SA Aquatic Ecosystem Condition Reports, DEW's Water Data SA and previous aquatic ecology studies in and around the Arcoona Plateau region. It was identified that the dominant wetland types in the region are claypans, Cane-grass swamps and ephemeral river pools.

Aquatic environments were also reviewed as part of the ODX Draft EIS, which describes the Olympic Dam region as supporting few natural permanent water bodies with drinkable water (BHP Billiton 2009). Noted exceptions were springs of the GAB and waterholes on the larger rivers in the north-east of the region (such as Clayton River, Frome River and Strzelecki Creek), which can persist for months after infrequent but large flows. Saline springs in the region were also identified in the region, including Yarra Wurta Spring near Lake Torrens, and large ephemeral lakes that provide important waterbird habitat.

No aquatic taxa of conservation significance were identified during the desktop review of the SRE Project Area and Ecology Study Area.

Appendix C1 Soil and Groundwater Impact Assessment has also concluded there are no aquatic ecosystems located in proximity to the SML Area, being the primary location for project activities.

Based on these assessments it is considered there are no aquatic ecology environments or aquatic ecological values in the SRE Project Area and surrounds.

5.5.5 Groundwater dependent ecosystems

Based on the following assessments it is considered that there are no GDEs in the SRE Project Area and surrounds:

- The presence of GDEs was investigated for the ODX Draft EIS (BHP Billiton 2009). The baseline GDE assessment identified Yarra Wurta Spring (one of a complex of springs) as the closest GDE to Olympic Dam, located approximately 45 km to the north-east of Olympic Dam.
- Appendix C1 Soil and Groundwater Impact Assessment which describes potential sensitive receptors associated with possible soil contamination has also concluded there are no potential GDEs located in proximity to the SRE Area, being the primary location for project activities. The assessment identified potential aquatic GDEs in the SML Area (Figure 5.25), namely claypans that can accumulate sediments and can hold water for a period of time. However, the preliminary site conceptual model developed as part of Appendix C1 Soil and Groundwater Impact Assessment indicates that any groundwater opportunistically accessed by GDEs would be hydraulically separate from the ALA and THA, and such GDEs are considered unlikely to utilise the high salinity groundwater.
- The baseline ecological survey of the SML Area undertaken to inform Appendix D1 Ecological Impact Assessment confirmed the limited number of claypan areas within the SML were devoid of vegetation. Specifically, no deep-rooted vegetation (commonly associated with GDEs) was present (Appendix B of Appendix D1).
- The extent of the GAB is mapped as occurring within proximity to Olympic Dam, however the Far North Prescribed Wells Area (Zone A and B GAB Springs, shown in Figure 5.25) is 6.1 km north of Olympic Dam and the SML Area, which is not in a prescribed wells area (DEW 2025). Therefore, there are no GAB mound springs located in proximity to the SRE Project.
- There is no riparian vegetation that represents those associated with a GDE in the vicinity of the SRE Project Area (DEW 2025).
- There are no areas mapped as high-potential aquatic GDE or terrestrial GDE in, or immediately adjacent to, the EIGR Areas (BoM 2025b). The nearest high-potential GDE areas mapped in the GDE Atlas and NatureMaps are:
    - Purple Swamp and Purple Lake – mapped as ‘intermittent lakes’, which are 300 m north and 550 m south-west of EIGR Area 8 respectively

- Lake Richardson – mapped as 'intermittent lake', which is more than 4 km east of the three most southern EIGR Areas.
- There are no Wetlands of National Importance in or adjacent the SRE Project Area; the nearest being Lake Torrens to the east and south-east of the SML Area (DEW 2025, Figure 5.25).

5.5.6 Weeds and pests

A search of the BDBSA extract for the Ecology Study Area identified 20 species with national and/or state weed status that potentially occur in the SRE Project Area. Monitoring conducted by BHP during financial year FY23 (BHP 2023b) identified the following pest plant species declared under the LSA Act in the Olympic Dam area of influence:

- Prickly Pear (*Opuntia* sp.)
- Buffel Grass (*Cenchrus ciliaris*)
- Innocent Weed (Cenchrus incertus)
- Fountain Grass (*Cenchrus setaceus*)
- Caltrop (*Tribulus terrestris*)
- Salvation Jane (Echium *plantagineum*)
- Athel Pine (*Tamarix aphylla*).

None of these species were detected during the ecology baseline surveys of the SRE Project Area but are likely present. There are records for all these species within the SML Area in the BHP Pest Plants database, and some are within areas mapped as 'Existing SML Disturbance'. There are also areas of Buffel Grass south of Roxby Downs recorded along the Olympic Dam Highway west of Coorlay Lagoon.

Records for non-declared weeds in the SML Area include Paddy Melon (*Cucumis myriocarpus* ssp. *myriocarpus*), Rosy Dock (*Rumex vesicarius*) and Saffron Thistle (*Carthamus lanatus*) (BDBSA 2024) and an additional 49 species recorded across Olympic Dam in the BHP Pest Database (BHP 2024b). Additional, non-declared weeds in the EIGR Areas included Wild Turnip (*Brassica tournefortii*), Chilean Brome (*Bromus lithobius*) and sparse cover of Ward's Weed (*Carrichtera annua*) (Appendix B of Appendix D1 Ecological Impact Assessment).

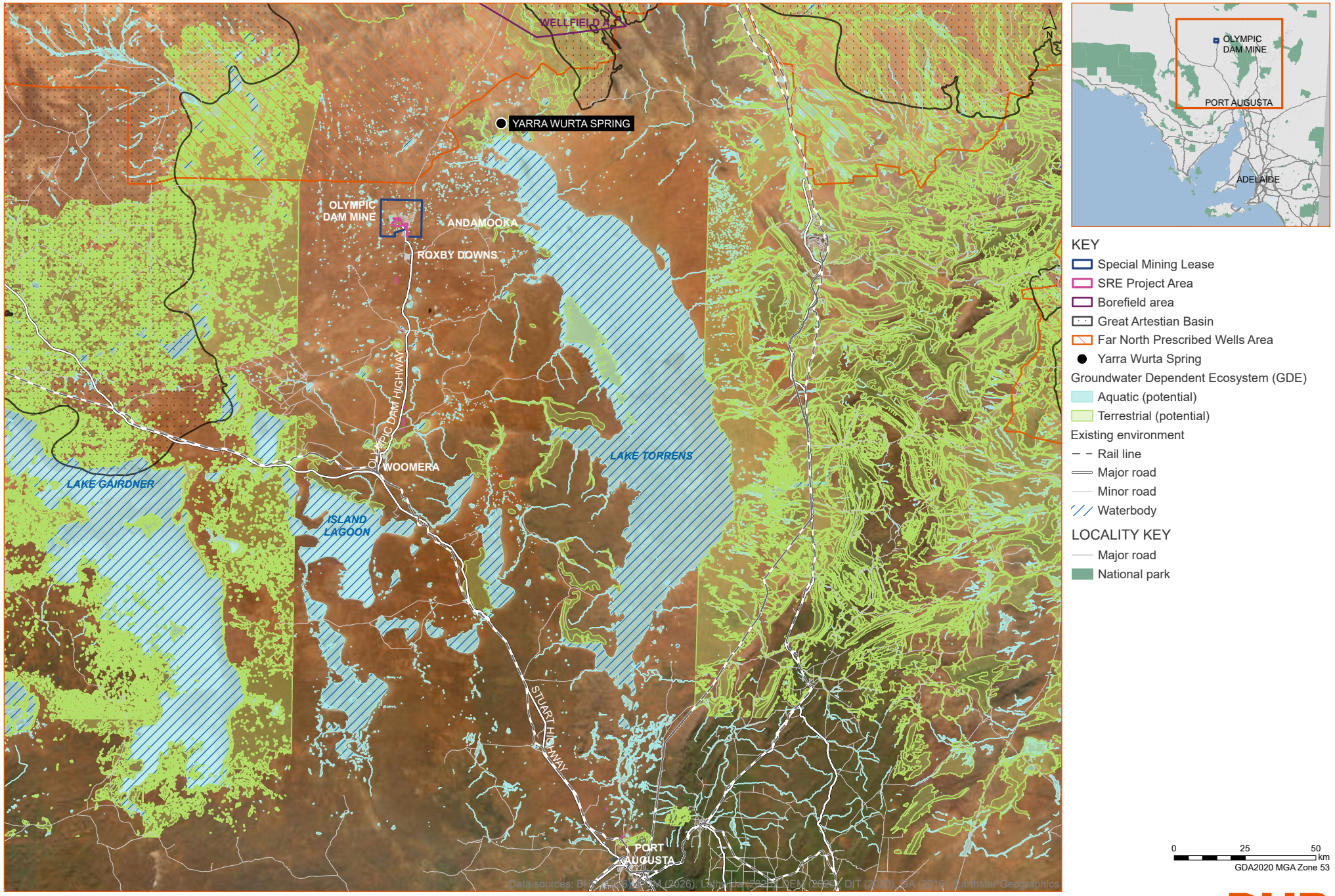


Figure 5.25 | Potential GDEs in proximity to the SRE Project

5.6 Socio-economic environment

This section summarises the baseline aspects of the receiving socio-economic environment (receptor). This comprises:

- population and demography
- housing and accommodation
- community and cultural values
- health, safety and amenity
- social infrastructure
- labour force
- business and industry
- transport and connectivity
- cultural heritage.

The information presented is derived from independent assessments that were undertaken for the SRE Project. The assessments were supported by observations from site personnel, and desktop investigations including literature review and use of publicly available data to assist in characterising the regional socio-economic environment.

Baseline socio-economic environment considerations are further discussed in Appendix D2 Social Impact Assessment and Appendix D3 Economic Assessment. Appendix D2 was focussed on the following 5 defined study areas relevant to the SIA of the SRE Project:

- SIA SRE Project Area
- SIA Nearby Local Communities, comprising Roxby Downs and Andamooka
- SIA Nearby Regional Communities, comprising Woomera, Port Augusta and Whyalla
- SIA Regional Study Area, comprising the SRE Project Areas and the LGAs of Unincorporated South Australia, Roxby Downs, Port Augusta and Whyalla
- South Australia.

5.6.1 Population and demography

The SIA Nearby Local Communities, SIA Nearby Regional Communities and SIA Regional Study Area are all generally characterised by population decline. Roxby Downs and Port Augusta are exceptions to this trend. Roxby Downs has experienced a stable population in the 5 years to June 2023 and Port Augusta has experienced negligible population change over the past decade (Appendix D2).

In the 5 years to 2021, a 17% population decline was recorded in the SIA Nearby Local Community of Andamooka, attributed to a lack of economic diversification, limited amenities and infrastructure, an ageing population, and harsh environmental conditions. Population decline was also recorded in the SIA Nearby Regional Communities of Woomera, Pimba and Whyalla.

Population decline has been a persistent trend in South Australia's regional areas. Between 2013 and 2023, the SIA Regional Study Area's population decreased by 5.5%, contrasting with South Australia's 10.8% growth (ABS 2024a). Key drivers of regional population decline include structural ageing, job losses, economic shifts, and migration to regional coastal areas (Roberston et al. 2017; Irving et al. 2021). Locally, major events such as the closure of the Port Augusta power stations and Leigh Creek coal mine, alongside the deferred expansion of the Olympic Dam mine, contributed to population decline, with Roxby Downs experiencing a 23.7% drop between 2011 and 2016 (ABS 2011; 2016). However, between 2016 and 2021, population decline in the SIA Regional Study Area slowed, and Roxby Downs remained relatively stable, with a 0.1% average annual growth rate (ABS 2024a). Future stability is supported by the long-term operations at Olympic Dam, family-oriented infrastructure, and residency incentives from BHP. Housing shortages remain a barrier to population growth, while Andamooka continues to decline due to limited economic opportunities and an ageing population.

Mining and pastoral regions often experience high population turnover, affecting community cohesion, social capital, and resilience (Carson and Carson 2014). Roxby Downs has a highly transient population, with only 64.1% of residents remaining at the same address between 2020 and 2021, compared to 82.4% statewide (ABS 2021b). Over 5 years, this retention rate drops to 30.6%, compared to 57.8% statewide, impacting volunteer availability, community engagement, and the housing market (Municipal Council of Roxby Downs 2021). The cyclical nature of mining operations at Olympic Dam further contributes to workforce mobility, influencing community stability.

Mining towns like Roxby Downs typically have younger populations, higher male proportions, and higher household incomes, while Andamooka is characterised by an ageing population and lower incomes. Woomera and Roxby Downs have few residents aged 65+, likely due to their single-industry economies, which attract working-age individuals and families. The absence of aged care options often leads older residents to migrate to regional centres or coastal areas upon retirement.

The SIA Regional Study Area has low cultural diversity, with fewer residents speaking languages other than English at home compared to South Australia. Port Augusta has the highest Indigenous population, with 20.8% of residents identifying as Indigenous in the 2021 Census (ABS 2021b). Income levels vary across towns, with Roxby Downs and Woomera benefiting from mining and government sector wages, while Andamooka has a higher proportion of low-income households (47.5% earning below $650 per week), reflecting its ageing population reliant on government pensions (ABS 2021b). Similarly, Port Augusta and Whyalla recorded lower household incomes compared to the state average.

5.6.2 Housing and accommodation

Roxby Downs has a higher proportion of unoccupied dwellings and low homeownership rates compared to South Australia. In 2021, 22.1% of Roxby Downs' 1,778 private dwellings were unoccupied[8], more than double the state average of 10.8% (ABS 2021b). Nearby communities recorded even higher vacancy rates, with 74.9% of dwellings in Andamooka and 60.7% in Woomera unoccupied (ABS 2021b). Population decline, along with mining and government-owned housing reserved for employees, likely contributes to these high rates of unoccupancy.

Housing affordability is a key concern in Roxby Downs, where income disparities between mine and non-mine workers are driving up rents and reducing affordability for some groups. FIFO workers are perceived as contributing to housing shortages, increasing demand for temporary housing, and impacting the local tourism industry (BHP 2023a).

[8] *BHP's Scheduled Campaign Maintenance 2021 is likely to have influenced Roxby Downs vacancy rates with the Olympic Dam mine production workforce demobilised during the maintenance period*

Short-term accommodation remains vital in Roxby Downs, Andamooka, Woomera, and Pimba. In 2019, 59,000 domestic overnight visitors stay in the Roxby Downs LGA, with 78.0% travelling for business, highlighting the importance of short-term rentals in supporting the local economy (Tourism Research Australia 2019).

Workforce accommodation villages are the predominant type of accommodation utilised by non-resident workers while on-shift in the SIA Regional Study Area. The SIA Regional Study Area hosts several workforce accommodation villages to accommodate non-resident workers employed at nearby mines, including for the Olympic Dam mine and Carrapateena mine.

5.6.3 Community values

The communities surrounding Olympic Dam, including Roxby Downs, Andamooka, Port Augusta, and Woomera, value both tangible and intangible aspects of quality of life. These include access to infrastructure, strong social networks, a sense of place, and community cohesion. The natural environment is highly valued, with the remote, pastoral landscapes offering unique cultural and recreational significance. Roxby Downs is perceived as a safe and family-friendly town, while Andamooka retains its appeal through its rugged landscape and historical identity. However, there are concerns over the impact of FIFO workforces, which some residents believe contribute to social disengagement and reduce BHP's local investment, although others see potential benefits in economic growth and housing development (Ipsos 2024).

Community connectedness is increasingly challenged by transient workforces, with declining volunteerism highlighting shifts in social capital. In 2021, only 14.0% of Roxby Downs residents engaged in voluntary work, compared to 17.0% statewide, a significant decline from 25.8% in 2016 (ABS 2021b). Community surveys consistently identify concerns about workforce transience, limited social services, and difficulties in attracting critical workers (Ipsos 2022; 2024).

5.6.4 Health, safety and amenity

Health, safety and amenity are essential to the quality of life of residents in the SIA Regional Study Area. Key health and wellbeing concerns include mental health issues, safety risks in mining, and community perceptions of crime and antisocial behaviour. Concerns over rising crime and antisocial behaviour have increased, particularly in relation to shutdown periods and contractor influxes (Ipsos 2024; Consentium 2024).

Mental health challenges are more prevalent in the Far North region than the state average, driven by geographic isolation, economic pressures, environmental adversity, and workforce-related stress (AIHW 2021). The FIFO model has contributed to anxiety, stress, and family disruption, exacerbated by limited service availability and staffing shortages.

The SIA Regional Study Area has higher proportions of people aged 14 years or under, people in social housing, unemployed individuals, and low-income households compared to South Australia overall. These groups in the SIA Regional Study Area are likely to display greater levels of vulnerability and therefore are more likely to have higher sensitivity to changes in their social environment, as a result of the SRE Project.

5.6.5 Social infrastructure

Roxby Downs provides key social services, including two schools, a hospital, a family medical practice, and a Community Youth Centre, which also serve Andamooka due to its small population. Andamooka Primary School has experienced a decline in enrolments from 26 students in 2019 to 15 in 2024, with many families choosing schools in Roxby Downs (ACARA 2025).

A lack of medical services is a notable concern in Roxby Downs (Ipsos 2024). Healthcare services are limited, with only two medical clinics in Roxby Downs and no healthcare facilities in Andamooka or Woomera, requiring residents to travel to Port Augusta or Adelaide for specialist care.

5.6.6 Labour force

Roxby Downs has a highly active workforce, with a 77.9% labour force participation rate in 2021, significantly higher than South Australia's 60.0% (ABS 2021b). The town's unemployment rate was just 2.3%, with only 53 unemployed individuals, making it one of the lowest in the state (ABS 2021b). In contrast, Andamooka, with its ageing population, recorded lower workforce participation and higher unemployment, reflecting fewer job opportunities and economic shifts. Woomera, a defence-focused town, also had a high participation rate (76.7%), though its small population limits overall workforce impact (ABS 2021b).

The mining sector dominates regional employment, accounting for 4,260 jobs (29.0% of total employment) in the Far North region, with 49.9% of Roxby Downs residents working in mining (ABS 2021b). The Olympic Dam mine is the primary employer in Roxby Downs and surrounding areas, while other industries like tourism, health care, and retail contribute to local employment. Mining remains a cornerstone of the regional economy, although job numbers have fluctuated. Between 2016 and 2021, the number of mining jobs declined by 12.2%, while construction jobs grew by 37.1% due to increased infrastructure and maintenance projects (ABS 2021b).

Despite the strong economic base, labour shortages are a growing issue in the region, particularly for essential service roles such as teachers, police officers, and retail workers. The transient nature of the workforce and housing constraints make it difficult to attract and retain workers in non-mining roles, impacting community services and local businesses.

5.6.7 Business and industry

The Far North region's economy is dominated by mining, particularly BHP's Olympic Dam, which generates 70.8% of the region's total economic output and employs 6,041 people (32.9% of total employment (REMPLAN 2025). Tourism is a growing industry, contributing $223.497 million in output, primarily from accommodation and food services ($128.578 million). The Government of South Australia aims to diversify the economy, promoting technology, defence, and space industries to reduce reliance on mining.

Local businesses in Roxby Downs face significant challenges, including declining retail diversity, rising rents, and limited government support. Many brick-and-mortar stores have closed, replaced by home-based businesses and online shopping. The high number of vacant shops reflects a declining local economy, with residents increasingly relying on online shopping or travelling for goods and services (Ipsos 2024). Despite this, the number of registered businesses in Roxby Downs grew by 18.4% between 2022 and 2024 to 141 registered businesses, though 56.7% are sole traders and no businesses employed over 200 people (ABS 2024b).

5.6.8 Transport and connectivity

Roxby Downs and Andamooka rely on key regional road networks, including the Olympic Dam Highway, Olympic Dam Way, Andamooka Road, and Stuart Highway, which provide access to mining operations, pastoral properties, and remote communities. Olympic Dam Way connects Roxby Downs to the mine site, with restrictions in place to divert mine-related vehicles away from the township.

The Olympic Dam Airport, the nearest commercial airport, is located 10 km from Roxby Downs. It facilitates daily flights to Adelaide operated by Alliance Airlines, recording 1,301 aircraft movements and 103,589 passengers in 2023–24, a 5.5% increase in number of passengers from the year prior (BITRE 2025). Public transport options are limited, with only a school bus service between Roxby Downs and Andamooka and a BHP-contracted Greyhound bus route connecting ODV to Adelaide via Port Augusta.

Traffic volumes within the road network surrounding SRE Project remain low, with 500 daily vehicle movements on the Olympic Dam Highway and 310 on Andamooka Road in 2018 (Data SA 2023). Between 2017 and 2021, there were 13 crashes on the Olympic Dam Highway (including one fatality) and 6 crashes on Andamooka Road. In 2021, 4 patients presented to Roxby Downs Hospital due to road incidents, consisting of 3 drivers and one pedestrian (Data SA 2023).

5.6.9 Cultural heritage

5.6.9.1 Aboriginal heritage

The region has a strong Indigenous cultural presence, with the Olympic Dam area located on the traditional lands of the Kokatha People. The protection of Aboriginal cultural heritage remains a priority. BHP continues to undertake cultural heritage assessments in accordance with the ODA and or AH Act 1988, ensuring Indigenous cultural values are considered in future developments.

As discussed in Section 2.3.2, the SRE Project Area spans the following Native Title areas:

- The SML Area and the northern portion of the EIGR Area (CT5441/913, CT5441/914) are located entirely within the Native Title determination boundary of the Kokatha People.
- The southern portion of the EIGR Area (CT 5480/470, CT 5439/775) is located within the Native Title determination boundary of the Barngarla.

BHP respects the cultural rights of the Traditional Owners and will not disclose results of sensitive discussions. Therefore, the Aboriginal heritage summary presented is limited to a high-level overview.

BHP has undertaken, and will continue to undertake, cultural heritage assessments to satisfy the requirements of the ODA and AH Act 1988. Identification of Aboriginal cultural heritage values has been compiled through background research, predictive modelling, Aboriginal consultation, archaeological field investigations and anthropological assessments.

Data collection has been undertaken by archaeologists and anthropologists, in consultation with the Traditional Owners, of proposed infrastructure locations and areas of proposed land disturbance. The presence of any artefacts or identified Aboriginal cultural heritage values, including landscape features, within the SRE Project will be handled in accordance with legislation and the agreed procedures and protocols for heritage management with the ODA Groups (Kokatha, Barngarla and Kuyani Indigenous Groups), which later formed a heritage governance corporation known as the Native Title Party Representative Corporation (NTPRC).

Aboriginal heritage site assessment

The SML Area has been archaeologically and ethnographically surveyed in its entirety, between 1981 and 2024. Past engagement records indicated that all heritage surveys within the SML Area were completed in consultation with the Traditional Owner groups who were/are culturally associated with the Olympic Dam and broader Roxby Down area, with the support from their preferred heritage professionals (i.e. archaeologist and anthropologist). The record of past Aboriginal heritage engagement is presented in Table 5.20.

Table 5.20 | Summary of past Aboriginal heritage surveys within the SML Area

Year	Aboriginal heritage survey activities
Ethnographic surveys	
1981	The SML Area has been the subject of broader ethnographic and archaeological surveys in Olympic Dam since 1981. At least six heritage representatives from Andamooka Land Council were involved in the heritage assessments. (Hagen 1981)
1983	The SML Area was revisited in 1983 to further capture the ethnographic association across the SML Area with the Kokatha Peoples. (Hagen and Martin 1983)
1997	The SML Area was ethnographically surveyed in 1997 by the female representatives of Barngarla, Kuyani, Kokatha and Nukunu (2 female representatives from each group) as part of the heritage survey to support the Olympic Dam 275 kV Powerline Project, under Western Mining Company. Sites of significance for Aboriginal women were identified within the current SML Area. (Fergie 1997)
2024	The SML Area was revisited by representatives from NTPRC in May 2024. The Native Title Party subsequently requested an additional ethnographic survey, involving senior men from NTPRC, to resurvey and re-capture the ethnographic values associated with the SML Area. (Ebbs and Freeman 2024)
Work area clearance surveys (archaeological and ethnographic)	
2007–2009	The SML Area was re-surveyed under the ODX Program. This heritage survey was completed in consultation with Kokatha, Barngarla and Kuyani representatives. (Hughes et al 2012).
2024–2025	The SRE Project Area was revisited by heritage representatives from the NTPRC. The survey aimed to identify all known Aboriginal heritage values associated with the SML Area to inform the development of the SRE Project. (Ebbs et al 2024; Schill and Freeman 2025)

Known Aboriginal heritage values

These previous Aboriginal heritage surveys identified many sites associated with Aboriginal heritage value across the SML Area. In addition, due diligence searches of the South Australian Register of Aboriginal Sites and Objects (SA Central Archive) confirm that the SML Area intersects with 9 Aboriginal heritage sites currently listed in the Register. All Aboriginal heritage value, identified within the SML Area, can be broadly categorised as:

- archaeological – artefact scatters and isolated artefacts
- ethnographic – sites identified with ethnographic or mythological values.

The Aboriginal heritage sites identified within the SML Area predominantly consist of archaeological scatters of low heritage significance. In addition to the archaeological sites, several sites of ethnographic importance, such as claypans, have also been reported within the SML Area.

Heritage impact authorisation principles

BHP adopts the following hierarchy for Aboriginal heritage management:

1. Avoid impacts wherever practicable.
2. Minimise impacts where avoidance cannot reasonably be achieved.
3. Consult with affected Traditional Owners regarding potential impacts and mitigation measures.
4. Obtain all required approvals and authorisations before disturbance occurs.
5. Implement monitoring, management and reporting measures throughout project delivery.

The assessment undertaken for the SRE Project has been structured on the basis that identification of a potential heritage impact does not automatically authorise disturbance. Any proposed disturbance affecting Aboriginal heritage values would be subject to assessment and approval processes separate to this EIS prior to implementation.

5.6.9.2 Non-aboriginal heritage

Non-indigenous heritage is discussed in detail in Appendix D4 Historic Heritage (non-indigenous) Assessment supporting this EIS.

European habitation of the broad region in which the SRE Project sits began in the early 1800s with the search for sheep-grazing land for wool production. The region's non-Aboriginal history for the next 100 years was driven by the struggle to produce wool within the limitations imposed by the arid environment. This resulted in boom/crash cycles associated with periods of good rains or drought.

Andamooka Pastoral Station was established by one of the Bowman brothers and Charles Burney Young with early activities including fencing, well-sinking and the erection of tanks (South Australian Register 1880:2). The Station had a reasonably short life and by 1904 it was being overseen by a government caretaker, later being incorporated into Purple Downs Station.

Historically, mining was not an important economic activity in the region, with only minor deposits discovered in the late 1800s and early 1900s. It was not until the discovery of copper ore deposits at what is now known as Olympic Dam in 1975 that mineral exploration and mining became important in the region.

A search of both the Australian Heritage Database and the South Australian Heritage Places Database was undertaken to determine the presence of National, State or local heritage places within the SRE Project Area and surrounds. Results of the database search are presented in Table 5.21. The closest site of historical significance is located at Stirling North, approximately 8 km from the southern portion of the EIGR Area. Based on these searches, no sites of non-Indigenous historical significance have been previously identified within the SRE Project Area.

Table 5.21 | Heritage places

Site name	Heritage class	Location	Distance to SRE Project	Description
Heritage places near the SML Area				
Andamooka Historic Reserve	State	Andamooka	~27 km	Andamooka Historic Precinct (Historical Museum Reserve), including Frank Albertoni's house, Bob Cutzow's Dugout, Tom Brady's Dugout, Mrs Perry's Kitchen, and Andy Absalom's House
Dick Clark's Residence	State	Andamooka	~27 km	Dick Clark's Residence including semi-dugout living room, two detached sleep-outs and workroom, together with dry-stone walling and connecting paths
Heritage places near the EIGR Areas				
Ostrich Farm	State	Stirling North	~8 km	Former Ostrich Farm, Emeroo Station, including Original Homestead, Ruins of Hatching Shed, Exotic Plants and Ostrich Fences
Port Augusta West Water Tower	State	Port Augusta	~ 10 km	Water tower

BHP

OD SRE EIS



6. Description of the project

6. DESCRIPTION OF THE PROJECT

This section describes the existing metallurgical operations at Olympic Dam, together with the Smelter and Refinery Expansion Project (SRE Project) elements, proposed operation and how the project would interface with the enabling activities also required to support existing Olympic Dam operations. Enabling activities are subject to regulatory approval outside of the Environmental Impact Statement (EIS) process.

6.1 Existing operations

The SRE Project involves the expansion, augmentation and modification of the existing metallurgical processing operation, which uses a concentrator, smelter and refinery to produce high quality copper cathode, and gold and silver ingot. The existing hydrometallurgical plant allows for the recovery of additional copper and for the recovery of uranium (as Uranium Oxide Concentrate, UOC), however no expansion of the hydrometallurgical facilities is proposed as a part of the SRE Project. The existing process is illustrated in Figure 6.1 and summarised in the following sections.

6.1.1 Concentrator

The concentrator separates the bulk of the copper-bearing minerals from the mined ore, producing a copper-rich flotation concentrate stream and a uranium-rich flotation tailings stream.

Ore from the mine is milled in autogenous mills to create a slurry of fine particles, which is directed to the flotation circuit. Flotation is used to recover the copper-bearing sulphide particles by mixing the ore slurry from the grinding mills with reagents in a series of agitated and aerated tanks. Most of the copper floats to the surface of these tanks, producing a copper-rich concentrate stream, also containing gold and silver, and leaving gangue minerals, including uranium-bearing minerals, to form the flotation tails stream.

The flotation concentrate is sent to a concentrate leach process for the removal, using sulphuric acid generated in the acid plant, of impurities and minerals that may negatively affect the subsequent smelting process, including fluoride. The leached concentrate is forwarded to the smelter for further treatment, including neutralisation and drying, prior to smelting. The flotation tailings, containing uranium, is directed to the hydrometallurgical plant for the extraction of uranium.

The concentrator also contains the slag concentrator circuit, consisting of a primary (semi-autogenous grinding (SAG)) mill and secondary (ball) mill grinding circuit, and a slag flotation plant. The slag concentrator circuit allows for the recovery of copper from slag generated by the EF. The processed slag concentrate is fed to the DBF for recovery of residual copper, and the tails are disposed of to the TRS.

6.1.2 Hydrometallurgical plant

The hydrometallurgical plant removes residual copper and uranium from the flotation tails and concentrates them into streams that, via electrowinning and solvent extraction/precipitation processes, produce final product for sale.

The tails leach circuit mixes sulphuric acid and reagents with the flotation tails. This leaching process extracts uranium and residual copper from the slurry. The resulting leached product is then washed and the liquor separated from any residual solids in a series of counter current decantation (CCD) tanks. The washed slurry is sent to a deslimes circuit to recover the larger sand particles (subsequently used as underground mine backfill) with the remaining slurry being directed to the TSF. The uranium and copper-

rich solution is further treated to remove any residual solids before progressing to the solvent extraction plant.

Copper solvent extraction separates copper from the uranium in the liquor in a series of steps involving the transfer of liquors from acidic to organic and back to acidic phases. The copper-rich stream is directed to electrowinning, and the uranium-rich stream is directed to the uranium solvent extraction plant where it is purified and washed before being precipitated to ammonium diuranate (ADU, yellowcake). This ADU is subsequently washed, thickened and dewatered before being forwarded to a furnace (calciner) that converts the ADU to uranium oxide, which is then packed into 205 litre (L) drums and exported from site as UOC.

6.1.3 Smelter and acid plant

The smelter processes copper-rich concentrate at high temperature, removing the bulk of the remaining impurities including iron and silica and producing a 99% pure copper anode.

Before smelting, a feed preparation stage dewaters and dries the copper-rich concentrate slurry using thickeners, filters and steam-coil driers. Silica flux (sand) and collected copper-rich smelter dusts are mixed with the concentrate after drying before it passes to the DBF. The reaction of the concentrate with oxygen separates the material into a high purity blister copper and a high-copper slag.

The high-copper slag is directed to an EF, which uses a coke reductant to recover almost all the residual copper in the slag. The molten blister copper is tapped from both the DBF and the EF to one of two anode furnaces, where almost all of the remaining impurities are removed before the copper is cast into anodes. Slag from the EF is categorised based on copper grade and either recycled directly to the EF, or milled in the slag concentrator, to produce a concentrate fed to the DBF for recovery of residual copper.

Off-gas from the electric and anode furnaces is directed to venturi scrubbers that remove particulate matter prior to exhausting the gas to atmosphere. Sulphur dioxide-rich off-gases from the DBF and the anode furnaces (during their oxidation cycle) are directed to the acid plant for conversion to sulphuric acid, which is subsequently used in the refineries, concentrate leach and hydrometallurgical plants. Captured dusts from the off-gas are either recycled to the DBF or directed to the leaching circuit. Waste heat from the DBF is used to generate steam in a waste heat boiler, which is used to heat process materials in the concentrator, hydrometallurgical and refinery circuits.

6.1.4 Refinery

Copper anodes from the smelter containing 99% copper and some gold and silver are transported to the electrorefinery where they are placed into a bath of dilute sulphuric acid and copper sulfate. A direct current is passed through each bath from the anode to a stainless steel mother plate (cathode). The copper from the anode dissolves and is deposited to the mother plate as 99.99% copper. Insoluble impurities such as gold, silver and lead fall to the bottom of the electrolytic cells as an anode slime which is subsequently collected and treated in the PMR to recover the gold and silver. The copper is stripped from the mother plates and strapped together for export.

The electrowinning plant deposits copper directly onto mother plates from a copper sulfate solution produced in the copper solvent extraction plant, with the spent electrolyte returned to the hydrometallurgical circuit.

The PMR involves a number of steps to remove trace impurities before casting gold bullion and silver bullion. Selenium is removed via leaching before the slimes are neutralised and treated with sodium cyanide to leach the gold and silver into solution. A zinc powder is added and the zinc, gold and silver material precipitated and dried before being smelted and refined in much the same way as the copper. The waste solutions are neutralised and detoxified before reporting to the TSF cells.

6.1.5 Tailings Retention System

Tailings are the waste product stream resulting from metallurgical processing and are directed to the TRS. The TRS consists of a number of TSF cells and associated liquor management infrastructure including liquor evaporation ponds and pumping facilities. Currently tailings are being disposed of to TSF cell 5 and cell 6, with TSF cell 1 to cell 4 now inactive (TSF cell 1 to cell 3 ceased tailings deposition in 2011, and TSF cell 4 ceased tailings deposition in late 2022).

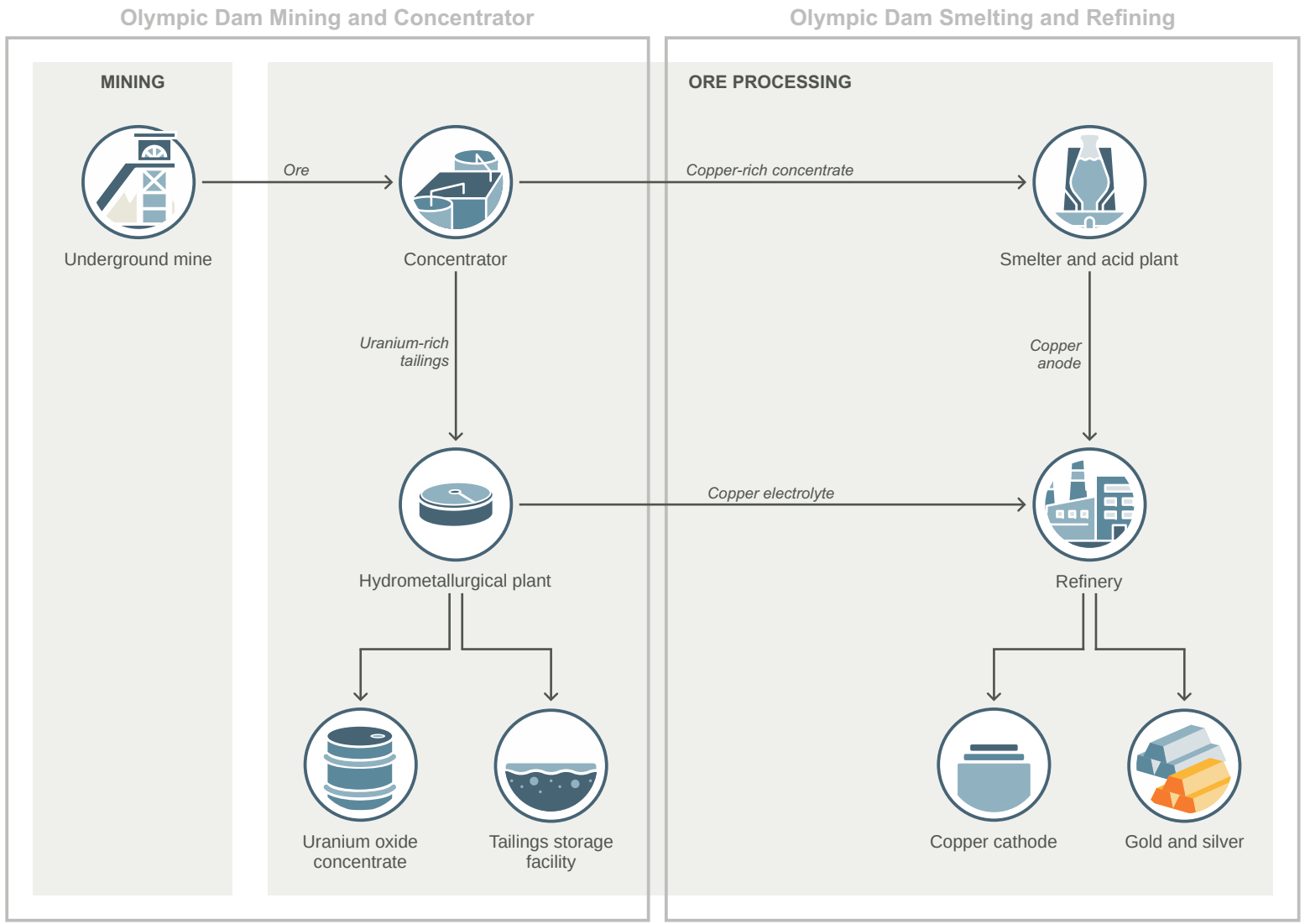


Figure 6.1 | Existing operations metallurgical processing flow diagram

6.2 General description of the proposed operations

The SRE Project would be developed within the SML associated with the Olympic Dam operations and includes both greenfield (new) and brownfield (expansion) components. This section provides a high-level description of the proposed SRE Project.

6.2.1 Project overview

The SRE Project aims to deliver a sustainable, highly productive, and more resilient smelting and refining operation which would enable the Copper SA growth plan and the realisation of regional opportunities. This would be achieved through:

- increasing copper production capacity up to 650,000 tpa of total copper plus associated products from the current average production of approximately 200,000 tpa
- delivering a sustainable, highly productive, and more resilient smelting and refining flowsheet
- ensuring the Cu:S ratio constraint is resolved at Olympic Dam for copper concentrate production
- delivering reliable and predictable production outcomes following the 2023 acquisition of OZ Minerals' Carrapateena and Prominent Hill mining operations to realise Copper SA province opportunities.

Key elements of the SRE Project are:

- expansion of, and additions to, the existing smelter and refinery to enable total production of up to 650,000 tpa copper plus associated products including up to approximately 893,000 ounces per annum of gold, 3,950,000 ounces per annum of silver, 4,900 tpa of uranium oxide, and 1,700,000 to 1,900,000 tpa of 98% sulphuric acid (H_2SO_4)
- introduction of a two-stage smelter involving the installation of a new primary FSF to produce copper matte, providing increased concentrate smelting capacity
- conversion of the existing DBF to a FCF, which would process the matte into blister
- addition of an acid plant of similar nature and scale to the existing acid plant and subsequent upgrade of the existing acid plant
- expansion of the electrorefinery and PMR facilities to produce cathode copper, gold, and silver.

Associated with these key elements, the SRE Project would require new supporting facilities, infrastructure and services and the upgrade, removal and/or relocation of existing facilities and services within the SML Area.

The key project characteristics are outlined in Table 6.1. The indicative location of key infrastructure is shown in Figure 6.2, with conceptual cross-sections of the prepared surface infrastructure shown on Figure 6.3 and Figure 6.4. The proposed metallurgical process flow diagram is presented in Figure 6.5.

Table 6.1 | Key characteristics of the SRE Project

Project element	Summary
SRE Project activities and infrastructure	
Smelter and refinery expansion and additions	Expansion of, and additions to, the existing smelter and refinery to enable production of up to 650,000 tpa copper plus associated products (gold, silver and acid). This would include: • a new concentrate handling and blending facility • additional concentrate leach capacity • upgrade and expansion of the existing smelter feed preparation • installation of a new primary FSF to produce copper matte and conversion of the existing DBF to a FCF to convert matte to blister, including matte handling and grinding infrastructure and additional anode furnace and anode casting infrastructure • upgrade of the existing slag concentrator circuit and subsequent development of a new slag concentrator circuit • new off-gas management infrastructure, including additional gas and dust handling equipment • a new acid plant and upgrade of the existing acid plant, and the addition of a new acid export facility • a new oxygen plant and expansion of existing oxygen plant capacities • a new electrorefinery, associated anode preparation infrastructure and slimes handling infrastructure • expansion of the PMR facility • slag stockpile and treatment.
Electricity demand, supply and distribution	An electricity demand of up to 68 MVA net load increase would be required for the SRE Project. The additional electrical demand due to the SRE Project would be met by capacity from the national grid via the existing 275 kV transmission line (noting potential for below-line land disturbance and associated vegetation clearance outside of the SML). Minor augmentation of existing onsite electricity supply infrastructure at Olympic Dam within the SML would be required to ensure the additional capacity could be achieved and maintained. New high voltage and low voltage power supply and reticulation infrastructure would be required to all smelter infrastructure.
Water demand	Water demand of between 2 and 16 ML/d is required for the SRE Project in addition to the existing supply for current operations.
Water supply and distribution	The SRE Project proposes no additional water abstraction from the GAB above daily average BAU volumes. Water supply for the SRE Project would nominally be provided from the DIT NWP infrastructure, following commissioning of the initial 90 ML/d capacity of the NWP. This would require new water storage and distribution infrastructure to connect the SRE Project to the NWP connection point at the SML boundary. The NWP water supply may be supplemented or offset by the provision of local groundwater supply. This water supply would occur via existing process storage dams, the desalination plant at the Olympic Dam site, and/or through the distribution of the existing water supply within daily average BAU volumes. The additional water supplies are likely to require augmentation of the existing desalination water treatment plant and water distribution network, and a demineralised water plant would be required to support the SRE Project operations.
Supporting infrastructure	Supporting infrastructure includes: • civil infrastructure works, such as roads and stormwater infrastructure • new offices and crib rooms • new workshops • new laydown areas

<table>
<tr><th>Project element</th><th>Summary</th></tr>
<tr><td></td><td>

process control system upgrades
concrete batching
other supporting infrastructure as required to facilitate the implementation and operation of the SRE Project.

</td></tr>
<tr><td>Waste management</td><td>
Development of the SRE Project may require decommissioning of the existing processing plant components including concentrate dryers, the electric furnace and the existing concentrate storage and transfer system. Some of the decommissioned infrastructure would be retained in-situ to preserve operational flexibility or for future management under the site Closure and Rehabilitation Management Plan, however some elements may require disposal as a component of the SRE Project.
Waste generated during construction would be managed as follows:

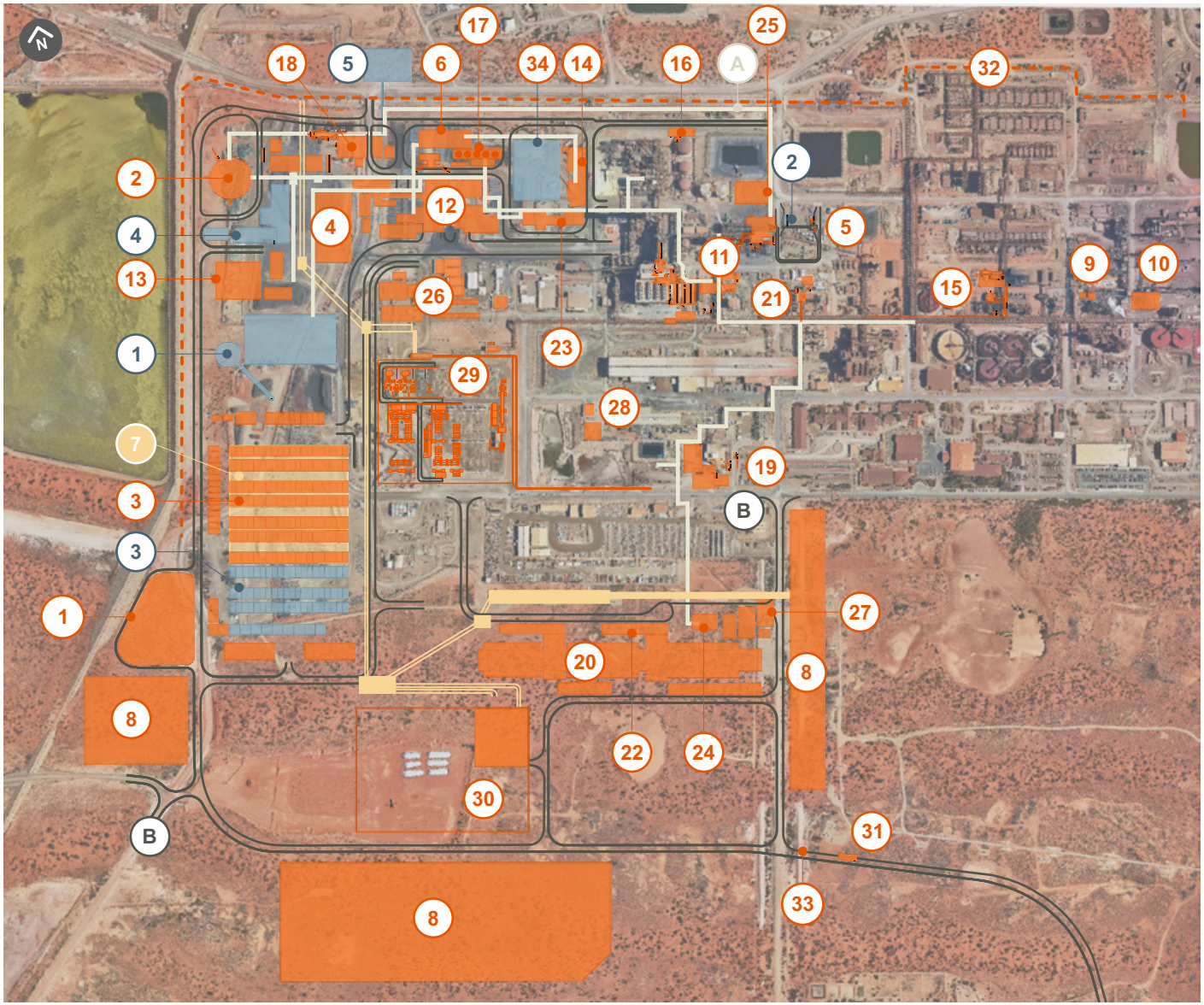
where practicable, demolition materials would be removed from site and recycled
materials not suitable for removal from site would be managed on the SML via existing waste management facilities.

All waste generated from construction of the SRE Project would be managed in accordance with existing site procedures and approved management plans.
Operational wastes associated with the SRE Project consist of processing and non-processing wastes where:

processing wastes are limited to low-copper slags generated from the smelting and slag concentrator operations that are not suitable for reprocessing and effluent streams from various process operations that are directed to tailings, including from the PMR and smelter off-gas systems.
non-processing wastes including reagent packaging wastes and operational consumables.

</td></tr>
<tr><td>Workforce</td><td>
100% FIFO workforce is assumed for construction and the SRE Project operational workforce. Estimated peak construction workforce numbers (in FTE) are summarised below.
<table>
<tr><th>Construction stage</th><th>Average FTE</th><th>Peak FTE</th></tr>
<tr><td>Stage 1a</td><td>~708</td><td>~1,313</td></tr>
<tr><td>Stage 1b</td><td>~260</td><td>~515</td></tr>
<tr><td>Stage 2</td><td>~519</td><td>~978</td></tr>
</table>
Following construction, the SRE Project would require the permanent operational workforce summarised below.
<table>
<tr><th>Operational stage</th><th>Additional SRE Project operational workforce</th><th>Total Olympic Dam smelter and refinery workforce</th></tr>
<tr><td>Stage 1a</td><td>~207</td><td>~766</td></tr>
<tr><td>Stage 1b</td><td>~57 (additional to Stage 1a)</td><td>~823</td></tr>
<tr><td>Stage 2</td><td>~244 (additional to Stage 1b)</td><td>~1,067</td></tr>
</table>
SRE Project construction and operational workforce is proposed to utilise existing and new accommodation to be established by BHP for the SCM27 shutdown, Olympic Dam future campaign maintenance accommodation, and/or greenfield accommodation (subject to separate approvals).
</td></tr>
</table>

Project element	Summary
Concentrate import	Import of copper concentrate from Prominent Hill and Carrapateena mining operations, as well as possible future mining operations (e.g. Oak Dam), and maintain the ability to receive copper concentrate from other third-party suppliers. Prominent Hill concentrate may be passed through concentrate leach to remove fluorides prior to smelter feed preparation. Carrapateena concentrate to pass directly to smelter feed preparation. Other, third-party concentrates may be passed through concentrate leach to remove deleterious elements (e.g. fluorides) prior to smelter feed preparation as required.
Production and export	Total production volumes of up to: • ~650,000 tpa of cathode copper • ~893,000 ounces per annum of gold • ~3,950,000 ounces per annum of silver • ~4,900 tpa of uranium oxide concentrate; note that the SRE Project does not materially change existing uranium production, with an increase of approximately 1% expected as a result of the leaching of Prominent Hill concentrate to remove fluoride. No upgrade or modification of uranium production facilities is proposed as a part of the SRE Project. • ~1,700,000 – 1,900,000 tpa of 98% sulphuric acid (H_2SO_4), of which up to approximately 810,000 tpa may be exported from Olympic Dam (i.e. operations become net sulphuric acid producer).



A Conveyor

B Internal roads

New or modified equipment installed as part of SRE Stage 1a/1b

1. Stormwater pond
2. Bedding dome
3. Flash converting furnace slag pits, flash smelter furnace slag pits, flash smelter furnace piles (Stage 1b)
4. Oxygen Plant
5. Concentrate truck load-out
6. Matte storage shed
7. Interim slag stockpile (Stage 1a only, then removed)
8. Contractor yard area reservation only, project laydown yard
9. Brownfield slag concentrator upgrade
10. Repurposing ANI Mill feeder/ feed conveyor mill/slag float cell
11. Conversion of existing direct-to-blister furnace to a flash-converting furnace, anode furnace and offgas, anode preparation machine/anode storage, anode furnace cooling tower, larox area
12. Flash smelting furnace
13. Flash-converting furnace, slag crushing and milling
14. Matte grinding
15. Concentrate leach
16. Acid import/export facility
17. Cooling towers
18. Concentrate storage pads
19. Precious metal refinery
20. Electrorefinery
21. Demineralisation plant (not shown on figure, augmentation of existing Desalination Plan)
22. Anode storage
23. Wet gas cleaning plant
24. Slimes treatment
25. Acid storage tanks
26. Workshop/administration buildings
27. Office, carpark, changehouse and workshop
28. Blank maintenance facility
29. Switchyard
30. OD South 11kV substation
31. Wheel wash and weighbridge
32. Stormwater pipeline
33. Security gate
34. Acid plant No. 3

New or modified equipment installed as part of SRE Stage 2

1. Slag concentrator
2. Lime silo
3. Flash converting furnace slag pits, flash smelter furnace slag pits, flash smelter furnace piles
4. Concentrate leach and filtration
5. Oxygen Plant

Figure 6.2 | Indicative location of key project infrastructure

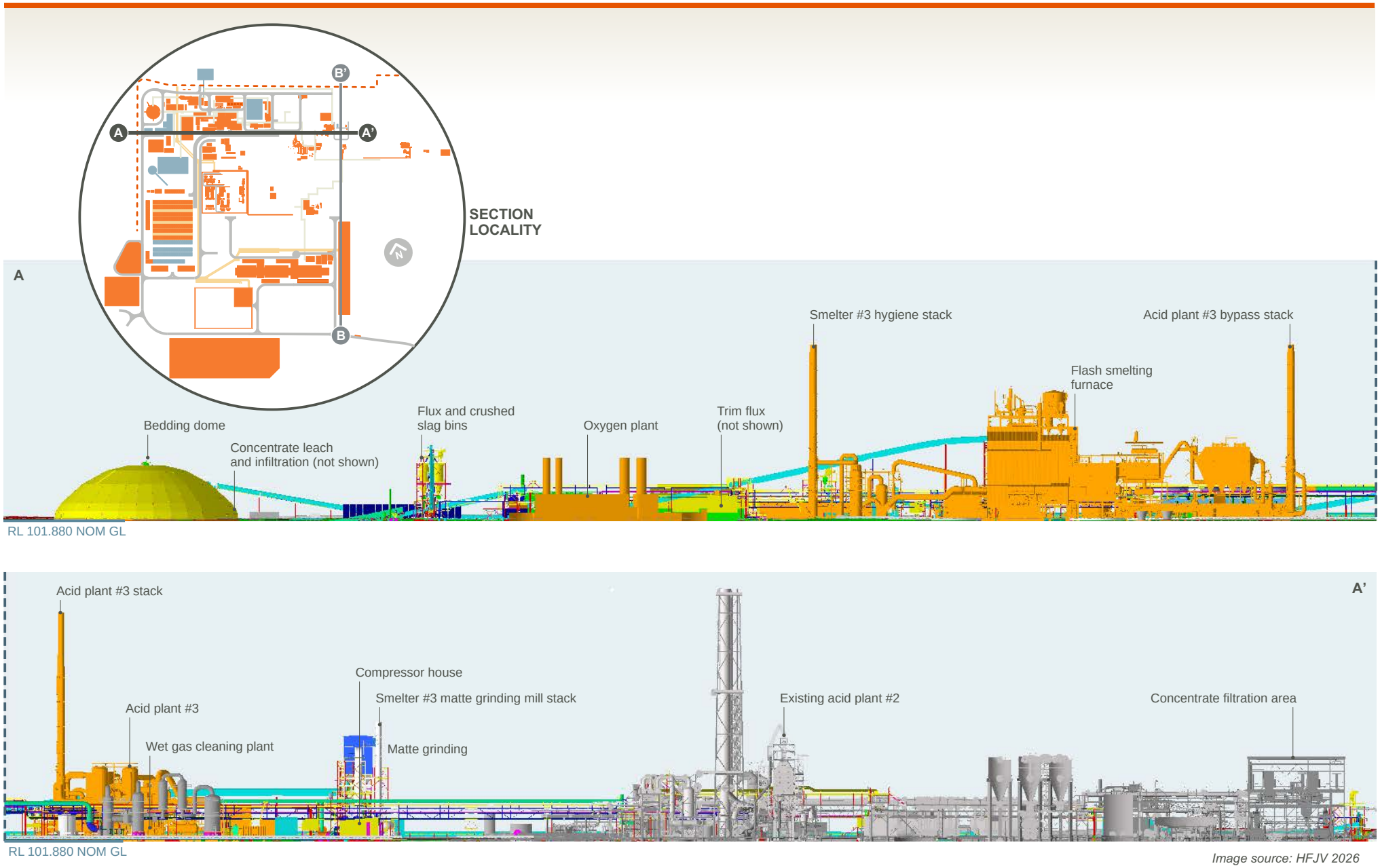


Image source: HFJV 2026

Figure 6.3 | Conceptual site infrastructure east-west cross-section

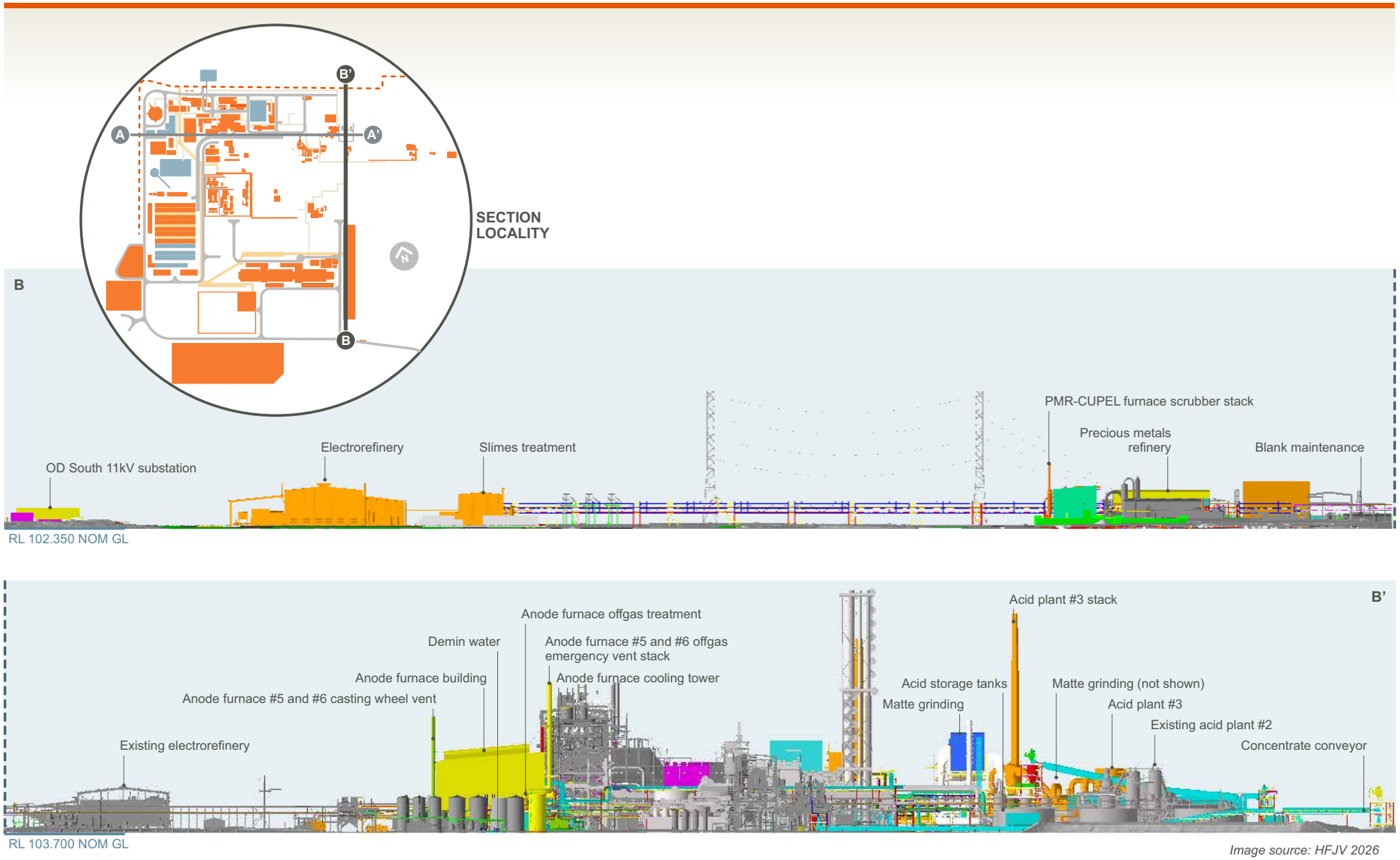


Image source: HFJV 2026

Figure 6.4 | Conceptual site infrastructure north-south cross-section

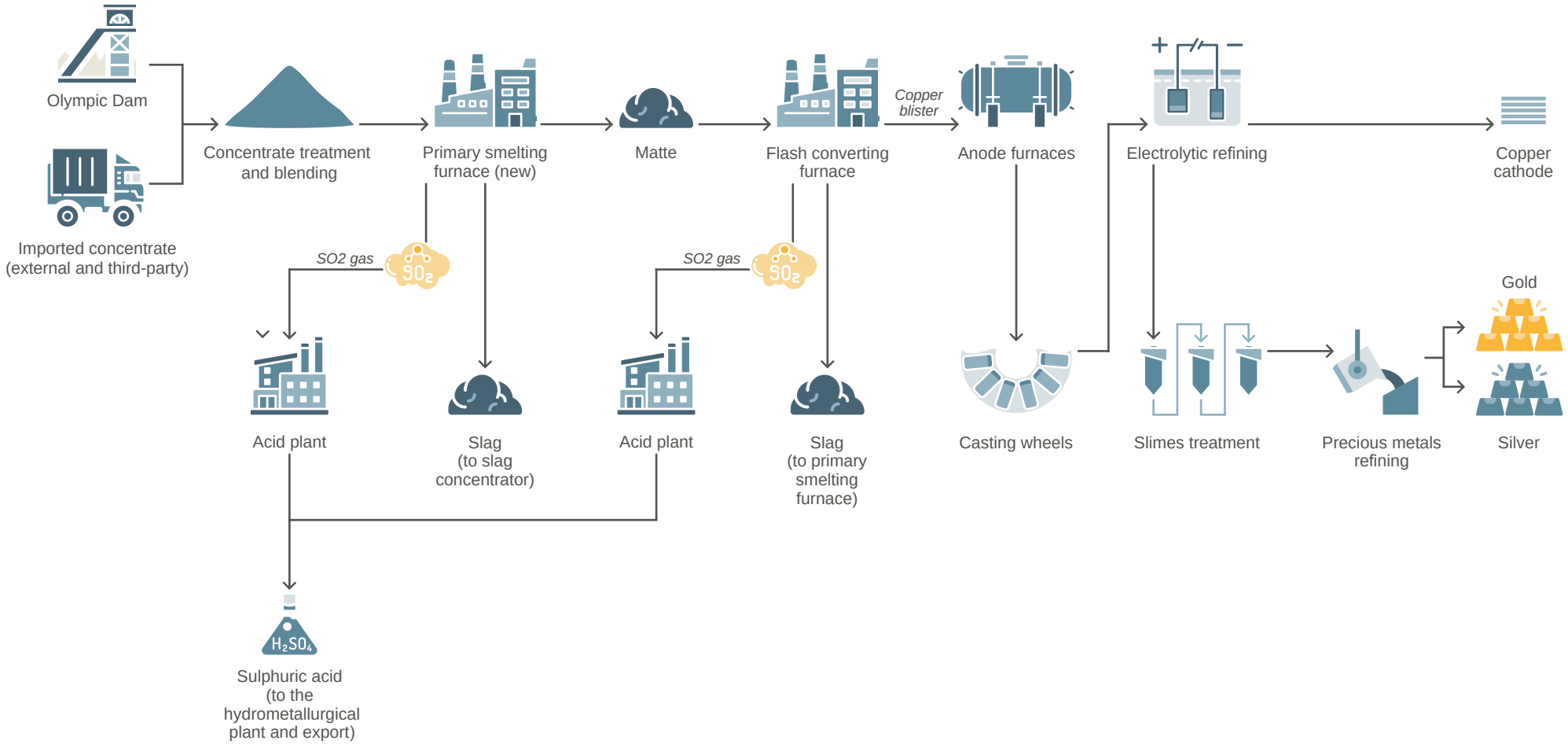


Figure 6.5 | SRE Project proposed metallurgical process flow diagram

6.2.2 Supporting activities

The SRE Project would be supported by existing and proposed facilities, infrastructure and processes on and off the SML. These supporting activities are the subject of existing approvals and/or regulation or will be subject to regulatory approval and implementation prior to the commencement of the implementation of the SRE Project. These BAU operations are associated with enabling and maintaining existing mining, copper production and tailings management, as well as activities associated with preparation for, and execution of, the SCM27 works.

Existing planned infrastructure associated with BAU and SCM27 operations that would ultimately support the SRE Project, but does not form part of the SRE Project scope, is summarised in Table 6.2. Regulatory approvals for these activities, where required or relevant, would be sought separately following engagement with agencies of the Government of South Australia and Roxby Council.

Table 6.2 | Key BAU and SCM27 infrastructure and activities excluded from SRE Project scope

Project element	Summary
BAU activities within the SML	
Infrastructure optimisations	Activities that optimise site infrastructure and processes, with respect to current average production of approximately 200,000 tpa, will continue to be undertaken up to the commencement of SRE Project activities. These activities may include, but not be limited to: • mining, copper and byproduct production and tailings management • relocation of supporting services (such as water and electricity distribution infrastructure, and internal roads) to allow for more efficient and safer access to smelter and refinery infrastructure and processes • burial of site services to remove access restrictions to infrastructure that may otherwise be present • optimisation of existing infrastructure to allow for easier expansion, augmentation or replacement in future
SCM27 activities within the SML	
Preparatory works	This may include, but not be limited to preliminary civil infrastructure works designed to facilitate SCM27, including the installation and/or demolition of infrastructure to support plant and equipment access and replacement which if approved would also support subsequent SRE Project activities
Supporting infrastructure	SCM27 will develop and deliver supporting infrastructure that may be utilised subsequently to support the SRE Project, such as: • development of new and/or expanded offices and crib rooms • development of new and/or expanded workshop facilities • establishment of laydown, fabrication and demolition waste management areas • execution of key service and equipment tie-ins that must occur during a cold shutdown or ahead of the SRE Project

Project element	Summary
BAU and SCM27 activities outside the SML	
Accommodation	SCM27 and Olympic Dam future campaign maintenance scheduled for 2033 (Financial Year (FY) 34) will require approximately 1,600 – 3,200 accommodation units, necessitating an expansion of the existing accommodation facilities in Olympic Village, Olympic Dam South (reinstated) (ODS), Roxby Downs and/or alternative greenfield accommodation (subject to separate regulatory approval(s)). The SRE Project would require accommodation for up to approximately 1,313 personnel (peak construction workforce requirement for Stage 1a) and thus it is proposed to maintain and use accommodation facilities established to support the SCM27 and Olympic Dam future campaign maintenance for SRE Project construction activities also. Permanent demand for SRE Project operations personnel accommodation (for up to approximately 508 additional operational personnel, Stage1a, Stage 1b and Stage 2) would be provided via existing accommodation, proposed future SCM27, Olympic Dam future campaign maintenance or alternative greenfield accommodation (subject to separate regulatory approval(s)).
Logistics	Prefabricated or preassembled modules (PAMs) associated with both the SCM27 and SRE Project would be transported directly to site for assembly. However, additional laydown areas, upgraded road intersections and/or road widening may be required to enable safe transport of large, modularised components during construction. The locations of these potential activities are currently not defined. However, these would, to the extent required, be established as a component of the SCM27 works and or Copper SA growth plan with only minor, if any, modifications required to support SRE Project logistics.

6.2.3 Summary of resource inputs and outputs

A summary of the key resource inputs and outputs associated with the SRE Project is presented in Table 6.3.

Table 6.3 | Summary of key resource inputs

Resource	Description
Resource inputs	
Concentrate	An increase from the current 500,000 tpa concentrate supplied from mining undertaken at Olympic Dam to 2,000,000 tpa of concentrate from Olympic Dam and the Copper SA province assets plus third-party suppliers (as needed/available)
Workforce	Up to approximately 1,350 personnel (FTE) during construction Up to an additional 500 operational personnel to the current 559 operational workforce
Water	An additional water demand (beyond the current BAU water demand) of between 2 ML/d (Stage 1a) and 16 ML/d (Stage 2) would be required for the SRE Project, to be met through increased water use efficiency and supply from the proposed NWP pipeline

Resource	Description
Energy	A net load increase of up to 68 MVA would be required for the SRE Project. The total site electricity consumption would increase from the current 1,425 gigawatt hour (GWh) per annum up to a peak of approximately 2,040 GWh per annum, of which approximately 330 GWh per annum is directly attributable to the SRE Project. The load increase would be supplied via augmentation of the existing BHP-held 275 kV electricity transmission line between the SML and the Davenport substation.
Reagents and chemicals	Only minor changes to the nature and storage capacity of currently used reagents and chemicals are proposed as a part of the SRE Project, specifically: • introduction of a new flotation reagent, sodium isobutyl xanthate (SIBX) and associated storage of approximately 2.2 t • a new oxygen plant will be constructed to support increased oxygen consumption in the smelter, electrorefinery (ER) and PMR, including additional storage of 1,280 t (Stage 1a) and 1,820 t (Stage 2) of liquid oxygen • addition of calcium oxide (Quicklime) as flux for the FCF, requiring a stored inventory of up to 327 t • an increase in the consumption of the following reagents associated with increased concentrate throughputs, requiring the installation of additional storage capacity: o sodium hydroxide, with an additional 30 t storage capacity to the existing 390 t capacity o diesel/fuel oil, with an additional 170 to 340 t storage capacity to the existing 490 t capacity o zinc dust, with an additional 0.8 to 1.6 t storage capacity to the existing 0.8 t capacity • an increase in the consumption of the following reagents associated with increased concentrate throughputs, however not requiring the installation of additional storage capacity: o sodium cyanide and hydrogen cyanide o hydrochloric acid o nitric acid o sodium sulphide o sulphur (prill) o borax o lime flux o ferrous sulphate.
Resource outputs	
Refined metal	Total refined metal production of: • copper, up to approximately 650,000 tpa • gold, up to approximately 893,000 ounces per annum • silver, up to approximately 3,950,000 ounces per annum.
Uranium oxide concentrate	Approximately 4,900 tpa of uranium oxide concentrate (UOC as U_3O_8). The SRE Project does not materially change existing uranium production, with the increase associated with the leaching of imported concentrate limited to less than 1%, and no upgrade or modification of uranium production facilities is proposed as a part of the SRE Project.
Sulphuric acid	Approximately 1,700,000 to 1,900,000 tpa of 98% sulphuric acid (H_2SO_4), of which up to 810,000 tpa may be exported from Olympic Dam (i.e. operations become net sulphuric acid producer).

6.2.4 Project footprint

An estimation of the nature and extent of the SRE Project land disturbance and required native vegetation clearance are summarised in the following sections.

6.2.4.1 Existing disturbance

The SML covers an area of 17,788.11 hectares (ha) (SARIG 2025). The SRE Project Area within the SML (SML Area) is 866.96 ha, of which 335.60 ha is existing disturbance (Appendix D1 Ecological Impact Assessment).

Although some pastoral disturbance existed within the area of the SML prior to the commencement of mining activities (associated with pastoral access tracks and stock water infrastructure), it is assumed that all current disturbance is related to the mining operations and associated activities.

6.2.4.2 Proposed disturbance footprint

The total SRE Project Area is 895.52 ha, including 866.96 ha within the SRE Area, General Infrastructure Area and Water Infrastructure Area (together referred to as the SML Area), and 28.56 ha for the EIGR Areas as summarised in Table 6.4.

Within the SRE Project Area, 479.90 ha of ground disturbance[9] is required for the SRE Project, of which 245.86 ha would occur on ground that has been subjected to existing disturbance (Figure 6.6 and Figure 6.7), and 234.04 ha would require disturbance to vegetation to enable the SRE Project (Appendix D1 Ecological Impact Assessment).

Table 6.4 | Summary of SRE Project Area and land disturbance

Project area/disturbance footprint		Area (ha)			
		Project area	Existing disturbance	Total disturbance (including existing disturbance)	Total disturbance (excluding existing disturbance)
SML Area	SRE Area	866.96	335.60	263.30	101.71
	General Infrastructure Area			112.55	64.01
	Water Infrastructure Area			75.49	39.82
EIGR Areas		28.56	0.06	28.56	28.50
Total SRE Project Area		**895.52**	**335.66**	**479.90**	**234.04**

[9] SRE Project land disturbance is indicative only, with proposed infrastructure located to avoid cultural heritage

6.2.4.3 Environmental offset

The *Native Vegetation Act 1991* (SA) (NV Act) provides for the management, enhancement and protection of native vegetation in South Australia. Native vegetation must not be cleared unless approval is granted by the NVC under the NV Act or Native Vegetation Regulations 2017 (depending on the activity and approval pathway).

The NVC may give consent to the clearance of native vegetation under the NV Act if it is satisfied that actions will be taken which result in an SEB. The aim of an SEB is to compensate for the loss of native vegetation from an approved clearance activity. An SEB must result in an overall environmental gain that considers both the loss of vegetation at the clearance site and the gain in vegetation (either condition, protection and/or extent) to be achieved through actions undertaken elsewhere.

The NV Act provides 4 ways to achieve an SEB:

6. establishing and managing native vegetation on land; approved by the NVC
7. protecting and managing existing areas of native vegetation on land; approved by the NVC
8. entering into a Heritage Agreement that provides for ongoing protection of established native vegetation on land; approved by the NVC and the Minister for Climate, Environment and Water
9. payments into the Native Vegetation Fund (the Fund).

The application for the SRE Project's native vegetation clearance approval under the PDI Act will occur concurrently with the EIS process. Where possible, infrastructure would be strategically placed to minimise vegetation clearance, however, where avoidance is not possible, an SEB offset would be required to lead to long-term increase in biodiversity values in the local area. BHP would determine the proposed SEB option(s) in consultation with the NVC, which may include the expansion of existing on-ground offset areas (e.g. the existing Emerald Springs SEB area established on Stuart Creek Station in Far North South Australia).

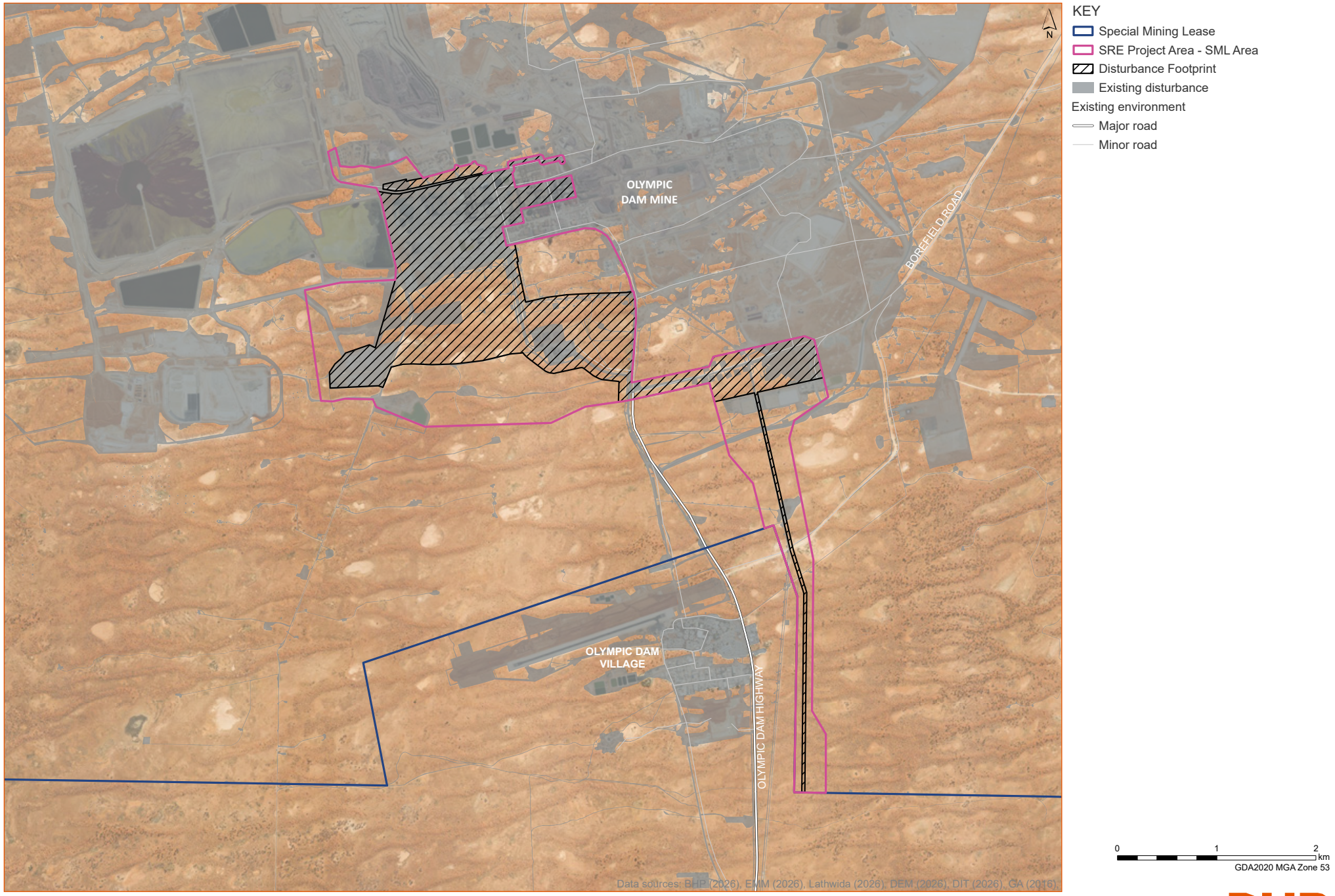


Figure 6.6 | SRE Project land disturbance - SML Area

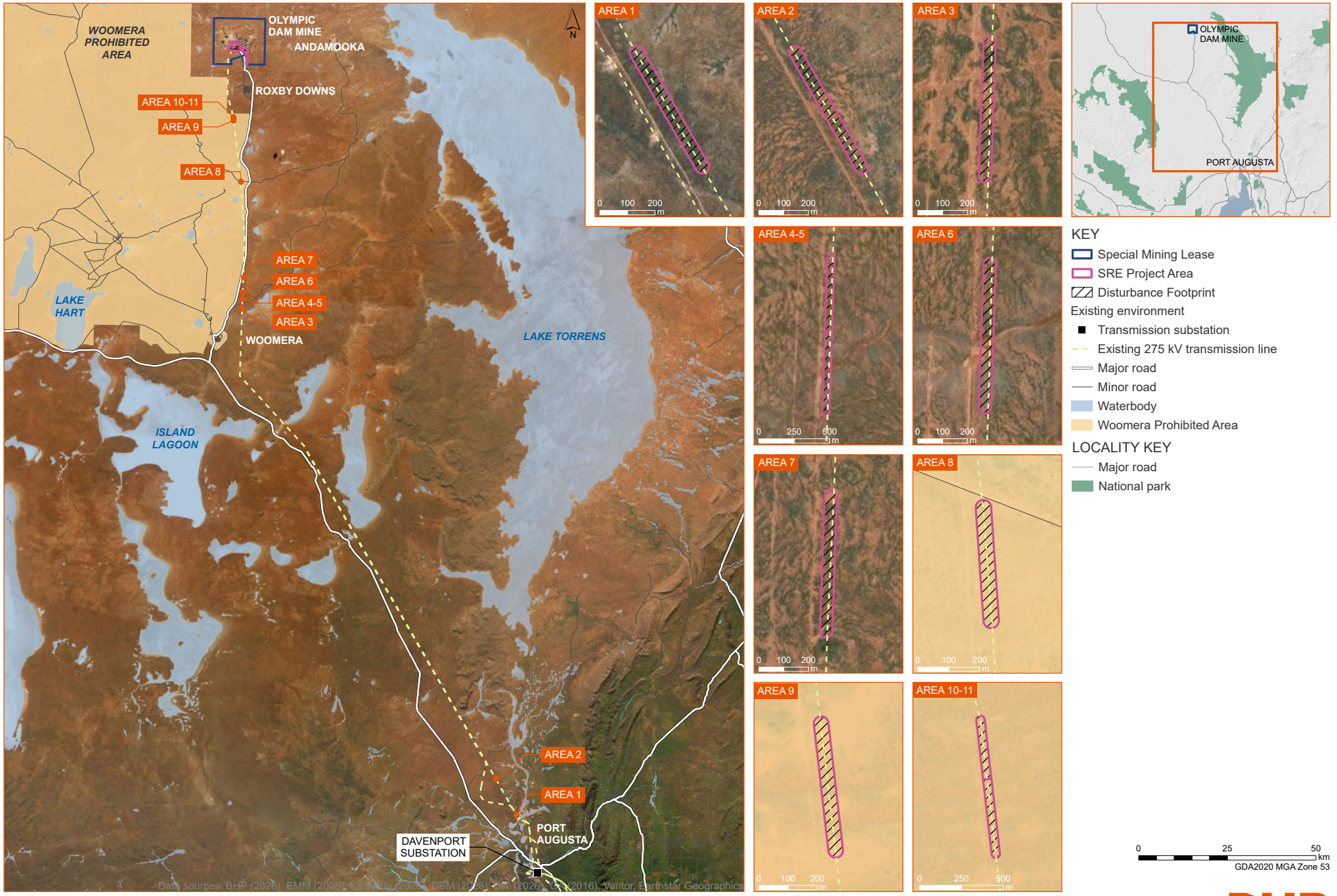


Figure 6.7 | SRE Project land disturbance - EIGR Areas

6.2.5 Project stages and timing

Olympic Dam's existing smelter throughput is approximately 500,000 tpa of concentrate producing an average output of approximately 200,000 tpa of total copper and associated products.

The SRE Project would be constructed and operated in a staged manner to enable production capacity up to 650,000 tpa of total copper and associated products, with stages detailed in Table 6.5.

Table 6.5 | Project stages and timing

Stage	Smelter concentrate throughput (tpa)	Description	Anticipated construction timing
1a	1,100,000	Stage 1a includes: • an increase of smelter throughput to approximately 1,100,000 tpa of concentrate producing an output of approximately 390,000 tpa of total copper • a new regional concentrate receiving, handling and blending facility • upgrade and expansion of the existing smelter feed preparation, including additional concentrate storage, blending and a new steam dryer • installation of a new primary FSF to produce copper matte and conversion of the existing DBF to an FCF to convert matte to blister, including matte handling and grinding infrastructure, additional anode furnace and anode casting infrastructure and decommissioning of the existing EF if required • expansion of the brownfield slag concentrator, supported by FSF slag cooling pits, a new interim slag stockpile and associated environmental management infrastructure • new off-gas management infrastructure, including additional gas and dust handling equipment • a new acid plant, additional acid storage and an associated acid loading station to allow the export of acid • a new oxygen plant and associated distribution infrastructure • a new electrorefinery, and associated anode preparation infrastructure and slimes handling infrastructure • expansion of the PMR facility	2028 to 2032
1b	1,400,000	Stage 1b includes: • an increase in smelter throughput to approximately 1,400,000 tpa of concentrate producing an output of approximately 500,000 tpa of total copper • installation of additional concentrate leach thickening, filtration and drying infrastructure • development of greenfield slag concentrator, associated stockpile, and decommissioning of the brownfield slag concentrator • incremental expansion of Stage 1a infrastructure and services, including: o the installation of an additional electrorefinery module o expansion of feed preparation, FCF feed system (including lime addition), off-gas management, acid plant, oxygen plants, slimes treatment and PMR capacities	2032 to 2036

Stage	Smelter concentrate throughput (tpa)	Description	Anticipated construction timing
2	2,000,000	Stage 2 includes: • an increase in smelter throughput to approximately 2,000,000 tpa of concentrate producing an output of approximately 650,000 tpa of total copper • installation of new concentrate leach circuit for treatment of imported concentrate • incremental expansion of Stage 1b infrastructure and services, including: o the installation of additional electrorefinery modules o the installation of an additional anode furnace and associated off-gas management infrastructure o expansion of feed preparation, FSF and FCF feed systems, off-gas and slag management, acid plant, slimes treatment and PMR capacities	2038 to closure

For the purposes of the EIS, BHP has taken a conservative approach and assessed the SRE Project based upon the maximum potential impacts associated with the proposed staging (i.e. the greatest impact scenario) to ensure the full extent of all potential impacts is identified and assessed. In general, this means that impacts have been assessed based on Stage 2 of the project, however, in some instances, impacts have been assessed at the interim stages where these are considered to represent a greater potential for impact.

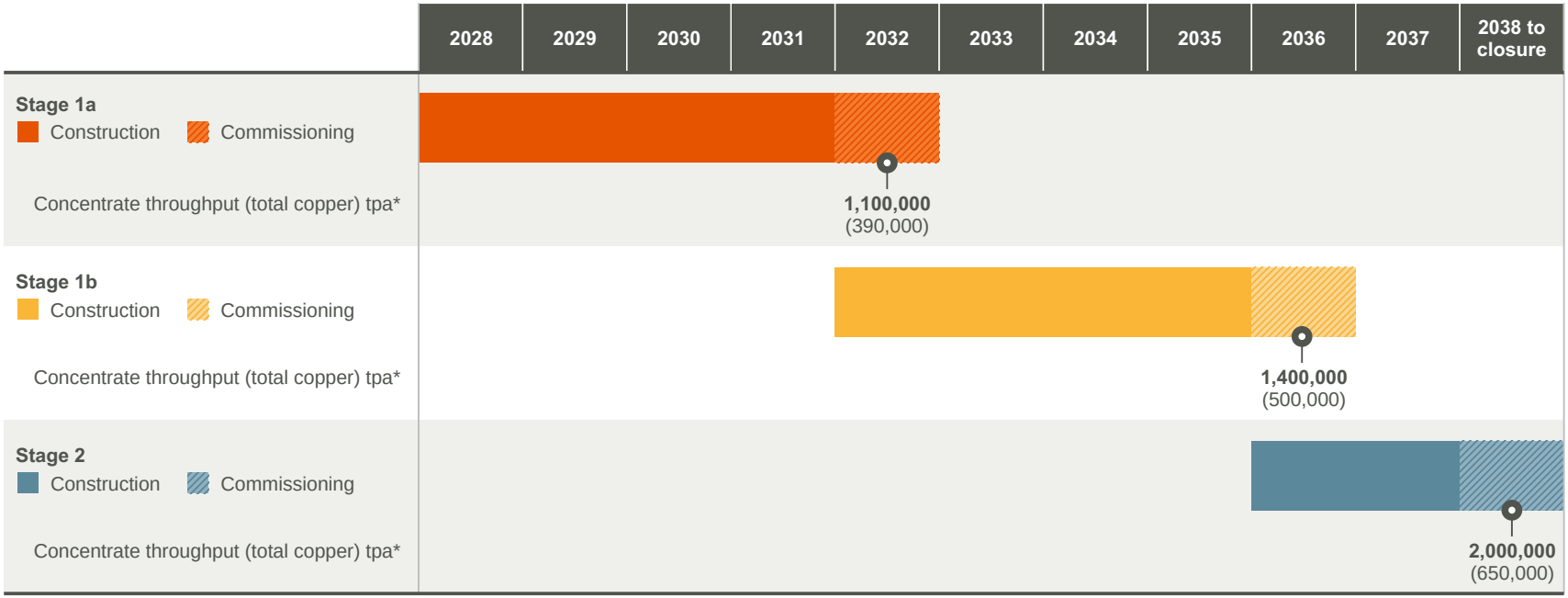
6.2.6 Project schedule and hours of operation

The indicative SRE Project schedule is illustrated in Figure 6.8. It would nominally take approximately eight years to complete all surface infrastructure development (Stage 1a and Stage 1b). The SRE Project would operate continuously, 24 hours per day, seven days per week and at night, in line with the Olympic Dam mine operations.

6.3 Project elements

6.3.1 Concentrate preparation

The flow diagram for the proposed concentrate feed preparation process is presented in Figure 6.9.



* *tonnes per annum*

Figure 6.8 | Indicative SRE Project schedule

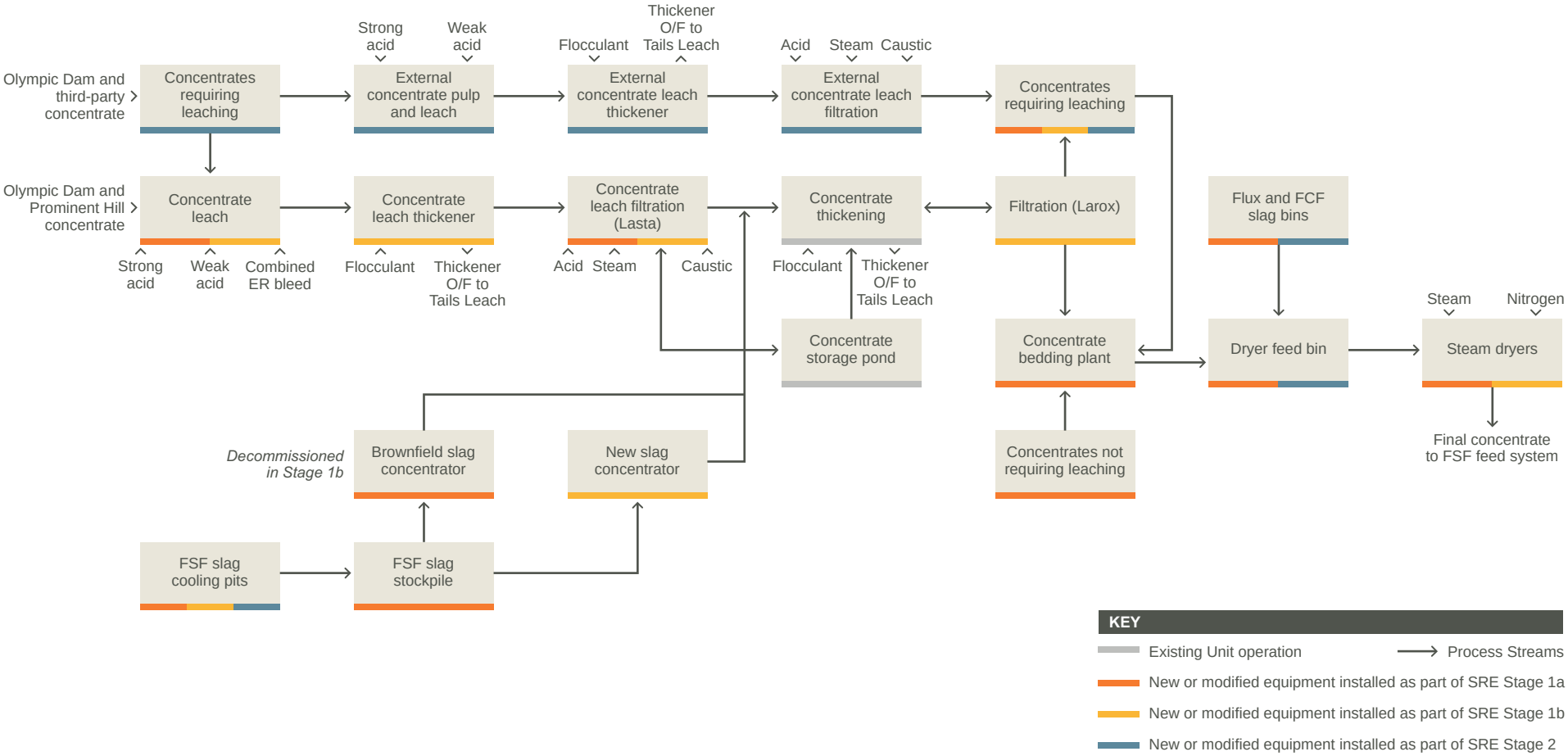


Figure 6.9 | Concentrate preparation flow diagram

6.3.1.1 Concentrate import and leaching

A concentrate import facility is required to receive concentrate from external sources and prepare it for incorporation with the Olympic Dam metallurgical process.

Imported concentrate with elevated deleterious elements (e.g. fluorine) may require leaching in the same way that the current Olympic Dam copper concentrate requires leaching (Section 6.1.1). The concentrate leach process removes these deleterious elements and, depending on the concentrate, recovers some copper and some uranium to the hydrometallurgical plant (Section 6.1.2). Concentrates that do not contain material concentrations of deleterious elements (e.g. with fluorine levels below that of the Olympic Dam leached concentrate) would not require leaching before blending with the prevailing Olympic Dam concentrate feed and would be received at the concentrate handling and blending facility (Section 6.3.1.3).

Within the proposed concentrate import facility, concentrates requiring leaching would be unloaded and repulped to a slurry using a weak acid solution before being fed to the upgraded concentrate leach process. The existing concentrate leach infrastructure would have to be upgraded to handle the additional concentrate throughput via the installation of an additional concentrate leach thickener and additional filtration capacity.

A summary of concentrate feed to the smelter is presented in Table 6.6.

Table 6.6 | Indicative concentrate feed by SRE Project stage

Concentrate source	Concentrate feed (ktpa) by SRE Project stage		
	Stage 1a	Stage 1b	Stage 2
Olympic Dam	600	800	950
Carrapateena	400	450	300
Prominent Hill	100	150	110
Oak Dam/third party	0	0	640
Total	**1,100**	**1,400**	**2,000**

6.3.1.2 Concentrate filtration

Before concentrate can be fed into the bedding plant, it must be dewatered to a filter cake. For leached concentrate, this also involves neutralising the slurry. Concentrates that do not require leaching would be delivered with a low enough moisture content to be conveyed directly to the bedding plant without requiring neutralisation or filtration. Concentrates that require leaching for the removal of deleterious elements would require filtration prior to progressing to the bedding plant.

Filtration of the additional concentrate volume would be achieved via the installation of an additional concentrate thickener, a third Lasta filter and third Larox filter.

6.3.1.3 Concentrate storage and blending

A concentrate storage and blending facility (termed the bedding facility) would be installed to minimise the variability of concentrate composition to the smelter and to improve furnace stability. Concentrates that required leaching would be directed to the bedding plant after leaching and filtration. Concentrates that do not require leaching would be fed into the bedding plant as a cake, through a dedicated leach bypass receival area.

The concentrate bedding plant would consist of a single radial bedding dome stockpile that is continuously filled at one end and reclaimed at the other. The concentrate bedding plant would be sized to provide a three-day stockpile.

Carrapateena concentrate would be delivered to a concentrate receival facility that would be similar to that used in the concentrate import plant, however without the need to repulp the concentrate to a slurry once unloaded.

The concentrate handling and blending facility would comprise:

- external concentrate area, including:
  - external concentrate import and weigh station
  - unloading pads
  - hoppers, feeders, conveyors and baghouses
  - storage sheds
- combined concentrate area, including:
  - concentrate bedding plant
  - feed storage bins.

6.3.1.4 Concentrate drying and transport

The existing multi-coil steam dryers are limited to a throughput of approximately 80 tonnes per hour (t/h) (wet), below the requirements of the SRE Project. As a result, the existing two dryers would be replaced initially with a single steam dryer (Stage 1a).

The dryers would be fed the pre-determined blend of concentrate, flux, slag, and any other reverts via belt conveyor. Dry product from the dryers would proceed to surge hoppers and be pneumatically transported to the primary smelting furnace concentrate day bin. Steam is supplied from the two smelter waste heat boilers, and existing acid plant waste heat boiler. Used steam would be condensed and returned to RO storage tanks.

6.3.2 Smelter and acid plants

The flow diagram for the proposed smelter and acid plant operation is presented in Figure 6.10.

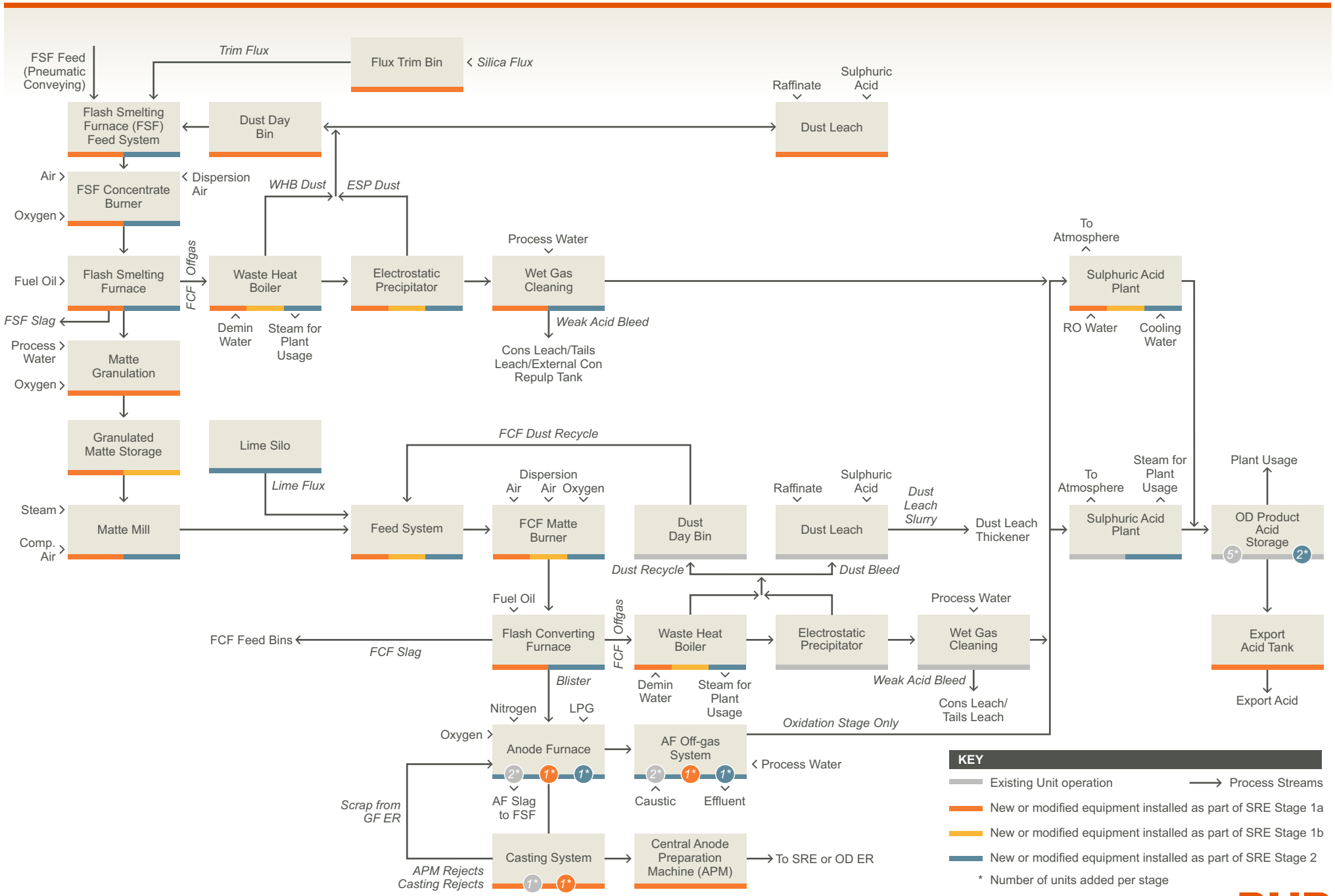


Figure 6.10 | Smelter and acid plant flow diagram

6.3.2.1 Primary smelting furnace

Basis of design

As part of the SRE Project's IPS, a review was conducted of available copper smelting technologies to determine the most appropriate smelting process for Olympic Dam. This review included a literature review, benchmarking, and technical exchange with external operations, and ultimately a multi-criteria analysis to determine the best alternative.

A declining Cu:S ratio over both the near and life-of-asset term necessitates a move away from the current direct-to-blister operation at Olympic Dam and a transition to a conventional smelting then converting flowsheet. This change would avoid the decreased copper recovery that would occur should the current direct-to-blister process continue. The existing direct-to-blister furnace has the required capacity to operate in the converting duty of a conventional smelter flowsheet and, as a result, flash converting has been selected as the secondary (converting) smelter technology.

The IPS indicated that for the primary smelting furnace, FSF technology is dominant within the industry, especially at higher duties similar to those of the proposed SRE Project, and economic and operability factors broadly similar against other competing technologies. Considering all factors in the review, the preferred smelting technology for the SRE Project was concluded to be a flash smelting and flash converting smelter flowsheet.

Primary smelting furnace operations

Within the FSF, the dried concentrate, fine, dry silica flux, dry recyclable materials including dust and slag concentrate, together with oxygen enriched air, are fed via a concentrate burner into a reaction shaft. This action forms a rapidly reacting sulphide combustion flame in the reaction shaft. The molten droplets of matte and slag fall to the settler section of the furnace hearth where matte and slag separate into two distinct layers. Tapping machines are then used to open tapholes that allow the products to flow from the furnace. Slag is laundered to pots for cooling and subsequently stockpiled pending treatment in the slag concentrator while matte is laundered to a granulator. Sulphide components of the concentrate partially oxidise in an exothermic reaction providing the bulk of the heat for the process, with additional fuel burners in the reaction shaft and settler to provide supplement heat.

Primary smelting furnace gas and dust handling

Gas and dust handling for the FSF is a duplication of the existing flowsheet (Section 6.1.4). Off-gas from the FSF leaves the uptake shaft of the furnace and enters the waste heat boiler (WHB). Sulphation air is added at the boiler inlet to ensure sulphation of dust particles. The WHB cools the gas to approximately 350ºC to 400ºC from approximately 1,250ºC to 1,350ºC before it enters the electrostatic precipitator (ESP). The cooled and cleaned gas then is sent to the acid plant via induced draft fan.

Approximately 40% of the dust in the off-gas drops out in the WHB, with the ESP removing the remaining dust. To manage radionuclide accumulation, a portion of the ESP dust is bled to a dust dissolving tank, where it is mixed with either a weak acid solution or water with acid, before being transported to a leach circuit and ultimately the copper solvent extraction plant for copper recovery. WHB boiler dust is pneumatically conveyed to the FSF dust day bin for recycle to the FSF.

Matte handling, storage and milling

Matte would be stockpiled as an interim product to feed the FCF. All matte handling facilities would be new, with matte tapped to one of two granulation systems. Granulated matte would be conveyed to the matte storage dome. It would then be conveyed to the vertical roller mill where it would be dried and milled. Steam is used to heat the air used for drying via heat exchanger. The dry, milled matte is then pneumatically conveyed to the FCF matte day bin.

Silica flux

Silica flux required to support smelting operations would be sourced from a combination of offsite supply and from dune sand recovered, and subsequently stockpiled using existing flux handling infrastructure, during incidental BAU and SRE Project land clearance activities.

Slag stockpiling and treatment

Slag from the FSF is laundered to pots for cooling before being crushed within new slag cooling pits and subsequently being stockpiled during Stage 1a and Stage 1b. Initially, a portion of the slag would subsequently be treated within a brownfield slag concentrator. The brownfield slag concentrator is an upgraded and expanded version of the existing slag concentrator, to be modified during Stage 1a. This necessitates the installation of a Jameson cleaner flotation cell and associated slurry pumping infrastructure to the current slag concentrator circuit to permit the treatment of FSF slag.

The interim slag stockpile (0.9 Mt capacity, being nominally 13 m high, 200 m long, 200 m wide) would consist of an engineered base with appropriate surface water management infrastructure to prevent the release of contact water and/or sediment during rainfall events. Slag reclaim infrastructure (e.g. vibrating feeders) may also be engineered into the stockpile base to allow for the subsequent transfer of stockpiled slag to the greenfield slag concentrator circuit to be developed during Stage 1b. This interim slag stockpile would store the difference between the maximum brownfield slag concentrator throughput and the FSF slag make.

During Stage 1b, a greenfield slag concentrator will be developed and once commissioned (approximately 3 years into the operation of Stage 1b), the brownfield slag concentrator will be decommissioned. Following commissioning of the new slag concentrator circuit, the interim slag stockpile would be drawn down and completed, with a separate (smaller) slag stockpile established to support the new slag concentrator. The greenfield slag concentrator would consist of a grinding circuit followed by a slag flotation circuit, producing a slag concentrate which would be fed back to the FSF. Tails from the slag flotation circuit would be directed to the TSF.

Indicative slag concentrator production is summarised in Table 6.7.

Table 6.7 | Indicative slag concentrator production by SRE Project stage

Stream	Input/production (ktpa) by SRE Project stage		
	Stage 1a	Stage 1b	Stage 2
Input			
FSF slag (from cooling pits)	608	1,149	1,360
Process water	785	887	1,049

Stream	Input/production (ktpa) by SRE Project stage		
	Stage 1a	Stage 1b	Stage 2
Production			
Slag concentrate (dry tpa)	39	77	92
Slag tailings (dry tpa)	557	1,049	1,242
Slag stockpile			
Build	80	-	-
Drawdown	-	260	-
Production			
Concentrate (wet tpa)	156	129	153
Tailings (wet tpa)	1,237	1,907	2,257
% solids			
Concentrate	25%	60%	60%
Tailings	45%	55%	55%

Supporting infrastructure

Supporting the primary smelting furnace would be the following infrastructure:

- feed storage bins
- dust collection systems
- furnace feed weigh bins
- load cells and feeding systems
- overhead crane
- slag handling system
- cooling water head tanks
- air fans
- concentrate burner
- matte granulation systems
- auxiliary burners and fuel oil systems
- combustion air and oxygen system
- cooling systems and slag cooling pits and handling areas.

Related electrical infrastructure would include high and low voltage switch and control rooms and associated transformers, switchboards and switchgear and modules.

6.3.2.2 Flash converting furnace

Flash converting furnace modification and upgrade

The existing DBF would be transitioned to performing the converting duty as an FCF, accepting matte feed to produce a molten high-copper product. The existing DBF has been studied to determined what capacity it is able to operate without major rebuild work, as well as what the ultimate capacity it could achieve would be with a reaction shaft expansion. The studies ultimately indicated a throughput capacity of approximately 460,000 tpa matte without modification and up to 590,000 tpa matte with an expansion of the reaction shaft size.

Flash converting furnace operations

In similar process to the FSF, the dried and milled matte, flux, dust, together with oxygen enriched air, are fed via a concentrate burner into a reaction shaft. The molten droplets of blister and slag fall to the settler section of the furnace where they separate into two distinct layers. Tapping machines are then used to open tapholes that allow products to flow from the furnace. Slag is laundered to pots and then milled for recycle back to the dryer and FSF, while blister is laundered to the anode furnaces for further treatment. Sulphur and iron components of the matte oxidise in an exothermic reaction providing the bulk of the heat for the process, with additional fuel burners in the reaction shaft and settler to provide supplement heat.

To enable quick changeover and conversion from DBF to FCF, the slag system would be retained as a silica/fayalite slag initially, before being switched to the industry-standard calcium ferrite during a subsequent furnace shutdown during Stage 2 of the SRE Project.

Flash converting furnace gas and dust handling

The existing flowsheet and infrastructure would be utilised for FCF gas and dust handling. The high-concentration sulphur dioxide (SO_2) off-gas would be captured and directed to an acid plant to produce sulphuric acid for use in the existing hydrometallurgical plant or for export. Gas volumes from the FCF would be significantly reduced compared to the DBF and require de-rating of the existing WHB. The design accommodates full dust recycle back to the FCF.

Supporting infrastructure

Supporting the FCF would be the following infrastructure:

- granulated matte storage facilities
- Loesche Matte mills to grind and dry matte prior to feed to the FCF
- development of the feed system to the FCF
- lime storage silo and feed system (noting that the FCF would use lime instead of silica as slag flux once converted)
- slag handling system.

6.3.2.3 Electric slag reduction furnace

The electric slag reduction furnace is proposed to remain in service. The operation may assess to decommission and leave the furnace in situ at a later date.

6.3.2.4 Anode furnaces and casting

The existing anode furnaces, casting equipment and supporting infrastructure would be utilised but modified and supplemented by additional anode furnaces and supporting infrastructure. Blister copper from the FCF is laundered to anode refining furnaces. Here it is put through an oxidation cycle for removal of residual sulphur and then a reduction cycle to remove oxygen. It is then laundered to the casting wheel for anode production.

During oxidation, off-gas from the anode furnaces is directed to an acid plant for recovery of the sulphur dioxide (SO_2) as sulphuric acid (H_2SO_4) except during situations where the acid plants may be unavailable. On these occasions off-gas may be directed to the existing Main Smelter Stack when required to maintain furnace integrity and safety, subject to meeting specific conditions including the sulphur concentration of the metal bath and the bath level within the furnace. During other, non-oxidation, cycles, the off-gas is quenched and scrubbed before being sent to atmosphere. Refinery scrap and other scrap (e.g. from mis-cast anodes) is also recycled through the anode furnaces for copper recovery.

Blister copper production from the FCF would increase in excess of the current capacity of the two existing anode furnaces (approximately 970 tonnes per day (t/d)). In total, two additional anode furnaces of the same capacity (approximately 380 t) would be added adjacent to the existing furnaces together with a new dedicated off-gas system, one during Stage 1a and the second during Stage 2. A new casting wheel and casting cooling tower would also be installed during Stage 1a to support the expanded anode furnace operations.

Burners associated with the existing anode furnaces operate with no enrichment, however under the SRE Project, these would be upgraded to oxy-fuel burners to reduce fuel consumption and subsequent greenhouse gas emissions.

6.3.2.5 Acid plants

In addition to the progressive upgrade of the existing acid plant, an additional double-contact double-absorption acid plant would be added to accommodate the increased metallurgical gas (metgas) production. The sulphur burner on the existing acid plant would be retained together with the ability to burn elemental sulphur prill to support acid production.

The wet gas cleaning section that receives metgas from the FSF gas and dust section of the smelter is the same flowsheet as the existing acid plant (which will be used to treat the FCF metgas), consisting of humidifier, radial flow scrubbing, gas cooling tower, halide tower, and wet ESPs. The cleaned gas can then be directed to either the new or existing acid plant.

The new acid plant would be either metgas only or sulphur burner, depending on the duty required. The gas is then dried with strong acid, and the sulphur dioxide gas (SO_2) is converted to sulphur trioxide (SO_3) via catalytic conversion in the presence of oxygen and subsequently absorbed to produce strong sulphuric acid (H_2SO_4). The acid plants would collectively capture approximately 99% of all SO_2 produced by the smelter operations, significantly reducing atmospheric SO_2 emissions that may otherwise occur.

Produced strong acid is directed to the existing onsite storage tanks; with a combined capacity of 37,000 t. Two additional onsite storage tanks, with a total capacity of approximately 15,000 t, would be installed

during Stage 2 and would incorporate dedicated acid export infrastructure. The export of acid would initially occur via the existing storage tanks before transferring to the new acid export facility during Stage 2 to facilitate the export of acid that is surplus to site requirements (up to 810,000 tpa).

Off-gas from the new acid plant, containing less than 1% of the original SO_2 in the furnace off-gases, would be directed to a new acid plant tails gas stack. A new acid plant bypass stack would be constructed between the new ESP and the new acid plant. This would allow for the venting of FSF off-gas to atmosphere in the event that the new acid plant is unavailable.

6.3.3 Electrorefinery and slimes treatment

The flow diagram for the proposed electrorefinery and slimes treatment process is presented in Figure 6.11.

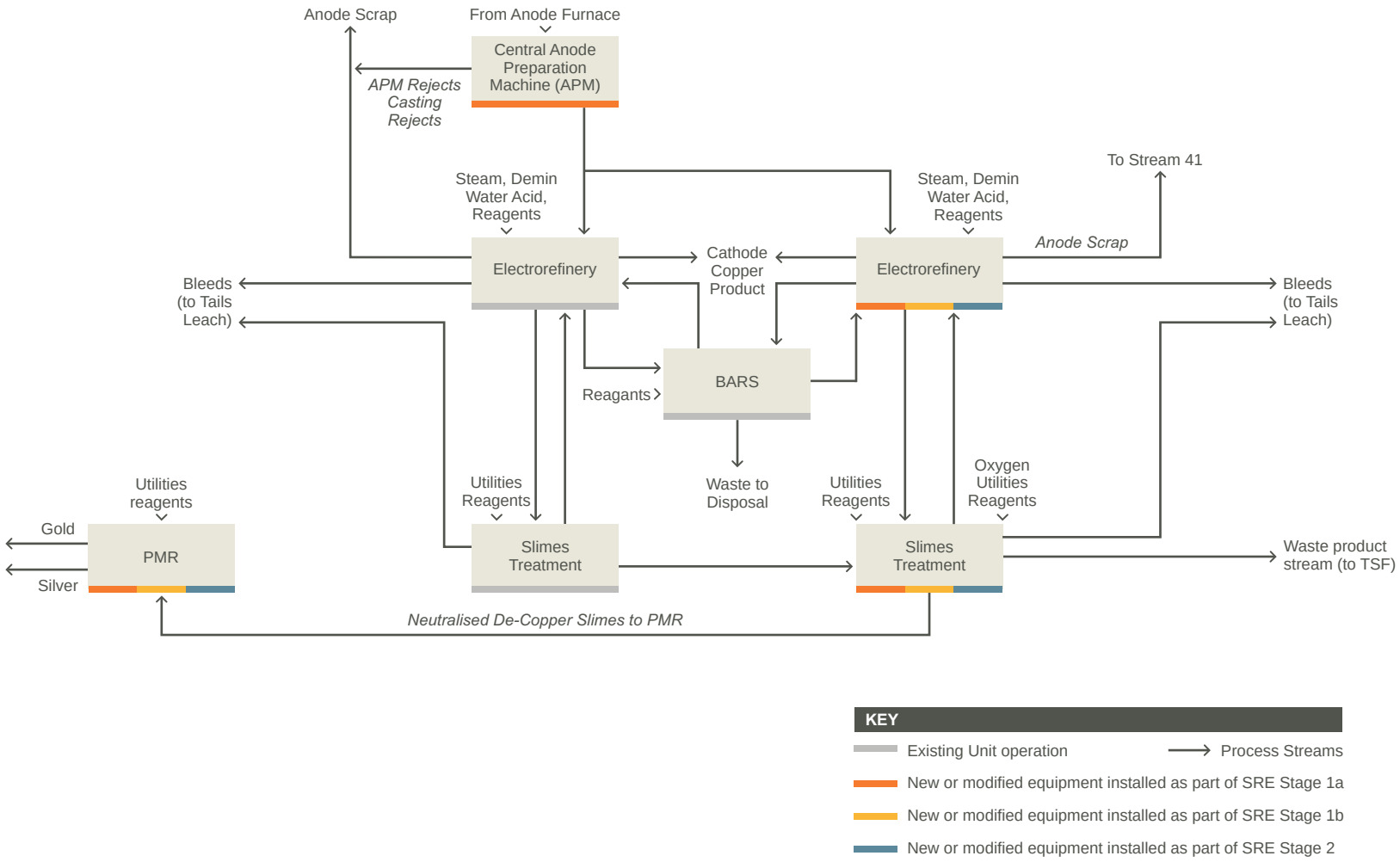


Figure 6.11 | Electrorefinery and slimes treatment flow diagram

6.3.3.1 Electrorefinery

A new ER would be developed in a greenfield location on the SML to supplement the existing ER, which would continue to operate and is not being upgraded as a component of the SRE Project. The new ER would be constructed in modules to suit project staging and anticipated anode production rates.

The anodes produced in the smelter would be processed in a new centrally located anode preparation machine (APM) where the anodes are weighed (and rejected if necessary), pressed to straighten the body and lugs, and the anode lugs are milled to ensure a solid electrical contact in the ER. The rejected anodes would be returned to the smelter. The prepared anodes would be transported to the new and existing ER and fed to an anode insertion machine (AIM) where the anodes would be checked for damage during transport or storage and spaced on the transfer conveyor ready for pick up by the crane.

The ER building crane transfers the prepared and spaced anodes to the refining cells and at the completion of the 20-day anode cycle, transfers the spent anodes to the anode scrap washing machine (ASWM) where the scrap anodes are cleaned and bundled for return to the smelter.

In the refining cells, copper is plated on the stainless-steel cathode plates in a 10-day cycle. The ER building crane transfers the cathode blanks with the copper deposit to the cathode washing and stripping machine (CWSM) where the cathode deposit is washed and stripped from the stainless-steel cathode mother plates, strapped, weighed and bundled ready for export. The ER building crane transfers stainless-steel cathodes plates back to the refining cells ready for the next 10-day cycle.

The power is supplied to the refining cells via a rectifier and busbar system. An electrolyte circulation system maintains a flow of electrolyte through the cells.

At the completion of the 20-day anode cycle, the cathodes and the spent anodes are removed from the cells and the anode slimes that collect on the bottom of the cells are washed and pumped to the slimes collection system.

Each ER module has its own rectifier and busbar system, 360 refining cells, a reagent dosing system, an electrolyte circulation system and slimes collection system. The copper cathode product produced at Olympic Dam following the implementation of the SRE Project would be unchanged from current specifications and continues to align with ASTM B115-10 Grade 1 (ASTM 2024) in order to meet London Metal Exchange specifications for Grade A cathodes.

6.3.3.2 Slimes treatment

The anode slimes from the new ER would be pumped from the collection systems in ER to the new slimes treatment area located adjacent to the new ER facility. The existing slimes treatment infrastructure would continue to support the existing ER operations and is not modified by the SRE Project.

The first step in the new slimes treatment is thickening with the overflow returned to the electrolyte system in ER. The thickened slimes are filtered and subjected to a pressure leaching step in an autoclave. Copper and tellurium are extracted from the slimes to the leach liquor. A filtration step separates the solids from the leach liquor. The solids are neutralised and pumped to the existing PMR for the recovery of gold and silver. The leach liquor undergoes a cementation and filtration process to remove copper telluride prior to the liquor being recycled to the ER tank house. Between 79 to 166 tpa of copper telluride filter cake (containing around 75% solids) would be produced per annum. This material may be sold to market, however if too high in radionuclides would be disposed to the TSF as per current practice.

6.3.3.3 Precious metal recovery

Radionuclides including polonium (Po210) and lead (Pb210) are present in the anode slimes, and consequently the anode slimes must be treated via a unique PMR flowsheet. The expansion of PMR capacity to support the SRE Project throughputs is based on the same process design.

The slimes received from the existing and new ER facilities would be processed in a sequence of cyanidation, cementation with zinc dust, acidification and filtration steps to prepare a gold and silver rich precipitate. The precipitate is mixed with fluxes and processed in a high temperature furnace to produce a slag containing the gangue materials, and a dore silver product containing the gold and silver. The dore silver is cast into anodes and refined in Moebius cells. The product silver crystals are washed, melted and cast into silver bullion bars.

The gold mud from the Moebius cells is leached, dried and cast into gold anodes for refining. The gold anodes are refined in gold cells and the product washed and melted and cast into gold bullion. The gold and silver bullion product specifications would also remain unchanged, at 99.99%, and 99.85 to 99.95% purity, respectively.

Off-gas from the various PMR processes are cooled and scrubbed prior to discharge to atmosphere, with scrubbing effluent bleed streams directed to the tails disposal area of the existing processing plant.

The expansion of PMR capacity is achieved with additional equipment, except in the following steps where existing equipment is being replaced with higher capacity up to date technology:

- the existing roaster is replaced with a modern oxygen cupel system
- the existing silver cells are replaced with Moebius silver refining cells
- the existing gold mud leach tank is replaced by a new kettle.

BHP is also investigating process optimisation and alternative processes that may eliminate the use of cyanide.

6.3.3.4 Tailings management

The minor tailings waste product stream generated by the SRE Project from metallurgical processing would be neutralised and detoxified, as per existing Olympic Dam operations. The waste product stream would then report to the TSF. A breakdown of the major streams is presented by SRE Project stage in Table 6.8. Minor streams not presented in Table 6.8 include effluents from the new waste gas cleaning infrastructure, scrubber bleeds, wastewater from the new ER and blowdown wastes from the new anode casting wheel and associated new cooling towers.

Table 6.8 | Indicative SRE Project wastes reporting to TSF by SRE Project stage

Waste stream	Waste production (tpa) by SRE Project stage		
	Stage 1a	Stage 1b	Stage 2
Slag tailings, total (wet) mass	1,237,000	1,907,000	2,257,000
FSF/FCF effluent	402	540	702
PMR detoxified slurry	617	793	1,130

The TSF has sufficient existing and approved capacity to accommodate the additional tailings from the SRE Project operations, while minor waste streams not presented in Table 6.8 can be accommodated through existing Olympic Dam infrastructure.

6.3.4 Oxygen plant

Oxygen is used to enrich the combustion air for fired equipment and as an oxidising agent in the Anode Furnaces, ER and PMR. An additional oxygen plant would be added in a greenfield location to support the SRE Project during Stage 1a, with expansion of the oxygen plants subsequently proposed for Stage 1b and Stage 2. Between 1,280 to 1,820 t of additional liquid oxygen storage would also be required.

Olympic Dam currently has a build-own-operate (BOO) arrangement for the existing oxygen plant facilities and the intent would be to extend this arrangement to the additional capacity.

6.4 Supporting infrastructure

The SRE Project would require standalone supporting infrastructure on the SML, which is additional to facilities delivered as part of SCM27 and suitable for ongoing use by the SRE Project. This supporting infrastructure may be provided by upgraded, expanded, replacement or new infrastructure and operations.

6.4.1 Site security and fencing

The SRE Project sits within the SML, which is fenced and free of stock. The SRE Project would have a dedicated internal access point, which may include the installation of a security gate to control access.

All internal SML access points to the SRE Project would be appropriately sign-posted to prevent inadvertent access by the public.

6.4.2 Surface water management infrastructure

The SRE Project would include provision of stormwater infrastructure and associated civil works. Reshaping of an existing pond would be undertaken as part of construction, together with construction of a surface water pipeline linking the north-east and south-west surface water storage ponds to enable pond freeboard management during large rainfall events.

6.4.3 Internal roads

The SRE Project would require new or upgraded internal roads to accommodate construction and operation, the detailed layout of which is still under consideration.

An indicative cross-section for new site access roads is shown in Figure 6.12

6.4.4 Administration, ablution and cribbing buildings

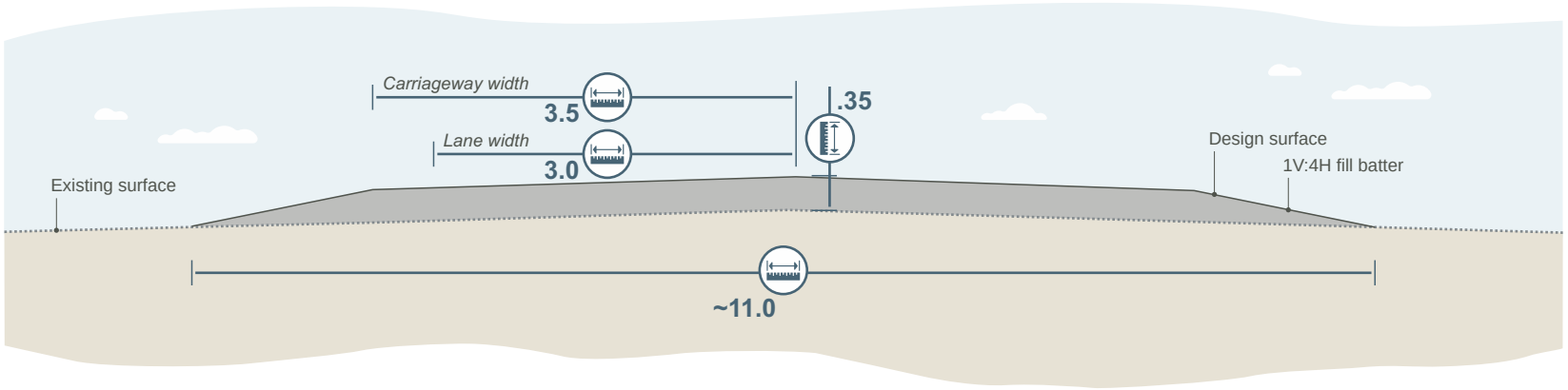
The SRE Project would require new or upgraded office buildings, crib rooms and ablution facilities to accommodate construction and operation.

6.4.5 Stores yard, warehouse and laydown areas

The SRE Project would require new, expanded or upgraded stores yards, warehousing and laydown areas to accommodate construction and operation.

6.4.6 Maintenance facilities, workshops and bays

The SRE Project would require new, expanded or upgraded maintenance facilities, workshops and bays to accommodate construction and operation.



Note: all measurements are in metres (m)

Figure 6.12 | Indicative new site access road cross-section

6.5 Resource inputs

This section outlines the labour, accommodation, water, energy and logistics inputs required to support the SRE Project.

6.5.1 Sustainability in design

6.5.1.1 Objectives

The BHP Global Safety in Design Standard requires that the SRE Project be developed with consideration to the following sustainability in design practices:

- consider the hierarchy of control principles in all aspects of design and vigorously pursue initiatives aimed at eliminating or substantially reducing reliance on administrative controls or personal protective equipment (PPE) during construction, maintenance, operations and closure
- introduction of new processes, equipment or substances should not, as far as is reasonably practical, increase exposure to health, safety or environmental impacts
- promote innovation such as the use of emergent technology and automation to reduce exposure to hazards
- consider the application of functional safety on control systems when necessary
- design tasks associated with new equipment or processes according to ergonomic principles and human factors to consider the limitations of human performance and to meet accessibility requirements
- consider temporary facilities while designing as they can be used for a longer time than expected
- aim for improvement in current workplace exposure levels and contaminant by design (e.g. control to noise, dust, and diesel particulate matter)
- design to eliminate or substantially decrease negative impact on communities and climate change, for the entire lifecycle of the facility, including its closure (e.g. power and water facilities that could add value to communities post-closure)
- increase social value, as far as reasonably practicable, through design
- be aware of possible cost that might be transferred to communities at closure
- consider that facilities will be used by diverse teams and should be inclusive.

6.5.1.2 Application and implementation

The objectives are applied through the implementation of technical solutions identified from risk assessments, Health, Safety and Security (HSS) sources, environmental impact assessments, design development, social value plans among other sources.

Specific technical solutions relating to improvements to water and energy use and that will be implemented as part of the SRE Project or are currently under consideration are summarised in Section 6.5.3.4 and Section 6.5.4.3, respectively.

More general sustainability and resource use efficiency measures that may be implemented as part of the SRE Project include:

- optimisation of plant layout and energy using systems to improve energy efficiency
- where possible, infrastructure and plant to be designed to enable switches to alternative, lower carbon fuels in the future
- opportunities for reduction in electricity consumption to be reviewed and implemented where practicable
- both operational performance (including energy efficiency and utility consumption) and sustainability (GHG emissions, water use, waste management) are key criteria for equipment selection
- where feasible, low impact, locally sourced materials should be utilised
- GHG objectives to be embedded within procurement requirements for SRE Project suppliers
- reduce energy and water demand through implementation of efficient fittings
- renewable energy integration opportunities to be evaluated.

Sustainability will also be a consideration throughout construction. Where possible, waste recovery through demolition and construction materials will be maximised and water and energy use will be minimised.

Additional detail on the SRE Project sustainability in design process is provided in Section 11.4.

6.5.2 Workforce and accommodation

6.5.2.1 Workforce profile

The estimated peak construction workforce numbers, as FTEs, are summarised in Table 6.9, assuming a 100% FIFO workforce for construction.

Table 6.9 | Indicative SRE Project construction workforce profile

Construction stage	Average FTE	Peak FTE
Stage 1a	~708	~1,313
Stage 1b	~260	~515
Stage 2	~519	~978

Following construction, the SRE Project would require a permanent operations workforce as summarised in Table 6.10. The SRE Project operations workforce would be split with 80% on even time 7:7-day rosters and 20% on a 5:2-day roster.

Table 6.10 | Indicative SRE Project operations workforce profile

Operational stage	Additional SRE Project operational workforce	Total Olympic Dam Smelter and Refinery workforce
Stage 1a	~207	~766
Stage 1b	~57 (additional to Stage 1a)	~823
Stage 2	~244 (additional to Stage 1b)	~1,067

6.5.2.2 Workforce transfer and accommodation

Workforce transfer

Workforce transfer would use existing and upgraded (where necessary) airport facilities and road infrastructure. These would be located off the SML.

Accommodation strategy

The SRE Project would place a demand on accommodation during construction and operation. Accommodation demand due to construction of the SRE Project would vary over time as shown in Table 6.9. Permanent room demand for SRE Project operations would be approximately 141.

SCM27 and Olympic Dam future campaign maintenance scheduled for 2033 (FY34) will require approximately 1,600 to 3,200 accommodation units, necessitating an expansion of the existing accommodation facilities in Olympic Village, ODS (reinstated), Roxby Downs and/or alternative greenfield accommodation (subject to separate approval(s)). The SRE Project construction and operational workforce is proposed to utilise the existing and new accommodation to be established by BHP for the SCM27 shutdown, Olympic Dam future campaign maintenance accommodation, and/or greenfield accommodation (subject to separate approvals).

6.5.3 Water demand and supply

6.5.3.1 Water demand

An additional water demand of between 2.1 ML/d (Stage 1a) and 15.6 ML/d (Stage 2) would be required for the SRE Project, as described in the SRE Project water demand presented in Table 6.11.

Table 6.11 | Indicative SRE Project water demand

Water quality	Current Smelter and ER water demand (ML/d)	Smelter and ER water demand following implementation of the SRE Project (ML/d)		
		Stage 1a	Stage 1b	Stage 2
Process water	7.4	5.1	6.2	12.7
Potable water	2.8	7.7	9.1	12.7
RO (desalinated) water	1.9	0.6	0.5	0.4
Demineralised water	0.7	1.5	1.8	2.7
Total	**12.8**	**14.9**	**17.7**	**28.5**
Incremental SRE Project increase	-	+2.1	+4.9	+15.6

Source: Incremental SRE Project increase water demand numbers are sourced from HFJV (2025a)

6.5.3.2 Water supply

Most of the water currently used at Olympic Dam, including within the existing smelter and ER operations, is supplied from the GAB. The water from the GAB is drawn from the two Wellfields: Wellfield A and Wellfield B, with the majority coming from Wellfield B.

The SRE Project proposes no additional water abstraction from the GAB. Current smelter and ER water demand volumes are presented in Table 6.11. Additional volumes of water required to meet the proposed SRE Project demand, as shown in Table 6.11, would nominally be provided from DIT's NWP infrastructure, following commissioning of the initial 90 ML/d capacity of the NWP.

This would require new water storage and distribution infrastructure to connect the SRE Project to the NWP connection point at the SML boundary. The NWP water supply may be supplemented or offset by the provision of local non-GAB groundwater supply. This water supply would occur via existing water infrastructure (e.g. process storage dams, desalination plant at the Olympic Dam site).

6.5.3.3 Water storage and distribution

Water treatment

Augmentation of the existing desalination water treatment plant would be required to accommodate supply from the NWP and local groundwater water supply alternatives. A demineralised water plant would be required to support the SRE Project operations.

Water distribution

Water storage and distribution infrastructure associated with the NWP and local groundwater water supplies would be required to connect the supply to the expanded refinery.

6.5.3.4 Water use efficiency

The NWP will provide a long-term sustainable water source for the SRE Project, however measures to reduce water usage are considered a key criterion for equipment selection. Standard water conservation measures such as incorporation of process water reuse systems and use of efficient fittings will be implemented as part of process design. Ongoing operational efficiency measures, such as maintenance of facilities to prevent water leakage, would continue to be implemented as per existing operations.

Specific measures to minimise water use and improve water use efficiency for the SRE Project through construction and operations may include:

- optimisation of construction activities requiring water, including decontamination of plant and equipment prior to disposal, dust suppression, mixing and curing of concrete and production of other construction materials, manufacturing of construction products and worker amenities
- used steam from concentrate drying will be condensed and returned to RO storage tanks for future use
- removal of FCF slag granulation and implementation of alternative handling of FCF slag, including tapping to pots, cooling in a slag dam, reclaiming, crushing and conveying to a dedicated bin
- the air/nitrogen granulation of matte and slag, instead of using water only, and in preference to the current granulation process.

6.5.4 Energy demand and supply

6.5.4.1 Electricity

An electricity demand of up to 68 MVA net load increase would be required for the SRE Project, with total site electricity consumption increasing from the current 1,425 GWh per annum up to a peak of approximately 2,040 GWh per annum, of which approximately 330 GWh per annum is directly attributable to the SRE Project, with the remaining increase being from continued development of mining and surface operations.

The additional electrical demand due to the SRE Project would be met by capacity from the national grid via the existing 275 kV transmission line; noting the potential for below line land disturbance and associated vegetation clearance. Minor augmentation of onsite electrical supply infrastructure at Olympic Dam within the SML would be required to ensure the additional capacity could be achieved and maintained.

New high and low voltage power supply and reticulation infrastructure would be required to all smelter infrastructure.

6.5.4.2 Diesel

An increase in diesel demand is required for the operation of the revised two-stage smelting process.

Diesel consumption associated with the smelter would increase from the existing 4,760 kilolitre (kL) per annum to approximately 8,150 kL per annum during Stage 1a, approximately 9,710 kL per annum during Stage 1b and approximately 11,655 kL per annum during Stage 2. Total site diesel consumption (including smelting operations) would increase from the existing 44,500 kL per annum to approximately 65,090 kL per annum, noting that some of this increase is from continued operational development outside of the SRE Project.

6.5.4.3 Energy efficiency

Energy efficiency, utility consumption, and the minimisation of GHG emissions are key criteria in equipment selection to ensure energy usage is minimised where practicable. Throughout the project design phases, a range of opportunities to enhance energy efficiency have been identified and assessed for their technical and economic feasibility, as well as their energy demand reduction potential. The outcomes of these assessments have informed decisions on which measures have been incorporated into the design, which require further investigation, and which are not currently viable or would have limited material benefit.

Specific measures under consideration for the SRE Project include:

- optimisation of the site layout to reduce cable lengths and reduce the requirement for the double-handling of process materials
- increased oxygen enrichment in the FSF, improving energy efficiency
- existing anode furnaces will be upgraded to oxyfuel burners, decreasing liquified petroleum gas (LPG) consumption
- SO_3 (sulphur trioxide) converter boiler to be installed in the new Acid Plant to capture waste heat
- use of electric air preheaters within the new Acid Plant to reduce hydrocarbon consumption

Measures that may be implemented for the SRE Project, subject to further consideration, include:

- use of steam heating in preference to fuel oil burners in the matte mill to reduce hydrocarbon consumption
- use of an electric auxiliary boiler to reduce hydrocarbon consumption associated with additional steam production
- mobile fleet optimisation and planning, including options for the electrification of some or all mobile fleet.

The SRE Project design has also been developed with future flexibility in mind, allowing for the potential integration of alternative fuel and electricity sources to support the green energy transition. These will be progressed in later design studies in cooperation with equipment manufacturers to confirm compatibility of selected equipment with alternative fuels such as biodiesel and bio-LPG.

6.5.5 Logistics

6.5.5.1 Construction material transport

Materials to support the construction of the SRE Project would be transported to site via heavy vehicles on the existing road network. Oversized loads, including PAMs associated with the SRE Project, would be transported directly to site for assembly.

Construction traffic volumes associated with the SRE Project are presented in Table 6.12 assuming that, as a worst case, that construction traffic would occur seven days per week, with delivery frequency and arrival times consistent across all days and with deliveries occurring during daylight hours only.

Table 6.12 | SRE Project estimated construction traffic volumes

Aspect	Stage 1a	Stage 1b	Stage 2
Total number of heavy vehicles	16,665	7,460	8,930
Duration of construction deliveries (days)	1,260	709	709
Average heavy vehicle trips per day[1]	13	11	13
Peak heavy vehicle trips per day[1]	30	30	37

[1] One vehicle trip is an inbound and outbound journey (i.e. two vehicle movements)
Source: HFJV (2025b)

6.5.5.2 Oversize/over mass construction vehicle movements

Oversize and over mass (OSOM) deliveries would be required for the SRE Project with the typical OSOM module expected to be up to 25 m long, 3.5 m wide and 5 m high.

The OSOM route from Whyalla to the SRE Project is approved for 25 m-long 59.5 t low loaders, which accommodates vehicles up to 3.5 m wide and 4.6 m high. Any OSOM vehicle over 25 m long, 3.5 m wide and 4.6 m high would require a detailed OSOM assessment and approval from the National Heavy Vehicle Regulator (NHVR) and DIT.

6.5.5.3 Operational traffic

Operational traffic represents a combination of workforce transport to and from site, concentrate import traffic and product export-related traffic.

Operational traffic associated with the SRE Project is summarised in Table 6.13.

Table 6.13 | SRE Project estimated operational traffic volumes

Aspect	Stage 1a		Stage 1b		Stage 2	
	Annual	Peak daily	Annual	Peak daily	Annual	Peak daily
Operational deliveries and exports						
Prominent Hill to/from Olympic Dam	1,489	5	1,786	6	1,310	4
Carrapateena to/from Olympic Dam	3,795	12	4,018	13	2,679	9
Oak Dam to/from Olympic Dam	0	0	0	0	5,715	18
Adelaide to/from Olympic Dam*	9,767	69	13,895	75	5,715	89
Port Augusta to/from Olympic Dam**	8,999	24	12,258	32	26,631	38
Operational personnel traffic						
Olympic Dam to/from Roxby Downs township (Day shift)	73,730	202	163,520	224	108,040	296
Olympic Dam to/from Roxby Downs township (Night shift)	35,040	96	36,500	100	62,050	170

[1] One vehicle trip is an inbound and outbound journey (i.e. two vehicle movements)

*Heavy vehicles comprise various types, including Triple Tanker, B-Triple, AB-Triple, Isotainer, Side Tipper Rotainer – Triple and Armoured Van

**Heavy vehicles comprise various types, including Triple Tanker and B-Triple

6.5.5.4 Upgrade and modification of the road network

Additional laydown areas, upgraded road intersections and/or road widening may be required to enable safe transport of large, modularised components during the implementation of the earlier SCM27 program of works and/or BHP's Copper SA growth plan. Regulatory approvals for these modifications to the road network would be progressed separately to the SRE Project.

It is anticipated that only minor, if any, further modifications would be required to support SRE Project logistics.

6.5.6 Waste management

Development of the SRE Project would require decommissioning of existing processing plant components including dryers, the EF and the existing concentrate storage and transfer system.

It is proposed that the EF, if it is determined to be not required, would remain in-situ to be closed as a component of the greater Olympic Dam closure activities due to the significant complexity of working within the existing operational smelter infrastructure. However, other decommissioned processing plant components would, wherever practicable, be removed and disposed of.

Where practicable, demolition materials generated during construction would be removed from site and recycled. Materials not suitable for removal from site would be managed on the SML via existing waste management facilities.

6.5.6.1 Construction

All SRE Project construction waste is proposed to be managed in accordance with EPA Waste Hierarchy outlined in the Environment Protection (Waste to Resource) Policy 2010.

Third-party contractors would prepare an approved Contractor Waste Management Plan(s) (Contractor WMP) to identify all waste streams and volumes that will be generated during construction.

Waste streams

Typical waste streams for demolition and construction are outlined in Table 6.14.

Table 6.14 I Anticipated waste streams

Phase	Waste streams
Demolition	Plant and equipment Concrete and other hardfill Structural steel, sheet metal, other scrap metals (including items like copper wiring) Electrical equipment and housings Other demolition wastes such as wall sheeting, glass and asbestos Piping
Construction	Excess concrete, bricks and asphalt Offcuts from timber, plasterboard and other building materials Other construction wastes such as packaging materials (timber and/or plastic pallets) General waste from construction personnel

It is anticipated that the largest volumes of construction waste would be generated from the demolition of:

- existing steam dryers – demolition of the two existing steam dryers, including dryer, turntables, conveying system, bag filter, condensate handling system and associated concrete platform, steel and footings
- existing concentrate transfer system – demolition of the existing concentrate pneumatic system, concentrate silos, flux loading system and associated structural steel and footings. (HFJV 2025e)

Waste collection and storage

A interim waste management storage yard(s), appropriately bunded, would be established within the SRE Area to allow for storage, segregation, testing and decontamination works (if required) to be undertaken isolated from ongoing operations and other construction activities.

Waste stream collection and storage principles which would be outlined in Contractor WMPs are outlined in Table 6.15.

Table 6.15 I Waste collection and storage principles

Waste stream	Collection	Interim storage
All solid wastes (excludes excavated spoil)	Solid waste to be segregated at the source to simplify downstream waste management activities Some wastes may have special collection requirements (e.g. any asbestos must be removed by a licensed contractor)	Solid waste segregated and stored at designated construction laydown area, awaiting removal for reuse/recovery/recycling or disposal. Other additional controls may be required during interim storage for certain waste streams. This may include testing, decontamination, bagging, covering or blanking of pipe ends and undercover storage for any E-waste
Excavated spoil (contaminated/other)	Excavation spoil to be classified (in-situ) for stockpiling	Contaminated waste to be stockpiled separately within designated, bunded construction laydown area for waste classification, prior to offsite disposal to EPA-licenced facility
Contaminated (radiation) excavated spoil	Radiation contaminated spoil to be managed in accordance with BHP existing site procedures and management plans	Radiation contaminated spoil to be disposed onsite in accordance with existing site procedures and management plans
Hydrocarbons (liquid waste)	Segregated according to material type (e.g. engine oil, hydraulic oil) into clean hydrocarbon drums Contaminated streams to be stored separately (as contaminated liquid waste)	To be stored in labelled drums within dedicated bunded area, prior to offsite disposal to EPA-licenced facility
Hydrocarbons (rags and filters)	Rags and filters to be stored separately and stored separately from liquid waste	To be stored in labelled containers within dedicated bunded area, prior to offsite disposal to EPA-licenced facility

Waste stream	Collection	Interim storage
Decontamination wash bay water	Decontamination activities to be undertaken within appropriately bunded designated temporary laydown area for collection of washdown water by vacuum truck	Decontamination processes would be undertaken within appropriately bunded areas to collect washdown water and prevent it from discharging to the environment Washdown water from decontamination activities to be collected and disposed of within the TSF
Wastewater (sewage)	Contractor work areas to include temporary wastewater management system(s), subject to secondary permits and approvals from SA Health	Short-term storage of sewage and greywater before vacuum-pumping and transport offsite by a licenced liquid waste contractor or transfer to onsite sewage treatment plant (subject to required secondary permits and approvals (e.g. SA Health))
Recyclable waste from construction personnel (e.g. cans and bottles, paper cardboard packaging, recyclable plastics, etc)	Collected in appropriate waste bins within construction work areas	Once bins are full, transported to offsite waste recovery/recycling facility
General waste from construction personnel (non-recyclable plastics, organic waste)	Collected in appropriate waste bins within construction work areas	Once bins are full, transported to onsite landfill for disposal

Waste processing and reporting

As part of the Contractor WMP, the contractor would be required to outline equipment and processes used to meet existing Olympic Dam site procedures with respect to testing, segregation, decontamination and disposal.

To mitigate risks to the environment, all contractors would be required to implement a waste register to:

- estimate and record waste quantities – estimate and subsequently measure actual waste quantities generated
- categorise waste types – identify whether the waste is hazardous or non-hazardous, and specify if it is recyclable, reusable, or requires disposal
- document waste origins and destinations – identify the origin area, disposal site, and any intermediate handling locations
- assess contamination levels – identify all contamination, including radiation or other hazardous substances
- reference documentation – attach and or reference internal forms and external documents, such as transport certificates
- update regularly – ensure the register is maintained and current. (HFJV 2025e)

Inspections and audits

During construction, onsite inspections and audits will be regularly undertaken by the environmental representative to confirm that contractor activities are compliant with all relevant environmental legislation, BHP site procedures and the requirements of the Contractor WMP.

6.5.6.2 Operation

All waste generated during operation of the SRE Project would be managed in accordance with existing site procedures and approved management plans.

Industrial and commercial wastes

Industrial and general waste materials generated at Olympic Dam are managed through the Resource Recovery Centre (RRC), which is located north-west of the existing smelter and south of the quarry.

Dedicated areas within the RRC allow waste streams to be segregated and temporarily stockpiled for offsite recycling or disposal. Recovered material is cleaned and undergoes a formal radiation clearance procedure prior to leaving the site.

Material which cannot be reused or recycled is disposed of to the landfill facility which is also located within the RRC. At the landfill face, waste materials are deposited and covered with clean fill material to facilitate containment of waste. The RRC is enclosed on all sides by either a mesh fence topped with strands of barbed wire or a bund. This is designed to restrict unauthorised access and function as a secondary litter containment control.

Hazardous wastes

Miscellaneous hazardous wastes such as laboratory chemicals, process chemicals and process waste materials may be generated as a by-product of processing activities. These wastes are, and would be, managed in accordance with site waste management plans and procedures to ensure their safe disposal and treatment.

Hazardous waste unsuitable for disposal within the SML would be transported offsite to an appropriate waste depot for further treatment, recycling or disposal. For offsite disposal, hazardous waste categorised as listed waste (within the meaning of the EP Act) is transported by an Environment Protection Authority (EPA)-licensed transporter to an EPA-licensed waste depot in accordance with EPA guidelines for waste transport and tracking

Contaminated wastes

Contaminated waste is managed in accordance with the BHP's Contaminated Waste Management Plan (CWMP) (BHP 2021a). The regulatory framework for the CWMP is contained within the current licence conditions for the Olympic Dam Licence to Mine (LM1), which specifically requires BHP to comply with the Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (Mining Code) (ARPANSA 2005).

BHP defines contaminated waste in accordance with the Mining Code definition of radioactive waste, specifically that 'contaminated wastes are materials that contain or are contaminated with radionuclides at concentrations or activities greater than clearance levels as established by the relevant authorities and for which no use is foreseen'. In practice, this is waste material that cannot be cleared below surface contamination clearance levels outlined in the ARPANSA Transport Code (ARPANSA 2019b), specifically:

- materials must be free of visual contamination
- materials must not exceed the site surface contamination criteria (clearance level) of 4,000 becquerel per square metre (Bq/m^2).

Contaminated wastes disposed of to the existing Contaminated Waste Disposal Facility (CWDF) are those solid wastes with non-removable surface contamination, where this contamination is the only source of radioactivity, and with an activity concentration less that as provided by IAEA (2014, as cited in ARPANSA 2021), specifically:

- 1 Bq/g for uranium in secular equilibrium (equivalent to material containing more than 80 ppm of uranium)
- 1 Bq/g for material containing ^{230}Th as the only radionuclide
- 10 Bq/g for each of the following radionuclides – ^{238}U, ^{234}U, ^{226}Ra, ^{210}Pb, ^{210}Po
- a calculated weighted average if there is a combination of radionuclides.

Typical contaminated wastes generated at Olympic Dam may include structural materials (e.g. beams, columns, plates, shells), processing infrastructure (e.g. tanks, vessels, pipes, fans and pumps, conveyor belts and rollers), surface and underground mobile equipment (e.g. light vehicles, trucks and materials handling equipment) and PPE.

Low-level radioactive wastes

Where structural waste materials cannot be cleaned, and the radionuclide concentration exceeds the guidance provided by IAEA (2014, as cited in ARPANSA 2021) as described in Section 6.5.6.2, it would be placed into the low-level radioactive waste (LLRW) storage area designated within the future expansion area of the CWDF, pending disposal to a final LLRW disposal facility.

Wastewater

Olympic Dam operates a sewage and wastewater treatment plant (WWTP) to contain and facilitate the anaerobic treatment of sewage from the processing plant and mine. The sewage facility consists of a high-density polyethylene (HDPE)-lined primary lagoon and two larger HDPE-lined evaporation ponds.

BHP has recently upgraded the existing WWTP to accommodate increased processing plant and mine load capacity, including from the SRE Project. Existing sewage and wastewater pipelines within the Water Infrastructure Area will be augmented to connect the SRE Project to the existing WWTP.

6.6 Completion and rehabilitation

At a nominated relinquishment date, all residual mining, processing operations and associated infrastructure (e.g. surface water management infrastructure) would be closed and rehabilitated, to achieve post-closure landforms and land-uses agreed with regulators and stakeholders and in accordance with the site Closure and Rehabilitation Management Plan (BHP 2023e).

The purpose of the Closure and Rehabilitation Management Plan is to describe how the Olympic Dam operation will be successfully closed and rehabilitated to achieve the agreed post-closure land-uses and the agreed environmental outcomes for identified values. The plan also outlines the performance criteria that would be used to measure successful closure and rehabilitation and addresses the necessary radiological considerations including the safe and secure disposal of the final radioactive processing residues, contaminated plant, soils and equipment.

For closure planning purposes, the site has been broken up into closure domains, specifically:

- airport facilities
- town and village facilities
- processing plant, administration and other general buildings
- pilot plant
- rock storage facilities
- wellfields and associated infrastructure
- RRC, disposal landfill and contaminated waste disposal facility
- quarry
- haul roads
- mine roads, tracks, car parks and linear infrastructure
- TRS
- underground mine
- backfill areas
- dam break barrier wall
- general disturbance
- exploration areas.

The closure requirements and implementation works are similar but may vary between domains. The various elements within each domain would be closed and rehabilitated where applicable to a specified/agreed standard. Progressive closure and rehabilitation would be planned as appropriate throughout the life of the asset. Rehabilitation and closure standard measures, closure design principles and completion criteria are documented.

Post-closure monitoring is also included in this plan to ensure these requirements are appropriately understood and costed. At the current stage of planning, the monitoring requirements are generalised, but over time the post-closure monitoring program and schedule would be tailored to suit agreed completion criteria requirements. Ongoing monitoring, data collection and observation during operation are acknowledged as a key component in eventual relinquishment of the site.

The Closure and Rehabilitation Management Plan describes aspects of the planned stakeholder engagement program. Such engagement and consultation on mine closure would only be meaningful closer to the closure date when the implications of closure on the post-closure community can be defined and understood.

Detail within the plan is supported by risk-based concept-level closure engineering designs that use best practice technology. The level of detail in the plan is commensurate with the early stages of project planning. The integrated closure planning system followed within BHP ensures that additional studies (and research where required) is carried out to provide design data and to increase certainty and confidence in the design and implementation strategy well in advance of closure execution works. Outcomes from the research, study and consultation would be fed into the Closure and Rehabilitation Management Plan review, as part of the continuous improvement and development of the plan.

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7. Stakeholder and community engagement

7. STAKEHOLDER AND COMMUNITY ENGAGEMENT

This chapter provides an outline of consultation and engagement for the SRE Project.

7.1 Objectives of stakeholder and community engagement

The objectives of effective stakeholder and community engagement are to:

- Ensure all parties potentially affected by the SRE Project are informed of the project's scope, timing, potential impacts and benefits.
- In collaboration with stakeholders, ensure potential issues are identified early on and appropriate mitigation strategies are developed.
- Ensure effective consultation with stakeholders to inform scope and direction.
- Position BHP as a 'good neighbour' that acknowledges and responds to stakeholder needs.
- Communicate decisions and provide progress updates.

7.2 Stakeholder and community identification

Stakeholders include any person, community, company or group that may influence or be impacted by the planning, operations or outcomes of the SRE Project.

Stakeholders can be internal or external to BHP, local, regional, state, national or international level, be directly or indirectly impacted by, have an interest in, or influence a decision or issue associated with the SRE Project.

Key stakeholders include:

- KAC as the Registered Native Title Body Corporate
- NTPRC
- local communities
- local government entities
- local business community and industry bodies
- government authorities and boards with local interests
- environmental interest groups
- Copper SA employees and contractors.

As the SRE Project progresses, new stakeholders may be identified, and stakeholder records kept by BHP would continue to be updated.

7.3 Stakeholder and Indigenous Peoples engagement

7.3.1 Approach

The Smelter and Refinery Expansion Project Stakeholder Communication and Engagement Strategy and Plan (the Plan) has been developed by BHP (Appendix A5). With reference to BHP's partnering approach and the Better Together engagement principles (DPC 2016), the Plan has considered the SPC Community Engagement Charter (SPC 2025b), which applies in circumstances where consultation is required on an Impact Assessed development application that is subject to an EIS.

The Plan details:

- all legislated notification requirements to be undertaken by the Minister pursuant to the PDI Act and Practice Direction 17 Impact Assessed Development (SPC 2023)
- BHP's overall engagement and collaboration strategy including scope and guiding principles
- engagement undertaken to date on the SRE Project
- engagement activities proposed throughout the EIS process including performance outcomes, level of public participation, techniques, indicative timeframes, responsibilities and metrics for measuring performance
- a list of affected stakeholders, interest groups and other relevant parties.

7.3.2 Engagement principles

In keeping with the requirements of the SPC Community Engagement Charter (SPC 2025b) and the Better Together engagement principles (DPC 2016), BHP has also considered the following principles when developing the SRE Project engagement approach:

- Engagement is genuine (Community Engagement Charter Principle 1, Better Together Principle 5) – All parties are genuine and honest in their participation. Those conducting the engagement use their best endeavours to proactively seek participation of communities and genuinely listen to and understand the range of views. Those participating are open to a range of perspectives and are well informed. Participants respect that their views may not prevail.
- Engagement is inclusive and respectful (Community Engagement Charter Principle 2, Better Together Principle 6) – Affected and interested people can have their say and be heard, regardless of background or status. People are invited and encouraged to participate early so that they can influence the process and the thinking from the start. All views are acknowledged and considered.
- Engagement is fit for purpose (Community Engagement Charter Principle 3, Better Together Principles 1, 2 and 3) – The engagement process matches the significance of the SRE Project. It is value-for-money, targeted, flexible, scalable and timely.
- Engagement is informed and transparent (Community Engagement Charter Principle 4, Better Together Principles 3, 4 and 5) – People have access to all relevant information at the time of consultation so that they can participate fully. They understand what is happening, why it is happening, what the consequences are, and what they can and cannot influence. When decisions are made, the reasons behind them will be explained.

- Engagement processes are reviewed and improved (Community Engagement Charter Principle 5) – After each engagement exercise, the process is reviewed to see whether the principles have been met and what can be done to improve the process next time.

7.3.3 Free, Prior and Informed Consent

The Copper SA Growth Program Free Prior and Informed Consent (FPIC) Strategy outlines a structured process that enables BHP to undertake the engagement and communications with the relevant Traditional Owner groups, therefore allowing BHP to:

- maintain compliance with BHP internal requirements, as outlined in the BHP Indigenous Peoples Policy
- support the approvals pathway and satisfy the requirements of the Capital Projects Global Standard, in delivering phase study deliverables
- effectively manage stakeholder and reputational risks
- meet regulatory expectations
- create value for BHP, and the communities connected to BHP's operations.

Establishing genuine, authentic relationships with Traditional Owner stakeholders is a key focus for BHP, evident by the commitment within the BHP Indigenous Peoples Policy Statement (BHP 2022b); that FPIC occur for all projects and proposed new operations that may impact Indigenous people. BHP recognises FPIC as an international human rights standard that safeguards Indigenous peoples' right to participate in decisions that may affect them.

BHP aim to be the partner of choice for our Indigenous stakeholders through:

- building positive, strong, and meaningful relationships with Traditional Owner partners, including regular relationship meetings, Traditional Owners wanting to partner with BHP into the future, and relationships beyond agreements
- building and promoting economic opportunities for Traditional Owners, Indigenous businesses and communities, including high engagement of Traditional Owners within their workforce, and strong commercial contracts with Traditional Owner businesses
- encouraging and uplifting cultural competence, respect, and capabilities of staff.

7.3.4 Level of engagement

BHP uses informative and inclusive practices to ensure stakeholder and community interest and confidence is maintained and enhanced. BHP's engagement approach is underpinned by FPIC principles with stakeholder needs, views and concerns documented in a manner suitable for assisting BHP's management and leadership team decision-making processes.

Adopting a flexible approach to stakeholder engagement allows the SRE Project to use different levels of consultation to suit the situations that arise and the needs of stakeholders. The level and method of planned engagement undertaken for each stakeholder has been classified into the categories defined in Table 7.1.

Table 7.1 | Level of stakeholder engagement

Level of engagement	Goal	Examples of engagement
Involve	To work directly with stakeholders throughout the process to ensure their concerns and aspirations are consistently understood and considered in decision-making processes	Workshops, meetings, advisory committees, information provision, document review and comment, formal and informal discussions
Consult	To obtain feedback from stakeholders for decision-makers on analysis, alternatives and/or decisions	Public submissions, focus groups, surveys, public meetings, informal interactions
Inform	To provide stakeholders with balanced and objective information to assist them to understand the problem, alternatives, opportunities and/or solutions	Websites, printed material, media releases, letters, emails, notice boards, public displays and events, meetings, forums, briefings

7.3.5 Stakeholder engagement approach

BHP propose to use a variety of communications methods to consult, record and respond to stakeholders and the community on the SRE Project to ensure they are informed and can provide feedback during the public exhibition of the EIS. The proposed engagement methods are outlined in Table 7.2.

Table 7.2 | Engagement methods

Engagement methods	Description
Website	SRE Project website (www.bhp.com) – provides project overview, updates, planning and approvals pathway, engagement material and BHP contact details
Information sheet	SRE Project Information Sheet outlining the project, including key project elements, environmental, economic and social outcomes – displayed in public notice boards in Port Augusta, Woomera, Roxby Downs and Andamooka
Dedicated email address and telephone number	Dedicated email address (coppersaprojects@bhp.com) and telephone number (1800 317 317) – provided as part of the consultation process, both on the website and the information sheet
Newspaper	Public advertisement of the SRE Project – promoted via newspaper with an advertisement in the Transcontinental and BHP's online environment to promote the Community Information Sessions
Social media	Social media advertisement of the SRE Project – promoted via the BHP South Australia Facebook Page to promote the Community Information Sessions during public exhibition
Community information sessions	Four community drop-in sessions at the following locations: • Port Augusta – Yarta Purtli Cultural Centre • Wommera – Community Café • Roxby Downs – Dune Café • Andamooka – Community Hall
Face-to-face meetings with Traditional Owners and Indigenous Groups	Ongoing meetings – held with NTPRC on the SRE Project design and proposed infrastructure locations

Engagement methods	Description
Cultural heritage surveys with Indigenous Groups	Conducting cultural heritage surveys for the SRE Project, in consultation with NTPRC, KYA and BDAC, to establish locations of any significant cultural heritage locations, and document archaeological and ethnographic findings to inform project design and infrastructure locations

7.4 Preliminary engagement outcomes

During the preparation of this EIS, BHP has undertaken preliminary stakeholder engagement as outlined below.

7.4.1 Community

A summary of community engagement feedback, issues raised, and where they have been addressed in the EIS are summarised in Table 7.3.

7.4.2 Local government

A summary of local government engagement feedback, issues raised, and where they have been addressed in the EIS are summarised in Table 7.4.

7.4.3 Traditional Owners and Indigenous Groups

Archaeological and ethnographic Work Area Clearance engagements were undertaken throughout 2024 and 2025 to survey the SML Area by heritage representatives from the NTPRC. The survey aimed to identify all known Aboriginal heritage values associated with the SML Area to inform the development of the SRE Project.

In addition to formal Aboriginal surveys, engagement to date by the Indigenous Engagement Team under the Copper SA Growth Program FPIC Strategy, has included presentation at board meetings and a site visit to the SML Area and Olympic Dam for the Traditional Owners in late 2025.

Future engagement actions scheduled by the BHP Heritage Team are to follow the FPIC process across the SRE Project's life cycle. The NTPRC has been established, and meets monthly to review project updates. If any concerns are identified, such as salvage requirements, they are addressed through a structured process.

The SRE Project infrastructure locations were designed to minimise impact to Aboriginal heritage. Between December 2024 and October 2025, the SRE Project disturbance footprint was significantly reduced through a series of revisions to the project designs, resulting in total avoidance of impact to all ethnographic sites identified across the SRE Project disturbance footprint within the SML Area.

Although heritage representatives from NTPRC recommend the protection and conservation of known Aboriginal heritage values wherever possible, it is recognised that the total avoidance of impact to heritage is unachievable during the development of SRE Project.

A summary of Traditional Owner and Indigenous Group engagement feedback, issues raised, and where they have been addressed in the EIS are summarised in Table 7.5.

7.4.4 Regulators

During the preparation of this EIS, BHP has undertaken in-depth engagement and technical discussions with a range of the Government of South Australia's agencies, including DHUD – Planning and Land Use Services (PLUS), Department for Energy and Mining (DEM), South Australian EPA, Department for Environment and Water (DEW), Landscape SA, DIT and the Australian Government's DCCEEW.

This engagement included meetings and technical workshops providing:

- opportunities for regulators to review source-pathway-receptors (SPRs), the Environmental Impact Assessment Framework (EIAF), technical information and modelling
- opportunities for regulators to confirm environmental, social and economic assessment requirements for BHP to address in the EIS
- opportunities for regulators to provide feedback on potential environmental, social, cultural and economic issues and opportunities.

Where government representatives have requested additional briefings or information, BHP has provided these on an ongoing basis. Feedback from the government agency engagement has been considered and addressed in this EIS.

Table 7.3| Community engagement and outcomes

Stakeholder	Consultation method	Date	Discussions/outcomes	Where addressed in the EIS
Roxby Downs Community	Drop-in session	December 2024 March 2026	• Excitement for Olympic Dam growth projects. • Question on how BHP can help to keep Roxby vibrant (i.e. maintain the balance between those employees who want to live in Roxby Downs and FIFO) • Question on potential impact on essential community services (e.g. Will it make it more difficult to see a doctor at the clinic? Is there enough housing? Access to flights for residents?) • Concern relating to anticipated increase in crime and anti-social behaviour in town • Concern regarding the increase in trucks on the roads due to these projects and how BHP will manage road safety • Question on how BHP will power the SRE Project expansion and water supply interaction with DIT's NWP? • Request for BHP to continue to engage on the SRE Project with acknowledgement of the benefit in these sessions • Request for specific engagement with local businesses would be beneficial (i.e. interested in procurement opportunities) • Request for BHP to explore opportunity for connection with the area school in relation to skills development and traineeships	• Section 9.9 Socio-economic (community values, infrastructure and economy) • Section 10.4 Local community (community values, health, safety, amenity)
Andamooka Community	Drop-in session	March 2026	• Request for potential BHP support for a new community bus at Andamooka • Concern relating to Roxby contractors bringing rubbish to Andamooka	• Section 9.9 Socio-economic (community values, infrastructure and economy) • Section 10.4 Local community (community values, health, safety, amenity)
Olympic Dam Stakeholder Engagement Group (SEG)	Meeting	June 2026	• Question in relation to transport scope associated with concentrate, construction materials and modules • Question on potential social impacts on workforce increases, housing, accommodation, health services and community infrastructure • Concern raised by the South Australia Ambulance Service (SAAS) in relation to emergency services and potential increased demand, volunteer impact and strain from village operations • Question on the SRE Project EIS assessment process under the PDI Act • Concern relating to increased runners on Olympic Way with a suggestion to consider a dedicated running track • Request for BHP to continue community engagement for the SRE Project during and post the EIS assessment	• Section 9.9 Socio-economic (community values, infrastructure and economy) • Section 10.4 Local community (community values, health, safety, amenity)

Table 7.4 | Local government engagement and outcomes

Stakeholder	Consultation method	Date	Discussions/outcomes	Where addressed in the EIS
Roxby Council Administrator and Chief Executive Officer (CEO)	Meetings ongoing	March 2024 - present	• Enquiry on how Roxby Council can support water management in the interim period before DIT's NWP comes online (e.g. Council has various water optimisation efforts underway and could look to reduce potable water use, redistribute wastewater from ODS). • Enquiry on how to optimise local business opportunities (i.e. bridge the gap between local suppliers, the local buy program and actual opportunities) • Observation that some FIFOs try convert to permanent residents, which Roxby Council wants to encourage • Suggestion that Roxby Council are interested in how to support the BHP workforce with an outlet for mental health and wellbeing (e.g. touch footy, soccer, netball) • Enquiry that Roxby Council wants to look at the pipeline of BHP's expansion work and determine adequacy of industrial land for the future with a strategic planning process planned to commence • Observation that there are possible synergies in waste management	• Section 9.9 Socio-economic (community values, infrastructure and economy)

Table 7.5 | Traditional Owner and Indigenous Group engagement and outcomes

Stakeholder	Consultation method	Date	Discussions/outcomes	Where addressed in the EIS
NTPRC	Meetings ongoing	February 2024 – present	• NTPRC recommended avoidance of harm to Aboriginal heritage sites and values within/adjacent the SRE Project wherever possible. • Impact to Aboriginal heritage to be managed in accordance with ODA Heritage Protocols • Develop a Project Heritage Management Plan (PHMP) for SRE Project, which outlines the agreed management measures to avoid impact to Aboriginal heritage	• Section 10.3 Cultural amenity (heritage and communities)
KAC	Meetings ongoing	December 2024 – present	• KAC Board provided with ongoing general updates and overview of growth projects within BHP's Copper SA Growth Program, including the SRE Project • KAC provided with an outline of the SRE Project approvals process, including EIS assessment requirements and execution timeframes • KAC engaged to conduct cultural heritage surveys in and around the SRE Project to establish any significant cultural heritage material • BHP facilitated Olympic Dam site visit conducted in July 2025, including SRE Project infrastructure areas within the SML • BHP facilitated Olympic Dam site visit scheduled for July 2026 of the SRE Project infrastructure areas within the SML, including providing KAC with EIS summary material ahead of formal submission and public consultation	• Section 7.6 Ongoing engagement
	Olympic Dam Site Visit	July 2025		
KYA	Meetings ongoing	February 2025	• Provision of general updates and overview of growth projects within BHP's Copper SA Growth Program, including the SRE Project, approvals progress and execution timeframes • KYA engaged to conduct cultural heritage surveys in and around the SRE Project to establish any significant cultural heritage material • Request for BHP to conduct more regular engagement	• Section 7.6 Ongoing engagement
BDAC	Meetings ongoing	December 2024 – present	• Provision of general updates and overview of growth projects within BHP's Copper SA Growth Program, including the SRE Project, approvals progress and execution timeframes • Request for BHP to conduct more regular engagement	• Section 7.6 Ongoing engagement

7.4.5 Summary of engagement outcomes

As outlined in Section 7.1, a key objective of BHP's engagement activities was to ask stakeholders for feedback to identify what was important to them about their communities, their potential concerns and suggestions for opportunities regarding the SRE Project. Their views regarding the importance of a wide range of environmental values and how these are considered were also gathered.

BHP has sought to respond to issues raised by stakeholders by undertaking detailed technical assessments, and ongoing stakeholder engagement where required. Where further information has been requested based on stakeholder feedback, BHP has gone back to relevant stakeholders to discuss potential concerns, questions, issues, or opportunities raised.

For government agencies, following a series of technical workshops, BHP has responded to government feedback either via the provision of further information directly to the stakeholder, or through additional technical work and clarifications added to the EIS.

The feedback received during engagement has enabled BHP to develop an understanding across the four key value themes – social, economic, environmental and cultural – of what is important to stakeholders. These are discussed in the following sections.

7.4.5.1 Social and economic values

The majority of stakeholders have identified that social and economic factors are of highest importance to them, in particular employment opportunities, opportunities to build capabilities and skills, and opportunities for business development and economic growth for the Far North Region.

The importance of a cohesive regional community, being a good neighbour, strong culture, spiritual connection and cultural heritage protection were also raised. Stakeholders also identified the importance of ongoing engagement in projects in their communities as a key value. Stakeholders, particularly the Roxby Downs and Andamooka local communities, expressed a strong desire to be involved in, and to have access to, opportunities arising from the SRE Project, including employment and supplier opportunities.

Most concerns or issues raised by stakeholders were also skewed towards social and economic values. They included challenges associated with unemployment, business closure and struggling businesses, poor economic climate, loss of youth from communities, social issues, and concerns associated with not receiving the benefits associated with mining projects in the region (e.g. companies not procuring locally).

Concerns were raised regarding BHP potentially not going ahead with the SRE Project and the need for ongoing communication, which reflects the vulnerabilities that exist within communities due to recent economic challenges. A number of local suppliers indicated that they would like greater information and access to potential supplier opportunities related to the SRE Project.

7.4.5.2 Environmental values

Local and regional environmental values were highlighted throughout stakeholder engagement for the SRE Project. In particular, the potential for air quality and radiological emissions from the SRE Project were discussed, which are discussed in detail in Section 9.3.3 and Section 9.4.3 of this EIS, respectively.

From a radiological perspective, the dose assessment indicates that potential impacts will be low and below the recognised public dose limit of 1 mSv/y and dose constraint of 0.3 mSv/y, in accordance with International Commission on Radiological Protection (ICRP) criterion (Section 9.4.3).

Further feedback was provided around specific environmental values through the SRE Project website and SRE Project Information Sheet prepared for stakeholder engagement. In terms of environmental values, stakeholders referred to the importance of environment and sustainability, including the need to preserve native species and protect the environment, and the importance of managing potential environmental impacts of projects for values such as ecology, groundwater and surface water.

7.4.5.3 Cultural values

With respect to cultural values, BHP respects that the presence of mining operations causes impacts to the cultural heritage and values of relevant Indigenous Groups, and our partnerships are focussed on honesty, transparency and mutual benefit, as we develop the SRE Project. BHP respects the cultural rights of the Traditional Owners and does not disclose results of cultural information.

The presence of any artefacts or identified Aboriginal cultural heritage values, including landscape features, within the SRE Project will be handled in accordance with legislation and the agreed procedures and protocols for heritage management with the KAC, KYA and BDAC Indigenous Groups.

7.5 Incorporating feedback into the SRE Project

Key social, economic, cultural and environmental values were identified throughout the stakeholder engagement activities (Section 7.4.5), with this feedback incorporated into the SRE Project as described in Table 7.6.

Table 7.6 | Incorporating feedback into the SRE Project

Value theme	Value	How feedback has been incorporated/addressed	EIS reference
Social	Employment	The SRE Project would generate between ~978 and ~1,313 (peak FTE) jobs during construction (depending on the project stage) and up to between ~207 and ~508 jobs during operations (depending on the project stage).	Section 9.9.3
Economic	Economy	The SRE Project is estimated to deliver a net incremental economic benefit to the South Australia community of approximately $342 million in NPV terms (FY26 AUD$, 6% discount rate) over the period of FY27 to FY76. Considering also a potential economic benefit to suppliers, the net benefit could reach up to $763 million attributed to the SRE Project (Appendix D3 Economic Assessment).	Section 9.9.2.4
Environmental	Air quality	The air quality impact assessment concludes that whilst pollutants are estimated to increase relative to BAU operations, the predicted concentrations and deposition rates for all pollutants and averaging periods are below the applicable EPA assessment criterion at all receptor locations for SRE Project emissions.	Section 9.3.3
	Radiation	From a radiological perspective, the dose assessment indicates that potential impacts would be low and below the recognised public dose limit of 1 mSv/y, and dose constraint of 0.3 mSv/y, in accordance with the ICRP criterion.	Section 9.4.3
Cultural	Aboriginal cultural heritage	BHP has undertaken, and would continue to undertake, cultural heritage surveys in accordance with the ODA. Identification of Aboriginal cultural heritage values have been compiled through background research, predictive modelling, Aboriginal consultation, archaeological field investigations and anthropological assessments. The SRE Project would develop a PHMP to ensure the ongoing protection of cultural heritage through the development of a cultural heritage management system, including inductions, training, communication and measures to be undertaken in the event Aboriginal heritage sites are discovered during construction and operations.	Section 9.8.3

7.6 Ongoing engagement

7.6.1 Public exhibition of the EIS

The Indenture Minister will place this EIS on public exhibition for a period of at least 30 business days. The public exhibition process is the government's formal consultation with stakeholders, providing an opportunity for all interested parties to read about the SRE Project and submit feedback to both the regulatory authorities and BHP regarding the SRE Project.

Following publication, the EIS will be available for review across several formats, including:

- online via the SA Planning Portal (plan.sa.gov.au) and YourSAy (yoursay.sa.gov.au) consultation portals
- online via the BHP Regulatory Information portal (bhp.com/sustainability/environment/regulatory-information)
- hard copies of the EIS and a digital copy of the EIS appendices on a portable USB drive will be made available on request by contacting BHP directly via email at coppersaprojects@bhp.com, or by calling BHP on 1800 317 317.

During the public exhibition phase, BHP and/or the SPC and/or PLUS will also hold in-person and online information sessions regarding the SRE Project.

Feedback regarding the SRE Project may be made by completion and submission of a survey form, an online submission form, or via email of a downloadable submission form.

7.6.2 EIS Response Document development

All submissions received by BHP or the SPC will be reviewed and responded to by BHP via development of an EIS Response Document. Together, the EIS and the EIS Response Document form the final application to the SPC. The SPC will evaluate all feedback as part of the Assessment Report and for making recommendations to the Minister for Energy and Mining.

7.6.3 Life-of-operation stakeholder engagement

As a global company, BHP Group interact with a range of partners and stakeholders during ongoing operational activities. BHP Group's methods, frequency of engagement and approach to listening to partners and stakeholders are diverse and use a range of formal and informal communication and engagement channels to understand partner and stakeholder views.

Table 7.7 provides an overview of BHP Group's partner and stakeholder groups, their range of interests and how engagement is undertaken with them.

Table 7.7 | BHP Group ongoing engagement matrix

Stakeholder/partner	Interest	Engagement approach
Customers: Broad customer base, geographically dispersed across multiple commodities	• Sales agreements • Product quality, performance and price • Environmental laws and regulations • Sustainability metrics and performance • Alignment with regional regulations	• Regular engagement according to commodity, sector and geography to understand our customers' needs and determine the optimal product placement • Participation in relevant industry associations and conferences and establishing partnerships and collaboration in areas of mutual interest, such as supply chain innovation and sustainability
Workers: BHP Group's global workforce of more than 90,000 employees and contractors	• BHP Group financial and sustainability performance • Health and safety • BHP Group's work with communities • Working conditions • Mental health and wellbeing • Inclusion and diversity • Development opportunities • Proposed changes to our operated assets or practices	• Regular communication through tailored internal channels, which include BHP's intranet, email and newsletters, town hall meetings, toolbox talks, field leadership activities, ongoing dialogue between leaders and teams, Health, Safety, Environment, and Community (HSEC) Awards and through our Engagement and Perception Surveys
Governments where BHP Group operate: National, regional or state level and local governments in the countries where we have a presence	• Fiscal and tax arrangements • Global trade systems • Labour relations and employment practices • Supplier payment arrangements • Environmental laws, regulations and project approvals • Mineral royalties • Local infrastructure • Community wellbeing	• Direct BHP Group engagement at all levels of government, as well as participation in industry associations where relevant to national (or international), regional/state or local issues
Indigenous peoples: A broad spectrum of Indigenous representatives including, community leaders and members, Traditional Owners and representative bodies	• Environmental, social and cultural impacts associated with our operated assets • Cultural heritage • Human rights • Opportunities for social investment, local employment, local suppliers and business creation • Improved community engagement mechanisms • Environmental performance	• Consultation, negotiation and agreement making processes • Community engagement • Work and local supply opportunities • Social investment • Preserving cultural heritage • Targeted communications • Community perception surveys
Industry peers and associations: Commodity-specific associations, as well as sector-specific associations at regional, national and international levels	• Diverse range of issues associated with the resources sector or specific commodities • Issues including the environment, health and safety, communities, skills and training for employees, economic policy and sustainability management and performance	• Representation on specific committees and engagement on specific projects with industry associations, to develop guidelines, standards and programs, agree advocacy priorities and share best practice
Investment community: Debt and equity analysts, ESG analysts and corporate governance analysts	• Alignment of our performance with shareholder interests, including good financial returns, strong governance and expectations of strong performance and management of financial and non-financial risk	• Regular communication through analyst briefings on key issues • Exchange releases • Sharing Group publications, such as Annual Reports and Operational Reviews • Participation in external benchmarking activities
Labour unions: Labour unions represented at many of our operated assets	• Workers' rights and interests • Freedom of association and collective bargaining • Health and safety • Remuneration, working hours and roster arrangements • Risk management	• Direct communication as required • Respecting the right to freedom of association
Local communities: A broad spectrum of local communities with interests and concerns	• Environmental, economic and social impacts associated with our operated assets • Opportunities for social investment, local employment, local supplier and business creation • Support for social infrastructure and programs • Improved community engagement mechanisms • Environmental performance	• Community consultation, engagement and participation in BHP activities • Work and local supply opportunities • Social investment • Targeted communications • Community perception surveys
Media: Representatives from print, online, broadcast and social media	• Broad range of issues reflecting diverse stakeholder interests	• Media releases, briefings, presentations and interviews • Publicly available information (Annual Report and other topic-specific reports) • Online and social media platforms (such as the BHP Group's website, LinkedIn, YouTube, X, Facebook etc.)

Stakeholder/partner	Interest	Engagement approach
Non-government organisations (NGOs) and civil society: Environmental, social and human rights organisations at local, national and international levels	• Ethical, social and environmental performance of our operated assets, proposed operated assets or closed operated assets • Governance mechanisms • Risk management • Complaint and grievance mechanisms and remedy, transparency • Practices to respect human rights • Social investment • Non-operated joint ventures • Social and environmental impacts	• Local engagement through each operated asset's stakeholder engagement plan • Various multi-stakeholder initiatives and partnerships • Through the BHP Group's Forum for Corporate Responsibility
Shareholders: A diverse group that has invested in our business with significant representation in Australasia, United Kingdom, Europe, South Africa and North America	• Creation of long-term shareholder value through consistent financial returns • Ensuring high-quality governance • Maintaining focus on continuous improvement • Understanding shareholder concerns, including ESG performance	• Annual General Meetings • Publicly available information (Annual Report, other topic-specific reports, BHP Group website) • Regular meetings with institutional shareholders and investor representatives • ESG roundtables • Investment and community presentations
Society partners: Public or private organisations we partner with on specific projects to benefit society, the communities where we operate or the environment	• Ethical, social and environmental performance of our operated assets, proposed operated assets or closed operated assets, governance mechanisms, risk management	• Boards and operating committees • Publicly available information (Annual Report and other topic-specific reports, BHP Group website) • Regular engagement at both the BHP Group and local/regional levels
Suppliers: Businesses local to our operated assets (including local Indigenous suppliers) as well as national and multinational suppliers	• Procurement • Inbound marketing procurement and charter party agreements, payments and minimum supplier requirements • Safety standards	• Regular engagement through the supplier life cycle determined according to supplier segmentation and risks including with respect to health, safety, environment and community, modern slavery, transparency, inclusion and diversity, and business conduct more broadly

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8. Impact assessment methodology

8. IMPACT ASSESSMENT METHODOLOGY

Relevant to the SRE Project, Section 113(4) of the PDI Act requires that an EIS must include a statement of:

- the expected environmental, social and economic effects of the development
- the expected effects of the development on the climate and any proposed measures designed to mitigate or address those effects
- the extent to which the expected effects of the development are consistent with the provisions of any relevant state planning policy, regional plan, the Planning and Design Code, and any matters prescribed by the regulations
- the extent to which the expected effects of the development are consistent with the EP Act
- commitments to avoid, mitigate or satisfactorily manage and control any potentially adverse effects of the development on the environment.

BHP has developed an Environmental Impact Assessment Framework (EIAF) to identify and, wherever possible, quantify, the potential environmental and social impacts associated with the SRE Project in a consistent and repeatable manner. The EIAF is applied, with minor project-specific revision as required, consistently across all of BHP's Copper SA sites to inform primary regulatory approvals. The SRE Project EIAF has been used to inform preparation of the EIS, and is provided in Appendix E1 and summarised in Figure 8.1.

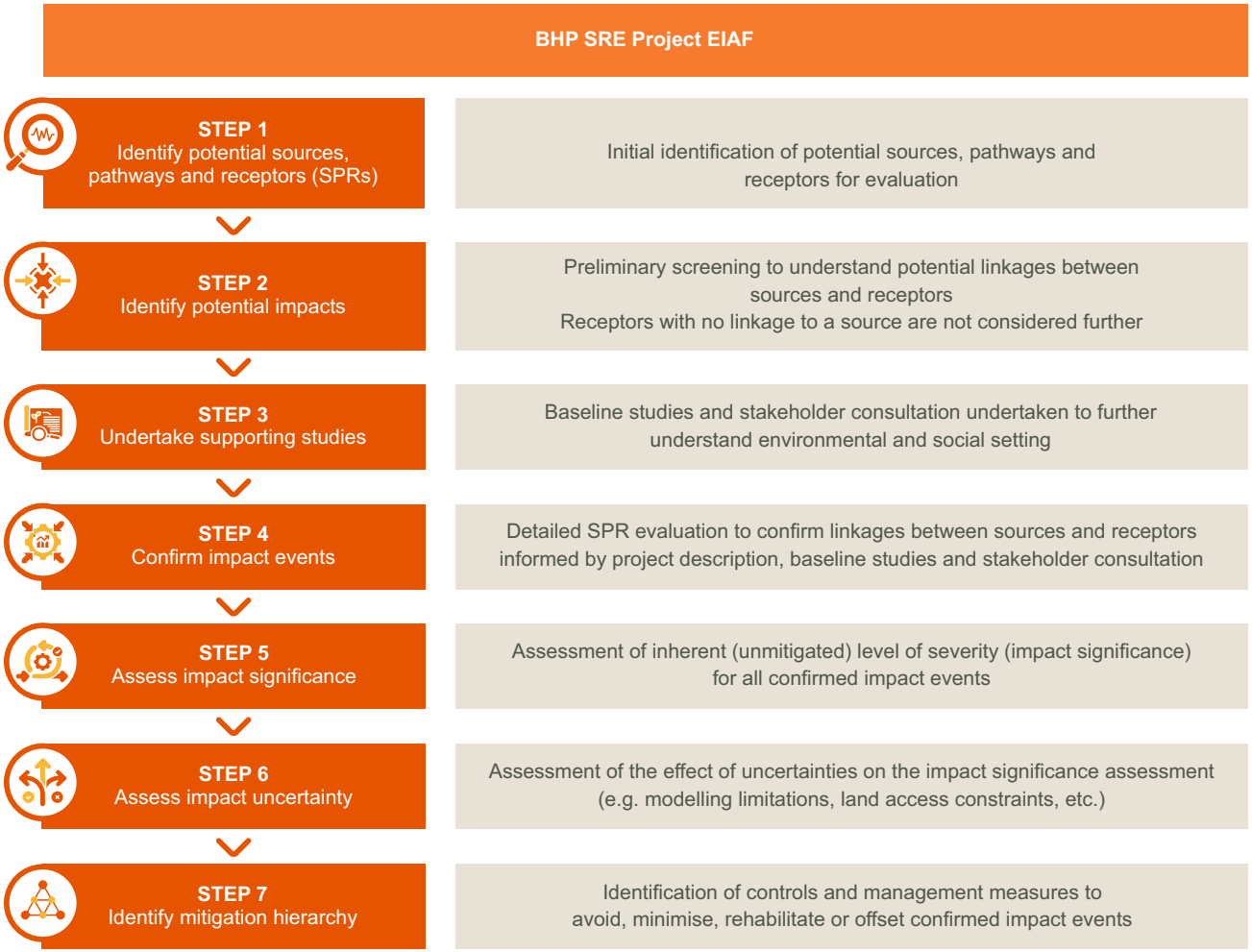


Figure 8.1 | Environmental Impact Assessment Framework

8.1 Definitions

To ensure a consistent approach to impact assessment for the SRE Project, it is important to understand the EIAF terminology and definitions. These are described in the following sections.

8.1.1 The Environment

In determining the pathways and receptors for the EIAF, consideration has been given to defining the environment as including:

- land, air, water (including both surface water, groundwater and sea water), organisms, ecosystems, native fauna and other features or elements of the natural environment
- buildings, structures and other forms of infrastructure, and cultural artefacts
- existing or permissible land use
- public health, safety or amenity
- the geological heritage values of an area
- the aesthetic or cultural values of an area.

Section 3 of the EP Act defines the environment as land, air, water, organisms and ecosystems, and includes:

- human-made or modified structures or areas
- the amenity values of an area.

Section 528 of the EPBC Act defines the environment as including:

- ecosystems and their constituent parts, including people and communities
- natural and physical resources
- the qualities and characteristics of locations, places and areas
- heritage values of places
- the social, economic and cultural aspects of the above.

8.1.2 Source, pathway and receptors

Sources, pathways and receptors are defined and are applied in the EIAF as follows:

- Source – a description of the source of the potential impact event which, alone or in combination, has the potential to impact a receptor.
- Pathway – a description of the pathway, means or route (with consideration of any natural barriers) by which an identified receptor can be exposed to, or may reasonably be expected to be impacted by, an identified source.
- Receptor – a description of the receptor that may reasonably be expected to be impacted by the source via the pathway, taking into account the elements of the environment as described in Section 8.1.1.

8.1.3 Impact events and risk events

For the purposes of the EIAF, the distinction between impact and risk is important.

Broadly, impact events are those events which are predicted to occur as a result of the implementation of the SRE Project ('planned events'). For example, for construction of the smelter furnaces, plant and equipment would require permanent land disturbance activities, which would require removal of existing vegetation, and therefore have an impact on receptors. Whilst there may be some uncertainty (Section 8.2.6) regarding the level and/or nature of the impact, it is certain that proposed project activities would result in some level of impact.

Risk events, by contrast, are not predicted to occur during planned project activities, however there is some potential (or likelihood) that they could occur in some circumstances ('unplanned events'), and should they occur, there may be a subsequent impact to a receptor. For example, a water pipeline may fail (the unplanned event), resulting in the release of saline water to the ground, which may subsequently result in an impact to native vegetation. In an EIAF context, risk events are characterised by the likelihood of a linkage between source and receptor occurring where, under planned situations, no linkage would be present.

Discussion regarding hazards and risks associated with the SRE Project, including the risk management method, framework and the risk register developed for the SRE Project, are described in Chapter 11. The SRE Project Risk Register (Appendix E3) identifies, assesses and manages risks associated with the various activities and infrastructure that comprises the SRE Project, including risks to occupational health and safety arising from those activities and the proposed SRE Project infrastructure. The SRE Project Risk Register does not specifically address the potential impacts of unplanned events on offsite receptors. Separately, the EIAF, discussed in this chapter, has been used to assess unplanned events (risks) to identified non-occupational receptors and offsite infrastructure that are not within the scope of the SRE Project Risk Register. These include:

- surface water (flooding) related risks associated with low probability rainfall events (e.g. 1-in-100-year average recurrence interval (ARI) events)
- soil and groundwater contamination risks associated with a loss of the containment (i.e. spills)
- risk to receptors related to fires that may be started onsite and progress offsite.

8.2 Impact assessment and management

The EIAF provides a systematic approach to identify and evaluate potential environmental and social impacts associated with the SRE Project through the project life cycle (construction, operations and closure) in a consistent, repeatable and transparent manner, ensuring community feedback and knowledge is embedded. This allows focus on the appropriate avoidance, mitigation and management measures to meet the environmental objectives.

The EIAF is used to:

- determine which combinations of sources and pathways are likely to result in impacts to receptors
- make consistent and repeatable determinations of the impact to receptors across multiple pathways
- understand the uncertainties, and resultant sensitivities, associated with the determination of impact
- allow consideration of perspectives that arise from stakeholder consultation about the SRE Project activities and the potential for impacts
- determine where controls, if any, are required to reduce impacts to as low as reasonably practicable (ALARP) in accordance with a mitigation hierarchy.

8.2.1 Identification of sources, pathways and receptors

An evaluation is undertaken for initial identification of potential SPRs for the SRE Project (Step 1, Figure 8.1). The identified sources, pathways and receptors for the SRE Project are described as Table 8.1.

Table 8.1 | Sources, pathways and receptors under the EIAF

Element	Description
Sources	All proposed SRE Project activities or actions, in whole or in part, and categorised by the timeframe at which the activity or action would be undertaken (i.e. construction, operation, and closure). This includes: • actual and reasonably foreseeable activities under BHP control (i.e. construction, operation, and closure) • associated activities that are essential for the SRE Project, but may not be directly owned, operated or managed by BHP • actual and reasonably foreseeable activities of others that may materially contribute to the severity of the impacts
Pathways	Air – air quality, noise, vibration, light, radiation and greenhouse gases
	Surface water – quality and quantity
	Groundwater – quality and quantity
	Land – quality
	Socio-economic – infrastructure, economy
Receptors	Ecology – terrestrial flora (including vegetation) and fauna (including habitat), aquatic ecology, GDEs, South Australian listed threatened species, EPBC Act listed threatened species
	Cultural amenity – historic heritage, cultural heritage, Indigenous communities
	Local community – health and safety, amenity, community values
	Third-party users – change in resource availability
	Future users – recognises the inherent environmental value of the pathways
	State and Commonwealth matters – economy, climate change

8.2.2 Identification of potential impact events

The PDI Act requires that the EIAF describe potential impact events associated with each phase of the proposed operations (construction, operation, and closure) and relevant to each element of the environment. Noting that, for the purpose of the impact assessment, a potential impact event is the combination of a (planned or unplanned) source, a pathway and a receptor, and is identified in the absence of the implementation of engineering or administrative control measures. Unplanned events, in relation to the distinction between those assessed under the EIAF and those assessed via the BHP Risk Framework and presented in the SRE Project Risk Register, are discussed in Section 8.1.3.

The SRE Project's EIAF identifies potential impact events through completion of a preliminary (screening) source-pathway-receptor (SPR) evaluation. This is undertaken to identify linkages between project

sources (i.e. proposed activities or project elements), pathways and receptors. This considers potential linkages for the full project life cycle (construction, operation, and closure). This preliminary screening identifies where potential impacts may occur (Step 2, Figure 8.1). Receptors with no linkage to a source are not considered further.

In addition to the SPR screening of potential impact events, stakeholder engagement also informs which of the potential impact events are progressed to confirmed impact events, and therefore to the impact assessment stage of the EIAF (Step 3, Figure 8.1). In these instances, a potential impact event may have been determined to have no SPR linkage but may be progressed based on the stakeholder's perceived potential for impacts to occur as a result of proposed project activities.

8.2.3 Supporting studies

The preliminary SPR outputs are used to inform scopes for further technical and supporting studies (Step 3, Figure 8.1). The supporting studies are designed to provide the information necessary to classify uncertain or unconfirmed linkages and to support the effects and or impact assessment stages of the EIAF for the confirmed impact events. Examples of supporting studies include:

- engineering studies describing the specifics of proposed site activities, actions and infrastructure (sources)
- baseline social and/or environment studies (pathways and receptors)
- assessment of effects studies, describing and, wherever possible, quantifying the likely change in the pathway values as a result of proposed project activities (e.g. air quality modelling, noise and vibration modelling) (pathways)
- impact assessment studies, describing and, wherever possible, quantifying how the changed pathway values may impact the receptor (e.g. how a change in air quality may result in health or amenity impacts, or how land disturbance may reduce the abundance or diversity of flora, vegetation and/or fauna habitat) (receptors).

8.2.4 Confirmation of impact events

Outcomes of the supporting studies undertaken on sources and pathways determine potential impact events to either have no linkage, a possible linkage, or a confirmed linkage (Step 4, Figure 8.1). Potential impact events that remain uncertain or unconfirmed following the completion of supporting studies shall be subject to the precautionary principle and carried forward assuming that a linkage exists.

8.2.5 Determination of impact significance

Confirmed impact events (i.e. those determined to have an SPR linkage and those other events carried forward as a result of the outcomes of stakeholder consultation) are subject to an impact assessment under the EIAF to determine the significance of the impact in the absence of controls (Step 5, Figure 8.1).

In determining the impact significance, consideration is given to the:

- type of impact, including direct, indirect, cumulative and/or perceived
- geographic extent, size and scale
- duration, frequency, reversibility of the potential impact
- whether the potential impact is from a planned or unplanned event

- uncertainty associated with the determination of impact significance, and subsequently the sensitivity to change (Section 8.2.6).

For the purposes of the EIS, an EIAF, including an impact significance determination matrix, was developed specifically for the SRE Project, with consideration to significance requirements under the PDI Act, other relevant state legislation and BHP's internal risk management classifications (Table 1.4 of Appendix E1 EIAF). Consequence definitions, severity levels and significance determinations under the EIAF relate specifically to the SRE Project and use different, and distinct, criteria from those assignments of significance under the EPBC Act. The SRE Project EIAF refers to 5 severity levels (Level 1 to Level 5), with severity of impact categorised as 'not significant' for Level 1 to Level 2, and as 'significant' for Level 3 to Level 5. Confirmed impact events are assessed against the consequence definitions to determine the severity level and allow a determination of impact significance.

Events determined to have an uncontrolled impact consequence of greater than or equal to Level 3, are considered significant and require the application of controls to reduce the consequence severity in keeping with the environmental objectives (Table 1.1 of Appendix E1 EIAF).

Alternatively, a confirmed impact event may be determined to be significant as an outcome of stakeholder engagement and may also necessitate the application of controls to eliminate or otherwise reduce the impact to ALARP.

Assessment outcomes of 'significant' under the EIAF also allow for the development of relevant environmental outcomes and associated compliance, which may subsequently be incorporated into the Olympic Dam Environmental Protection and Management Program (EPMP) and regulated under the Indenture. This provides assurance regarding the requirements for implementation of mitigation and management measures to reduce impact significance.

8.2.6 Assessment of uncertainty and sensitivity

Uncertainties exist in the determination of impact significance across any proposed project where actual as-built monitoring data does not exist, and may include:

- source, pathway or receptor knowledge gaps
- assumptions used to inform the assessment of effects studies (e.g. modelling) or the assessment of impacts (e.g. the duration of frequency of an impact)
- representativeness of baseline data.

An understanding of the level of uncertainty is required for each pathway (effects) and impact assessment in accordance with Table 8.2 (Step 6 of Figure 8.1).

Table 8.2 | Uncertainty levels

Level	Description
High	Low level of confidence in the outcomes of the assessment – the potential changes to the baseline environment, the potential impact and impact significance are not well-defined or understood. For example: • scientific evidence and previous experience are lacking or unreliable, with high potential for variability in impacts • no field verification has been undertaken • assessment of effects undertaken using a new method that is not industry recognised or has been undertaken using an informal approach • several assumptions have been applied for which there is little scientific basis
Moderate	Moderate level of confidence – the potential changes to the baseline environment, the potential impact and impact significance are partially defined and understood. For example: • some scientific evidence is available, with some potential for variability in impact • some field verification has been undertaken • relevant knowledge of somewhat generally-similar projects and impacts is available and has been applied • assessment of effects undertaken with an existing method, using a novel application which is not industry recognised • some assumptions have been applied with a reasonable/relevant basis
Low	High level of confidence – the potential changes to the baseline environment, the potential impact and impact significance are well-defined and understood. For example: • extensive scientific evidence is available, with low potential for variability in impact • extensive field verification has been undertaken • relevant knowledge of similar projects and impacts is available and has been applied • assessment of effects undertaken using industry recognised and/or best-practice methodology and/or modelling approach • limited number of assumptions have been applied with a solid scientific basis

Where the impact assessment has a level of uncertainty that changes the impact significance, a conservative (i.e. worst case) and precautionary approach towards the impact is to be taken and the higher impact assessment rating assumed.

The EIAF also assesses the sensitivity of an impact to change of any assumption related to the SPR relationship, using defined levels of sensitivity (Table 8.3). This assessment will determine whether the sensitivity to change in an assumption result in a significant change to the predicted confirmed impact event.

Table 8.3 | Sensitivity levels

Level	Description
High	• predictions highly sensitive to input variations • sensitivity not studied/known • high potential for variability in impact
Moderate	• some sensitivity of predictions to input variations • moderate potential for variability in impact
Low	• predictions not sensitive to input variation • low potential for variability in impact

8.2.7 Control and management strategies

Control and management strategies are then identified which can be implemented to ensure the potential of adverse impacts is ALARP, that Environmental Outcomes are complied with, and where possible, positive impacts are realised (Step 7, Figure 8.1).

The EIAF specifically aims to identify control and management strategies where the impact assessment has determined that the uncontrolled impact is significant, or where such uncertainty exists that a significant impact may occur.

When developing control and management strategies for the SRE Project, the following mitigation hierarchy of controls is considered:

- Avoid: Adjust a project layout or eliminate the effect of the proposed project on the receptor by design. Significant avoidance and minimisation measures have been incorporated into decision making and project design
- Minimise: Measures that minimise or reduce an impact (e.g. reducing speed limits to reduce dust emissions from vehicle travel on unsealed roads)
- Rehabilitate: Measures that rectify, repair, rehabilitate or restore an impact
- Offset: Required if significant residual environmental impacts remain following the application of the above measures.

Control and management strategies should be developed with consideration to any significant uncertainties and assumptions regarding the likely effectiveness of proposed control measures in managing and mitigating impacts and achieving Environmental Outcomes for operations and closure.

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9. Assessment of effects

9. ASSESSMENT OF EFFECTS

The identified potential impact events, summarised by pathway in the following sections, represent scenarios for which there is, or is likely to be, a linkage between SRE Project activities and infrastructure (sources), the relevant pathways, and the identified receptors.

A total of 141 potential impact events were identified during initial impact identification studies. A subsequent preliminary SPR assessment identified 131 of the potential impact events as having, or potentially having, a linkage between source and receptor as a result of the SRE Project. These identified potential impact events (i.e. those that have either a confirmed linkage or unconfirmed linkage) have been carried forward to the assessment of effects presented within this chapter. A full list of all potential impact events, including those identified which were determined during screening to have no potential linkage, is presented in Appendix E2 Environmental Impact Assessment Tables.

Assessment of effects studies are undertaken to quantify the change in the existing (baseline) pathway environment as a result of SRE Project activities and infrastructure. This allows both the confirmation of any potential impact events with an unconfirmed linkage and informs a subsequent assessment of the likely impact significance (Chapter 10).

The assessment of effects studies considered, as a component of understanding the baseline environment in the context of the SRE Project activities, the likely cumulative effects of existing activities (e.g. pastoral, industrial, etc.) on the identified receptors.

9.1 Air (noise and vibration)

The baseline noise and vibration environment was described in Section 5.1.1. The assessment of noise and vibration-related effects introduced by the SRE Project is presented in Appendix C2 Noise and Vibration Impact Assessment and summarised in the following sections.

9.1.1 Summary of assessment methodology

9.1.1.1 Surface infrastructure noise

Surface infrastructure noise was modelled using 3D noise modelling software ‘SoundPLAN version 9.1’. Predictions were carried out using the Conservation of Clean Air and Water Europe (CONCAWE) 1981 prediction algorithm. The Guidelines for the use of the Environment Protection (Commercial and Industrial Noise) Policy (EPA 2023b) (Noise EPP) state that predictions with a source to receptor distance greater than 100 m should be made using default weather conditions that are equivalent to CONCAWE meteorological category 6 at night, and CONCAWE meteorological category 5 during the day period.

A combination of measured and theoretical data was used as inputs in the noise model.

The modelling assumed that:

- all plant is operating at once, and operational during the day and night-time periods under noise enhancing conditions (i.e. worst-case scenario)
- the proposed fixed plant has a throughput of 2,000,000 tpa to meet the SRE Project production capacity of 650,000 tpa.

Modelled outputs were assessed against objective noise criteria under the Noise EPP (EPA 2023b).

9.1.1.2 Road traffic noise

Road traffic noise levels were predicted using the UK Calculation of Road Traffic Noise (CoRTN) method. Adaptations were applied for South Australian conditions, at a reference distance representing the most affected receptor along each road segment identified as being impacted by the SRE Project. The assessment quantified the change in traffic noise levels as well as the absolute levels at noise sensitive receptors.

The following assumptions have been made in road traffic noise predictions:

- The speed limit is 110 km/h, except on Olympic Dam Way and Olympic Dam Highway (north of Roxby Downs), which were assumed to be 60 km/h.
- The road surface is dense graded asphalt.
- The distribution of traffic is 90% during day-time period (7 am to 10 pm) and 10% night-time period (10 pm to 7 am).
- The ground is 50% absorptive, and 50% reflective.
- The receptor height is 1.5 m with full line of sight to the road.

Existing and future traffic volumes were sourced from Appendix C8 Traffic Impact Assessment.

As there are no South Australian guidelines or policies specific to noise impacts from developments relating to increased noise levels on public roads, the NSW Road Noise Policy (DECCW 2011) was referenced. The NSW Road Noise Policy provides the following criteria for existing residences affected by additional traffic on existing freeways, arterial, and sub-arterial roads generated by land use developments:

- day (7:00 am to 10:00 pm) – L_{Aeq} 60 dB.
- night (10:00 pm to 7:00 am) – L_{Aeq} 55 dB.

9.1.1.3 Aircraft noise

Aircraft volumes or types at Olympic Dam Airport are not expected to change from BAU as a result of the SRE Project. As such, an assessment of aircraft noise has not been undertaken.

9.1.1.4 Vibration

Operational and construction vibration sources are not expected to generate perceptible levels of vibration at distances greater than a few hundred metres from the source. As the nearest sensitive receptor is approximately 3 km from any potential vibration sources, vibration levels from activities would be negligible, and therefore a quantitative assessment has not been undertaken. Vibration may impact fauna, and this potential impact event has been carried forward.

There is no blasting proposed as part of the SRE Project, and as such noise and vibration associated with blasting activities has not been assessed.

9.1.2 Potential impact events

Potential noise and vibration-related impact events identified through the preliminary (screening) SPR evaluation as being linked or having an uncertain linkage are summarised in Table 9.1.

Table 9.1 | Potential noise and vibration-related impact events

SPR ID	Pathway	Potential impact event
A32	Air (noise)	Project-related construction activities result in the generation of noise that is audible above baseline noise levels and impacts the health and safety of the local community
A40	Air (vibration)	Project-related construction activities result in vibration (e.g. from infrastructure or access road construction, including vehicle movement) that is at levels which impacts the health and safety of the local community
A33	Air (noise)	Project-related construction activities result in the generation of noise and vibration that is audible above baseline noise levels and impacts the amenity of the local community
A41	Air (vibration)	Project-related construction activities result in vibration (e.g. from infrastructure or access road construction, including vehicle movement) that is at levels which impacts the amenity of the local community
A34, A35	Air (noise)	Project-related construction activities result in the generation of noise and vibration that is audible above baseline noise levels and impacts fauna and habitat and/or State and Commonwealth listed threatened species
A42, A43	Air (vibration)	Project-related construction activities result in vibration at levels which impacts fauna and habitat and/or State and Commonwealth listed threatened species
A36	Air (noise)	Project-related operational activities result in the generation of noise that is audible above baseline noise levels and impacts the health and safety of the local community
A43	Air (vibration)	Project-related operational activities (e.g. pumps, fans, mobile fleet and including vehicle movement) result in vibration that at levels which impacts the health and safety of the local community
A37	Air (noise)	Project-related operational activities result in the generation of noise that is audible above baseline noise levels and impacts the amenity of the local community
A44	Air (vibration)	Project-related operational activities (e.g. pumps, fans, mobile fleet and including vehicle movement) result in vibration that is at levels which impacts the amenity of the local community
A38, A39	Air (noise)	Project-related operational activities result in the generation of noise that is audible above baseline noise levels and impacts fauna and habitat and/or State and Commonwealth listed threatened species
A46, A47	Air (vibration)	Project-related operational activities result in vibration that is at levels which impacts fauna and habitat and/or State and Commonwealth listed threatened species

9.1.3 Summary of assessment outcomes

9.1.3.1 Surface infrastructure noise

Table 9.2 provides predicted worst-case noise enhancing night-time noise levels for baseline, construction, and surface infrastructure operational scenarios at noise sensitive receptors. Baseline processing plant and moving plant noise sources were included in the noise modelling. Construction and operational noise contours are provided in Figure 9.1 and Figure 9.2.

Table 9.2 | Predicted surface infrastructure noise levels

Receptor	Noise limit, L_{Aeq}, dB (Noise EPP)		Predicted noise levels, L_{Aeq}, dB under worst-case noise enhancing conditions		
	Day	Night	Baseline	Construction	SRE Project (Stage 2, 2,000 ktpa)
R1	60	50	45	46	49
R2	60	50	45	46	48
R3	60	50	45	45	48
R4	60	50	45	46	48
R5	60	50	45	45	48
R6	60 (40)[1]	55 (35)[1]	46	47	50
R7	60 (40)[1]	55 (35)[1]	46	46	49
R8	47	40	28	28	31
R9	47	40	28	28	31
R10	60 (40)[1]	55 (35)[1]	27	27	30

Notes: 1. Internal noise criteria indicated in parentheses

Results in Table 9.2 indicate that under worst-case noise enhancing conditions, the baseline, construction and SRE Project operational scenarios comply with the Noise EPP at privately-owned noise-sensitive receptors, and internal noise levels recommended by Australian Standard AS 2107:2016 at BHP-owned receptors.

Sleep disturbance assessment was required at only R8 and R9 which are within a quiet locality. The Noise EPP states that maximum noise levels L_{Amax} should not exceed 60 A-weighted decibels (dBA). Due to the distance between the source and receptor, and the continuous nature of plant and equipment assessed, it is anticipated that predicted maximum noise levels would be considerably lower than the 60 dBA required by the Noise EPP (EPA 202b).

As all relevant noise criteria are met, the SRE Project is expected to meet its general environmental duty related to surface infrastructure noise under the EP Act.

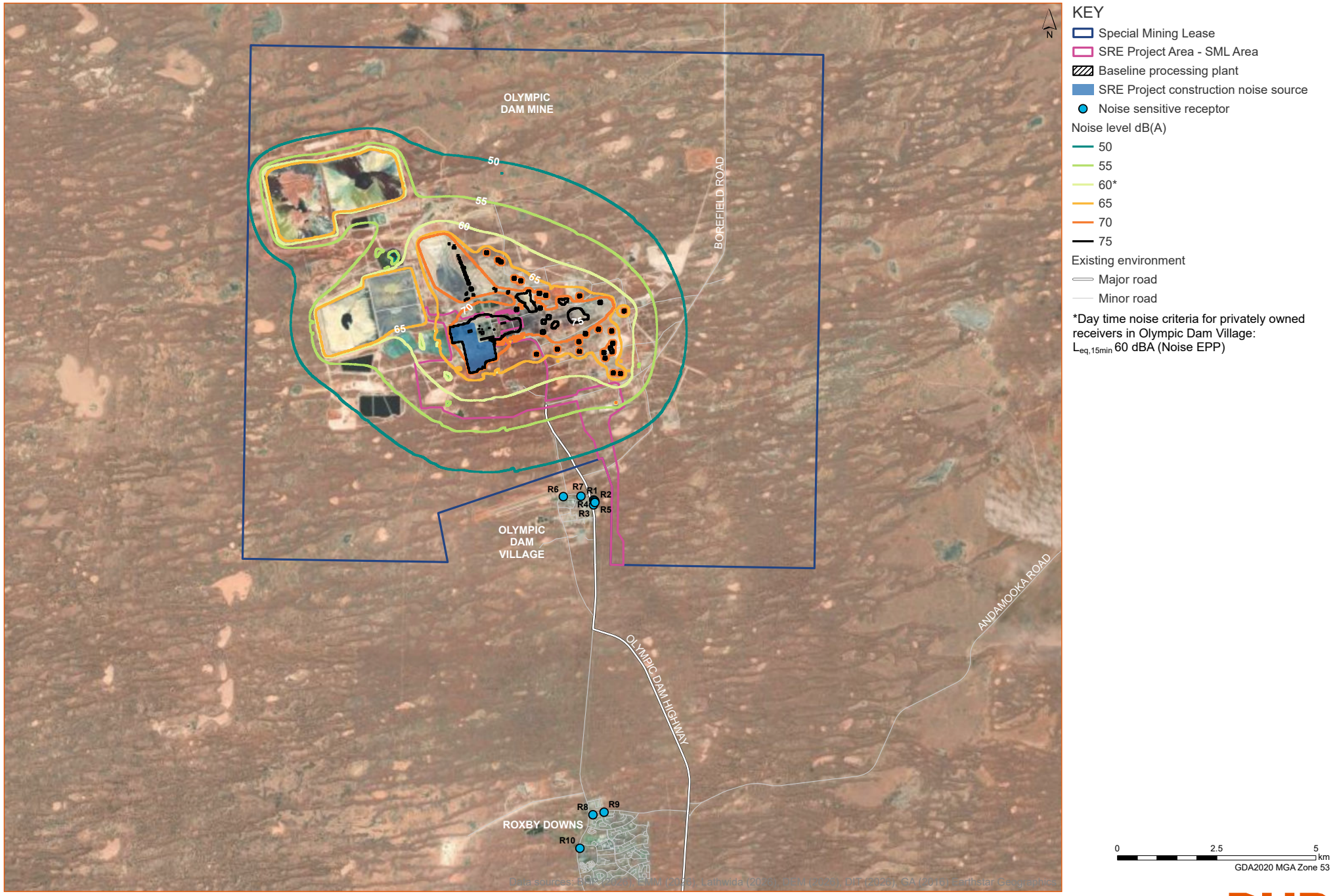


Figure 9.1 | Predicted construction noise contours, Day L_{Aeq}, dB

SRE Project BHP

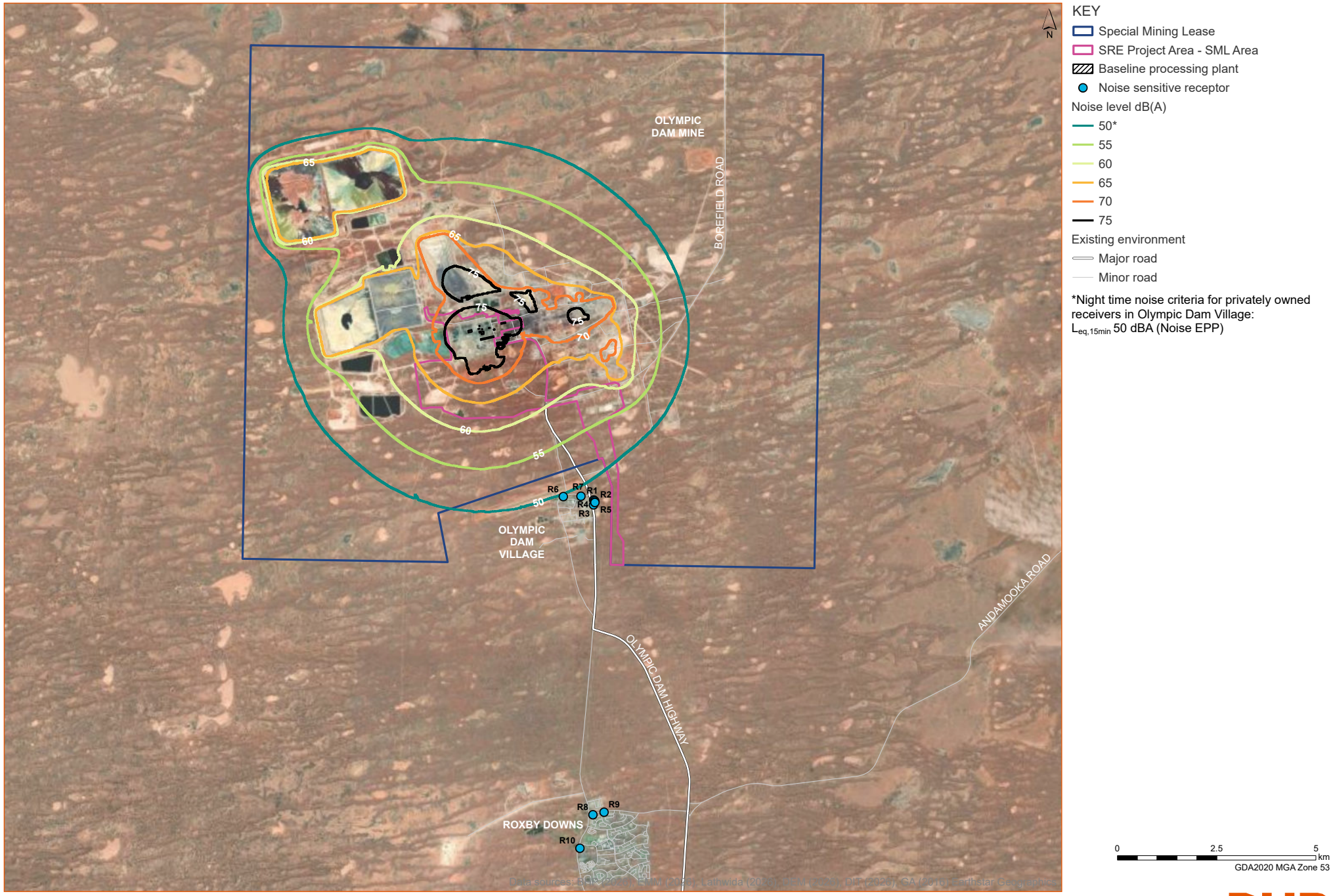


Figure 9.2 | Predicted operational noise contours, Night L_{Aeq}, dB

SRE Project BHP

9.1.3.2 Road traffic noise

Table 9.3 displays predicted road traffic noise levels at representative distances from the nearest carriageway for all roads impacted by the SRE Project.

Results in Table 9.3 indicate that road traffic noise is below the guidance noise criteria set out in the NSW Road Noise Policy (DECCW 2011) (RNP), with the exception of following 2 minor exceedances:

- an exceedance of the day criteria by 1 dB on Olympic Dam Highway, located north of Roxby Downs
- an exceedance of the night criteria by 3 dB on Olympic Dam Way.

An increase of 1 dB to 3 dB represents a small noise increase that is not considered perceptible to the average person. As such, it is unlikely there would be significant impacts on any noise-sensitive receptors due to road traffic noise and as such, the SRE Project is expected to meet its general environmental duty related to increased road traffic noise under the EP Act.

9.1.4 Confirmed impact events

Following the completion of the assessment of the noise and vibration-related effects study, 10 confirmed SPR linkages (confirmed impact events) were established. These were progressed to an assessment of impact significance in accordance with the EIAF (Appendix E1). The confirmed noise and vibration-related impact events are summarised in Table 9.4.

Table 9.3 | Predicted road traffic noise levels

Road sections	Reference distance (m)	RNP Criteria (dB)		Predicted noise level (L_{Aeq}, dB)				Predicted RNP exceedance (dB)
				Stage 1a, Stage 1b operation and Stage 2 construction		Stage 2 operations		
		Day	Night	Day	Night	Day	Night	
Olympic Dam Highway – north of Roxby Downs	25	60	55	60	55	**61**	55	1
Olympic Dam Highway – south of Roxby Downs	100	60	55	52	46	53	39	-
Olympic Dam Way	10	60	55	55	55	57	**58**	3
Olympic Dam Highway – south of Pimba	100	60	55	49	44	49	39	-
Stuart Highway – east of Stuart Highway/Olympic Dam Highway intersection	100	60	55	51	45	51	42	-
Stuart Highway – west of Stuart Highway/Olympic Dam Highway intersection	100	60	55	47	39	47	39	-
Augusta Highway – Port Pirie to Port Augusta	100	60	55	56	49	56	48	-
Augusta Highway – Port Wakefield to Port Pirie	100	60	55	55	48	55	47	-
Port Wakefield Highway – Dublin to Port Wakefield	100	60	55	59	51	58	51	-

Note: Road noise predictions are Day $L_{Aeq,15\ hr}$ / Night $L_{Aeq,15\ hr}$.
Minor exceedances of road traffic noise criteria shown in **bold**.

Table 9.4 | Confirmed noise and vibration-related impact events (confirmed linkage)

SPR ID	Pathway	Potential impact event
A33	Air (noise)	Project-related construction activities result in the generation of noise and vibration that is audible above baseline noise levels and impacts the amenity of the local community
A34, A35	Air (noise)	Project-related construction activities result in the generation of noise and vibration that is audible above baseline noise levels and impacts fauna and habitat and/or State and Commonwealth listed threatened species
A42, A43	Air (vibration)	Project-related construction activities result in vibration at levels which impacts fauna and habitat and/or State and Commonwealth listed threatened species
A37	Air (noise)	Project-related operational activities result in the generation of noise that is audible above baseline noise levels and impacts the amenity of the local community
A38, A39	Air (noise)	Project-related operational activities result in the generation of noise and vibration that is audible above baseline noise levels and impacts fauna and habitat and/or State and Commonwealth listed threatened species
A46, A47	Air (vibration)	Project-related operational activities result in vibration that is at levels which impacts fauna and habitat

9.2 Air (light)

The baseline light environment was described in Section 5.1.2. The assessment of light-related effects introduced by the SRE Project is presented in Appendix D1 Ecological Impact assessment and Appendix D5 Visual Amenity Assessment and summarised in the following sections.

9.2.1 Potential impact events

Potential light-related impact events identified through the preliminary (screening) SPR evaluation as being linked or having an uncertain linkage are summarised in Table 9.5.

Table 9.5 | Potential light-related impact events (confirmed linkage)

SPR ID	Pathway	Potential impact event
A29	Air (light)	Project-related operational activities result in emissions of light leading to changes in visual amenity and impacts to the local community
A30, A31	Air (light)	Project-related operational activities result in emission of light leading to impacts to fauna and habitat and/or State and Commonwealth threatened species

9.2.2 Summary of assessment methodology

The SRE Project requires lighting for safety and is expected to be visible at night. The assessment of light-related effects was assessed as part of Appendix D1 Ecological Impact assessment and Appendix D5 Visual Amenity Assessment. The methodologies for these assessments are summarised in Section 9.8.2.1 and Section 9.8.2.4 respectively.

The visual assessment applied a Visual Study Area extending 4 km around the SRE Area.

9.2.3 Summary of assessment outcomes

9.2.3.1 Effect of light on amenity

The Olympic Dam mine has a landscape with a high visual absorption capacity rating (Section 9.8.3.3). This is due to the site being an established mining industrial setting within the SML, which is considered capable of absorbing a higher degree of modification or addition, as proposed by the SRE Project, without significantly changing the landscape character for the local community (Figure 9.3).

The SRE Project would require lighting for safety which is expected to be visible at night.

Additional night lighting from the SRE Project in the immediate vicinity of the existing Olympic Dam mine infrastructure has the potential to cause loss of visual amenity within the Visual Study Area. As currently applied at Olympic Dam, the visual assessment assumed that the SRE Project would adopt Australian Standard (AS 4282) for lighting which would shield the lights and minimise light spill directly from light sources. While lights may be visible immediately around the surface infrastructure, most of the visible lighting is expected to be reflected off surfaces (walls, structures and ground).

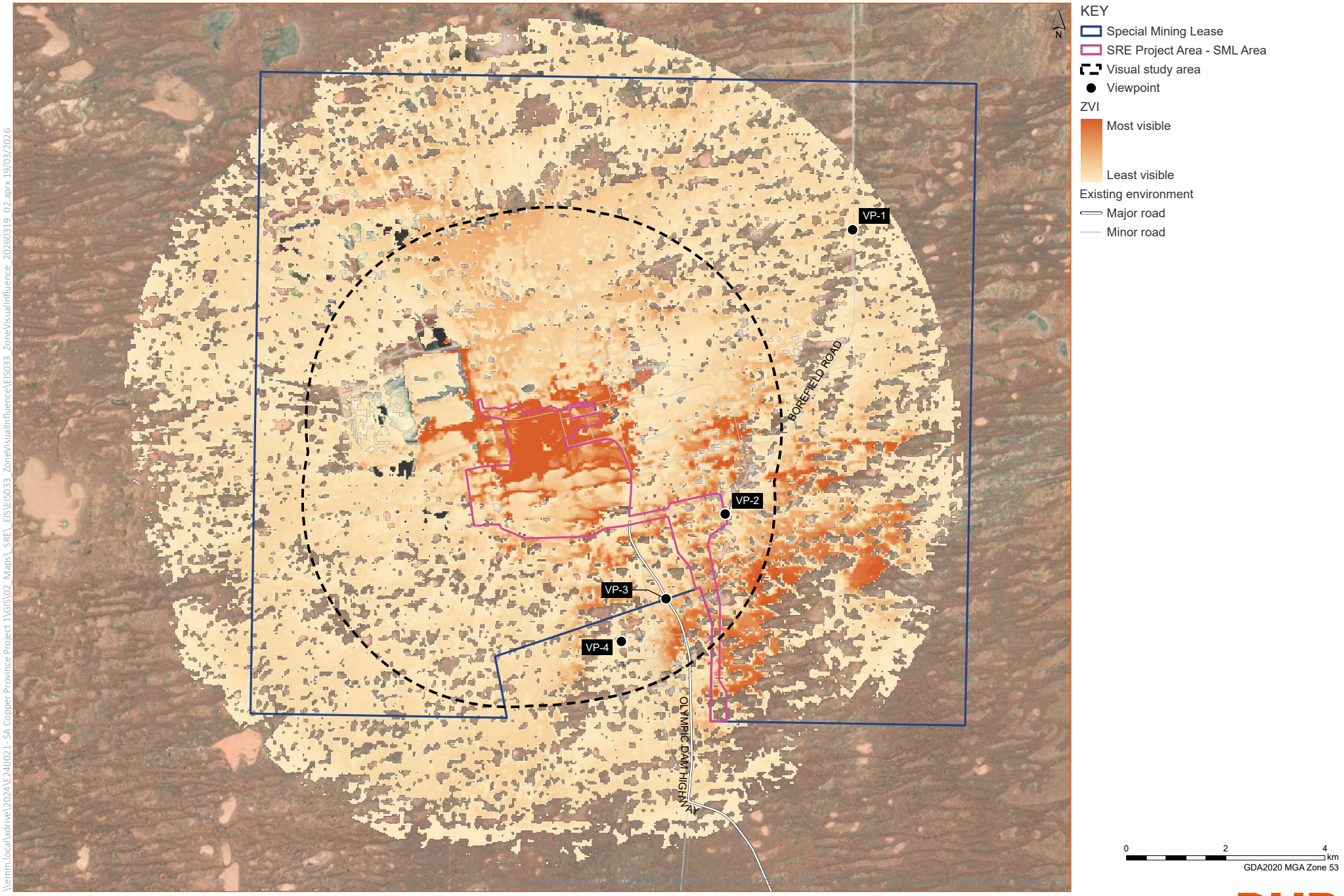
Both direct light and reflected light has the potential to shine into the night sky, causing a visible glow over the SRE Project at night. For this reason, minimising light pollution of the night sky has been included in the design phases of the SRE Project.

9.2.3.2 Effect of light on fauna

Anthropogenic lighting as a result of SRE Project-related activities, such as plant and infrastructure, would be likely to reach nocturnal fauna species, including but not limited to invertebrates (including insects), bats and other nocturnal mammal and bird species. However, light emissions from the SRE Project are likely to represent a marginal increase compared to light sources from the existing Olympic Dam operations.

Whilst the effects are difficult to quantify, it is widely accepted that, similar to the existing site infrastructure, lights used during continuous operations on a 24-hour cycle facilitate increased numbers of flying insects that may result in a change in feeding behaviour of terrestrial nocturnal fauna. The overarching effect of light emissions are poorly understood and therefore a degree of uncertainty exists associated with the potential impacts.

As no State or Nationally listed species which are identified as potentially present in the SRE Area are nocturnal, no impacts through behavioural change to these species are anticipated.



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Figure 9.3 | Zone of visual influence

SRE Project BHP

9.2.4 Confirmed impact events

Following the completion of the assessment of the light-related effects study, 2 confirmed SPR linkages (confirmed impact events) were established. These were progressed to an assessment of impact significance in accordance with the EIAF (Appendix E1). The confirmed light-related impact events are summarised in Table 9.6.

Table 9.6 | Confirmed light-related impact events (confirmed linkage)

SPR ID	Pathway	Confirmed impact event
A29	Air (light)	Project-related operational activities result in emissions of light leading to changes in visual amenity and impacts to the local community
A30	Air (light)	Project-related operational activities result in emission of light leading to impacts to fauna and habitat

9.3 Air (air quality)

The baseline air quality environment was described in Section 5.1.3. The assessment of air quality-related effects introduced by the SRE Project is presented in Appendix C3 Air Quality Impact Assessment and summarised in the following sections.

9.3.1 Potential impact events

Potential air quality-related impact events identified through the preliminary (screening) SPR evaluation as being linked or having an uncertain linkage are summarised in Table 9.5.

Table 9.7 | Potential air quality-related impact events

SPR ID	Pathway	Potential impact event
A6	Air (air quality)	Operational activities release emissions of off-gases and fugitive gases that affect air quality, resulting in impacts to the health and safety of the local community
A7	Air (air quality)	Operational activities release emissions of off-gases and fugitive gases that affect air quality, resulting in impacts to the amenity of the local community
A8, A9, A10	Air (air quality)	During operation, emission of off-gases and fugitive gases from smelting, acid plant and refinery operations results in concentrations that impact terrestrial flora and vegetation, fauna and habitat and State and Commonwealth threatened species
A11	Air (odour)	Operational activities release emission of off-gases and fugitive gases that generates odour, resulting in impacts to the health and safety of the local community
A12	Air (odour)	Operational activities release emissions of off-gases and fugitive gases that generates odour, resulting in impacts to the amenity of the local community
A13	Air (air quality)	Project-related construction activities release emissions of particulate matter that affect air quality, resulting in impacts to the amenity of the local community
A14	Air (air quality)	Project-related construction activities release emissions of particulate matter that affect air quality, resulting in impacts to flora and vegetation
A15, A16, A17	Air (air quality)	During construction, the movement of soil materials and the creation of cleared areas subject to wind erosion results in the emission of dust that reduces air quality, impacting the abundance and diversity of terrestrial flora and vegetation, habitat and State and Nationally threatened flora species
A18	Air (air quality)	Project-related operational activities release emissions of particulate matter that affect air quality, resulting in impacts to the health and safety of the local community
A19	Air (air quality)	Project-related operational activities release emissions of particulate matter that affect air quality, resulting in impacts to the amenity of the local community
A20, A21, A22	Air (air quality)	During operation, the emission of particulate matter from stacks or material handling activities results in concentrations that impact terrestrial flora and vegetation, fauna and habitat and State and Commonwealth threatened species

9.3.2 Summary of assessment methodology

A qualitative assessment was undertaken to assess the effect of construction phase emissions.

To assess the effect and significance of emissions during the operational phase of the SRE Project, relative to existing operations at Olympic Dam, the following emission scenarios were developed and modelled:

- existing BAU operations, hereafter referred to as BAU operations
- three future operations scenarios, comprising of BAU operations and SRE Project emissions:
  - Stage 1a SRE Project operations
  - Stage 1b SRE Project operations
  - Stage 2 SRE Project operations.

Air pollutant emissions were quantified for all 4 scenarios listed above. Through the analysis, it was determined that Stage 2 SRE Project operations represented the highest emission potential for the SRE Project. Therefore, focus is given to Stage 2 SRE Project emissions and impacts.

9.3.2.1 Emissions inventory

Construction phase emissions

Sources of air pollution during the construction phase are likely to be fugitive releases of particulate matter (e.g. earthworks, wind erosion of exposed areas, wheel-generated dust from the movement of plant and vehicles, etc.) and pollutants associated with the combustion of diesel fuel (particulate matter, NO_x, VOCs etc).

BAU operations emissions inventory

An emissions inventory was developed to quantify emissions from various pollutants resulting from the operations of the SRE Project relative to BAU operations at Olympic Dam. The air pollutant emission sources reported for BAU operations include:

- point sources, which are emissions from stacks associated with existing smelter and refinery processes
- diesel and other fuel combustion, such as smelter, underground mining fleet, permanent gensets, quarrying fleet, etc.
- explosives detonation from surface and underground
- fugitive emissions from surface mining and quarrying operations
- fugitive emissions from material handling and processing operations
- fugitive emissions from the movement of trucks along paved and unpaved roads
- fugitive emissions from wind-generated erosion of open surfaces such as stockpiles, cleared areas and TSFs
- data sources used to predict BAU operations emissions included:

- stack emissions – emissions for existing stack sources have been quantified using stack test emissions data, and engineering assumptions (Hatch 2025)
- fugitive emissions – annual NPI-reported fugitive emissions for FY25
- temporary RSF emissions (Lathwida 2025).

SRE Project operations emissions inventory

Similar to BAU operations, the SRE Project would involve a combination of fugitive and stack air pollutant emission sources. Emissions from proposed SRE Project stack sources were quantified using a combination of representative stack test emissions data, and engineering assumptions from Hatch (2025). BAU operations stack sources would remain for the SRE Project except for the BAU operations Dryer 1, which would be decommissioned and replaced by a new concentrate dryer for the SRE Project.

For emissions from the SRE Project cyanidation and zinc precipitation area stack, no relevant stack emissions monitoring data was available for use in the assessment. To estimate the cyanide emissions for Stage 2 from both point and fugitive sources, the reported annual cyanide emissions from the NPI FY25 were upscaled, relative to the difference in total smelter concentrate throughput (i.e. from 500 ktpa to 2,000 ktpa for Stage 2). This approach is expected to be highly conservative.

For emissions from the slimes autoclave scrubber and circulation area scrubber, limited emission parameters were available to estimate emissions for modelling. Based on guidance from the engineering, procurement and construction management contractor, these stacks are expected to release SO_3 (sulphur trioxide) / H_2SO_4 (sulphuric acid) mist emissions. For conservative purposes, the stack emission limit for SO_3 of 100 mg/normal cubic metre (Nm^3) was adopted for both stacks.

Excluded emissions sources

The existing site and proposed SRE Project include a range of bypass emission stacks that are used infrequently for emergency releases, principally comprising of SO_2 (sulphur dioxide). There are four existing bypass stacks and four new bypass stacks proposed. Due to uncertainty around the exact timing of bypass releases and the nature of the dispersion modelling undertaken for continuous processes, it is not practical to include the bypass emissions in the dispersion modelling presented in this assessment.

It is noted that consistent with EPA Licence 1301, the reporting of bypass stack emission releases is conducted in accordance with BHP's ongoing reporting obligations (BHP 2026b), which would be expanded to include reporting of emissions from the proposed bypass stacks under the SRE Project.

Other excluded sources of emissions include:

- emergency power generator engines, due to infrequent operation
- underground mining ventilation shaft emissions, due to limited emissions monitoring data for existing vents by which to quantify emissions.

9.3.2.2 Meteorological modelling

Atmospheric dispersion modelling for the assessment of effects was conducted using the AMS/USEPA regulatory model AERMOD (model version v24142). The meteorological inputs for AERMOD were generated using the AERMET meteorological processor (model version v24142), using surface observations from the BoM Olympic Dam Aerodrome AWS and upper air profiles generated by the

Commonwealth Scientific and Industrial Research Organisation (CSIRO) The Air Pollution Model (TAPM) meteorological modelling module.

9.3.2.3 Air dispersion modelling

The atmospheric dispersion modelling completed for the Air Quality Impact Assessment used the AERMOD dispersion model (version v24142). AERMOD is designed to handle a variety of pollutant source types, including surface and buoyant elevated sources, in a wide variety of settings such as rural and urban as well as flat and complex terrain.

In addition to the 2,076 sensitive receptor gridded points, air pollutant concentrations were predicted across a nested receptor grid (totalling 5,097 receptor points) with the following configuration:

- an inner 10 km x 10 km domain with receptor points at 200 m intervals
- a second-tier domain of 20 km x 20 km domain with receptor points at 500 m intervals
- an outer domain of 30 km x 30 km with receptor points at 1 km
- an outer domain of 60 km x 60 km with receptor points at 2 km.

Simulations were undertaken for January to December 2024 using the AERMET-generated file using the BoM Olympic Dam Aerodrome AWS data as input.

The influence of the existing and proposed building and structures about the Olympic Dam site, including the SML Area, was accounted for in the AERMOD dispersion modelling through the Building Profile Input Program – Plume Rise Model Enhancements (BPIP-PRIME) downwash module.

The ozone limiting method was applied to convert model-predicted concentrations of NO_x to NO_2 (nitrogen dioxide) for comparison with the applicable impact assessment criteria.

Emission control measures

The following fugitive particulate matter emission control measures are incorporated into the design of the SRE Project:

- All concentrate transported to the SRE Project are in sealed rotainers to eliminate fugitive emission loss during transport.
- The rotainers will be emptied within a suitable enclosure (99% reduction).
- All conveyors and conveyor transfer points moving concentrate will be fitted with a cover and side wall cladding for wind protection (75% reduction).
- With the exception of the slag haul road, all SRE Project roads will be sealed. Water spraying will occur along all unsealed and sealed roads (75% reduction).
- Slag pot haulers will have a reduced travel speed (44% reduction).
- All other material handling and transfer operations (e.g. silo and day bin loading, bedding plant, slag/revert shed, etc) will occur within full enclosures with dust extraction (99% reduction).

Other emission control measures incorporated into the SRE Project, and accounted for in the dispersion modelling through engineering calculations where relevant, include the following:

- Concentrate retention proposed in ponds (wet), in storage bins, shed, dome, to prevent losses.
- Matte to be stored as a granulate and damp preventing losses.

- Crushing and breaking operations to be in a dedicated area, where possible completed with wet techniques (i.e. slag milling).
- The concentrate material will feature a high moisture content, reducing dust generation potential.
- Venturi scrubbers and off-gas capture are in place at the acid plant to convert to sulphuric acid.
- Primary processes are operated under negative pressure which contains all process emissions within the primary processing equipment and buildings.
- Anode furnaces and primary smelting emissions are scrubbed prior to ventilation to atmosphere.
- Optimised stack heights and release characteristics (exhaust flow rate and temperature, exit diameter) to enhance dispersion performance.
- Continuous and periodic emissions monitoring of all significant existing and SRE Project emission stack sources.

9.3.2.4 Air quality impact assessment criteria

The relevant air quality impact assessment criteria, applicable at ground level at sensitive receptor, are defined in Schedule 2 of the Environment Protection (Air Quality) Policy 2016 (Air Quality EPP), as amended in May 2023 (EPA 2023a). The criteria for the pollutants and averaging periods that are relevant to the SRE Project are given in Table 9.8.

In addition, stack emission limits currently apply to Olympic Dam mine operations via the existing EPA Licence 1301 (Table 9.9). For SRE Project Stage 2 operations, all stacks comply with the stack emission concentration limits, with the exception of H_2S (hydrogen sulphide) emissions from the tails leach hygiene stack and roaster scrubber (hydrosonic scrubber) stack. The implications for stack emission concentrations and compliance with relevant limits is addressed by the atmospheric dispersion modelling.

Table 9.8 | Impact assessment criteria (ground level concentrations)

Pollutant	Averaging time	Assessment criteria
Particulate matter PM_{10}	24-hour	50 µg/m^3
Particulate matter $PM_{2.5}$	Annual	8 µg/m^3
	24-hour	25 µg/m^3
SO_2 (sulphur dioxide)	1-hour	0.1 ppm / 290 µg/m^3
	24-hour	0.02 ppm / 60 µg/m^3
NO_2 (nitrogen dioxide)	1-hour	0.08 ppm / 164 µg/m^3
	Annual	0.015 ppm / 30 µg/m^3
HCl (hydrogen chloride)	3-minute	0.17 ppm / 270 µg/m^3
H_2S (hydrogen sulphide)	-	0.0001 ppm / 0.15 µg/m^3 (odour) 0.32 ppm / 51 µg/m^3 (toxicity)
H_2SO_4 (sulphuric acid)	3-minute	36 µg/m^3
Arsenic	3-minute	0.19 µg/m^3

Table 9.9 I Stack emission concentration limits

Pollutant	Criteria (mg/Nm³)		Notes
	EPA Licence 1301	Schedule 4 – Stack Emissions (Air Quality EPP)	
Particulates	100*	100	Processes involving the heating of metal, metals ores, including from the FSF, anode furnace, acid plant, electric furnace bypass stacks (EPA 1301.37-43) and the gold room roaster scrubber
Antimony (Sb)	-	10	
Arsenic (As)	-	10	
Cadmium (Cd)	-	3	
Lead (Pb)	-	10	
Mercury (Hg)	-	3	
Nitrogen oxides (NO_x)	-	350	Fuel burning equipment – gaseous fuels
	-	500	Fuel burning equipment – liquid or solid fuels
	-	2,000	Sulphuric acid plants
Sulphur dioxide (SO_2)	2,400	1,000	Acid plant tails gas stack and main smelter stack
Sulphur trioxide (SO_3)	100	100	Including from the FSF, anode furnace, and electric furnace bypass stacks
Total acid gases (as SO_3)	100	100	Including from the acid plant tail-gas stack and main smelter stack (EPA 1301.37-43)
Hydrogen sulphide (H_2S)	-	5	
Hydrofluoric acid (HF)	-	50	Including all fluoride compounds
Chlorine (Cl)	-	200	Including all chlorine compounds
Carbon monoxide (CO)	-	1,000	

Note: *Particulate emissions from the existing calciners, feed preparation dryer baghouse stack, and the cemented aggregate fill plant silos are managed to less than 250 mg/Nm^3 in accordance with EPA Licence 1301.

9.3.3 Summary of assessment outcomes

9.3.3.1 Construction phase emissions

The construction of the SRE Project is expected to be undertaken progressively during Stage 1a, Stage 1b and Stage 2.

Throughout each construction period, it is considered that the assorted earthworks phases progressively staged in 4-to-6-month campaigns would have the greatest potential for air pollutant emission generation. However, the emissions intensity during this phase is expected to be lower than BAU operations or future operations involving the operation of the SRE Project. Any construction-related air pollution emissions would be generated well within the SML and distant from sensitive receptor locations to the south. Consequently, air quality impacts from the construction phase are expected to be lower than the BAU or future SRE Project operations.

9.3.3.2 Operations phase dust and gaseous emissions

The Air Quality Impact Assessment (Appendix C3) showed that BAU operational emissions returned predicted concentrations for all pollutants and averaging periods that are below the applicable ground level concentration limits listed in Schedule 2 of the Air Quality EPP at all modelled receptor locations.

The SRE Project is predicted to increase air quality impacts at neighbouring sensitive receptor locations relative to BAU operations, however, despite the predicted increase in air quality emissions, the predicted concentrations for all pollutants and averaging periods are below the applicable ground level concentration limits listed in Schedule 2 of the Air Quality EPP at all receptor locations (ODV and Roxby Downs) for SRE Project Stage 2 operations. Elevated concentrations of dusts and gases may be expected in areas in close proximity to emissions sources during operations. Predicted maximum emission contours for PM_{10} (Figure 9.4), $PM_{2.5}$ (Figure 9.5 and Figure 9.6), SO_2 (Figure 9.7 and Figure 9.8), and NO_2 (Figure 9.9) show no exceedances of the relevant criteria provided in Table 9.8.

As identified in Section 9.3.2.4, the predicted in-stack emission concentration for H_2S (hydrogen sulphide) is above the relevant Air Quality EPP stack emission concentration limit for the tails leach hygiene stack and roaster scrubber (hydrosonic scrubber) stack. Despite this, no exceedance of the ground level concentration criteria for H_2S (hydrogen sulphide) is predicted at any sensitive receptor.

9.3.3.3 Odour

Emissions of sulphur-related pollutants are estimated to increase as a result of the SRE Project relative to BAU operations.

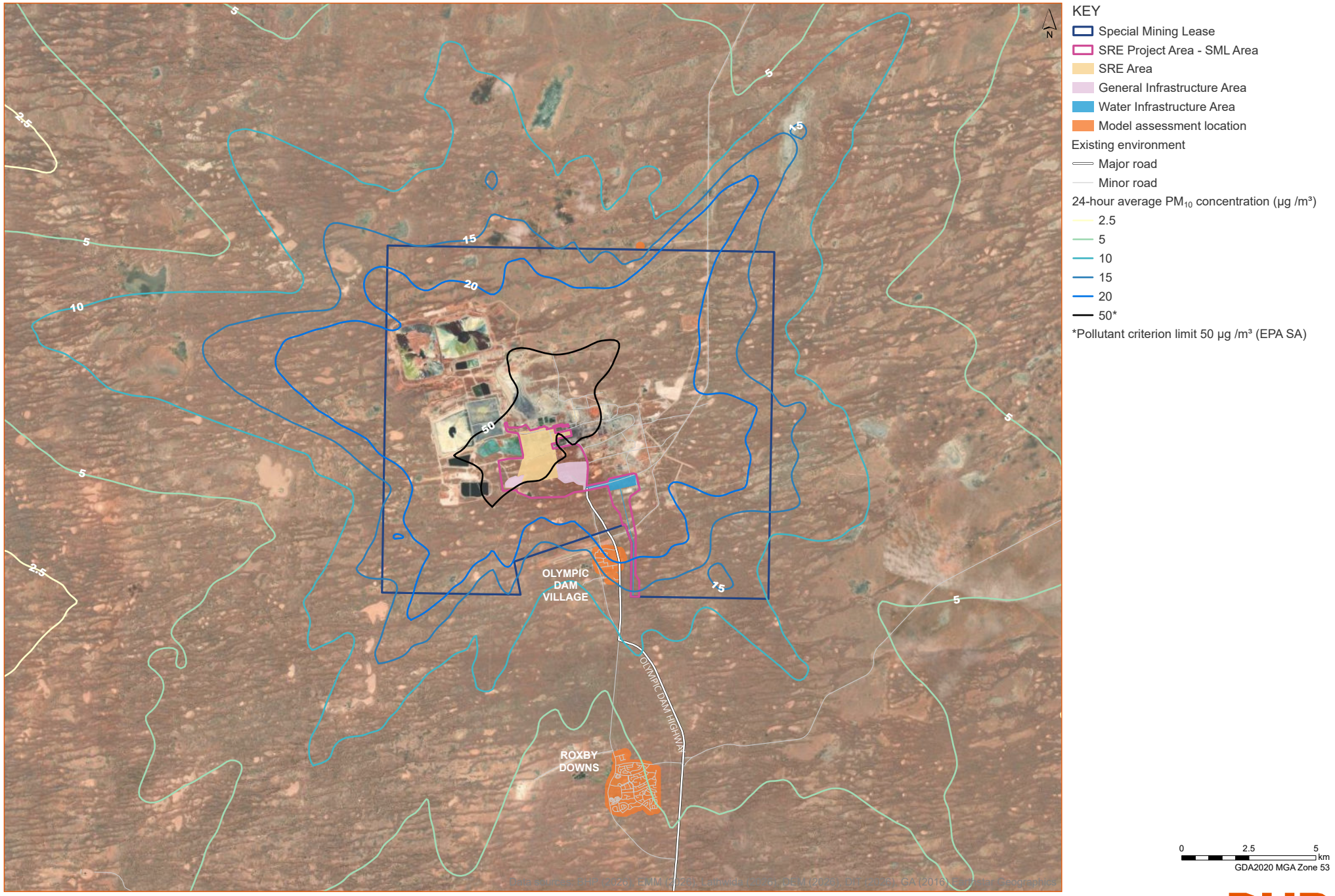


Figure 9.4 | Predicted maximum 24-hour average PM_{10} concentrations (µg/m³)

SRE Project BHP

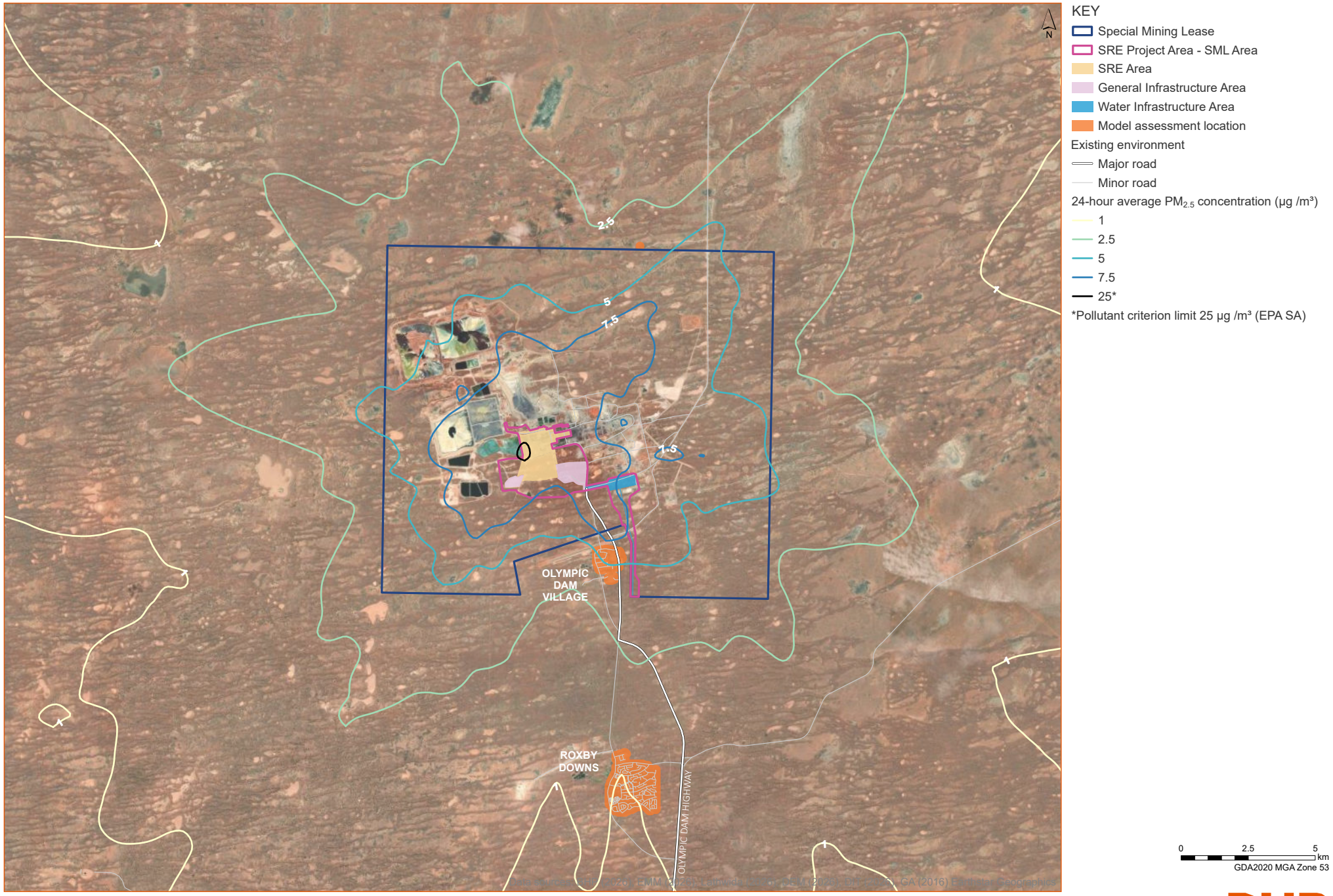


Figure 9.5 | Predicted maximum 24-hour average $PM_{2.5}$ concentrations (µg/m³)

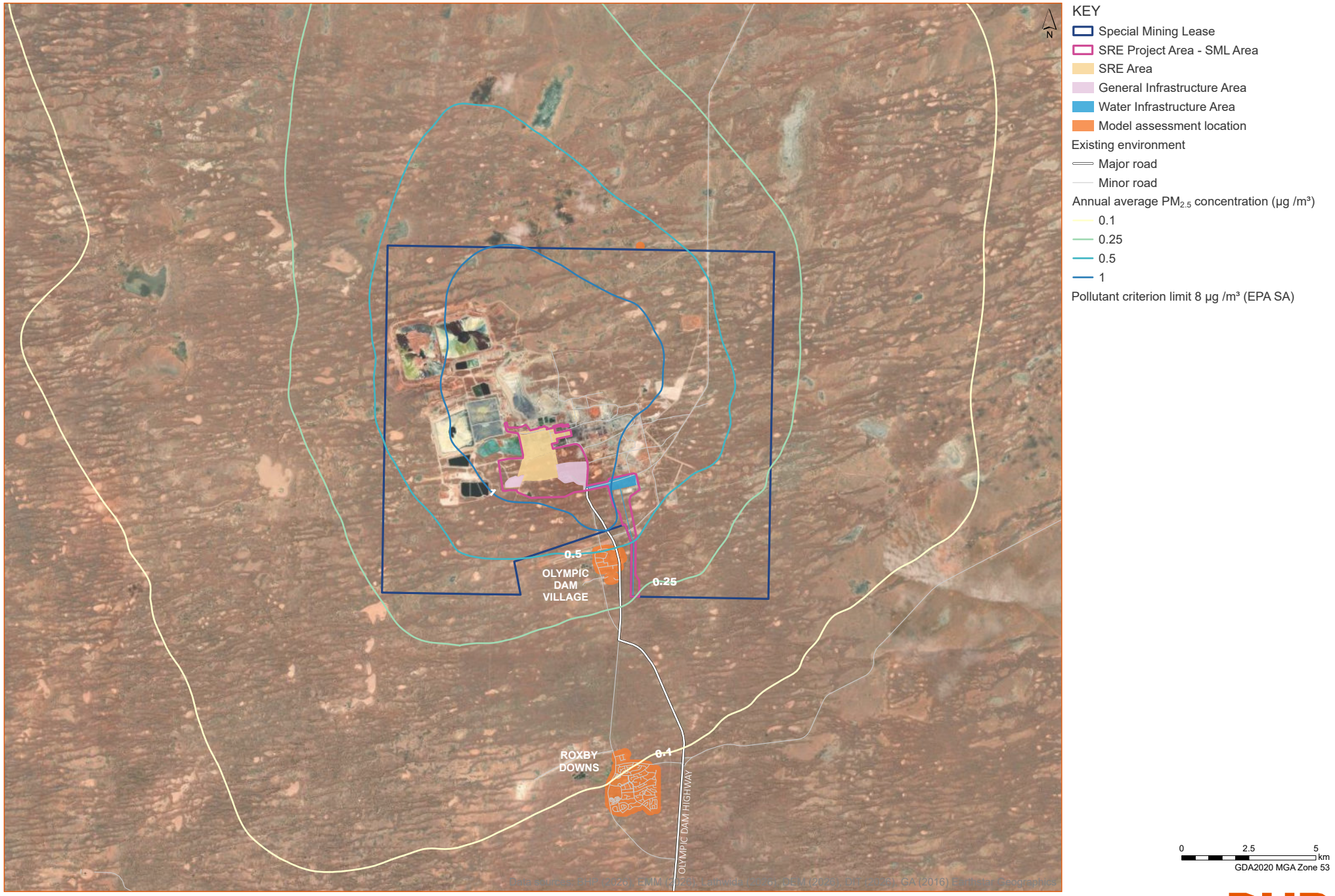


Figure 9.6 | Predicted maximum annual average $PM_{2.5}$ concentrations (µg/m³)

SRE Project BHP

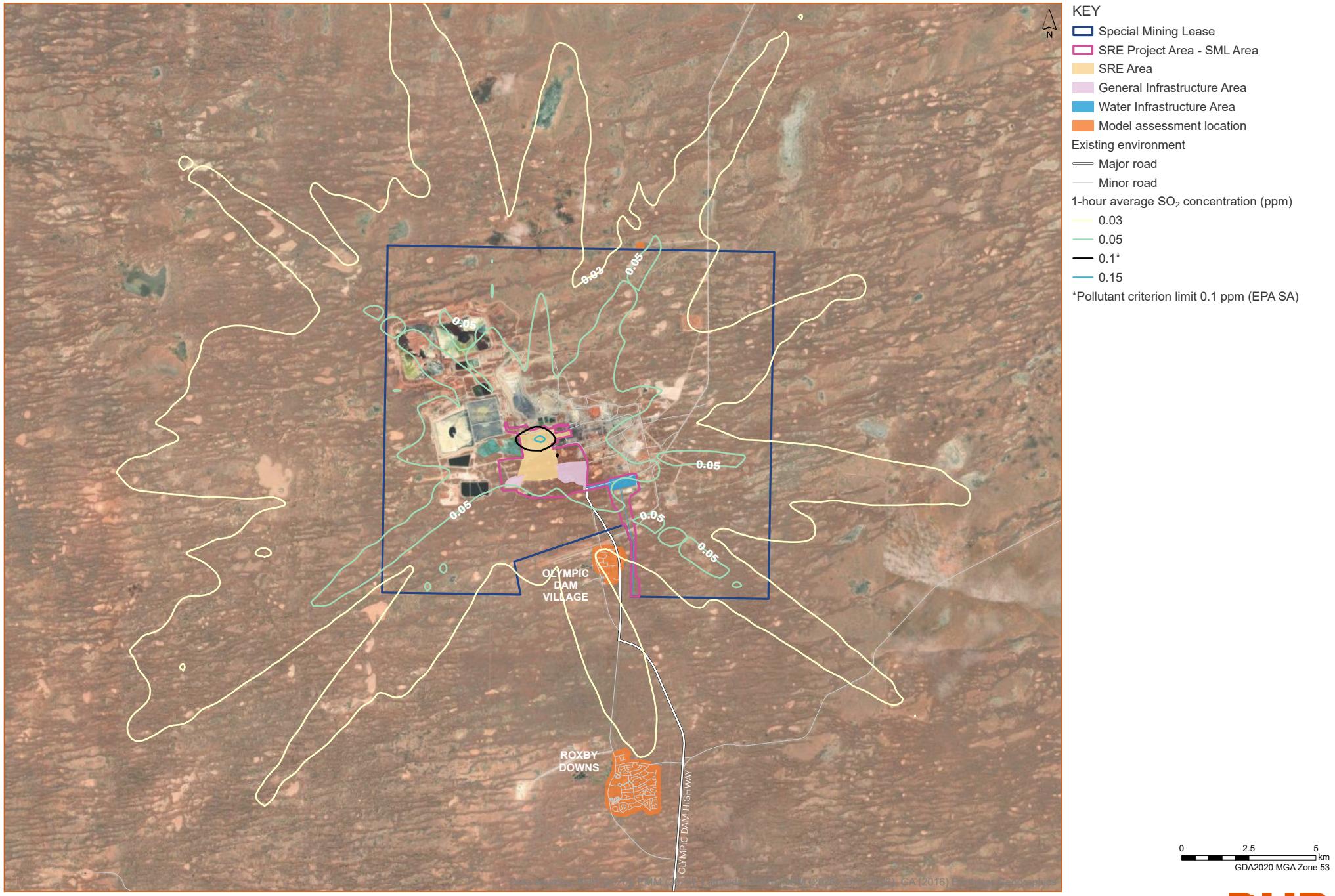


Figure 9.7 | Predicted maximum 1-hour average SO_2 concentrations (ppm)

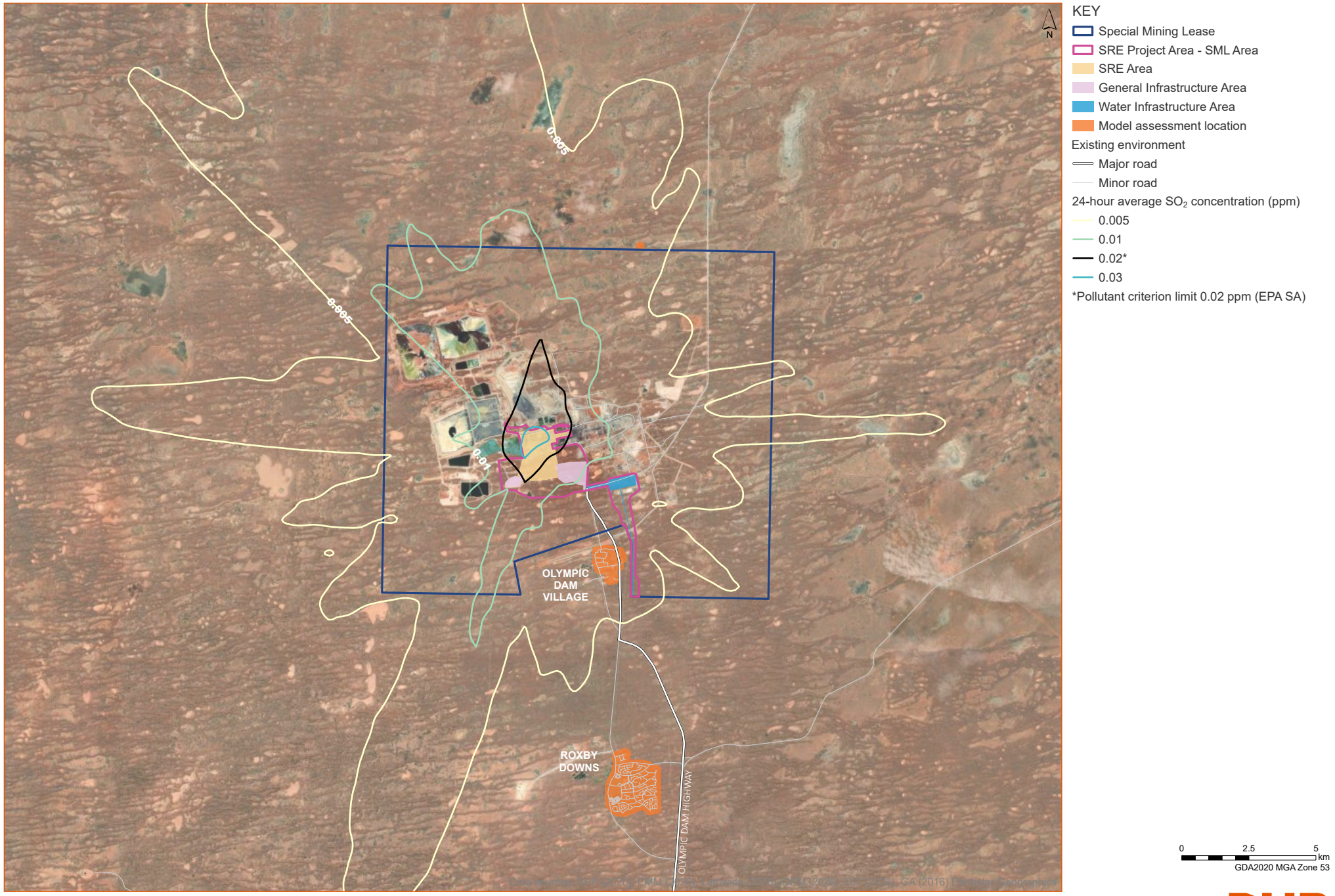


Figure 9.8 | Predicted maximum 24-hour average SO_2 concentrations (ppm)

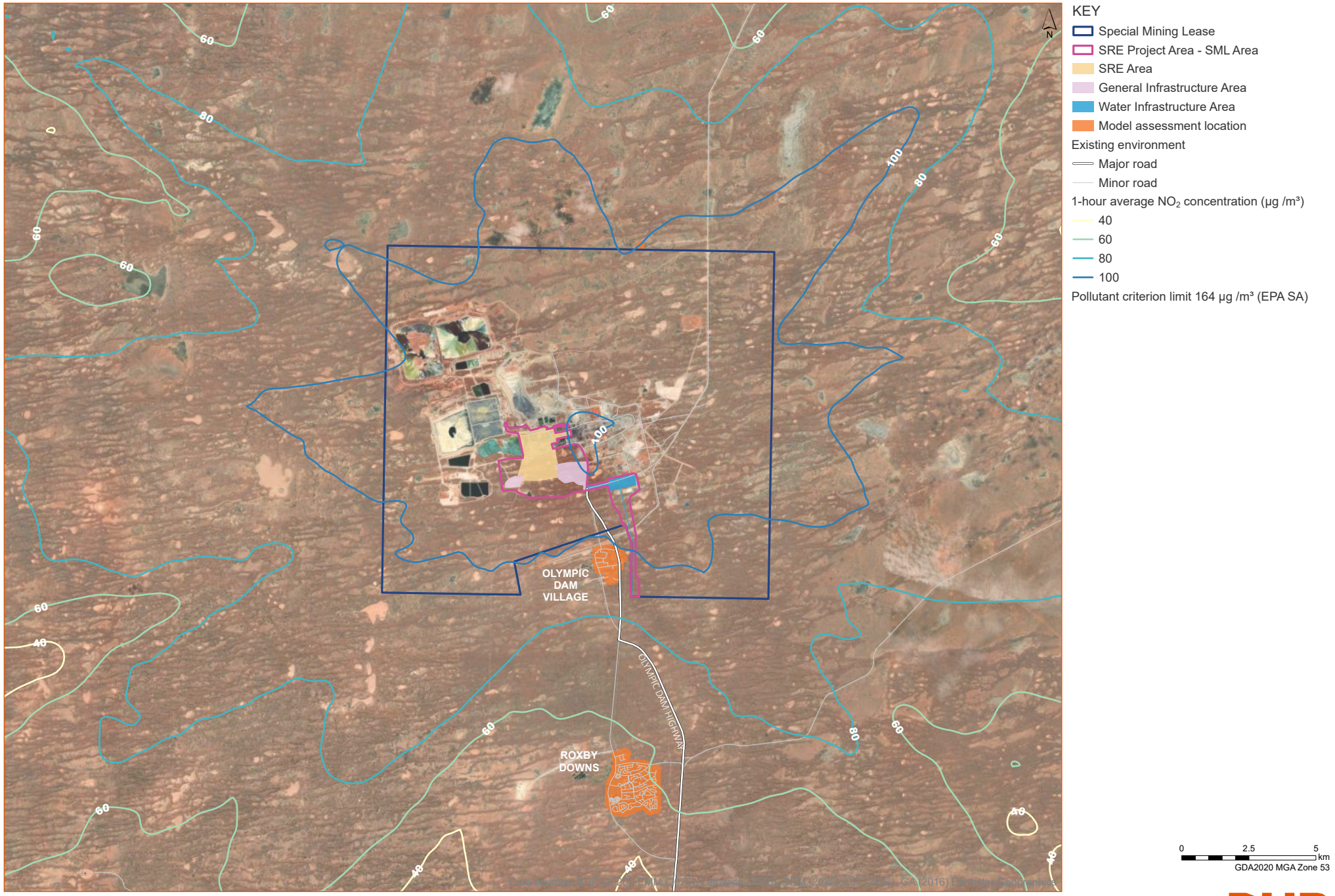


Figure 9.9 | Predicted maximum 1-hour average NO_2 concentrations (µg/m³)

9.3.4 Confirmed impact events

Following the completion of the assessment of the air quality-related effects study, 17 confirmed SPR linkages (confirmed impact events) were established. These were progressed to an assessment of impact significance in accordance with the EIAF (Appendix E1). The confirmed air quality-related impact events are summarised in Table 9.10.

Table 9.10 | Confirmed air quality-related impact events (confirmed linkage)

SPR ID	Pathway	Confirmed impact event
A6	Air (air quality)	Operational activities release emissions of off-gases and fugitive gases that affect air quality, resulting in impacts to the health and safety of the local community
A7	Air (air quality)	Operational activities release emissions of off-gases and fugitive gases that affect air quality, resulting in impacts to the amenity of the local community
A8, A9, A10	Air (air quality)	During operation, emission of off-gases and fugitive gases from smelting, acid plant and refinery operations results in concentrations that impact terrestrial flora and vegetation, habitat and threatened species
A11	Air (odour)	Operational activities release emission of off-gases and fugitive gases that generates odour, resulting in impacts to the health and safety of the local community
A12	Air (odour)	Operational activities release emissions of off-gases and fugitive gases that generates odour, resulting in impacts to the amenity of the local community
A13	Air (air quality)	Project-related construction activities release emissions of particulate matter that affect air quality, resulting in impacts to the amenity of the local community
A14	Air (air quality)	Project-related construction activities release emissions of particulate matter that affect air quality, resulting in impacts to flora and vegetation
A15, A16, A17	Air (air quality)	During construction, the movement of soil materials and the creation of cleared areas subject to wind erosion results in the emission of dust that reduces air quality, impacting the abundance and diversity of terrestrial flora and vegetation, habitat and State and Nationally threatened flora species
A18	Air (air quality)	Project-related operational activities release emissions of particulate matter that affect air quality, resulting in impacts to the health and safety of the local community
A19	Air (air quality)	Project-related operational activities release emissions of particulate matter that affect air quality, resulting in impacts to the amenity of the local community
A20, A21, A22	Air (air quality)	During operation, the emission of particulate matter from stacks or material handling activities results in concentrations that impact terrestrial flora and vegetation, habitat and State and Nationally threatened flora species

9.4 Air (radiation)

The baseline radiation environment was described in Section 5.1.3.1. The assessment of air quality-related effects introduced by the SRE Project is presented in Appendix C4 Radiological Impact Assessment and summarised in the following sections.

9.4.1 Potential impact events

Potential radiation-related impact events identified through the preliminary (screening) SPR evaluation as being linked or having an uncertain linkage are summarised in Table 9.11.

Table 9.11 | Potential radiation-related impact events

SPR ID	Pathway	Potential impact event
A23	Air (radiation)	Project-related operational activities release emissions of radon and/or radionuclide bearing materials that result in radiation exposure to the local community, impacting health and safety
A25, A26, A27	Air (radiation)	During operations, the emission of radon and/or radionuclides (e.g. from stacks or materials handling activities) results in concentrations that impact terrestrial flora and vegetation, habitat and threatened species
GW9	Groundwater (quality)	During operations, loss of control of process liquors leads to seepage of radionuclides into the groundwater, increasing concentrations in the natural groundwater impacting abundance and diversity of groundwater dependent ecosystems
GW10	Groundwater (quality)	During operations, loss of control of process liquors leads to seepage of radionuclides into the groundwater, increasing concentrations in the natural groundwater impacting the ability of third-party users to continue use of groundwater for their purposes
GW11	Groundwater (quality)	During operations, loss of control of process liquors leads to seepage of radionuclides into the groundwater, increasing concentrations in the natural groundwater impacting the ability of future users of the groundwater to use of groundwater for their purposes

9.4.2 Summary of assessment methodology

The assessment of effects methodology was based on translating the outputs of the air quality modelling to determine the change in the baseline radiation environment as a result of the SRE Project (Appendix C3 Air Quality Impact Assessment). Consideration of incremental changes in gamma radiation exposure and groundwater radionuclide concentrations were also considered.

The assessment methodologies used are summarised in Table 9.12, and provide a standardised way of determining the effect from the different radiation types and different exposure pathways.

Table 9.12 | Radiation exposure pathways and assessment methodology

Exposure pathway	Assessment methodology
Irradiation by gamma radiation	• Calculate project originated incremental gamma radiation levels at receptor • Determine exposure hours • Multiple levels by hours to calculate dose
Inhalation of radionuclides in dust	• Calculate project originated incremental dust in air concentrations at receptor • Convert to incremental radionuclide concentrations • Determine exposure hours • Multiply radionuclide concentrations by exposure hours and breathing rate to calculate exposure • Convert exposure to dose using the dose coefficients
Ingestion of radionuclides in foods	• Calculate project-originated incremental radionuclide in media concentrations at receptor • Calculate flora and fauna radionuclide uptakes using the concentration ratios • Determine consumption rates • Calculate the intake of radionuclides • Convert uptake to dose using recognised dose coefficients

The assessment method for each exposure pathway results in a dose from that pathway, which are summed to give a total dose for comparison against dose limits and constraints.

9.4.2.1 SRE Project airborne radiological increments

The predominant radiation exposure pathway for the SRE Project is via the release of radionuclides into the air. To determine an exposure, the radiation assessment used the outputs of air quality modelling (Appendix C3 Air Quality Impact Assessment). The output of the modelling provides the following data for each identified sensitive receptor location:

- annual average SRE Project-generated Rn-222 in air concentrations (units of Bq/m^3)
- annual average SRE Project-generated TSP in air concentrations (units of g/m^3)
- annual average SRE Project-generated dust deposition rates (units of g/m^2/month).

9.4.2.2 Dose assessment

Appendix C4 Radiological Impact Assessment quantifies the effects to the baseline radiation environment arising from radiological emissions from the SRE Project. The effects were calculated as:

- a potential radiation dose for people
- an absorbed dose rate for non-human biota.

In both cases, the incremental effects, above natural background radiation levels, were determined and assessed and compared to relevant standards and limits.

Potential doses to the public were calculated for members of the public at the sensitive receptor locations (i.e. ODV, Roxby Downs and Andamooka). It is usual to use the same locations to assess non-human biota, however any location can be selected. For this assessment, human and non-human biota assessments were conducted at the same locations, with ODV representing the closest sensitive receptor.

The adopted assessment methods are based on the following internationally recognised standards – ICRP (2007), ARPANSA (2011), IAEA (2014), and ARPANSA (2010).

Human radiation exposure pathway and assessment method

An exposure pathway describes the mechanism by which a person may be exposed to radiation. The dose assessment methodology provides a standardised way of determining impact from the different radiation types and different exposure pathways.

The assessment method for each exposure pathway resulted in a dose from that pathway which were summed to give a total dose for comparison against dose limits and constraints.

Non-human biota radiation exposure pathways and assessment method

The method for assessing the radiological effects of the SRE Project on non-human biota was undertaken using an internationally and Australian accepted approach, together with a software package called ERICA (ARPANSA 2010).

The ERICA software uses changes in soil radionuclide concentrations, and concentration ratios, to provide a dose rate for a list of reference species. The dose rates are then compared to screening levels, which are the levels below which no effects would be observed on a species.

Members of the public at receptor locations

The radiological impacts to the public were assessed by calculating the potential total effective dose from all the exposure pathways. The calculated dose was then compared to the accepted dose limit of 1 mSv/y and dose constraint of 0.3 mSv/y.

9.4.3 Summary of assessment outcomes

9.4.3.1 Radionuclides in dust

Radionuclides in dust were based on the dust mass concentrations from the air quality modelling (Appendix C3 Air Quality Impact Assessment). The air quality modelling differentiated the concentration of the dust based on its source. Therefore, different radionuclide concentrations were attributed to different dusts and the impacts.

Table 9.13 and Table 9.14 show the key radiological-related outputs of the air quality modelling, noting the dust outputs are subsequently converted to radionuclide concentrations.

Table 9.13 | Air quality modelling radon concentration outputs

Receptor	Annual average radon concentration (Bq/m^3)
ODV	0.15
Roxby Downs	0.02
Andamooka	0.01

Table 9.14 | Air quality modelling dust outputs

Receptor	Annual average dust concentration (µg/m^3)			Dust deposition rate (g/m^2/y)		
	Hygiene stack	Other stacks	Other sources	Hygiene stack	Other stacks	Other sources
ODV	0.02	0.03	0.79	0.009	0.007	0.919
Roxby Downs	0.01	0.01	0.05	0.004	0.002	0.059
Andamooka	0.01	0.01	0.01	0.001	0.001	0.013

The dust mass concentrations and dust deposition rates were converted to activity concentration and radionuclide deposition rates taking into account the activity concentration of each of the long-lived radionuclides.

The change in annual average dust concentration and dust deposition rates (Table 9.14) were combined with the radionuclide composition of the dust to determine the incremental change in radionuclide concentrations at each sensitive receptor location. The radionuclide composition of the dust was based on the weighted average of the sources of the dust and their respective radionuclide concentrations.

Table 9.15 shows the incremental change in radionuclide concentrations at the sensitive receptor locations.

Table 9.15 | Incremental radionuclide concentrations

Receptor	Incremental radionuclide in dust concentrations (Bq/m^3)				
	U238/U234	Th230	Ra226	Pb210	Po210
ODV	1.3	1.0	4.7	27.0	34.2
Roxby Downs	0.1	0.1	0.5	10.8	11.6
Andamooka	0.1	0.1	0.3	10.5	11.0

9.4.3.2 Gamma radiological increments at receptor locations

Gamma radiation levels from the concentrate stockpile (as the main source) were modelled using the following assumptions:

- Copper concentrate containing 10 Bq/g (based on current Olympic Dam concentrate) would produce approximately 5.2 µSv/h at 1 m (based on 65 µSv/h per percent natural uranium in secular equilibrium at 1 m from an infinite plane (Thompson 1980).
- A 100,000 t stockpile of copper concentrate (based on a stock holding of 20 days), with a density of 2, and dimensions of 500 m x 200 m x 5 m.
- The slag stockpile contains Ra226 conservatively estimated to be 30 Bq/g, giving a gamma dose rate of approximately 15 µSv/h at 1 m assuming that almost all gamma from the uranium decay chain is from Ra226, and therefore using the factor of 65 µSv/h per percent natural uranium in assumed secular equilibrium.
- The gamma radiation intensity reduces as the inverse of the distance (and the inverse square of the distance when the distance is greater than ten times the largest dimension of the source).

The gamma dose rates were calculated for various distances from the stockpile as follows:

- dose rate of less than 5 nanoSieverts per hour (nSv/h) at 5,000 m from the stockpile
- dose rate of less than 1 picoSieverts per hour (pSv/h) at 10,000 m from the stockpile.

All sensitive receptors are beyond these distances, so these values represent a conservative assessment. The dose rates have also been converted to an annual dose rate, with exposure hours of a full year of 8,760 hours.

The results indicate that offsite effects of gamma radiation would be negligible.

9.4.3.3 Groundwater

While groundwater is a potential pathway for radionuclides, it is not considered to be credible due to the physical constraints. To occur, radionuclides must be mobilised into solution from solids and this predominantly occurs under acidic or caustic conditions (such as those that occur in the tailings systems). Under neutral conditions, mobilisation of radionuclides into solution is highly unlikely. In addition, for any radionuclide that do mobilise, there are no identified human or non-human biota pathways to exposure. Regionally, Lake Torrens is the largest sensitive receptor for groundwater discharge with a number of hypersaline springs and seeps, including the Yarra Wurta Spring Group (BHP Billiton 2009), as well Coorlay Lagoon, Salt Creek and Bosworth Creek drainage lines (OZ Minerals 2017a). These receptor locations are over 30 km from the SML and are therefore unlikely to be affected by any SRE Project activities.

9.4.3.4 Dust generation during construction

Some areas within the footprint of proposed SRE Project infrastructure have been identified as containing a layer of slag material (Appendix C4 Radiological Impact Assessment). These are areas where slag from existing operations has been stored and processed (e.g. via cooling and crushing). Radiological modelling showed that despite containing elevated activity concentrations of Ra226, the rate of radon exhalation from Olympic Dam slag materials is low relative to other process materials on site (Appendix C4 Radiological Impact Assessment).

It is planned that, under BAU operations, this material be reclaimed for later processing or appropriately disposed using the existing onsite disposal pathways. The site preparation works and contaminated materials reclamation would be undertaken in accordance with existing site earthworks procedures which require dust controls.

Based on this approach, emission of slag-contaminated-soil dust is not expected to be significant.

9.4.3.5 Radiation dose assessment for human exposure

Radiation dose from the inhalation of dust

The calculation of the dose from the inhalation of radionuclides in dust involved determining the inhalation intake for each radionuclide and multiplying by the standard dose factor for the radionuclide. The intake is determined by multiplying the annual average radionuclide concentration in air by a breathing rate (1 m^3/h) multiplied by exposure hours (assumed to be a full year of 8,760 hours). Worker dose factors and a particle size of 1 µm were used.

The estimated doses are presented in Table 9.16.

Table 9.16 | Dose estimates from the inhalation of radionuclides in dust

Receptor	Dust concentration (µSv/y)						Dust inhalation dose (mSv/y)
	U238	U234	Th230	Ra226	Pb210	Po210	
ODV	0.23	0.26	0.29	0.94	3.54	0.84	0.006
Roxby Downs	0.03	0.03	0.03	0.11	1.42	0.28	0.002
Andamooka	0.02	0.02	0.02	0.07	1.38	0.27	0.002

Radiation dose from the inhalation of radon decay products

Dose due to the inhalation of RnDP was calculated for the three receptor locations based on the following assumptions:

- determine annual average radon concentration from air quality modelling
- apply a dose factor (9 nSv/Bqh/m^3)
- apply a breathing rate of 1 m^3/h and exposure hours of 8,760 hours per year.

The estimated doses are presented in Table 9.17.

Table 9.17 | Dose for the inhalation of radon decay products

Receptor	Change in Rn concentration (Bq/m^3)	RnDP dose (mSv/y)
ODV	0.15	0.012
Roxby Downs	0.03	0.002
Andamooka	0.01	0.001

Radiation dose from the ingestion of food

Appendix C4 Radiological Impact Assessment assumed a standard Australian diet (ARPANSA 2019a), and that half of the ingested food (excluding milk and fish which are not considered) is grown at the sensitive receptor location, where SRE Project dust has deposited and has been taken up into plants and animals. The calculations were based on the soil radionuclide increment after 20 years of dust deposition.

Due to the short half-life of Po210 (approximately four months), simple accumulation for 20 years is inappropriate as the Po210 will be decaying and the concentration cannot be less than the Pb210 concentration due to its ingrowth. Therefore, for this assessment, the Po210 long-term concentrations have been set to the Pb210 values.

Ingestion doses were calculated for four age groups to account for differences in dietary intake and dose coefficients and are shown in Table 9.18.

Table 9.18 | Doses from ingestion of food

Receptor	Food ingestion dose (mSv/y)			
	1 year	5 years	10 to 15 years	Adult
ODV	0.013	0.014	0.017	0.006
Roxby Downs	0.006	0.006	0.006	0.003
Andamooka	0.002	0.002	0.002	0.001

Total estimated dose

The summary of radiological impact to humans at each sensitive receptor location for all exposure pathways is shown in Table 9.19. The conservative estimates of total doses to humans at the receptors, due to the SRE Project, are below the recognised public dose limit of 1 mSv/y and the dose constraint of 0.3 mSv/y.

Table 9.19 | Conservative annual total dose at receptors

Receptor	Total dose estimate (mSv/y)			
	1 year	5 year	10 to 15 years	Adult
ODV	0.039	0.040	0.044	0.033
Roxby Downs	0.010	0.010	0.010	0.006
Andamooka	0.004	0.004	0.004	0.003
Dose constraint	**0.300**	**0.300**	**0.300**	**0.300**
Dose limit	**1.000**	**1.000**	**1.000**	**1.000**

9.4.3.6 Radiation dose assessment for non-human biota (flora and fauna)

The radiological effects on flora and fauna due to the SRE Project were conservatively assessed based on the soil radionuclide increment at the conclusion of the SRE Project (after 20 years of dust deposition, with the Po210 concentration in equilibrium with the Pb210 concentration) at the receptor with the greatest dust deposition (being ODV). An ERICA Tool Tier 2 assessment was conducted, with the outputs presented in Table 9.20.

The screening level, being the absorbed dose rate above which additional assessment is required due to possible impact to species, is 10 µGy/h (ARPANSA 2015). The potential impact to all reference species was determined to be below the screening level.

Table 9.20 | Outputs of ERICA Tool Tier 2 assessment for flora and fauna

Reference species	Dose rate (µGy/h)
Amphibian	0.23
Annelid	0.37
Arthropod – detritivorous	0.47
Bird	0.06
Flying insects	0.10
Grasses and herbs	0.36
Lichen and bryophytes	3.01
Mammal – large	0.14
Mammal – small-burrowing	0.14
Mollusc – gastropod	0.07
Shrub	0.61
Tree	0.06
Kangaroo	0.93
Australian reptile	6.93

9.4.3.7 Worker doses

Worker doses were estimated based on the doses currently received by operational smelter and refinery workers. This was because the work categories and tasks being done in the SRE Project would be effectively the same as the work being done in the existing Olympic Dam operations, with annualised potential inhalation doses of between 0.1 and 6.5 mSv/y during normal operations.

Some maintenance activities, particularly those involving exposure to smelter off-gas dusts, would require the implementation of similar existing BHP smelter design controls, such as ventilation, dedicated extraction systems and process stream recirculation, to ensure doses remain within the occupational criterion (20 mSv/y).

9.4.4 Confirmed impact events

Following the completion of the assessment of the radiation-related effects study, 4 confirmed SPR linkages (confirmed impact events) were established. These were progressed to an assessment of impact significance in accordance with the EIAF (Appendix E1). The confirmed radiation-related impact events are summarised in Table 9.21.

Table 9.21 | Confirmed radiation-related impact events (confirmed linkage)

SPR ID	Pathway	Confirmed impact event
A23	Air (radiation)	Project-related operational activities release emissions of radon and/or radionuclide bearing materials that result in radiation exposure to the local community, impacting health and safety
A25, A26, A27	Air (radiation)	During operations, the emission of radon and/or radionuclides (e.g. from stacks or materials handling activities) results in concentrations that impact terrestrial flora and vegetation, habitat and threatened species

9.5 Air (greenhouse gases and climate change)

The baseline climate for the SRE Area was described in Section 5.1.5. The assessment of GHG and climate change-related effects introduced by the SRE Project is presented in Appendix C5 Greenhouse Gas Impact Assessment and summarised in the following sections.

9.5.1 Potential impact events

Potential GHG and climate change-related impact events identified through the preliminary (screening) SPR evaluation as being linked or having an uncertain linkage are summarised in Table 9.22.

Table 9.22 | Potential greenhouse gas and climate change-related impact events

SPR ID	Pathway	Potential impact event
A1	Air (GHG)	During construction, the combustion of fossil fuels leads to the emission of GHGs which impacts State and Commonwealth matters
A2	Air (GHG)	During operation, the combustion of fossil fuels leads directly to the emission of GHGs from combustion of fossil fuels in smelting activities and indirectly via the consumption of purchased non-renewable electricity from the National Electricity Market impacting on State and Commonwealth matters

9.5.2 Summary of assessment methodology

GHG emissions are referred to as ‘direct’ or ‘indirect’, and defined according to three ‘scopes’ (Scope 1, Scope 2 and Scope 3), as follows:

- Scope 1 relates to direct emissions from sources within the boundary of an organisation (or project), and as a result of the organisation’s activities. Scope 1 emissions are determined for the point of release (onsite). They include, for example, emissions from solid and liquid fuel combustion, and clearing of vegetation.
- Scope 2 relates to indirect emissions associated with the purchase of electricity, steam, heat or cooling at a site. Scope 2 emissions are physically generated outside an organisation’s boundaries, such as an external power station in the case of electricity, but they are included in an organisation’s emissions inventory because they are a result of the organisation’s energy use.
- Scope 3 relates to all other indirect emissions (i.e. other than Scope 2) which occur outside the boundary of an organisation but as a result of actions by the organisation, and are generated in the wider economy. Scope 3 emissions may occur upstream, such as during the extraction and production of fossil fuels, or downstream, such as from the transport of an organisation’s product to customers, or the emissions from outsourced activities.

The GHG assessment mainly focussed on Scope 1 and Scope 2 emissions, as defined under the *National Greenhouse and Energy Reporting Act 2007* (Cth) (NGER Act). Annual Scope 3 emissions have not been included in the GHG assessment.

In order to consider existing GHG emissions, seven years (FY19 to FY25) of annual emission reports from Olympic Dam were reviewed. Annual Scope 1 GHG emissions from Olympic Dam BAU operations are in the order of 221,546 t of carbon dioxide equivalent (CO_2-e) per year, of which 122,938 t CO_2-e/year (approximately 55%) is produced from the existing smelter and refinery.

From the analysis of the seven most recent NGER Scheme reports, the key contributors to annual Olympic Dam GHG emissions are:

- diesel and fuel oil combustion (stationary, transport, electricity production) at approximately 69%
- LPG combustion at approximately 17%
- coke coal at approximately 13%.

These three emission source categories constitute approximately 99% of total annual Scope 1 GHG emissions from the existing operations at Olympic Dam.

Annual Scope 2 GHG emissions from the consumption of purchased non-renewable electricity are in the order of 347,289 t CO_2-e/year, of which approximately 20% is produced from the existing smelter and refinery.

Annual GHG emissions for the Olympic Dam site for the period from FY25 onwards, including SRE Project operations, were quantified using projected annual copper anode production rates and emission intensity factors. Annual GHG emissions were estimated for the following phases of operations:

- BAU operations projected, including of SRE Project Stage 1a construction
- SRE Project Stage 1a operations, including SRE Project Stage 1b construction
- SRE Project Stage 1b operations, including SRE Project Stage 2 construction
- SRE Project Stage 2 operations.

For Scope 1 emissions, the key sources included were:

- onsite liquid fuel (diesel, fuel oil) combustion
- LPG combustion
- coke coal consumption.

Other sources such as SF_6 (sulfur hexafluoride), soda ash usage, electrode paste, oils and greases, are considered minor contributors to Scope 1 emissions. For each GHG (CO_2 (carbon dioxide), CH_4 (methane) and N_2O (nitrous oxide)), annual Scope 1 emissions from the onsite consumption of liquid fuels was estimated.

For Scope 2 emissions, the relevant source was the purchase of grid electricity for onsite use. Scope 2 emissions arise from the generation of non-renewable electricity purchased and consumed by an organisation, but are physically produced by the burning of fuels (coal, natural gas, etc.) at power stations.

9.5.3 Summary of assessment outcomes

9.5.3.1 Emissions of greenhouse gases

The annual average Scope 1 and Scope 2 emissions during the staged development of the SRE Project are estimated to be:

- 160,218 t CO_2-e/year for Stage 1a
- 182,697 t CO_2-e/year for Stage 1b
- 192,524 t CO_2-e/year for Stage 2.

Relative to the estimated annual average BAU period (i.e. FY26 to FY32) projected smelter and refinery emissions (117,834 t CO_2-e/year), the SRE Project returns an increase of approximately 36% for Stage 1a, 55% for Stage 1b and 63% for Stage 2.

Overall, Scope 1 emissions from the SRE Project, when combined with Olympic Dam BAU projected whole-of-site operations, are estimated to be 253,029 t CO_2-e/year for Stage 1a, 279,696 t CO_2-e/year for Stage 1b and 256,891 t CO_2-e/year for Stage 2, or approximately 9%, 21%, and 11% higher, respectively.

SRE Project Scope 2 emissions for Stage 1a are estimated to be 58,004 t CO_2-e/year, 61,573 t CO_2-e/year for Stage 1b and 78,329 t CO_2-e/year for Stage 2. In terms of the projected change in annual SRE Project emissions, compared to the BAU projected operations of the Olympic Dam BAU smelter and refinery, the annual Scope 2 GHG emissions during Stage 1a, Stage 1b and Stage 2 are approximately 137%, 152%, and 220% higher, respectively.

Overall, Scope 2 emissions from the SRE Project when combined with Olympic Dam BAU projected whole-of-site operations are estimated to be 91,834 t CO_2-e/year for Stage 1a, 98,684 t CO_2-e/year for Stage 1b and 122,952 t CO_2-e/year for Stage 2, or approximately 26%, 20%, and 1% lower, respectively.

When considering Scope 2 emissions, it is noted that no consideration of sourcing of additional renewable energy via power purchasing agreements has been made in the calculations. Scope 2 emission calculations are therefore highly conservative.

The emission totals calculated show that the introduction of the SRE Project will increase annual Scope 1 and Scope 2 GHG emissions relative to BAU projected operational emissions, however several alternative fuel strategies (e.g. bio-LPG and bio-diesel) are currently under consideration by BHP under the preferred pathway to net zero (P2NZ) roadmap.

The viability and timing of the preferred P2NZ mitigation strategy options will by shaped by factors such as biofuel availability, feasibility for implementation by site and sufficient power purchase agreement to supply renewable energy to Olympic Dam.

For Scope 2 emissions associated with the consumption of purchased electricity, it is noted that emissions are based on the South Australian grid electricity emission factor projections. Under the BHP Renewable Electricity Plan, BHP is investigating the uptake of 100% renewable electricity from 2030, which would effectively reduce annual Scope 2 emissions to zero.

9.5.4 Confirmed impact events

Following the completion of the assessment of the GHG-related effects study, 2 confirmed SPR linkages (confirmed impact events) were established. These were progressed to an assessment of impact significance in accordance with the EIAF (Appendix E1). The confirmed GHG-related impact events are summarised in Table 9.23.

Table 9.23 | Confirmed GHG and climate change-related impact events (confirmed linkage)

SPR ID	Pathway	Confirmed impact event
A1	Air (GHG)	During construction, the combustion of fossil fuels leads to the emission of GHGs which impacts State and Commonwealth matters
A2	Air (GHG)	During operation, the combustion of fossil fuels leads directly to the emission of GHGs from combustion of fossil fuels in smelting activities and indirectly via the consumption of purchased non-renewable electricity from the National Electricity Market impacting on State and Commonwealth matters

9.6 Groundwater (quality and quantity)

The baseline groundwater environment was described in Section 5.2. The assessment of groundwater-related effects introduced by the SRE Project is presented in Appendix C1 Soil and Groundwater Impact Assessment and summarised in the following sections.

9.6.1 Potential impact events

Potential groundwater-related impact events identified through the preliminary (screening) SPR evaluation as being linked or having an uncertain linkage are summarised in Table 9.11.

Table 9.24 | Potential groundwater-related impact events

SPR ID	Pathway	Potential impact event
GW5	Groundwater (quality)	During operations, infiltration of chemicals and/or hydrocarbons used in SRE Project operations, including metals mobilised via acid rock drainage from stockpiles and/or the TSF or effluent released from WWTPs, result in changes to groundwater quality, impacting aquatic ecology
GW6	Groundwater (quality)	During operations, infiltration of chemicals and/or hydrocarbons used in the SRE Project, including metals mobilised via acid rock drainage from stockpiles and/or the TSF or effluent released from WWTPs, results in changes to groundwater quality, impacting the abundance and diversity of aquatic species and groundwater dependent ecosystems
GW7	Groundwater (quality)	During operations, release of chemicals and/or hydrocarbons used in SRE Project beyond containment areas, results in changes to groundwater quality, impacting third party users
GW8	Groundwater (quality)	During operations, release of chemicals and/or hydrocarbons used in SRE Project beyond containment areas, results in changes to groundwater quality, impacting future users

9.6.2 Summary of assessment methodology

To assess the potential for effects to groundwater and subsequent impacts to receptors, it was necessary to characterise the geochemistry of soils that may be affected by the SRE Project to understand potential leachate quality. The outcomes of these studies are summarised in the following sections and presented in detail in Appendix C1 Soil and Groundwater Impact Assessment.

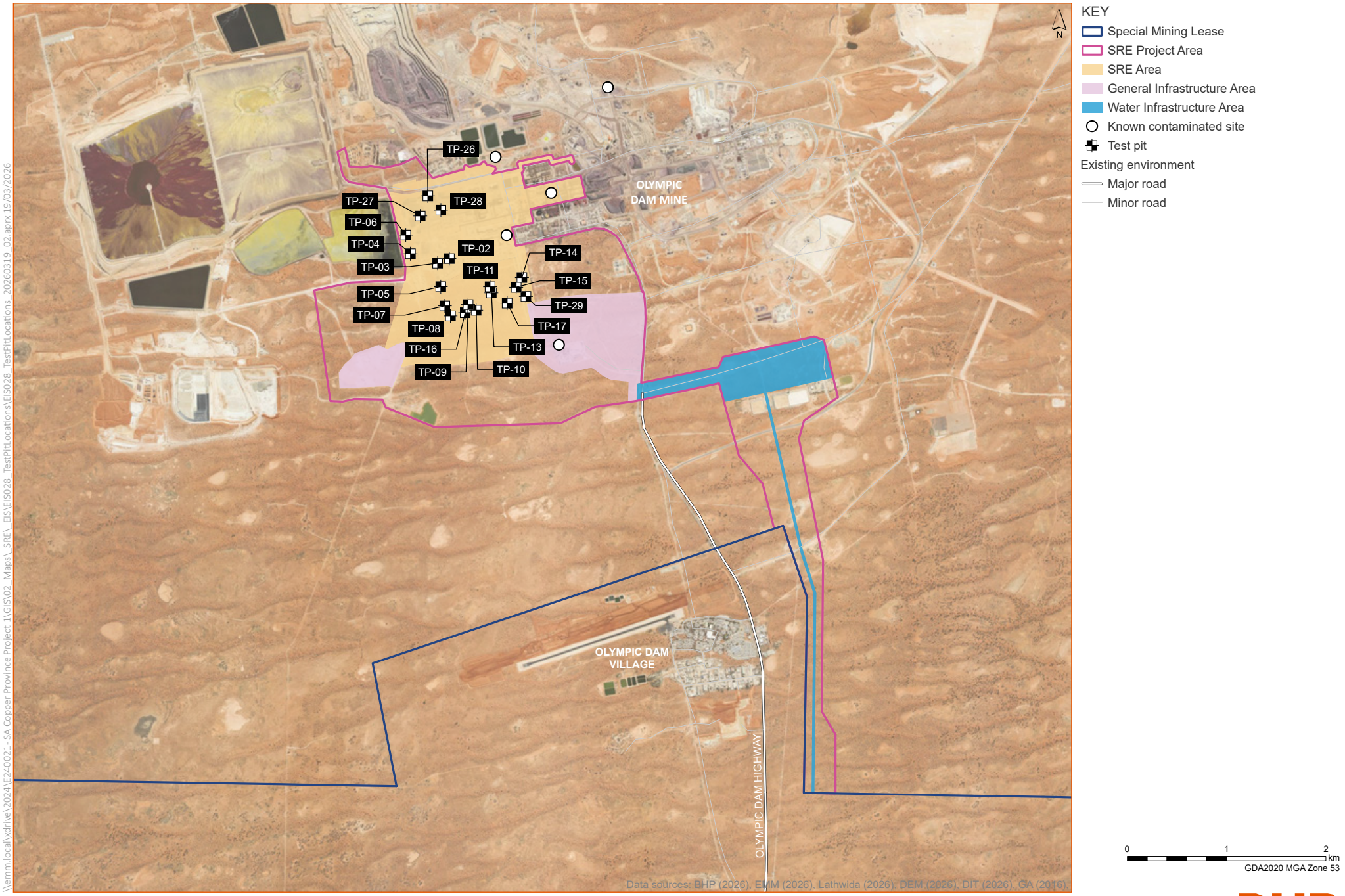
9.6.2.1 Targeted soil sampling and analysis

The targeted soils and geochemistry sampling program was completed between 25 to 29 November 2024. The program excluded three known contaminated sites related to existing Olympic Dam mine operation within the SML Area that are being investigated and managed under separate processes. Existing contaminated site locations are shown in Figure 9.10. The scope of the targeted soils and geochemistry sampling program was to investigate potential soil contamination within the SRE Area. Test pit locations were selected to target areas encompassing the proposed SRE Project smelter, refinery and associated infrastructure.

The scope of the field program included:

- collection of soil and geochemistry samples from 19 geotechnical investigation test pits within the SRE Area (Figure 9.10):
    - 12 test pits were located within the undisturbed area
    - 7 were located in current Olympic Dam operational areas
- laboratory analysis of selected samples for a range the contaminants of potential concern (CoPC), including the one listed in Table 9.25
- analysis of field and laboratory data, including comparison of laboratory analytical results against site assessment criteria (SAC) appropriate for the intended land use
- geochemical characterisation to assess whether disturbed material may generate acidic, saline or neutral drainage (collectively termed acid and metalliferous drainage)
- assessment of the geochemical characteristics of the surface water and groundwater currently monitored onsite to compare to the leachate test results and determine how the leachate concentrations compared to the receiving environment and whether impacts would be likely.

The targeted soil sampling and analysis program was undertaken to address the relevant PSI requirements of the National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended in 2013) (ASC NEPM) (NEPC 2013) and Guidelines for the assessment and remediation of site contamination (EPA 2019). The sampling design, rationale and methodology are further discussed in Appendix C1 Soil and Groundwater Impact Assessment.



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Figure 9.10 | Test pit locations

SRE Project BHP

Soil sample collection

Soil samples were obtained via direct grab sampling from segregated temporary stockpiles created during the excavation.

Samples in general were obtained from the following intervals:

- 0.0 to 0.15 mbgl
- 0.4 to 0.5 mbgl
- 1.0 to 1.1 mbgl
- 2.0 to 2.1 mbgl
- at changes in lithology, or
- where potential contamination was observed.

Samples were also collected at the base of each test pit.

Each sample was collected using a new pair of nitrile gloves to avoid cross-contamination. Samples were placed directly into laboratory supplied sample jars for transport to the nominated laboratories.

All samples were placed in an insulated rigid container with ice and transported to the analysing laboratory under chain of custody protocol.

Laboratory analysis

All samples were transferred to National Association of Testing Authorities (NATA) accredited laboratories under chain of custody conditions. Select samples, for quality assurance and quality control purposes, were taken to a secondary laboratory. The nominated primary laboratory was Australian Laboratory Services (ALS), and the nominated secondary laboratory was Envirolab Services.

The soil analytical schedule is summarised in Table 9.25

Table 9.25 I Soil analytical suite

Contaminants of potential concern (CoPC)	Soil
Contamination	
TRH, benzene, toluene, ethylbenzene, xylenes, and naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAH), metals (arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), nickel (Ni), lead (Pb), zinc (Zn), mercury (Hg))	19 primary samples
NEPM screen schedule B1 Table 1A(1) HIL	19 primary samples
Soil characterisation	
Topsoil suite: pH (water), pH calcium chloride ($CaCl_2$), electrical conductivity (EC), chloride, exchangeable cations and anions (calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), aluminium (Al)), cation exchange capacity (ammonium chloride or ammonium acetate), organic carbon and organic matter, phosphorus (P), sulphate, sulphur, total phosphorus, total nitrogen (N), nitrate, ammonium nitrate, boron (B), Emmerson aggregate test, total nutrients in soil (aluminium (Al), calcium (Ca), iron (Fe), magnesium (Mg), manganese (Mn), potassium (K), sodium (Na), sulphur (S))	11 primary samples
Subsoil suite: pH (water), pH ($CaCl_2$), EC, chloride, exchangeable cations and anions (Ca, Mg, Na, K, Al)	12 primary samples

Contaminants of potential concern (CoPC)	Soil
Particle Size Analysis (sand/silt/clay calculated from texture)	17 primary samples
Geochemistry	
Acid-base screening (chromium reducible suite and net acid production potential (NAPP)) on the same samples, with 10% assumed for metal leachate testing	37 primary samples
Metal leachate testing	6 primary samples

Site assessment criteria

Laboratory results were assessed against the SAC, which have been selected based on the continued use of the study area for mining and infrastructure related activities. The SAC were derived from the ASC NEPM (NEPC 2013) are outlined in Table 9.26.

Table 9.26 I Site assessment criteria

Adopted criteria	Rational for selection
Health Investigation Levels (HILs), ASC NEPM (NEPC 2013)	The ASC NEPM HILs provides a framework for the use of investigation and screening levels. The framework is applicable for assessing human health risk via all relevant pathways of exposure and covers a broad range of metals and organic substances. The proposed study area land use is for the continued use for mining and infrastructure related operations. Therefore, the analytical results from this investigation have been compared to the ASC NEPM Commercial/Industrial HIL D.
Health Screening Levels (HSLs), ASC NEPM (NEPC 2013)	The ASC NEPM HSLs for petroleum compounds have been derived through consideration of risks to human health, with the main focus being on the vapour exposure pathway. The HSLs have been calculated using parameters that generally correspond to data available and as such aim to provide levels that are realistic rather than overly conservative. The analytical results from this investigation have been compared to the ASC NEPM Commercial/Industrial D. The criteria for commercial and industrial land use are considered relevant for the upper 2 m of soil.
Ecological Investigation Levels (EILs) ASC NEPM (NEPC 2013)	The ASC NEPM EILs have been developed for selected metals and organic substances and are applicable for assessing risk to terrestrial ecosystems. EILs depend on specific soil physicochemical properties and land use scenarios. It is noted that EILs take into consideration the depth of contamination, soil texture and age of the impacts. EILs apply principally to contaminants in the top 2 m of soil at the surface/ground level which corresponds to the root zone and habitation zone of many terrestrial flora and fauna species. The proposed study area land use is for the continued use for mining and infrastructure related operations. Therefore, the analytical results from this investigation have been compared to the guideline for 'commercial and industrial'. It is noted that the ASC NEPM states that EILs are not applicable to agricultural soils which need evaluation in relation to crop toxicity, plant contaminant uptake and detailed consideration of soil type. Whilst the proposed SRE Area is located wholly within the SML, the analytical results have been screened against these guidelines as a conservative risk-based approach (i.e. future closure and rehabilitation of Olympic Dam would need to consider potential for uptake of contaminants into plants as part of the data analysis).

Adopted criteria	Rational for selection
	As samples within the top 2 mbgl have been analysed, these guidelines have been adopted for this investigation.
Ecological screening Levels (ESLs) ASC NEPM (NEPC 2013)	The ASC NEPM ESLs were developed to be protective of environmental concerns by determining the reasonable maximum exposure from study area sources for a range of petroleum hydrocarbon compounds and TRH fractions commonly encountered on contaminated sites and are applicable for assessing risk to terrestrial ecosystems. ESLs broadly apply to coarse and fine-grained soils and various land uses. They are generally applicable to the top 2 m of soil and 3 m in arid regions. The analytical results from this investigation have been compared to the ASC NEPM ESLs for commercial and industrial land uses. The study area is located within the South Australian Arid Land Regions (LSA SAAL 2022), therefore ESL guidelines are applicable to up to 3 m. The screening strata have been selected based on the subsurface conditions encountered (i.e. mixture of silts, sands and clays – in which case the most conservative criteria has been applied (sand/coarse)).
Aesthetic issues	In accordance with the ASC NEPM, the aesthetic state of the study area is required to be taken into consideration. Aesthetic issues generally relate to the presence of materials with a negligible risk or non-hazardous inert foreign material in soil or fill resulting from human activity. Sites that have been assessed as being acceptable from a human health and environmental perspective may still contain such foreign material. An assessment of the site aesthetics requires consideration of the natural state of soil, and a comparison between it and the soil encountered during investigation works. In particular, soils should not exhibit discolouration (staining), a malodorous nature (odours) or abnormal consistency (rubble and asbestos). As such, aesthetic considerations (odour) have been considered throughout the fieldwork for soil sampling and noted in field notes when observed.

9.6.2.2 Geochemical characterisation

A geochemical characterisation was undertaken at the SRE Area to assess the potential for material disturbed during project activities to negatively impact the receiving environment. The primary aim of the characterisation was to assess whether disturbed material may generate acidic, saline or neutral drainage (collectively termed acid and metalliferous drainage), which may then impact surface water and/or groundwater on site.

The assessment consisted of the following components:

- sampling and geochemical analysis of potentially disturbed soil samples from the proposed disturbance footprint to determine the primary geochemical characteristics of the material and highlight any potential sources of acid and metalliferous drainage
- leachate testing on samples identified as containing elevated concentrations elements of potential concern to determine the mobility of these elements if exposed to the receiving environment (e.g. subjected to rainfall)
- assessment of the geochemical characteristics of the surface water and groundwater currently monitored on site to compare to the leachate test results and determine how the leachate concentrations compared to the receiving environment and whether impacts would be likely.

Laboratory analysis

Laboratory testing was undertaken by ALS Melbourne and consisted of the following:

- acid-base accounting – non-acid forming (NAF), potentially acid forming (PAF) and uncertain (UC)
- elemental analysis – concentrations were assessed with reference to the geochemical abundance index (GAI)
- leachate testing – analysis of elevated metal/metalloid contents as determined by the elemental analysis underwent leachate testing using the Australian Standard Leaching Procedure to provide an indication of the likelihood of leaching contaminants of potential concern under acidic, saline or neutral drainage conditions.

9.6.2.3 Groundwater characterisation

Groundwater levels and quality within the ALA and the deeper THA are subject to an ongoing operational monitoring program as a component of the site Environmental Management System (EMS, see Section 12.1.2). Monitoring includes annual groundwater level and quality measurements across an established network of bores. This program is reviewed annually and updated as required.

Annual monitoring for copper, uranium, manganese, chloride, sulphate, calcium, iron, pH, total dissolved solids and electrical conductivity has been undertaken for 34 bores from 2008 onwards. Additionally, groundwater monitoring data was collected as part of the Olympic Dam Expansion EIS (BHP Billiton 2009), where 58 bores were sampled between July 2006 and August 2007 was analysed to enable the characterisation of groundwater quality.

9.6.3 Summary of assessment outcomes

The geochemical characterisation consisted of a determination of the acid-base, elemental, and leachate characteristics of samples collected from the SRE Area, followed by a comparison to monitored groundwater quality, to assess whether disturbance during SRE Project activities would likely impact groundwater environmental values.

9.6.3.1 Soil metals characterisation

A total of 38 primary samples from 19 test pit locations (Figure 9.10) (two samples per test pit) were submitted for laboratory analysis as part of this preliminary site investigation.

All concentrations were below the adopted human health and ecological SAC. Trace concentrations of metals (arsenic, chromium, copper, nickel and zinc) were detected in all analysed samples.

Comparing the metal concentrations with the background ranges taken from the ‘Field Geologist Manual, Monograph 9’ (AIMM 2011), arsenic, copper and lead exceeded the background range. However, all concentrations were below the adopted human health and ecological SAC as outlined on Table 9.27.

Table 9.27 I Summary of the quantifiable metal concentrations in soil

Parameter	Arsenic (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
Maximum concentration (all samples)	54	28	13,000	35	26	27
Background ranges (AIMM 2011)	2–15	40–1,000	10–100	0.001–0.03	10–600	15–200
EIL (NEPC 2013)	**160**	**-**	**-**	**-**	**-**	**-**
HIL (NEPC 2013)	**3,000**	**900**	**240,000**	**1,500**	**6,000**	**400,000**

In all samples taken, concentrations of TRH, BTEXN and PAHs were below the laboratory LOR. The complete table of soil results, laboratory analytical reports and certificates of analysis are presented in Appendix C1 Soil and Groundwater Impact Assessment.

9.6.3.2 Soil geochemical characterisation

Acid-base characteristics

All samples tested are NAF, with negative NAPP values and high neutralisation potential ratios (NPRs), due to each sample containing low sulphur concentrations (≤0.29% S) with correspondingly low values of maximum potential acidity (MPA) (≤0.88 kg H_2SO_4/t), and relatively high values of acid neutralising capacity (ANC) (≥4.31 kg H_2SO_4/t) (Figure 9.11).

Values of pH are consistent with the NAF nature of the samples, reflecting the absence of potentially readily-available acid-generating material and range between 6.8 to 9.8. Values of EC range between 13 and 6,070 µS/cm. Detailed acid-base accounting results are provided in Appendix C1 Soil and Groundwater Impact Assessment.

Elemental analysis

Calculated GAIs are zero for almost all measured analytes, indicating that the samples are not enriched compared to global median soil contents. Two analytes (cobalt and arsenic) recorded slightly elevated contents, and one analyte (copper) showed significant enrichment, which is expected given the nature of the Olympic Dam resource, specifically:

- GAIs for cobalt ranged between 1 and 2, indicating an enrichment of approximately 2 to 4 times the global median soil concentration.
- GAIs for arsenic in two samples indicated approximately 6 times the enrichment of global median soil content.
- Across all samples, GAIs for copper ranged between 1 and 8, indicating an enrichment of approximately 3 to 340 times the global median soil concentration, with the highest values reported at 10,200 mg/kg.

Leachate concentrations

Leachate test results indicate the following:

- All samples recorded leachate concentrations at or below laboratory LORs for arsenic, cadmium, lead, mercury and nickel.
- One sample at the slag bay and one sample at the support yard recorded low levels of zinc, both at 0.2 mg/L; all other zinc leachate concentrations were at or below LORs of less than 0.1 mg/L.
- Copper concentrations were all above LORs and ranged from 0.2 mg/L to 122 mg/L.

For the analytes of concern, the leachate concentrations were compared to the elemental analysis of each sample. This was undertaken to determine whether correlations existed between solid sample contents and corresponding leachate. This may indicate the potential for neutral drainage as high initial (solid) concentrations may provide more opportunity for readily-leachable material to be mobilised.

No correlations were found between the elemental concentration and its corresponding leachate for any of the analytes, except for copper, which showed some correlation (Figure 9.12). Due to the nature of operations onsite and given that copper is a mined resource at Olympic Dam, elevated copper concentrations are expected. The correlation between whole-sample copper and potentially leachable copper does, however allow for management of high copper concentrations, whereby samples found to have copper concentrations in excess of 5,000 mg/L (0.5% Cu) can be managed appropriately to reduce the risk of copper leaching into the receiving environment in accordance with the Olympic Dam Contaminated Waste Management Plan (BHP 2021a).

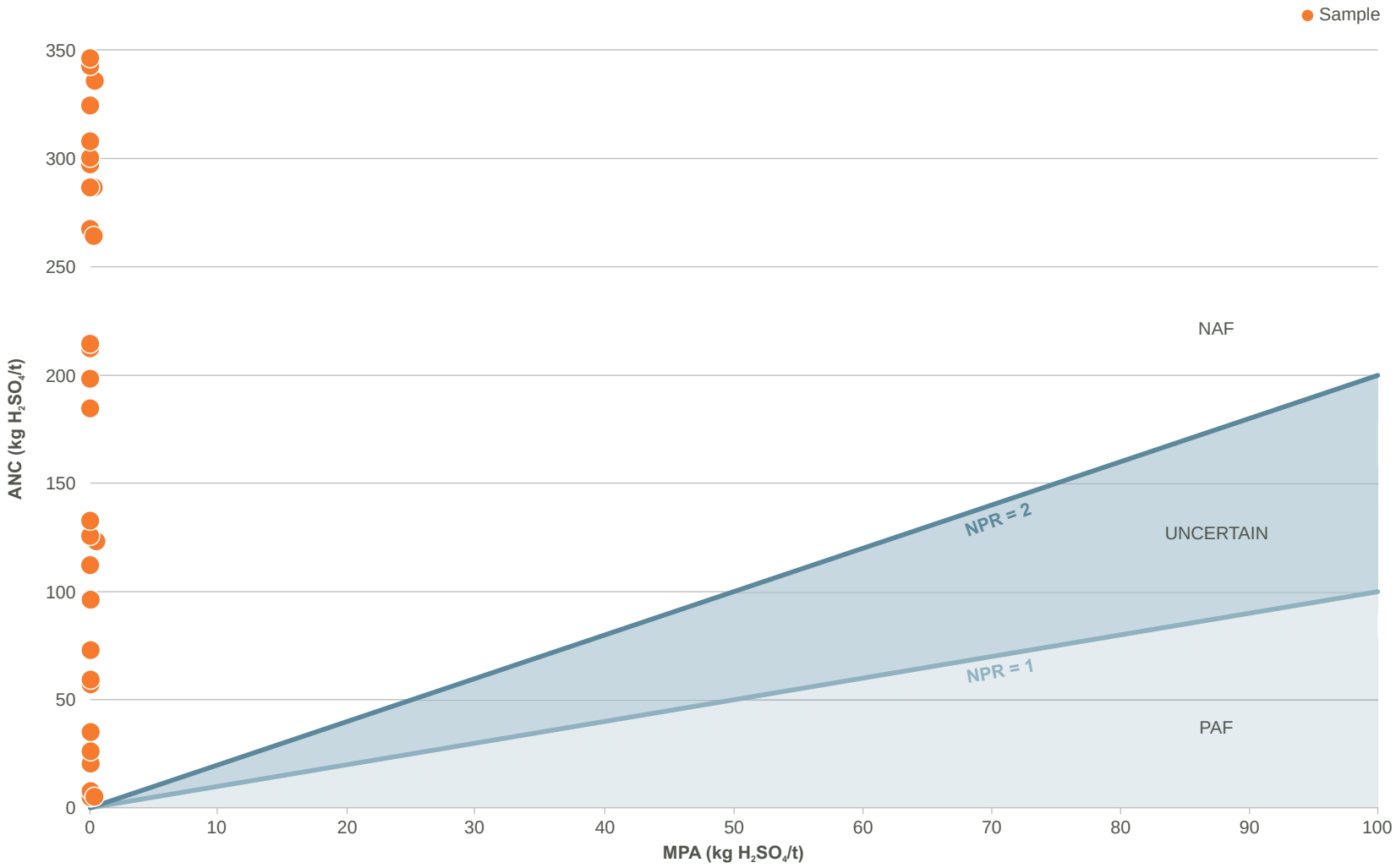


Figure 9.11 | MPA versus ANC for geochemical samples

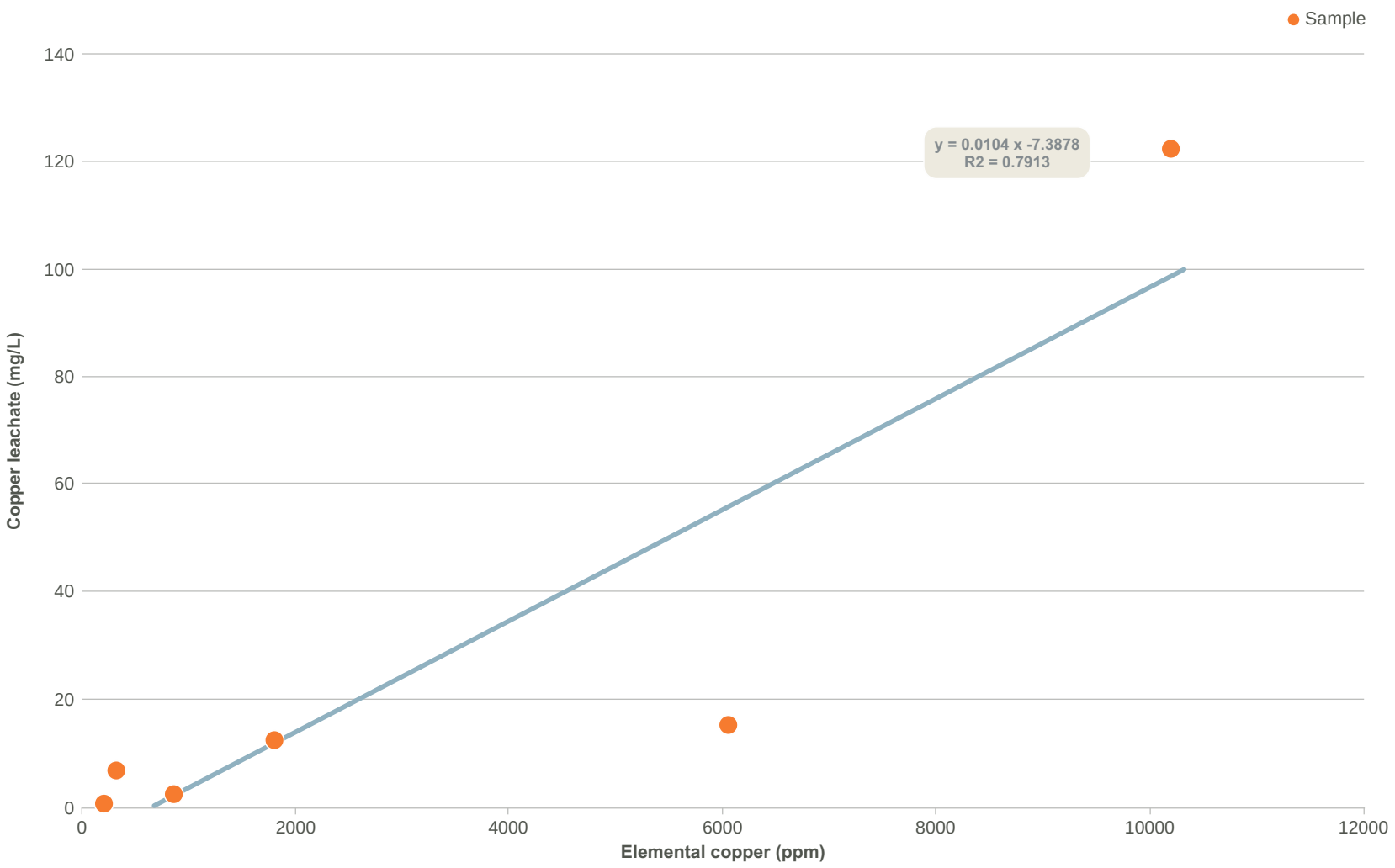


Figure 9.12 | Elemental copper concentration versus copper leachate concentrations

Slag geochemical testing

Geochemical characterisation, comprising acid-base accounting, net acid generation (NAG) testing, elemental abundance analysis (total digest), and toxicity characteristic leaching procedure (TCLP), was performed on an uncrushed flash furnace slag sample. This suite of static testing was used to evaluate the potential for acid mine drainage and the risk of trace element mobilisation associated with this material.

The slag sample exhibited significant elemental enrichment (GAI ≥ 3) in several parameters, including copper, bismuth, silver, molybdenum, uranium, lead, arsenic, cobalt, and tungsten. Subsequent TCLP leachate testing identified detectable concentrations of several of the same analytes; cobalt, copper, molybdenum, and uranium.

The partial overlap between elevated GAI values and detectable leachate concentrations suggests that elemental abundance exerts a first-order control on leaching potential. It is noted that the slag leachate test was undertaken under acidic conditions (TCLP), which are designed to identify contaminants of potential concern and are not representative of typical field exposure conditions (e.g. rainfall).

The NAG results however indicate that the slag material will not generate acidity under natural conditions and, therefore, leachability is expected to be lower in situ.

9.6.3.3 PFAS

The PFAS Stage 1 DSI (JBS&G 2026b) identified PFAS at various operational areas. The greatest soil impacts were associated with the pilot plant, current solvent extraction plant, former solvent extraction plant and emergency response shed, with lower levels identified at the existing smelter and other operational areas.

The potential for SRE Project activities to increase exposure to or mobilise existing PFAS chemicals can be appropriately managed through targeted investigation of work areas during construction.

9.6.3.4 Groundwater quality

Groundwater quality monitoring generally reflects the local characteristics of the SRE Project's location, with median total alkalinity concentrations for bores monitoring the ALA of 226 mg/L as $CaCO_3$, with concentrations ranging from 101 to 515 mg/L. The range of alkalinity concentrations for bores demonstrates strong buffering capacity in the local groundwater system. Most metal concentrations are recorded below the EPA exceedance levels (Appendix C1 Soil and Groundwater Impact Assessment), with manganese exceedances most common, followed by arsenic and lead. No copper exceedances have been reported.

As a representative of mine-affected water, the TSF reports high EC (more than 30,000 µS/cm), high sulphate (30,000 to 100,000 mg/L), acidic pH (less than 2), and elevated metals (e.g. copper concentrations of 1,000 to 2,000 mg/L). Although, due to differences in scale and sampling conditions, direct comparisons of laboratory leachate test results (Appendix C1 Soil and Groundwater Impact Assessment) and monitored TSF water quality should not be made, the relatively low leachate copper values reported from the test work indicates a low potential impact to surface water and groundwater receptors following appropriate management of disturbed material in accordance with existing Olympic Dam Waste Management Plan (BHP 2021a).

9.6.3.5 Conceptual site model

A conceptual site model (CSM) has been developed to identify existing known sources and areas of contamination, associated potential impacts to human health and ecological receptors and to identify exposure source, pathway, receptor linkages for the SRE Project (Figure 9.13).

The main features of the CSM are as follows:

- Surface activities which are a source of contamination include the smelter support yard, smelter tipping bays and various SRE Project operations, such as possible leaks, spills and metal leaching from stockpiles and cooling beds.
- The main HSUs beneath Olympic Dam, from shallow to deepest includes surface topsoils and sub-soils, the ALA, the Arcoona Quartzite aquitard, the THA, and the Woomera/Tregolana Shale aquitard, which is then underlain by mainly basement fractured rock material largely considered as aquitards.
- There is a considerable vertical hydraulic gradient between the ALA and THA, yet the mounding within the ALA does not interact with the drawdown within the THA, suggesting that the Arcoona Quartzite aquitard provides an effective hydraulic barrier between the two main aquifers, which would limit the migration and movement of any potential contamination.
- The SRE Project proposes no additional water extraction from the GAB above current Olympic Dam daily average BAU volumes, with additional water supply sourced via DIT's NWP infrastructure. On this basis, the SRE Project would not change or influence current groundwater effects of existing Olympic Dam operations.
- Terrestrial vegetation considered to be potential GDEs within the SML are typically associated with an accumulation of sediments that can hold water for a period of time (e.g. claypans). The groundwater opportunistically accessed by GDEs is hydraulically separate from the ALA and THA, with most GDEs unable to utilise the high salinity groundwater and are therefore considered unlikely to be affected by SRE Project activities.
- From a regional perspective, sensitive receptors outside of the SML include Lake Torrens and potential watercourse springs which may have some reliance on groundwater associated with Lake Torrens. Given the low regional hydraulic gradient (SRK 2020) and the location of these sensitive receptors are over 30 km to the east they are considered unlikely to be affected by SRE Project activities.
- Groundwater utilisation by landholders is also sparse. Where groundwater is used, it is predominately sourced from quaternary sediments that host shallow and perched groundwater lenses. There are no active third-party landholder bores within 30 km of the SML. Given the location of landholder bores is over 30 km to the west, and groundwater moves very slowly, from west to east, they are considered unlikely to be affected by SRE Project activities.
- Surface water drainage is proposed to be captured and managed within the SRE Area with zero discharge offsite. No impacts are expected to occur in the surface water environment due to stormwater design and management (Appendix C6 Surface Water Impact Assessment).

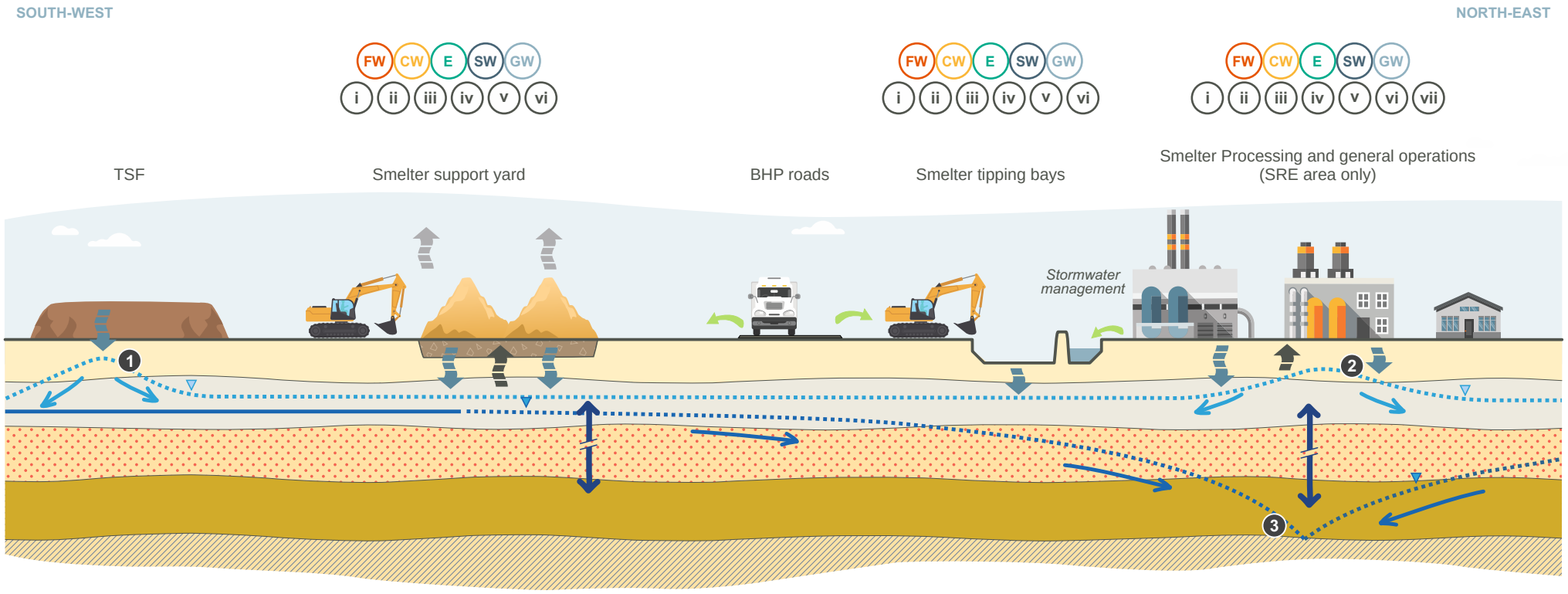
- The connection between surface water and groundwater within the SRE Project can be considered limited due to the depth of the shallowest water table (approximately 50 mAHD within the SRE Area, equating to an approximate depth of 35 to 48 mbgl) and limited surface water infiltration rates (Appendix C6 Surface Water Impact Assessment).
- The PFAS Stage 1 DSI (JBS&G 2026b) improved understanding of existing PFAS sources and pathways within the operational mine area. Confirmed or potential PFAS sources include impacted soils associated with historical aqueous film forming foam use and storage, PFAS-affected concrete that may act as a secondary source through leaching, and PFAS-affected surface water associated with the pilot plant fire-training area.

Based on the physical and chemical features of the CoPC identified, the potential exposure pathways (i.e. SPR linkages) that may be applicable to each CoPC at the SRE Area are presented in Table 9.28 and Figure 9.13.

As discussed previously in Section 5.2.2 and Section 5.5.5, the are no third-party groundwater users and or aquatic ecosystems located in proximity to the SRE Project. Regionally, Lake Torrens and associated drainage lines like Bosworth Creek are the largest sensitive receptors for groundwater discharge and are located over 40 km to the east and 60 km south-east, respectively. Therefore, they are unlikely to be affected by any SRE Project activities.

Table 9.28 I CoPC and potential SPR linkages

CoPC	Potential exposure pathways (SPR linkage)
TRH/BTEXN	• Direct contact and incidental ingestion with impacted surface water and sediment • Dermal contact and incidental ingestion of impacted soil • Dermal contact and incidental ingestion of impacted groundwater • Inhalation of dust (including soil derived) • Plant uptake and/or ingestion by animals • Inhalation of dust and/or vapour in outdoor air and/or a construction trench • Inhalation of vapour in indoor air
PAHs	• Direct contact and incidental ingestion with impacted surface water and sediment • Dermal contact and incidental ingestion of impacted soil • Dermal contact and incidental ingestion of impacted groundwater • Inhalation of dust (including soil derived) • Plant uptake and/or ingestion by animals • Inhalation of dust and/or vapour in outdoor air and/or a construction trench
Metals	• Direct contact and incidental ingestion with impacted surface water and sediment • Dermal contact and incidental ingestion of impacted soil • Dermal contact and incidental ingestion of impacted groundwater • Inhalation of dust (including soil derived) • Plant uptake and/or ingestion by animals • Inhalation of dust and/or vapour in outdoor air and/or a construction trench
PFAS	• Direct contact and incidental ingestion with impacted surface water and sediment • Dermal contact and incidental ingestion of impacted soil • Dermal contact and incidental ingestion of impacted groundwater • Inhalation of dust (including soil derived) • Plant uptake and/or ingestion by animals • Inhalation of dust and/or vapour in outdoor air and/or a construction trench



ALA

- Groundwater flow direction
- Inferred groundwater level
- 1 TSF mounding (existing)
- 2 OD operation mounding (existing)

THA

- Groundwater flow direction
- Inferred groundwater level
- 3 OD Mine dewatering (existing)

- Infiltration of vapours
- Atmospheric dispersion of dust
- Seepage
- Surface water flow
- No groundwater connection

AQUIFER	Quaternary sediment
AQUIFER	Andamooka Limestone
AQUITARD	Arcoona Quartzite
AQUIFER	Tent Hill Formation
AQUITARD	Woomera/Tregolana Shale

RECEPTORS

- FW Future construction workers involved in the SRE Project and visitors
- CW Future and current mine workers and visitors
- E Terrestrial ecosystem
- SW Surface Water Aquatic ecosystems
- GW GDEs

EXPOSURE PATHWAYS

- i Direct contact and incidental ingestion with impacted surface water and sediment
- ii Dermal contact and incidental ingestion of impacted soil
- iii Dermal contact and incidental ingestion of impacted groundwater
- iv Inhalation of dust (including soil derived)
- v Plant uptake and/or ingestion by animals
- vi Inhalation of dust and/or vapour in outdoor air and/or a construction trench
- vii Inhalation of vapour in indoor air

Figure 9.13 | Conceptual site model

Contamination

Based on the collected data from the targeted soils and geochemistry sampling program, it has been demonstrated that:

- No exceedances of CoPC above the SAC were identified within the 19 test pit locations investigated.
- The CSM provided context regarding the potential for effects related to soil and groundwater to interact with receptors and subsequently no complete SPR linkages related to the SRE Area, being the primary location for proposed smelter and refinery expansion infrastructure for the SRE Project, have been identified.
- The potential contamination risk related to SRE Project construction and operations have been quantified and can be appropriately mitigated and managed in accordance with best practice to relevant Australian Standards, construction environmental management and operational control measures (e.g. construction environmental management plan (CEMP), BHP's EPMP, Olympic Dam site operating procedures and Contaminated Waste Management Plan (BHP 2021a)) to relevant environmental legislation, guidelines and policies.
- No targeted sampling was undertaken within the General Infrastructure Area, Water Infrastructure Area and EIGR Areas of the SRE Project. Given the typical construction activities proposed in these location (i.e. ancillary infrastructure comprising water storage dams, water pipelines, soil stockpiles, laydown areas and access roads), the potential for contamination related to the SRE Project construction and operations are considered unlikely and may be appropriately mitigated and managed in accordance with best practice to relevant Australian Standards, construction environmental management and operational control measures. Consideration of additional investigations would be made as part of the construction contract scope.

Geochemistry and groundwater

All samples analysed were NAF with low metal and metalloid concentrations, with the exceptions of arsenic and copper contents. These were targeted during the leachate testing. Copper leachate concentrations displayed a reasonable correlation with the corresponding whole-sample (solid) copper content and suggested that leachate copper may become more significant as whole-sample copper concentrations reach and exceed approximately 5,000 mg/kg (0.5% copper). This value may be used as a 'cut-off' for onsite management of enriched copper samples as the SRE Project proceeds, the value integrated into the existing Olympic Dam management system.

All other analyte leachate concentrations, including arsenic concentrations, were reported at or below LORs (with the exception of two zinc leachate contents of 0.2 mg/L, which were marginally above the LOR of 0.1 mg/L), indicating that the overall likelihood of leachate occurring from the disturbed material is low.

Comparison of the soil leachate results with existing surface water and groundwater monitoring data indicates that waters across the Olympic Dam site are naturally variable and commonly characterised by elevated salinity. While some guideline exceedances for metals (e.g. manganese) occur in monitored waters, these conditions reflect existing site-wide groundwater characteristics rather than project-specific influences. Baseline groundwater quality in both the ALA and THA is characterised by saline to hypersaline conditions, neutral to slightly alkaline pH, and generally low dissolved metal concentrations, with localised elevations in manganese, uranium and iron in some site-based bores associated with known mine water influences that are subject to ongoing monitoring.

Review of post-baseline groundwater quality data collected between 2012 and 2022 from monitoring bores located within and hydraulically down-gradient of the SRE Area indicates that groundwater quality has remained generally consistent with baseline conditions, with no evidence of widespread or systematic deterioration in metals or hydrocarbon-related parameters. Hydrocarbon (TRH), BTEXN and PAH analytes were predominantly below laboratory LOR, with isolated detections limited to individual bores associated with known historically contaminated areas.

The depth to groundwater beneath the SRE Area, typically greater than 35 m, substantially limits the potential for downward migration of contaminants from surface soils to groundwater. Surface water within the SRE Project footprint would be captured and managed under a zero-discharge design, reducing the potential for contaminant mobilisation via infiltration or runoff. In addition, best practice engineering controls, bunding of chemical and hydrocarbon storage, spill response procedures and implementation of BHP's site contamination management systems further reduce the likelihood of contaminant migration to groundwater.

Any leaching from material disturbed by SRE Project activities in the SML Area is likely to have less of an impact on the receiving environment than mine affected water already present on site and can be appropriately management in accordance with Olympic Dam's EMS. The SRE Project proposes no additional water extraction above current Olympic Dam daily average BAU volumes with additional water supply via DIT's NWP infrastructure. On this basis, the SRE Project would not change or influence the current groundwater regime of existing Olympic Dam operations and thus no additional water affecting activities are anticipated on the SRE Project site.

PFAS

Existing PFAS impacts identified by the Stage 1 DSI represent pre-existing site contamination rather than contamination generated by the proposed SRE Project. The potential for SRE Project activities to increase exposure to or mobilise existing PFAS chemicals can be appropriately managed through targeted investigation of work areas during construction.

9.6.4 Confirmed impact events

Following the completion of the assessment of the groundwater-related effects study, no confirmed SPR linkages (confirmed impact events) were established. Groundwater-related impact events were not progressed to an assessment of impact significance in accordance with the EIAF (Appendix E1).

9.7 Surface water (quality and quantity)

The baseline surface water environment was described in Section 5.3. The assessment of surface water-related effects introduced by the SRE Project is presented in Appendix C6 Surface Water Impact Assessment and summarised in the following sections.

9.7.1 Potential impact events

Potential surface water-related impact events identified through the preliminary (screening) SPR evaluation as being linked or having an uncertain linkage are summarised in Table 9.29.

Table 9.29 | Potential surface water-related impact events

SPR ID	Pathway	Potential impact event
SW1, SW2, SW3, SW4	Surface water (quantity)	During construction, placement of SRE Project infrastructure and associated surface water management infrastructure disrupts, reduces or increases surface water flows, impacting abundance and diversity of native vegetation, habitat, threatened species and aquatic species
SW5, SW6, SW7	Surface water (quality)	During construction, placement of SRE Project infrastructure and associated surface water management infrastructure results in the sedimentation of the downstream environment, impacting the abundance and diversity of native vegetation, habitat and threatened species
SW8, SW9, SW10	Surface water (quality)	During construction, the use of water for dust suppression activities results in saline water run-off into surrounding environments, causing salinisation which impacts the downstream environment, impacting flora and vegetation, habitat and threatened species
SW11	Surface water (quality)	During operations, the release of chemicals or hydrocarbons used in SRE Project operations, results in impacts to the downstream environment, impacting the health and safety of the local community
SW12, SW13, SW14, SW16, SW17, SW18	Surface water (quality)	During construction and operation, the release of chemicals or hydrocarbons used in SRE Project operations, including metals mobilised via acid rock drainage from stockpiles and/or the TSF or effluent released from WWTPs, results in impacts to the downstream environment, impacting the abundance and diversity of native vegetation, habitat and threatened species
SW15	Surface water (quality)	The release of chemicals or hydrocarbons used in SRE Project operations, including metals mobilised via acid rock drainage from stockpiles and/or the TSF or effluent released from WWTPs, results in impacts to the downstream environment, impacting the health and safety of the local community
SW19, SW20, SW21	Surface water (quality)	During closure, erosion of closed structures and rehabilitated areas results in the sedimentation of the downstream environment
SW22, SW 23, SW24, SW25	Surface water (quantity)	During operations, placement of SRE Project infrastructure and associated surface water management infrastructure disrupts, reduces or increases surface water flows, impacting abundance and diversity of native vegetation, habitat, threatened species and aquatic species

9.7.2 Summary of assessment methodology

An assessment of effects was undertaken to determine the potential for change in the baseline surface water environment as a result of the proposed SRE Project activities. The assessment of effects included the following steps:

- review of baseline environment data
- review of the SRE Project activities
- consider potential events and pathways by which SRE Project activities could affect identified surface water receptors
- simulate the alteration of flood behaviour with a flood model
- utilise the assembled information to undertake an effects assessment.

Flood modelling undertaken as part of Appendix C6 Surface Water Impact Assessment was based on an existing flood model of the Olympic Dam site (WSP 2023). Information carried forward from the previous work included:

- model software version (TUFLOW release 2023-AB)
- model geometry, including:
    - lidar data describing the topography and existing built areas
    - stormwater infrastructure details such as culverts and channels.

Appendix C6 Surface Water Impact Assessment describes the following changes from the WSP (2023) flood study:

- reference to the current release of Australian Rainfall and Runoff (Ball et al. 2019)
- updated climate data, including warming factors suitable for 2025, and a 2.5°C warming climate scenario, representing approximately:
    - 2070, if following the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) SSP3-7.0 trajectory (IPCC 2021)
    - 2075, if following draft IPCC Seventh Assessment Report (AR7) High trajectory, which assumes roll back of current climate policy (Van Vuuren et al. 2026)
    - 2090, if following draft IPCC AR7 Medium trajectory, which assumes continuation of current climate policy (Van Vuuren et al. 2026)
- addition of the SRE Project's infrastructure when considering project effects scenarios.

Site infrastructure and buildings were modelled in TUFLOW as topography modifications and inactive areas. Inactive areas were used to direct flood waters around the buildings or other infrastructure.

9.7.3 Summary of assessment outcomes

9.7.3.1 Potential changes to flood behaviour

Process plant stormwater infrastructure

The flood model indicated that in the 1% annual exceedance probability (AEP) storms (and smaller), the proposed SRE Project drainage scheme (HFJV 2025d) would perform as intended. Flood depths on the graded surfaces are expected to be less than 0.1 m. The storage pond was demonstrated not to overtop in the 1% AEP storm, although the 500 mm minimum freeboard was breached in the 1% AEP events and the 2.5°C warming scenario, 2% AEP storm.

Once at capacity the pond backwatered into the drainage channels, causing pooling on the SRE Project infrastructure pad surface, as outlined in the water management strategy (HFJV 2025d). No discharges to the environment were observed in the model results.

Soil stockpile storage facility

The placement of the soil stockpile storage facility may cause a localised change in water depth during and immediately following rainfall events, with temporary ponding adjacent to the proposed SRE Project infrastructure pad location ranging from 0.3 m deep for the 5% AEP event to 1 m for the 0.2% AEP event.

Dune swales

Dune swales intersected by the proposed development footprint may receive less stormwater runoff, due to water being redirected by the SRE Project stormwater drainage system. For example, the flood model indicated flood depths reducing by 0 to 10 cm within a swale immediately west from the proposed development.

Other dune swales were intersected by the SRE Project infrastructure such that bunds, roads or pad surfaces acted as barriers to flow with a minor reduction in swale catchment area. In this instance, the flood model indicated, for example, that flood depths would increase by 0 to 10 cm in two swales directly east of the proposed development.

Summary

Construction of the SRE Project infrastructure would result in collection of stormwater from some areas which currently exist as natural swales and banking up of water against the edge of proposed bunds, roads and raised pads (Figure 9.14).

Flood modelling indicated that 27 dune swales may have altered flood hydrology for a 1% AEP event following SRE Project development. There was a negligible difference in wet and dry areas in each modelled scenario. These are predominantly located south of the existing Olympic Dam mine process plant infrastructure pad and result in increases and decreases to water levels either side of a bund or access road. The addition of culverts to the access road in detailed design is predicted to return many of these to near-baseline conditions.

Pooling and depth increases also occurred next to the southern pad surface, however detailed design of the drainage system in this area will be able to at least partially ameliorate this. In each case, the change in water level is not expected to result in an impact to sensitive receptors.

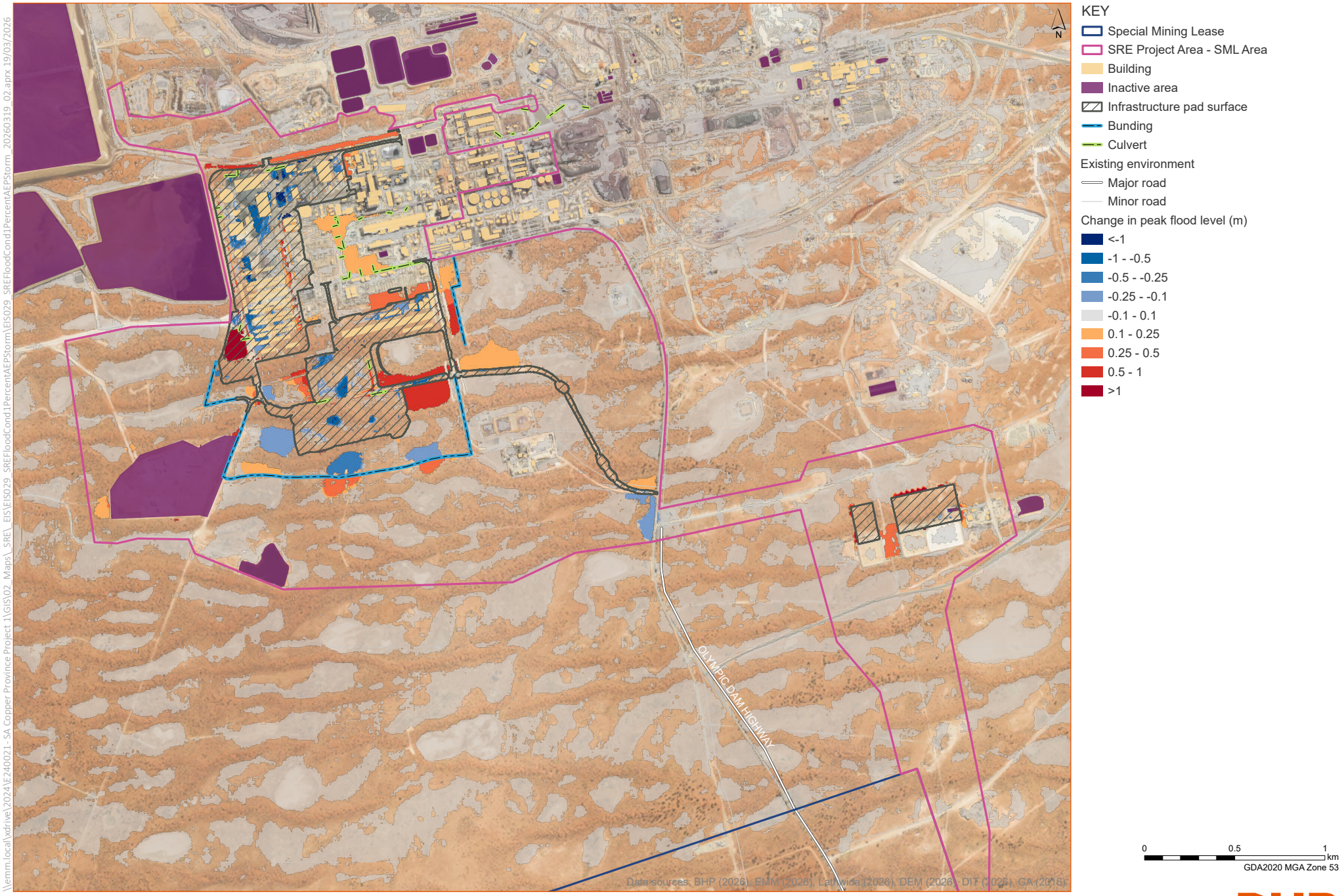


Figure 9.14 | SRE Project flood conditions (1-in-100-year) 1% AEP storm

9.7.3.2 Surface water quality

If unmanaged, there is potential for the SRE Project to affect surface water quality, for example through accidental spills of contaminants (i.e. fuels, lubricants, other chemical) which may subsequently be transported by rainfall runoff into swales, through saline water runoff into surrounding environments from dust suppression activities, or through erosion of disturbed areas. Additionally, it is anticipated that runoff from SRE Project pads may contain contaminants including dusts and radionuclides which would need to be managed accordingly (HFJV 2025d).

The SRE Project is expected to have little or no effect on surface water quality as:

- Contaminant sources such as fuel storage and stockpiles would be bunded and located away from stormwater flow paths, preventing interaction with stormwater.
- SRE Project smelter and refinery plants would be enclosed within buildings, such that rainfall is excluded.
- No stormwater discharge points would be created by the SRE Project.
- Stormwater runoff velocities in the natural environment would remain unchanged, thus there would be no change to erosion potential.
- The dunal catchment system means that any contaminant, if one were to be released, would not be transported through a waterway network but would be captured locally, facilitating cleanup.
- Any excess saline water runoff from dust suppression would be captured within a stormwater containment system, which would not discharge to the environment.
- Standard water conservation measures, such as incorporation of process water reuse systems and use of efficient fittings, will be implemented as part of SRE Project process design.

9.7.3.3 Site water balance

An additional water demand of up to 15.7 ML/d would be required for the SRE Project (i.e. 28.5 ML/d total demand). The additional water demand includes the reuse of 8.0 ML/d of water in various processes on site. This water would be supplied via a connection to the proposed NWP, which includes a desalination plant on Eyre Peninsula and a water supply pipeline to Olympic Dam, with offtakes to pastoral operations, communities and industry along the pipeline route.

The proposed SRE Project water demand is provided in Table 6.11. BHP may opportunistically use collected stormwater runoff to reduce the required supply of water from the NWP, however, given the low yearly rainfall and unpredictable nature of rain events, such use would constitute only a minor component of the site water balance. Analysis of historical climate records and developed catchment area indicates that an average of 0.05 ML/d may be harvestable, which would have a negligible effect on the typical annual water balance. In addition, standard water conservation measures, such as incorporation of process water reuse systems and use of efficient fittings will be implemented as part of SRE Project process design.

The NWP water supply may be supplemented or offset by the provision of local groundwater supply . This water supply would occur via existing process storage dams, the desalination plant at the Olympic Dam site, and/or through the distribution of the existing water supply within daily average BAU volumes.

The additional water supplies are likely to require augmentation of the existing desalination water treatment plant and water distribution network, and a demineralised water plant would be required to support the SRE Project operations.

9.7.4 Confirmed impact events

Following the completion of the assessment of the surface water-related effects study, 15 confirmed SPR linkages (confirmed impact events) were established. These were progressed to an assessment of impact significance in accordance with the EIAF (Appendix E1). The confirmed surface water-related impact events are summarised in Table 9.30.

Table 9.30 | Confirmed surface water-related impact events (confirmed linkage)

SPR ID	Pathway	Potential impact event
SW1, SW2, SW3	Surface water (quantity)	During construction, placement of SRE Project infrastructure and associated surface water management infrastructure disrupts, reduces or increases surface water flows, impacting abundance and diversity of native vegetation, habitat and threatened species
SW5, SW6, SW7	Surface water (quality)	During construction, placement of SRE Project infrastructure and associated surface water management infrastructure results in the sedimentation of the downstream environment, impacting the abundance and diversity of native vegetation, habitat and threatened species
SW12, SW13, SW14, SW16, SW17, SW18	Surface water (quality)	During construction and operation, the release of chemicals or hydrocarbons used in SRE Project operations, including metals mobilised via acid rock drainage from stockpiles and/or the TSF or effluent released from WWTPs, results in impacts to the downstream environment, impacting the abundance and diversity of native vegetation, habitat and threatened species
SW19, SW20, SW21	Surface water (quality)	During closure, erosion of closed structures and rehabilitated areas results in the sedimentation of the downstream environment

9.8 Land (landscape values, vegetation and habitat)

The baseline landscape value and vegetation and habitat of the SRE Area was described in Section 5.4 and Section 5.5 respectively. The assessment of land-related effects introduced as a result of the SRE Project is presented in Appendix D1 Ecological Impact Assessment, Appendix D4 Historic Heritage Impact Assessment and Appendix D5 Visual Amenity Assessment and summarised in the following sections.

9.8.1 Potential impact events

Potential land-related impact events identified through the preliminary (screening) SPR evaluation as being linked or having an uncertain linkage are summarised in Table 9.31.

Table 9.31 | Potential land-related impact events

SPR ID	Pathway	Potential impact event
L1, L2, L3	Land (quantity)	During construction, clearing of native vegetation for SRE Project infrastructure results in a reduction in abundance and diversity of native vegetation, habitat and threatened species
L33	Land (quantity)	During construction, land clearing associated with the construction of SRE Project infrastructure results in disturbance to an unknown non-Indigenous heritage site
L4	Land (quantity)	During construction, land clearing associated with the construction of SRE Project infrastructure results in disturbance, removal or damage to cultural artefacts
L5	Land (quantity)	During construction, land clearing associated with the construction of SRE Project compromises Aboriginal intangible ethnographic values of an area through alteration or damage to the cultural landscape/features
L6, L7, L8	Land (quality)	During construction, land clearing associated with the construction of SRE Project infrastructure results in conditions that are favourable for an increase in the abundance and diversity of weed species and an associated reduction in abundance and diversity of native vegetation, habitat and threatened species
L9, L10, L11	Land (quality)	During construction, placement of SRE Project infrastructure and associated surface water management infrastructure results in the sedimentation of the downstream environment, with changes to the prevailing surface water catchments resulting in a reduction in abundance and diversity of native vegetation, habitat and threatened species
L12	Land (quantity)	Placement of SRE Project infrastructure changes the prevailing visual amenity of the area
L13	Land (quality)	During construction, placement of SRE Project infrastructure, and particularly the installation of electricity distribution lines, results in an increase in fauna interactions resulting in impacts to fauna abundance and diversity
L18	Land (quality)	During operations increased occupancy of Olympic Dam accommodation due to the SRE Project workforce results in an increase in feral/pest fauna numbers that results in a decrease in native fauna abundance and diversity
L14, L15, L16, L17, L22, L23, L24, L25, L29, L30, L31, L32	Land (quality)	During construction, operation and closure project activities, including planned construction and maintenance activities and unplanned equipment and plant failures, create conditions that result in a bushfire, resulting in destruction of habitat and vegetation and impacting the abundance and diversity of flora, fauna, State and Nationally threatened species and protected areas
L19, L20, L21	Land (quality)	During construction and operation, the release of chemicals or hydrocarbons used in the SRE Project, including temporary storages, transport and unloading/loading activities, metals mobilised via acid rock drainage from stockpiles and/or the TSF or effluent released from WWTPs, results in the contamination of land, impacting the abundance and diversity of native vegetation, habitat and threatened species
L26, L27, L28	Land (quality)	During closure. the rehabilitation of cleared land following closure results in conditions that are favourable for an increase in the abundance and diversity of weed species resulting in a reduction in the abundance and diversity of native vegetation, habitat and threatened species

9.8.2 Summary of assessment methodology

9.8.2.1 Land disturbance and vegetation clearance

The SRE Project disturbance footprint has been progressively refined as the engineering of infrastructure aspects has progressed, together with a greater understanding of environmental and cultural constraints. The proposed footprint and associated infrastructure are described in Chapter 6.

The assessment of the effects of the SRE Project footprint on vegetation and habitat has considered this SRE Project footprint in the context of the baseline ecological environment presented in Section 5.5, and is presented in detail in Appendix D1.

9.8.2.2 Historic heritage impact assessment methodology

The Historic Heritage Impact Assessment (Appendix D4) had a study area extending 500 m around the SRE Project Area.

The Historic Heritage Impact Assessment was conducted with the process including the following:

- a review of the Australian Heritage Database and the South Australian Heritage Places Database
- historical research and analysis of the historical plans and aerials to determine the presence of historical features.

9.8.2.3 Aboriginal heritage impact assessment methodology

The Aboriginal Heritage Impact Assessment used baseline heritage survey data, stakeholder engagement outcomes and available project design information to assess the potential for impact to Aboriginal heritage.

9.8.2.4 Visual impact assessment methodology

The Visual Impact Assessment (Appendix D5) applied a Visual Study Area extending 4 km around the SRE Project Area.

The Visual Impact Assessment was conducted using a three-stage assessment process comprising the following:

- Baseline visual amenity environment – used to establish the existing character of the landscape and visual environment (i.e. baseline condition) and determine the landscape's susceptibility to visual change (known as the visual absorption capacity (VAC)).
- VAC is a measure of the landscape’s ability to absorb development without a significant change in the character and is measured as either low, moderate or high. A landscape with a low VAC rating would indicate that it is not capable of absorbing modification/addition without significantly changing the character of the landscape. A landscape with a high VAC rating indicates that it is capable of absorbing a higher degree of modification/addition without significantly changing the landscape character.
- Developing a zone of visual influence (ZVI) map to gain an appreciation of where the SRE Project infrastructure may be visible.

- Visual amenity assessment – using the existing landscape and visual environment, the ZVI, photomontages from four viewpoints and a review of relevant planning policies, the Visual Assessment determined the sensitivity of the existing landscape to change and assessed the potential visual impacts of the SRE Project on the local community, its visitors and landscape.

9.8.3 Summary of assessment outcomes

9.8.3.1 Land disturbance and vegetation clearance

Development of the SRE Project would require the clearance of native vegetation and therefore associated fauna habitat.

Disturbance data used for the calculations is based upon the infrastructure layer, buffers and existing disturbance within the SML Area and EIGR Areas (Appendix D1). The Disturbance Footprint for the SRE Project is 234.04 ha with the breakdown by vegetation community shown in Table 9.32, Figure 9.15 and Figure 9.16.

Table 9.32 | SRE Project estimated disturbance footprint

Vegetation community	Within SRE Project Area (ha)	Within Disturbance Footprint (ha)
SML Area (SRE Area, Water Infrastructure Area and General Infrastructure Area)	531.40	205.48
Loamy swales with Chenopod low open shrubland and emergent Mulga	283.41	114.40
Sand dunes with Umbrella Bush (Acacia ligulata)/Bullock Bush tall shrubland over mixed shrubs/tussock grasses	188.28	77.35
Sand dunes with White Cypress-pine open woodland and mixed tall shrubs/tussock grasses	21.70	4.71
Sandy swales with mixed Acacia tall shrubland and tussock grasses	23.40	5.66
Claypans	12.65	3.11
Planted vegetation	0.25	0.25
Run-on depression with River Red Gum (/Willow Wattle open woodland	1.71	0.00
EIGR Areas	28.56	28.56
Sand dunes with Umbrella Bush /Bullock Bush tall shrubland over mixed shrubs/tussock grasses	3.12	3.12
Sandy swales with mixed Acacia tall shrubland and tussock grasses	3.49	3.49
Undulating plain with Chenopod low open shrubland and emergent Dead Finish	2.01	2.01
Stony plains with low open chenopod shrubland and minor gilgai formations, and shallow drainage lines containing Cotton-bush	5.55	5.55
Stony plains with varied low open chenopod shrubland and minor shallow gilgai formations	11.77	11.77
Sandy plain with low open chenopod shrubland	2.56	2.56
Existing disturbance	0.06	0.06
Totals	**559.96**	**234.04**

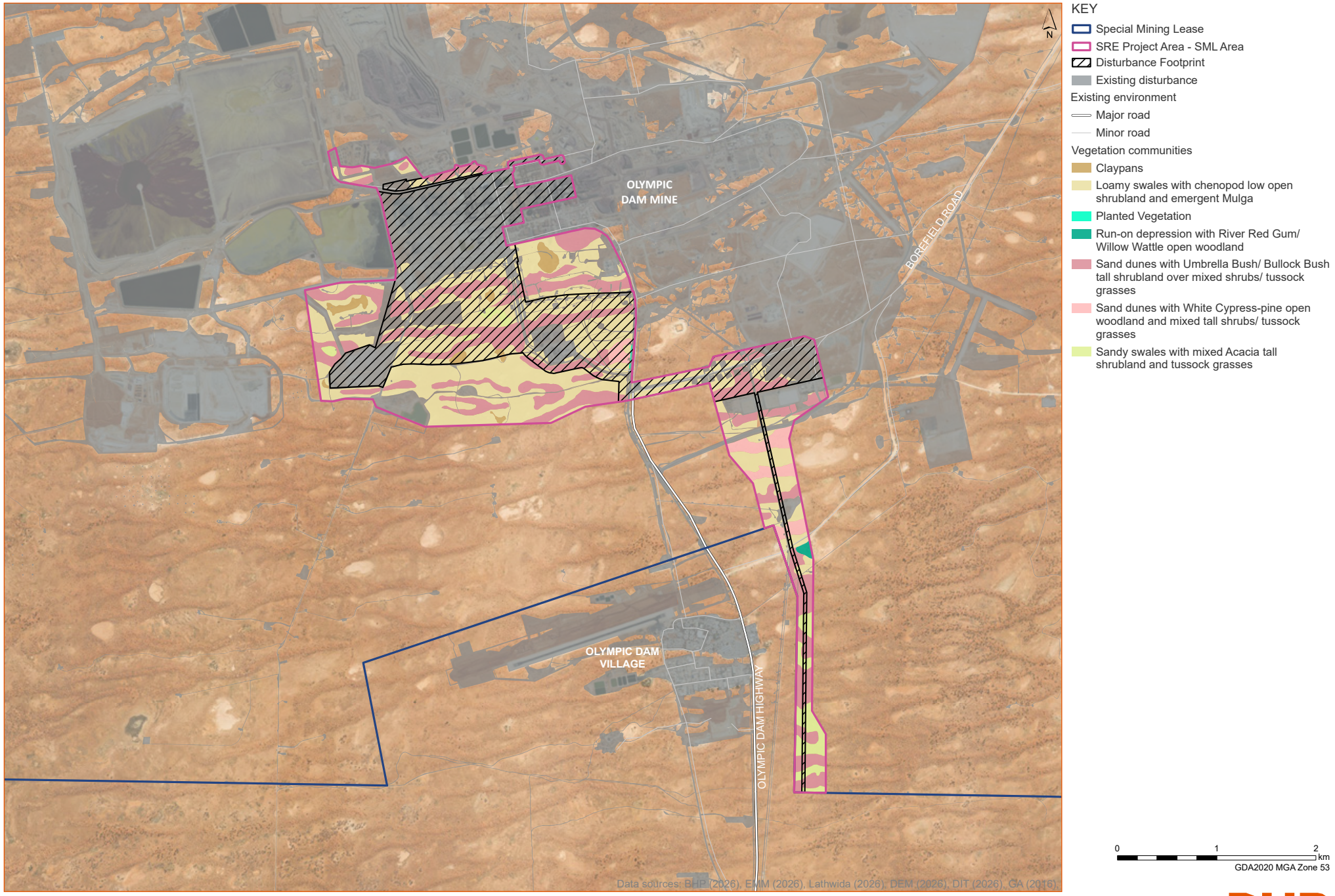


Figure 9.15 | Vegetation communities and SML Area Disturbance Footprint

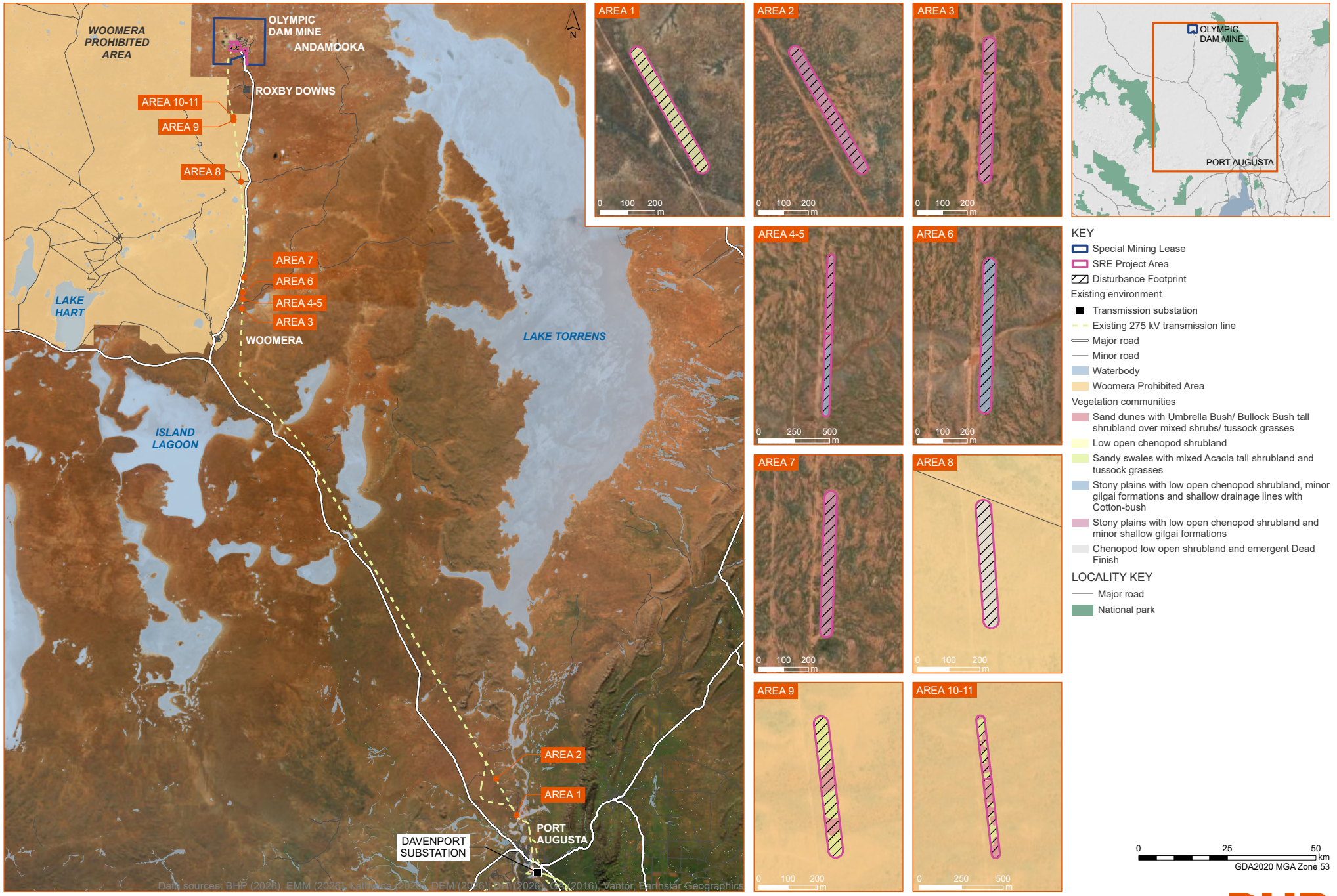


Figure 9.16 | Vegetation communities and EIGR Area Disturbance Footprints

9.8.3.2 Effects on historic heritage from land disturbance

The SRE Project contains:

- no Commonwealth heritage properties, National heritage places or places on the non-statutory Register of the National Estate
- no heritage places on the SA Heritage Register or State Heritage Areas
- no Local Heritage Places.

The closest registered heritage places are located over 5 km from the SRE Project and would not be affected by the construction, operation, or closure phases of the SRE Project as there is no linkage due to the intervening distance.

Furthermore, no historic archaeological sites have been identified in the SRE Project.

While there are no surface indications and no historical sites in the SRE Project, there remains the low to very low potential for the Historic Heritage Study Area to contain subsurface historical archaeological features that may be encountered during ground disturbing construction activities. Features could include wells, evidence of historical fencing alignments, artefact deposits or hut foundations as these are site types known to occur within the region.

9.8.3.3 Effects on visual amenity from placement of infrastructure

The SRE Project elements with the potential to be visible are summarised in Table 9.33.

Table 9.33 | SRE Project potentially visible elements

Project element	Within SRE Project Area (ha)	Within Disturbance Footprint (ha)
Acid plant cooling tower	20	20
Anode furnace filter stacks	55	55
Anode furnaces	30	30
Anode furnace off gas system – surrounded by larger anode furnaces	10	-
FSF complex building	50	50
Larox – inside existing plant of 30 m in height	30	-
Lasta – located next to existing plant of 30 m in height	25	-
Loesche mill	10	N/A
Oxygen plant	30	10
Refinery	20	20
Steam dryer – surrounded by larger FSF complex building of 50 m in height	5	-
Wet gas clearing	10	-

Visual absorption capacity

The Olympic Dam mine has a landscape with a high VAC rating given its established mining industrial setting within the SML that is considered capable of absorbing a higher degree of modification/addition, as proposed by the SRE Project, without significantly changing the landscape character.

Visibility of the SRE Project

The ZVI illustrates that some of the SRE Project Area elements may be visible up to and even beyond a distance of approximately 8 km (Figure 9.3). Along Olympic Dam Highway and the Borefield Road, however, fewer project elements are visible as the natural topography is undulating and the landform restricts continuous clear sightlines of the surface infrastructure to distances generally less than approximately 4 km.

Areas of highest visibility are located along the Borefield Road, where there would be limited access for people, as there are no towns or existing built infrastructure along the road. Borefield Road is predominantly used by the BHP, ARR, pastoralists and tourists.

The ZVI indicates that impacts to visual amenity would be low and are unlikely to be observed beyond 4 km of the SRE Project infrastructure.

Photomontages were developed at four viewpoint locations representing the sensitive receptors identified within the Visual Study Area (public road users, Olympic Dam Airport visitors and ODV accommodation camp workers and visitors).

The potential visual effects using ZVI mapping and photomontages are summarised in Table 9.34.

Table 9.34 | Assessment of visual effects summary

Viewpoint / location	Sensitive receptors / representative locations	Potential for visual impact?		Observations
		ZVI	Photomontage	
VP-1	Borefield Road	Yes – partial	Yes	Potential visual impact. The photomontage indicates parts of the SRE Project would be visible from this location and would increase the visual impact of the existing site infrastructure, including lighting. In the scale of this landscape this impact would be minimal/negligible. Undulating terrain would further mitigate any visual impact, while adopting AS 4282 for lighting would help minimise light spill directly from light sources. Visual elements would be introduced into the landscape, however any reduction in visual amenity could be remedied at closure.
VP-2	Olympic Dam Highway	Yes	No visibility	The topography prevents any visual impact at this location.
VP-3	Olympic Dam desalination plant	Yes	Yes	The photomontage indicates parts of the SRE Project would be visible, including lighting. The SRE Project infrastructure would not extend above or beyond existing industrial elements. Visual elements would be introduced into the landscape, however any reduction in visual amenity could be remedied at closure.
VP-4	ODV – Blinman Road	Yes	Yes	Potential visual impact. The photomontage indicates parts of the SRE Project would be visible from this location, including lighting. There would be no increase in the horizontal extent of visible development.

9.8.3.4 Effects on cultural heritage values from land disturbance

Past Aboriginal heritage surveys have identified sites associated with Aboriginal heritage value across the SML Area, broadly categorised as:

- archaeological – artefact scatters and isolated artefacts
- ethnographic – sites identified with ethnographic or mythological values.

Modification of the design footprint between December 2024 and October 2025 (as an outcome of Aboriginal heritage consultation) to avoid Aboriginal Heritage sites and values where possible resulted in total avoidance of impact to all ethnographic sites identified across the SRE Project footprint within the SML Area. However, there may be some restriction of access to sites in the SML Area due to SRE Project activities.

9.8.4 Confirmed impact events

Following completion of the land-related assessment of effects study described in Section 9.8, 32 confirmed SPR linkages (confirmed impact events) were established. These were progressed to an assessment of impact significance in accordance with the EIAF (Chapter 8). The confirmed impact events are summarised by pathway in Table 9.35.

Table 9.35 | Confirmed land-related impact events (confirmed linkage)

SPR ID	Pathway	Confirmed impact event
L1, L2, L3	Land (quantity)	During construction, clearing of native vegetation for SRE Project infrastructure results in a reduction in abundance and diversity of native vegetation, habitat and threatened species
L33	Land (quantity)	During construction, land clearing associated with the construction of SRE Project infrastructure results in disturbance to an unknown non-Indigenous heritage site
L4	Land (quantity)	During construction, land clearing associated with the construction of SRE Project infrastructure results in disturbance, removal or damage to cultural artefacts
L5	Land (quantity)	During construction, land clearing associated with the construction of SRE Project compromises Aboriginal intangible ethnographic values of an area through alteration or damage to the cultural landscape/features
L6, L7, L8	Land (quality)	During construction, land clearing associated with the construction of SRE Project infrastructure results in conditions that are favourable for an increase in the abundance and diversity of weed species and an associated reduction in abundance and diversity of native vegetation, habitat and threatened species
L9, L10, L11	Land (quality)	During construction, placement of SRE Project infrastructure and associated surface water management infrastructure results in the sedimentation of the downstream environment, with changes to the prevailing surface water catchments resulting in a reduction in abundance and diversity of native vegetation, habitat and threatened species
L12	Land (quantity)	Placement of SRE Project infrastructure changes the prevailing visual amenity of the area
L18	Land (quality)	During operations increased occupancy of Olympic Dam accommodation due to the SRE Project workforce results in an increase in feral/pest fauna numbers that results in a decrease in native fauna abundance and diversity
L14, L15, L16, L17, L22, L23, L24, L25, L29, L30, L31, L32	Land (quality)	During construction, operation and closure project activities, including planned construction and maintenance activities and unplanned equipment and plant failures, create conditions that result in a bushfire, resulting in destruction of habitat and vegetation and impacting the abundance and diversity of flora, fauna, State and Nationally threatened species and protected areas
L19, L20, L21	Land (quality)	During construction and operation, the release of chemicals or hydrocarbons used in the SRE Project, including temporary storages, transport and unloading/loading activities, metals mobilised via acid rock drainage from stockpiles and/or the TSF or effluent released from WWTPs, results in the contamination of land, impacting the abundance and diversity of native vegetation, habitat and threatened species
L26, L27, L28	Land (quality)	During closure. the rehabilitation of cleared land following closure results in conditions that are favourable for an increase in the abundance and diversity of weed species resulting in a reduction in the abundance and diversity of native vegetation, habitat and threatened species

9.9 Socio-economic (community values, infrastructure and economy)

The baseline socio-economic environment was described in Section 5.6. The assessment of socio-economic-related effects introduced by the SRE Project is presented in Appendix D2 Social Impact Assessment, Appendix D3 Economic Assessment, Appendix C7 Land Use and Planning Impact Assessment and Appendix C8 Traffic Impact Assessment summarised in the following sections.

9.9.1 Potential impact events

Potential socio-economic-related impact events identified through the preliminary (screening) SPR evaluation as being linked or having an uncertain linkage are summarised in Table 9.36.

Table 9.36 | Potential socio-economic-related impact events

SPR ID	Pathway	Potential impact event
SE1	Socio-economic (infrastructure)	Increases in vehicle traffic associated with the movement of construction materials, general travel, including oversized and restricted movements, leads to degradation, increasing the risk to public health and safety
SE2	Socio-economic (infrastructure)	Increases in vehicle traffic associated with the movement of construction materials, general travel, including oversized and restricted movements, results in an increase in likelihood of traffic accidents, impacting on the health and safety of the local community
SE3	Socio-economic (infrastructure)	Increases in heavy vehicle traffic associated with the movement of construction materials, including oversized and restricted movements, leads to increase travel times affects road users, impacting on the social value of the local community
SE4	Socio-economic (infrastructure)	During operations, increases in heavy vehicle traffic associated with the movement of operational reagents and concentrates affects road users and impacts on the health and safety of the local community
SE5	Socio-economic (infrastructure)	During operations, increase in road traffic results in the degradation of the roads and increases risk to the public health and safety
SE6	Socio-economic (infrastructure)	During operations, the increased movement of heavy vehicles results in increases in travel times within the local and regional areas, impacting existing social values
SE7, SE8	Socio-economic (infrastructure)	During construction and operation, the workforce demand results in decreased access to essential services (e.g. medical), impacting on the social value of the local community
SE9, SE10	Socio-economic (infrastructure)	During construction and operation, the SRE Project results in reduced access to emergency services for existing residents in nearby communities due to increased demand for emergency services to respond to increased risk of traffic accidents and workplace accidents at Project site and on Olympic Dam Highway
SE11, SE12	Socio-economic (infrastructure)	During construction and operation. the workforce demand results in decreased access to accommodation or increases in rental prices, impacting the social value of the local community
SE13, SE14	Socio-economic (infrastructure)	Increased labour force participation and reduced unemployment during the SRE Project, contributes to enhanced socio-economic wellbeing in FIFO source communities, including those within the regional study area
SE15, SE16	Socio-economic (infrastructure)	The SRE Project results in enhanced economic prosperity for local businesses through increased engagement from non-resident workers in the local economy, alongside new business and supply chain opportunities generated by the SRE Project
SE17, SE18	Socio-economic (infrastructure)	The SRE Project results in strengthening of the regional economy through contribution to GRP and to the State, indirectly supporting economic diversification and providing greater resilience to economic downturns
SE19, SE20	Socio-economic (infrastructure)	During construction and operation, the workforce demand reduces the availability of flights due to increased demand driven by SRE Project workforce, indirectly increasing flight fares
SE21, SE22	Socio-economic (infrastructure)	The SRE Project results in potential community impacts (e.g. cohesion and vitality) in Roxby Downs due to an increase in non-resident workers

SPR ID	Pathway	Potential impact event
SE23, SE24	Socio-economic (infrastructure)	The SRE Project results in an increased non-resident workforce resulting increased crime and anti-social behaviour
SE25	Socio-economic (infrastructure)	Reduced rural and agricultural amenity due to presence of heavy industry of the project

9.9.2 Summary of assessment methodology

9.9.2.1 Land use and planning assessment methodology

An assessment of land use and planning-related effects was undertaken to determine the change in the existing land use environment as a result of the SRE Project (Appendix C7). The assessment of effects included:

- obtaining input and qualitative data to determine the baseline environment
- reviewing the SRE Project activities and identified potential impact events against the baseline land use environment and relevant land use planning policies and strategic plans.

9.9.2.2 Traffic impact assessment methodology

Appendix C8 Traffic Impact Assessment was prepared in accordance with the Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments (Austroads 2020) and Guideline for the Preparation of a Traffic Impact Statement (DIT 2022).

Based on analysis of population data, the assessment assumes baseline traffic volumes for 2028 and 2039 are the same as the existing volumes measured via survey in 2024. No linear growth of baseline data has been applied.

The worst-case construction scenario (SRE Project Stage 2 construction overlapping with Stage 1a and Stage 1b operation, from July to September 2037) and the worst-case operation scenario (SRE Project Stage 1a, Stage 1b and Stage 2 operation) were considered in the assessment.

9.9.2.3 Social impact assessment methodology

Each step of the SIA (Appendix D2) was informed by outcomes of stakeholder engagement. The key steps in the SIA process included:

- Scoping – to gain an understanding of what the SRE Project entails and how it might interact with the social environment. Scoping activities undertaken for the SRE Project included:
  - understanding the regional context
  - outlining the policy and planning context relevant to the SIA
  - defining the anticipated SRE Project activities, including project labour and accommodation requirements
  - preliminary identification of relevant stakeholder groups and the potential key social changes likely to be invoked by SRE Project activities, including relevant baseline indicators to be collated.
- Analysing the baseline conditions – to concisely document the current state of relevant social, economic and land use characteristics within the defined SIA study areas, providing a benchmark against which direct and indirect impacts can be identified, assessed and managed.
- Assessing the potential effects on social values – to determine the change in social values resulting from proposed SRE Project activities.
- Evaluating the confirmed social impacts – to determine the significance of negative social impacts.

- Defining management measures.

The SIA Study Area was defined based on communities and stakeholders likely to experience changes to the social environment, encompassing the nearby local communities of Roxby Downs and Andamooka, as well as the regional communities of Woomera, Pimba, Port Augusta, and Whyalla. At a broader level, the SIA Regional Study Area includes the Unincorporated South Australia LGA, Roxby Downs LGA, Port Augusta LGA, and Whyalla LGA.

9.9.2.4 Economic assessment methodology

Appendix D3 Economic Assessment comprised:

- a CBA in accordance with the Government of South Australia (2022) Better Regulation Handbook
- a regional impact analysis in the form of a local effects analysis which identifies the direct and indirect impacts of the project on the local area (which includes Roxby Downs Statistical Area 2) and the local region (defined as the Outback – North and East Statistical Area 3) during construction and operation.

The key steps for the CBA included:

- establishing a reasonable base case or ‘do-minimum’ case to assess the project against
- defining the scope of project case options considered
- identifying and quantifying (where possible and relevant) direct revenues and costs to South Australia and presenting them in ‘real’ terms, as well as economic benefits to workers and suppliers
- considering potential externalities associated with environmental and community impacts and estimating the monetary value of these impacts, where feasible and material (where it was not possible to monetise impacts, a qualitative assessment was undertaken)
- application of an appropriate real discount rate to measure NPV of the SRE Project’s future net benefits.

The key steps for the local effects analysis included:

- identifying the direct impacts of the SRE Project on the local area and local region economy during construction and operation
- describing any potential economic effects on the local area and local region, including for employment opportunities, expected impacts on the local workforce, and direct and indirect impacts for local businesses
- considering indirect costs to existing industries due to changes to worker employment, and conversely indirect economic benefits through opportunities to local industries and supply chains.

9.9.3 Summary of assessment outcomes

9.9.3.1 Construction traffic generation

Construction traffic for the SRE Project would comprise of materials and equipment deliveries, as well as workforce traffic. Workforce traffic would be confined to travel between the accommodation village and the SRE Project worksites, limiting any impacts to the broader public road network. As a result, peak hour traffic analysis focused solely on materials and equipment deliveries. The AM and PM peak hour were assumed to align with the existing intersection peak hours.

The construction traffic movements are presented in Table 9.37 and incorporate the following assumptions derived from HFJV (2025c):

- A vehicle trip is defined as one inbound and one outbound movement. One vehicle trip equates to two vehicular movements in the same hour.
- Construction would be occurring throughout the whole week (i.e. seven days). Delivery frequency and arrival time would be consistent across weekdays, weekends and public holidays.
- The maximum number of heavy vehicles per day during the peak month (Stage 2 construction, July 2037) represents the worst-case scenario as presented in Table 9.37 since this period overlaps with Stage 1a and Stage 1b operation.
- 15% of the daily heavy vehicle volume during the peak month would represent the AM and PM peak hour traffic scenario.

Table 9.37 | Construction traffic volumes

Units	SRE Project Stage 1a	SRE Project Stage 1b	SRE Project Stage 2
Total number of heavy vehicles	16,665	7,460	8,930
Duration of construction deliveries (days)	1,260	709	709
Average heavy vehicle trips per day	13	11	13
Peak heavy vehicle trips per day	30[1]	30[2]	37[3]
Peak hour heavy vehicle trips	**5**	**5**	**6**
Peak hour heavy vehicle movements	**10**	**10**	**12**

Source: Construction traffic volume derived from HFJV (2025c)

Note: Values have been rounded up to provide a conservative estimate

1. Volume for Q4-2028 source Table 3.2 of HFJV (2025c)
2. Volume for Q4-2028 source Table 3.3 of HFJV (2025c)
3. Volume for Q1-2038 source Table 3.4 of HFJV (2025c)

9.9.3.2 Construction traffic distribution

SRE Project – Stage 2 construction

All construction materials and equipment delivery vehicles (not including OSOM vehicles) were assumed to originate from Adelaide.

Heavy vehicles would travel via Port Wakefield Highway, Augusta Highway, Stuart Highway and Olympic Dam Highway, avoiding the township of Roxby Downs. The peak hour traffic distribution is summarised in Table 9.38.

Table 9.38 | Peak hour movement distribution (July 2037, SRE Project Stage 2 construction)

Olympic Dam to/from	AM peak		PM peak	
	Inbound	Outbound	Inbound	Outbound
Adelaide	6	6	6	6

Note: All vehicles are heavy vehicles in the construction peak hour

SRE Project Stage 1a and Stage 1b operations

Stage 1a and Stage 1b operation vehicles are summarised in Table 9.39. All Stage 1a and Stage 1b operational material and equipment delivery vehicles were assumed to originate from Prominent Hill, Carrapateena, Adelaide, Pimba Intermodal Terminal and Roxby Downs. Rail to Pimba Intermodal Terminal would be used to support material and equipment deliveries from Adelaide and Port Augusta. All material and equipment delivered to Pimba Intermodal Terminal would be loaded onto trucks for road delivery to Olympic Dam (Table 9.39).

Heavy vehicles would travel via Olympic Dam Highway avoiding the township of Roxby Downs township, while personnel light vehicles would travel from Roxby Downs township via Olympic Dam Way.

Personnel light vehicles were assumed to travel in both directions during peak hours, similar to the shuttle bus movements to/from the ODV and ODS accommodation villages, due to the shift-based nature of the operational jobs.

Table 9.39 | Peak hour movement distribution (July 2037, Stage 1a and Stage 1b operation)

Road movements to Olympic Dam from	AM peak				PM peak			
	Light vehicles		Heavy vehicles		Light vehicles		Heavy vehicles	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Carrapateena	0	0	4	4	0	0	4	4
Prominent Hill	0	0	2	2	0	0	2	2
Roxby Downs	9	9	0	0	9	9	0	0
Adelaide	0	0	4	4	0	0	4	4
Pimba Intermodal Terminal[1]	0	0	28	28	0	0	28	28

Note: 1. Material and equipment would be delivered to Pimba Intermodal Terminal by rail originating from Adelaide or Port Augusta.

EIGR Areas

BHP propose to undertake isolated areas of land disturbance and associated vegetation clearance in the EIGR Areas to achieve the required electrical clearances between the 275 kV line and the ground surface (Figure 1.5).

The proposed minor clearance of land would be undertaken using a grader and/or dozer under BHP's existing transmission line maintenance agreements, and would be subject to secondary permitting and approvals (e.g. native vegetation clearance approval).

9.9.3.3 OSOM vehicles during construction

Appendix C8 Traffic Impact Assessment provides a preliminary assessment of the effect of OSOM vehicles during construction, assuming that where feasible, OSOM modules would be within the Heavy Vehicle National Law and associated regulations (i.e. less than 25 m long, 3.5 m wide and 5.0 m high). Any additional larger OSOM modules would be subject to separate detailed OSOM assessment and approval from DIT, the NHVR, affected Local Council(s) and electricity utility provider as part of secondary permitting.

The preferred construction OSOM route would originate from the Port of Whyalla, via Port Augusta and Pimba, to the SRE Project. No construction OSOM would use the Joy Baluch AM Bridge or the Yorkeys Crossing Bypass. The total length of the route is approximately 335 km which primarily uses the arterial road network (Figure 9.17). The OSOM route from Whyalla to the SRE Project is approved for 25 m long 59.5 t low loaders and accommodates vehicles up to 3.5 m in width and 4.6 m in height.

The total number of OSOM deliveries for the SRE Project are summarised in Table 9.40. These volumes represent the highest heavy vehicle traffic volumes and therefore reflect the worst-case scenario for the purposes of impact assessment.

Table 9.40 | Over size over mass vehicle movements

SRE Project Stage	Wide load – no pilot
Stage 1a	173
Stage 1b	26
Stage 2	25
Total	**224**

Source: HFJV 2025c

Appendix C8 Traffic Impact Assessment includes a preliminary OSOM assessment to identify potential impacts along the preferred OSOM construction route where escort loads are required. The assessment assumed a conservative OSOM vehicle configuration of 47 m long, 8.0 m wide and 4.5 m high with no additional road upgrades required.

This preliminary assessment has identified the following potential road infrastructure interactions, subject to further detailed OSOM assessment that would be managed as part of secondary permitting:

- Four locations along the preferred OSOM construction route where movement would not occur on the correct side of the road but could be accommodated without changes to existing road infrastructure.

- One location along the preferred OSOM construction route where the heavy vehicle would need to travel over mountable median strip and kerb on the north approach (i.e. temporary change to existing road infrastructure would be required).

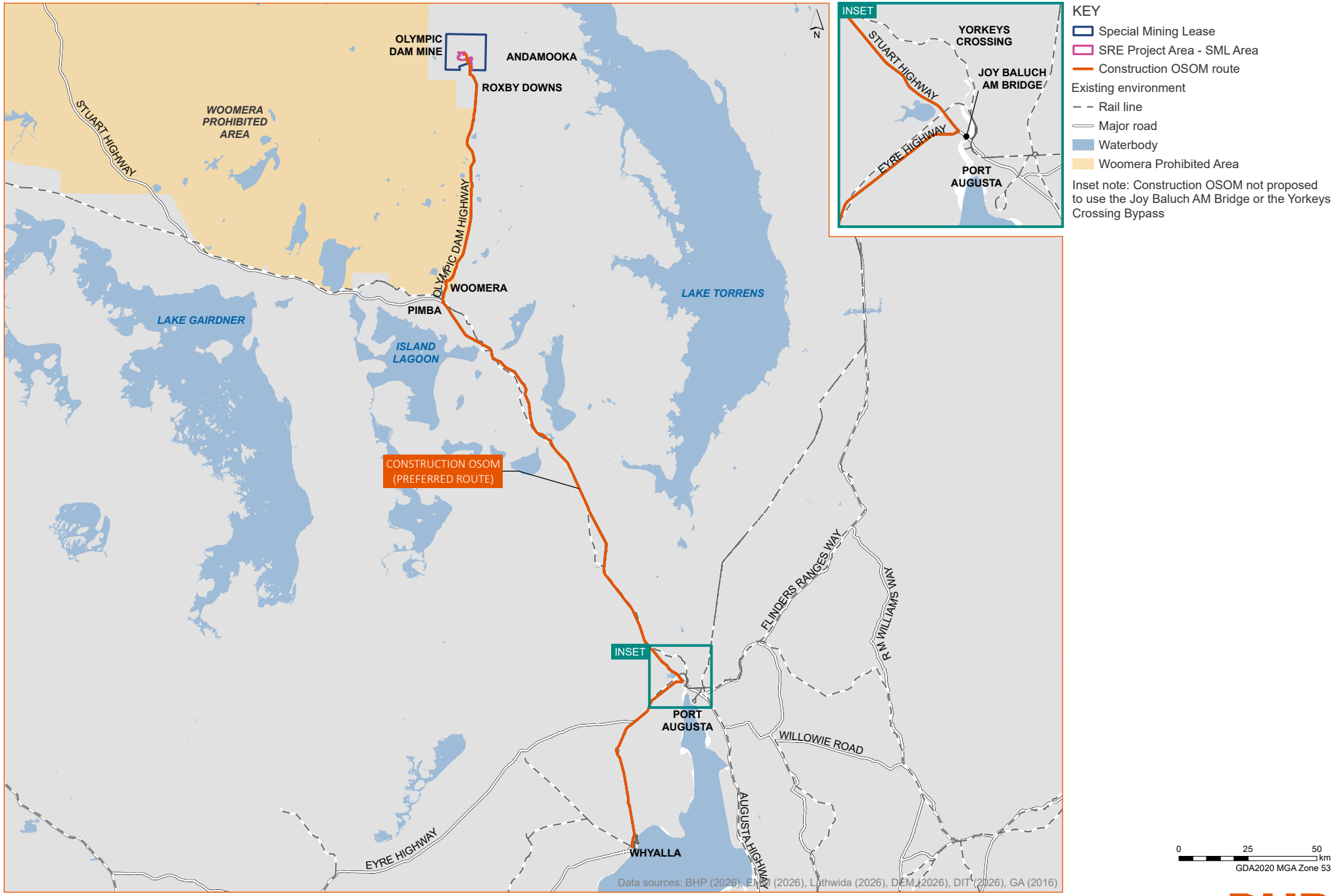


Figure 9.17 | Construction OSOM (preferred route)

SRE Project BHP

9.9.3.4 Operational traffic generation

During SRE Project operations, BHP's proposed transport strategy is to prioritise the Trans-Australian Railway line at Pimba via the Pimba Intermodal Terminal (under construction at time of submission of this EIS) as an alternative freight option for deliveries to Olympic Dam. Freight would be unloaded from the rail at the designated transfer point and then loaded onto trucks for transport to a logistics hub at the SRE Project Area. Therefore, operational vehicle types would include light vehicles, heavy vehicles and trains.

Operational traffic for the SRE Project would comprise material and equipment deliveries, as well as workforce traffic. However, 90% of workforce traffic would be confined to travel between the ODV and ODS accommodation village and the Olympic Dam mine site. The AM and PM peak hour are assumed to align with the existing intersection peak hours.

The operational traffic movements are presented in Table 9.41 and incorporate the following assumptions derived from HFJV (2025c):

- A vehicle trip is defined as one inbound and one outbound movement. One vehicle trip equates to two vehicular movements.
- Operation deliveries would be occurring throughout the whole week. Delivery frequency and arrival times would remain consistent across weekdays, weekends, and public holidays, operating 365 days a year.
- Deliveries would occur only during daylight, with no night-time deliveries occurring.
- Operational personnel would work throughout the week, covering both the dayshift and nightshift.
- The PM peak hour of 5:00 pm to 6:00 pm is considered within daylight hours year-round.
- Peak daily vehicle volume would be commencement of Stage 2 operations in April 2039 as it includes the combined traffic volumes from existing operations, Stage 1a, Stage 1b and Stage 2, representing the worst-case scenario.
- Existing operation volumes which were measured during the traffic survey conducted 11 to 12 November 2024 are not included in the operational traffic generation figures, as they form part of the baseline traffic environment.
- The peak hour traffic scenario is represented by 15% of the daily heavy vehicle volume during the peak month.

Table 9.41 | Operation traffic volumes – peak-hour trips

Road movements to Olympic Dam from	SRE Project Stage 1a	SRE Project Stage 1b	SRE Project Stage 2	Total
Carrapateena	12	13	9	34
Prominent Hill	5	6	4	15
Oak Dam (subject to separate approval)	0	0	18	18
Adelaide	12	12	12	36
Pimba Intermodal Terminal	79	93	105	277

Note: Values have been rounded up to provide a conservative estimate

9.9.3.5 Operational traffic distribution

All operational material and equipment delivery vehicles were assumed to originate from Prominent Hill, Carrapateena, Oak Dam, Adelaide, Pimba Intermodal Terminal or Roxby Downs. Rail to Pimba Intermodal Terminal would be used to support material and equipment deliveries from Adelaide and Port Augusta. All material and equipment delivered to Pimba Intermodal Terminal would be loaded onto trucks for road delivery to Olympic Dam (Table 9.42).

Heavy vehicles would be travelling via Olympic Dam Highway avoiding the township of Roxby Downs while personnel light vehicles would travel from Roxby Downs via Olympic Dam Way.

Personnel light vehicles were assumed to travel in both directions during peak hours, similar to the shuttle bus movements to/from the ODV and ODS accommodation villages, due to the shift-based nature of the operational jobs.

The peak hour traffic distribution is summarised in Table 9.42

Table 9.42 | Peak hour movement distribution (April 2039, Stage 1a, Stage 1b and Stage 2 operation)

Road movements to Olympic Dam from	AM peak				PM peak			
	Light vehicles		Heavy vehicles		Light vehicles		Heavy vehicles	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Carrapateena	0	0	6	6	0	0	6	6
Prominent Hill	0	0	3	3	0	0	3	3
Oak Dam	0	0	3	3	0	0	3	3
Roxby Downs	15	15	0	0	15	15	0	0
Adelaide	0	0	6	6	0	0	6	6
Pimba Intermodal Terminal	0	0	45	45	0	0	45	45

9.9.3.6 Effects on transport, access and connectivity

Effect on traffic congestion at railway crossings

Traffic congestion has been identified as a key concern among stakeholders engaged for the SRE Project, particularly regarding the perceived increase in truck traffic on Olympic Dam Highway, Olympic Dam Way and Stuart Highway. Given the remote location and limited public transport, stakeholders have raised concerns about the increased truck movements contributing to congestion.

With respect to the potential for increased queue lengths at railway crossings, the baseline traffic assessment identified there are typically two freight trains passing the level crossing during the AM peak (8:00 am to 9:00 am) and another two during the PM peak hour (5:00 pm to 6:00 pm). These peak periods apply to train movements only.

The total time the level crossing is assumed to be closed to vehicular traffic is estimated at four minutes. This includes approximately three minutes for a train to pass through Olympic Dam Highway at Pimba and the Stuart Highway in Kootaberra, as well as an additional one-minute warning period. It should be noted that this estimate is conservative.

No additional trains are expected to be required for SRE Project operations, with project-related freight planned to be accommodated within existing rail services.

Pimba railway level crossing

The peak hour traffic volumes at the level crossing at Pimba are summarised in Table 9.43.

Table 9.43 | Peak hour traffic volumes at Olympic Dam Highway (Pimba)

Stage	Both	Northbound	Southbound
Baseline	65	46	46
SRE Project Stage 2 construction and Stage 1a and Stage 1b operation traffic (2037)	20	14	14
SRE Project Stage 1a, Stage 1b and Stage 2 operation traffic (2039)	17	12	12

A SIDRA analysis was conducted to determine the 95th percentile queue length (Table 9.44), which provides a conservative analysis of the maximum queue length on Olympic Dam Highway. The model was developed as a signalised intersection, with two trains crossing in one hour, each assumed to block traffic for four minutes in every 30-minute interval. The calculated queue lengths for Olympic Dam Highway at the level crossing are:

- 2037/2039 Baseline – 45.2 m
- Baseline + SRE Project Stage 2 construction and Stage 1a and Stage 1b operation traffic (2037) – 60 m
- Baseline + SRE Project Stage 1a, Stage 1b and Stage 2 operation traffic (2039) – 57.4 m.

Table 9.44 | Pimba level crossing maximum queue length (SIDRA)

Description	Baseline (2037/2039)	Baseline + SRE Project – Stage 2 construction, Stage 1a and Stage 1b operation traffic (2037)	Baseline + SRE Project – Stage 1a, Stage 1b and Stage 2 operation traffic (2039)
Queuing (m)	101	73	73

The increase in queue length between the baseline and worst-case scenario is 14.8 m, which is considered negligible given the ample road space available for vehicle queuing.

Kootaberra railway level crossing

The peak hour traffic volumes at the level crossing at Kootaberra are summarised in Table 9.45.

Table 9.45 | Peak hour traffic volumes at Stuart Highway (Kootaberra)

Stage	Both	Northbound	Southbound
Baseline	95	67	67
SRE Project Stage 2 construction and Stage 1a and Stage 1b operation traffic (2037)	12	9	9
SRE Project Stage 1a, Stage 1b and Stage 2 operation traffic (2039)	7	5	5

A SIDRA analysis was conducted to determine the 95th percentile queue length (Table 9.46), which provides a conservative analysis of the maximum queue length on Stuart Highway. The model was developed as a signalised intersection, with two trains crossing in one hour, each assumed to block traffic for four minutes in every 30-minute interval.

Table 9.46 | Kootaberra level crossing queuing assessment (SIDRA)

Description	Baseline (2037/2039)	Baseline + SRE Project – Stage 2 construction, Stage 1a and Stage 1b operation traffic (2037)	Baseline + SRE Project – Stage 1a, Stage 1b and Stage 2 operation traffic (2039)
Queuing (m)	77.4	93	86

The increase in queue length between the baseline and worst-case scenario is 15.6 m, which is considered negligible given the ample road space available for vehicle queuing.

Effects on traffic congestion at intersections

With respect to the potential for additional wait times at intersections, the key SRE Project intersections were modelled with the SIDRA Intersection 9.1 software, a micro-analytical tool for individual intersections and linked intersection-network modelling. The modelling was based on the baseline traffic survey data and the projected traffic volumes for the following scenarios:

- 2037/2039 baseline peak hour traffic volumes – identical baseline peak hour traffic volumes for both years
- 2037 construction and operation peak hour traffic volumes – includes construction traffic for SRE Project Stage 2 and operational traffic for SRE Project Stage 1a and Stage 1b
- 2039 operation peak hour intersection volumes – includes operational traffic for SRE Project Stage 1a, Stage 1b and Stage 2.

The key intersections modelled were:

- Olympic Dam Highway/Olympic Dam Way (north of Roxby Downs)
- Olympic Dam Highway/Olympic Dam Way (south of Roxby Downs).

Performance indicators modelled included Level of Services (LOS) which is a categorisation of average delay and a good indicator of the overall performance of individual intersections.

The SIDRA modelling outcomes are summarised in Table 9.47.

Table 9.47 | Summary of outcomes of assessment for intersection performance

Intersection	Summary of outcomes
Olympic Dam Highway/ Olympic Dam Way (north of Roxby Downs)	The right turn from Olympic Dam Highway (east) decreases from LOS A (good operation, <14 second delay per vehicle) to LOS B (good with acceptable delays and spare capacity, 15 to 28 second delay per vehicle) in the following scenarios: • 2037 baseline + construction + operation PM peak • 2039 baseline + operation PM peak. All other scenarios operate well within capacity achieving LOS A (good operation). The intersection can effectively accommodate SRE Project traffic volumes associated with both construction and operation without significantly impacting its performance.
Olympic Dam Highway/ Olympic Dam Way (south of Roxby Downs)	During both the AM and PM periods, the intersection operates well within capacity, achieving a LOS A (good operation) across all scenarios. The intersection can effectively accommodate SRE Project traffic volumes associated with both construction and operations without significantly impacting its performance.

Effect on incidence of road accidents

Stakeholders engaged for the SRE Project expressed concern that an increase in truck movements would affect road safety.

Between 2019 and 2023, there were 21 road crashes on the road network, resulting in 3 serious crashes, 6 minor/other injuries and 12 crashes with no injuries. Of the serious crashes, 1 occurred 3 km south of the Olympic Dam Highway/Olympic Dam Way intersection (south of Roxby Downs township), where a vehicle ran off the road and hit a fixed object. The 2 other serious crashes occurred 2 km south of the Olympic Dam Highway/Olympic Dam Way intersection (north of Roxby Downs township); 1 involving an animal collision and another a vehicle rollover. The SRE Project would increase heavy vehicle traffic and the potential for vehicle collision for road users.

With respect to road safety at intersections, Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads 2023) requires all unsignalised T-intersections to have clear visibility between the through traffic travelling on the major road and the turning traffic exiting from the minor road, so that the turning traffic can observe gaps to turn safely to merge with the major road traffic. This visibility measurement is called sight distance.

The safe intersection sight distance (SISD) was assessed for each intersection, which varies according to the design speed of the road. Normally a design speed 10 km/h higher than the posted speed limit is used to calculate the SISD.

Sight distances were estimated based on the line of sight and observations at each intersection. The following considerations applied at each assessed intersection:

- approach speed limit – 110 km/h
- assumed design speed – 120 km/h
- minimum SISD required for a general two-second driver reaction time – 324 m.

The outcomes of the sight distance assessment are summarised in Table 9.48, and show that the sight distances on both sides of all intersections assessed meet the minimum SISD requirements.

Table 9.48 | Summary of outcomes of sight distance assessment

Intersection	Minimum SISD (m)	Sight distance to the left (m)	Sight distance to the right (m)
Olympic Dam Highway/Olympic Dam Way (north of Roxby Downs township)	324	**700**	**500**
Olympic Dam Highway/Olympic Dam Way (south of Roxby Downs township)	324	1,400	615
Stuart Highway/Olympic Dam Highway	324	500	350

Effect on availability of flights

The SRE Project workforce would be 100% FIFO for construction and 90% FIFO for operations, with all FIFO workers accommodated at ODV or ODS accommodation villages, leading to an increase in FIFO-related air travel. This higher flight demand may lead to a reduction in accessibility for local residents and increase in flight costs. Community members have expressed concerns that the SRE Project would limit access to flights, making travel more difficult for non-BHP personnel, local businesses, and residents.

However, the SRE Project would build on the existing Olympic Dam operations, and towns like Roxby Downs are already characterised by transient FIFO workforces. As of 2021, the Roxby Downs area recorded 3,957 non-resident employed persons, highlighting the town's familiarity with FIFO arrangements. As such, the region has capacity to adapt to fluctuations in flight availability and pricing, and similar trends are common in most mining regions with FIFO workforces. Furthermore, airlines typically have capacity to schedule additional flights to meet higher levels of demand. In case of the SRE Project, BHP would ensure there is no material impact on the availability of commercial flights for other passengers.

9.9.3.7 Effects on social infrastructure and utilities

Effect on access to emergency services

The SRE Project may increase demand for emergency services due to an increase in the non-resident population and an increased risk of traffic accidents from workforce traffic and workplace accidents. This could result in reduced access to emergency services for existing residents in Roxby Downs and surrounds.

The nearest emergency services to the SRE Project include Roxby Downs Health Service, Roxby Downs Ambulance Station and Roxby Downs Police Station, located an approximate 10-minute drive from the Olympic Dam mine. Additionally, Olympic Dam Highway is the major transport link, and limited regional connectivity may further exacerbate concerns about emergency response times.

No impacts to emergency services in Port Augusta are expected.

Effect on demand for, and access to, health service providers

While the presence of non-resident workers may be perceived as increasing demand for healthcare services, the actual effect is expected to be minimal. The SRE Project workforce would be fully accommodated at ODV or ODS, which provide access to site medics. In addition, FIFO workers are anticipated to access non-urgent, routine and preventative healthcare within their home communities, limiting demand on medical services in Roxby Downs (Commonwealth Government 2013).

No impacts to health service providers in Port Augusta are expected.

9.9.3.8 Effect on housing and accommodation

Reduced housing availability and affordability

No direct effects on housing availability or affordability are expected during SRE Project construction as the workforce would be accommodated at permanent accommodation facilities (ODV or ODS).

During operations, the SRE Project would require an additional peak workforce of 508 workers, with approximately 90% accommodated at ODV, ODS, or RDV. The remaining 10%, which is around 50 new workers, would be expected to reside locally in Roxby Downs. While this may create a perception of increased housing demand and potential pressure on the local housing market, the actual effect is anticipated to be minimal. As of June 2025, Roxby Downs had 102 dwellings for sale and 53 properties available for rent (REA Group 2025). Given that the SRE Project could increase demand by up to 50 dwellings, the existing housing supply is considered sufficient to meet this demand without significant market disruption.

No impacts to housing availability in Port Augusta are expected.

Reduced availability of short-term accommodation

While the majority of the SRE Project workforce would be accommodated at ODV and ODS, there is a possibility that some FIFO workers may choose to stay in Roxby Downs for brief periods before or after their shifts. However, this is expected to be infrequent, and as such, the effect on short-term accommodation availability is anticipated to be negligible.

No impacts to short-term accommodation in Port Augusta is expected.

9.9.3.9 Effect on community values, health and wellbeing

Effect on community cohesion and vitality

BHP's continued operation of Olympic Dam as a predominantly FIFO workforce, further supported through the SRE Project, has raised concerns among some Roxby Downs residents about the potential impacts on community cohesion and the town's long-term vitality.

The transient nature of FIFO workforces has affected community connectedness, evidenced by, amongst other metrics, volunteering rates in Roxby Downs which have dropped sharply, falling from 25.8% in 2016 to just 14.0% in 2021, well below the statewide average of 17.0% (ABS 2021b). Lower participation in civic and social activities reflects a broader erosion of local engagement, as FIFO workers are often perceived as not contributing to the town's social fabric. While some stakeholders are optimistic that operational expansions could bring economic benefits, there remains concern about a lack of BHP's long-term investment in the local community (Ipsos 2024). However, BHP has several long-term community

investment and social value initiatives in Roxby Downs and the Upper Spencer Gulf region, which would be maintained throughout the delivery of the SRE Project.

The increase in non-resident FIFO workers due to the SRE Project also has the potential to deepen social divisions between non-resident workers and the permanent population in Roxby Downs and Andamooka. The clear distinction between the two groups may foster perceptions of inequality, creating an us-versus-them dynamic that weakens social cohesion and trust. Non-resident workers may be viewed as not contributing to the local economy, exacerbating social tensions and disengagement from community life.

Effect on health

Residents of Roxby Downs may perceive the SRE Project as increasing the risk of exposure to gamma radiation, from sources of radioactivity within the operations, toxic chemicals and materials. The effect of radiation due to the SRE Project has been assessed as part of Appendix C4 Radiological Impact Assessment, summarised in Section 9.4.3.

More broadly, mining remains one of Australia's most hazardous industries, exposing both workers and local communities to significant health and safety risks. Previous incidents, including a 2007 smelter shutdown fatality and a 2015 underground rockfall fatality at Olympic Dam, highlight the physical dangers associated with mining operations (Verisk Maplecroft 2023). Workers also face risks such as musculoskeletal stress, fatigue, and site-related accidents, which require strict safety protocols to mitigate.

Beyond workplace risks, community health and amenity concerns related to noise and air quality (including dust) have been consistently raised by residents of host communities. The effects of noise and air pollutant emissions have been assessed as part of Appendix C2 Noise and Vibration Impact Assessment and Appendix C3 Air Quality Impact Assessment, summarised in Section 9.1.3 and Section 9.3.2.4 respectively.

In August 2022, BHP received a complaint regarding demolition materials on roads, underscoring potential health and safety concerns for residents (BHP 2023a). While the SRE Project itself is not directly linked to increased health risks for Roxby Downs residents, broader concerns around industrial activities, environmental exposure, and ongoing mine operations remain key considerations for community well-being.

Effect on crime and anti-social behaviour

Residents of Roxby Downs highly value their strong, tight-knit community and safe environment, particularly for families (Verisk Maplecroft 2023; Ipsos 2024). However, concerns about rising crime and antisocial behaviour have been growing, particularly in relation to shutdown periods and the influx of FIFO and contractor workforces. The community perception surveys for Olympic Dam revealed an increase in reports of crime and antisocial behaviour as a key concern from 1% in 2022 to 8% in 2023, with drug-related issues and social disturbances identified as key concerns (Ipsos 2024).

The influx of additional FIFO workers has the potential to alter community dynamics, with some stakeholders fearing greater pressure on local policing services (Consentium 2024). Residents have specifically raised concerns that a higher number of transient workers may lead to more crime, disorder, and social disengagement, reinforcing a perception of reduced safety in the town.

While no direct link between FIFO workers and increased crime has been established, the perception of increased risk remains significant among residents, highlighting the need for proactive community engagement and security measures to maintain public confidence and social cohesion.

Effect on rural and agricultural amenity

Assessment of the SRE Project against the Planning and Design Code identified that the majority of the SML Area, comprising SRE Area, General Infrastructure Area and Water Infrastructure Area, is identified as being within the Remote Areas Zone of the Code (PlanSA 2025).

The Code under the PDI Act envisages:

> *"a diverse range of uses, including mining and workers accommodation."*

A portion of the EIGR Areas within CT 5439/775 was also identified as being within the Remote Areas Zone (PlanSA 2025).

Under the PDI Act, the Remote Areas Zone envisages:

> *"A zone supporting the economic prosperity of South Australia primarily through the production, processing, storage and distribution of primary produce, forestry and the generation of energy from renewable sources."*

The land use and planning assessment concluded that the SRE Project is:

- Consistent with the desired outcome of:
  - The Remote Areas Zone envisages mining and transmission line development of the nature and scale proposed. The SRE Project involves the efficient use of suitability zoned land for mining-related activities within the SML and on the following freehold land held by WMC Corporation (now BHP Olympic Dam Corporation Pty Ltd), CT5439/775, CT5441/913, CT5441/914, CT4580/470 and CT5480/618, held for the purpose of electricity transmission infrastructure (Table 2.3), and designed to minimise potential impacts on surrounding land uses and meet relevant environmental and amenity criteria.
  - The Rural Zone which accommodates existing transmission line development. The proposed EIGR Area within this zone does not propose to establish new infrastructure.
- Compatible with the scale, function, character and intensity of the existing land uses and surrounding areas and consistent with applicable performance outcomes.
- Not located in proximity to sensitive receptors.
- Would be designed and constructed to minimise potential impacts to meet relevant environmental and amenity criteria.

9.9.3.10 Effect on labour force and regional economy

Effect on labour force participation

The SRE Project would require a peak construction Stage 1a workforce of approximately 1,313 workers, a Stage 1b workforce of approximately 515 workers and a Stage 2 peak workforce of approximately 978 workers (HFJV 2025a). Given the specialist skills required and the limited local labour pool, the majority of the workforce is expected to be FIFO, sourced from South Australia, Queensland, and Western Australia. While this means limited direct local employment opportunities, the SRE Project would still support indirect employment through supply chains, services, and local businesses, benefiting nearby communities.

The local effects analysis estimates the SRE Project would directly support an average of 141 FTE jobs for workers from the local region during the construction phase, and 147 FTE jobs during ongoing operations (Appendix D3 Economic Assessment). The net local employment effect, estimated as the additional employment income from the SRE Project, in excess of average wages in the local region, is calculated to be between $1 million to $4 million per year over the life of the project.

More broadly, increasing labour force participation contributes to regional economic growth and prosperity. Higher workforce engagement stimulates local economies through wages spent in communities, increased demand for goods and services, and stronger business activity. Reduced unemployment lowers social welfare dependency, improves financial stability for households, and enhances overall community resilience. In this way, the SRE Project's contribution to employment would extend beyond immediate job creation, fostering broader economic benefits.

Effect on local economic prosperity

As the SRE Project would be located within the existing SML, it would not impact local designated employment land, thereby avoiding potential land use conflicts and supporting the protection of economic diversity in Roxby Downs and the surrounding region. Despite concerns about the limited availability of industrial land, the SRE Project presents an opportunity to enhance economic diversification by increasing demand for local goods and services, including construction materials, cleaning, staffing logistics, and engineering services. Stakeholder engagement indicated that many local businesses are available to support the SRE Project, and specific engagement with local businesses would help maximise their involvement.

Contribution to the regional and state economy

The SRE Project would strengthen the regional economy by contributing to GRP and economic output at both the regional and state levels. In the Far North region of South Australia, GRP has increased by 119% over the past decade, reaching $6.544 billion in 2024 (REMPLAN 2025). The mining industry is the largest economic driver, accounting for 70.8% of total output, with Roxby Downs generating 39.8% of the region's total economic output.

The Olympic Dam mine remains the dominant economic force in Roxby Downs and the Far North region, making a significant contribution to both GRP and the broader South Australian economy (Verisk Maplecroft 2023). The SRE Project would further boost regional economic output by creating new employment and business opportunities, as well as through direct financial contributions to the State. This would also support economic diversification and increase resilience to economic downturns, particularly for communities reliant on mining, such as Roxby Downs.

9.9.4 Confirmed impact events

Following completion of the socio-economic-related assessment of effects study described in Section 9.9, 18 confirmed SPR linkages (confirmed impact events) were established. These were progressed to an assessment of impact significance in accordance with the EIAF (Chapter 8). The confirmed impact events are summarised by pathway in Table 9.49.

Table 9.49 | Confirmed socio-economic-related impact events (confirmed linkage)

SPR ID	Pathway	Potential impact event
SE1	Socio-economic (infrastructure)	Increases in vehicle traffic associated with the movement of construction materials, general travel, including oversized and restricted movements, leads to degradation, increasing the risk to public health and safety
SE2	Socio-economic (infrastructure)	Increases in vehicle traffic associated with the movement of construction materials, general travel, including oversized and restricted movements, results in an increase in likelihood of traffic accidents, impacting on the health and safety of the local community
SE3	Socio-economic (infrastructure)	Increases in heavy vehicle traffic associated with the movement of construction materials, including oversized and restricted movements, leads to increase travel times affects road users, impacting on the social value of the local community
SE4	Socio-economic (infrastructure)	During operations, increases in heavy vehicle traffic associated with the movement of operational reagents and concentrates affects road users and impacts on the health and safety of the local community
SE5	Socio-economic (infrastructure)	During operations, increase in road traffic results in the degradation of the roads and increases risk to the public health and safety
SE6	Socio-economic (infrastructure)	During operations, the increased movement of heavy vehicles results in increases in travel times within the local and regional areas, impacting existing social values
SE9, SE10	Socio-economic (infrastructure)	During construction and operation, the SRE Project results in reduced access to emergency services for existing residents in nearby communities due to increased demand for emergency services to respond to increased risk of traffic accidents and workplace accidents at Project site and on Olympic Dam Highway
SE13, SE14	Socio-economic (infrastructure)	Increased labour force participation and reduced unemployment during the SRE Project, contributes to enhanced socio-economic wellbeing in FIFO source communities, including those within the regional study area
SE15, SE16	Socio-economic (infrastructure)	The SRE Project results in enhanced economic prosperity for local businesses through increased engagement from non-resident workers in the local economy, alongside new business and supply chain opportunities generated by the SRE Project
SE17, SE18	Socio-economic (infrastructure)	The SRE Project results in strengthening of the regional economy through contribution to GRP and to the State, indirectly supporting economic diversification and providing greater resilience to economic downturns
SE21, SE22	Socio-economic (infrastructure)	The SRE Project results in potential community impacts (e.g. cohesion and vitality) in Roxby Downs due to an increase in non-resident workers
SE23, SE24	Socio-economic (infrastructure)	The SRE Project results in an increased non-resident workforce resulting increased crime and anti-social behaviour

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10. Assessment of impact significance

10. ASSESSMENT OF IMPACT SIGNIFICANCE

This chapter summarises the impact assessment of confirmed impact events under the EIAF as described in Section 8.2.5.

10.1 Terrestrial flora and vegetation

The baseline ecological environment was described in Section 5.5, and the predicted effects of the SRE Project on baseline environmental (pathway) values was presented in Chapter 9. Details of the likely impacts to terrestrial flora and vegetation as a result of these effects are described in Appendix D1 and summarised in the following sections.

10.1.1 Dust deposition

Increased amounts of dust deposition can occur due to, but not limited to, the following:

- vehicle movement on unsealed roads, and increased degradation or unsealed roads (construction and operation)
- material movement of soil material and the creation of laydown areas (construction)
- land clearance removing topsoil layer and vegetation, and stockpiling of materials (construction)
- increased particulate matter from stacks and material handling activities (operation).

With consideration of the potential impact on the abundance and diversity of terrestrial flora and vegetation; is it noted that increased rates of dust concentration can cause a reduction in the growth, yield, flowering and reproduction of vegetation (Saunders and Godzik 1986, cited in Prajapati 2012). This can be attributed to the following principal mechanisms:

- changes in energy exchange (i.e. the absorption and conversion of radiation)
- reductions in light absorptions (i.e. effects on vegetation photosynthesis)
- inhibition of water vapour exchange (i.e. gas diffusion between leaves and air) (Doley 2006).

Doley (2006) suggests that plant capability can be significantly altered as a result of critical dust loads, whereby particle size distribution and the colour of dust can have an impact. This being dust from approximately 1 g/m^2 for ultra-fine carbon black particles to about 8 g/m^2 for more coarse road or limestone particles with a median diameter of more than 50 µm. When considering direct physical effects of mineral dust on vegetation it has been shown that vegetation becomes negatively impacted at relatively high surface loads of greater than 7 g/m^2 (Farmer 1993). Roadside deposition of dust on vegetation adjacent unpaved roads can also be subjected to up to 10 g/m^2/day (Everett 1980, cited in Farmer 1993). Thompson and colleagues (1984) also determined that for roadside vegetation to show a reduction in photosynthesis between 18 and 30 per cent, the dust deposition would need to be 10 g/m^2. It was established that dust may have an appreciable effect at concentrations ranging between 5 and 10 g/m^2, and that dust may affect photosynthesis by shading and obstructing diffusion (Thompson et al. 1984).

Dust can physically block the stomata of vegetation, inhibiting water vapour exchange. Where reductions in photosynthesis and inhibition of water vapour exchange, combined with an increase in leaf temperature is likely to make vegetation more susceptible to drought (Farmer 1993). It is noted, however, some desert plants have glandular hairs covering stomata which can result in increased tolerance to dust deposition (Doley 2006).

Dust deposition measured at the Olympic Dam site averages around 1 g/m^2/month, with BHP's nearby Carrapateena Mine averaging around 1.6 g/m^2/month (including the deposition of regionally generated saline aerosols). Significant additional Carrapateena-related dust deposition is noted as being confined to the immediate 500 m surrounding the dust-generating operations.

In a study at Carrapateena, dust totals of 7 g/m^2 were deemed to be the level at which changes in plant health become evident (OZ Minerals 2017c), and the actual impact is likely to be variable based on the period between rainfall events and high wind speed events, which remove dust deposition from the leaf surface. It would, therefore, require several months without rainfall before some species may begin to demonstrate impacts, and the significance of these impacts are expected to be greater near the operations versus across the baseline environment. Periodic rainfall events or even high winds are expected to remove dust from vegetation, having a re-setting effect on the potential for impacts.

In relation to chemical effects associated with deposition of reactive materials, it is noted this can also have an impact. Dust with a higher pH (greater than 9) may cause direct injury to the vegetation onto which they're deposited or through accumulation in the soil (Doley 2006).

Considering this information in relation to the SRE Project, immediate road-side vegetation has potential to be impacted as a result of increased vehicle traffic, with the effect correlating to the amount of vehicle use. It is expected that the impact would be limited to the immediate vicinity of the roads and disturbed areas. Impacts to flora species and vegetation as habitat for common and threatened species are therefore likely to be very localised and short-term, particularly during construction when disturbance first occurs. In addition, no EPBC-listed flora species, or State-listed flora species are known to occur in the SRE Project Area.

A relatively low rate of dust deposition is predicted in the SML Area during construction and operation of the SRE Project. Appendix C3 Air Quality Impact Assessment suggests that while not quantified, emissions and associated impacts from SRE Project construction are expected to be localised and lower than BAU operations or SRE Project plus BAU operations. As a relatively low rate of dust deposition is predicted, impacts of dust on terrestrial flora around the SRE Project are considered minor.

Disturbance would only occur within the EIGR Areas for the vegetation clearance associated with meeting the safety requirements of the existing line, and any impacts from dust deposition on both listed and non-listed native vegetation would be temporary.

Overall, the impacts of dust deposition on flora have been assessed as significance Level 2 (not significant).

10.1.2 Impact of off-gases and fugitive gases

Modelling results presented in Appendix C3 Air Quality Impact Assessment indicate that increases in concentrations of off-gases and fugitive gases due to SRE Project operations would be restricted to the immediate vicinity of the SRE Project plant activities, within an area which is already subject to such emissions from the existing Olympic Dam operations. While the modelling results indicate emissions of sulphur-related pollutants would increase as a result of the SRE Project relative to BAU operations, the predicted impacts are below applicable health and safety impact assessment criteria at all sensitive

receptor location areas. As such, the impact of fugitive gases on terrestrial ecology is considered to result in little or no reduction or change (likely an immeasurable change) in species viability and is assessed, as a worst case, as Level 2 (not significant).

10.1.3 Radiation

Like all environments, there is naturally occurring background radionuclide levels associated with the SRE Project. During stockpiling and smelting of copper concentrates, emissions of dust from stacks and subsequent deposition/release into the surrounding environment, results in an increased potential for exposure of flora to radionuclides, impacting the diversity of terrestrial flora.

In relation to flora, the accepted method for assessing potential risk is the ERICA Assessment Tool (ARPANSA 2010), whereby the method uses changes in soil concentrations and standard species uptake factors to calculate radiological risk. The assessment of impact significance indicated potential radiological impact to flora is low, with no additional controls justified due to the very low potential impacts. Therefore, the significance for impacts to flora has been assessed as Level 1 (not significant).

10.1.4 Bushfires

Bushfires can be an important factor in shaping the overall diversity and health of ecosystems, however, the level of dependence on bushfires varies greatly across different vegetation communities within Australia. Within the SRE Project Area, which is largely dominated by sandy swales with chenopod vegetation and low dunes Acacia or Native Pine woodlands, it is assumed that dependence on bushfires for succession of vegetation and general landscape function is less than, for example, some mallee communities which are located further south.

The nature and extent of a bushfires in different regions can also vary greatly. A review of the fire history surrounding the SML indicated no fires have been recorded within 100 km of the SML, with the most recent fire in the broader region recorded in 2012 (DEW 2025). At and surrounding the SML Area, there are existing levels of degradation from the existing Olympic Dam operation, from historical grazing, and evidence of impacts from rabbits. Ground cover and litter levels at the surface are very low, meaning any bushfires will likely be of relatively low intensity.

There are no known EPBC-listed or State-listed flora in the SRE Project Area. Only one highly mobile EPBC-listed fauna (Southern Whiteface) has been identified in the SRE Project Area, and a number of mobile State-listed fauna that have not been identified are considered to possibly or likely occur (Australian Bustard, Black Falcon, Flock Bronzewing, Little Eagle, Peregrine Falcon and Scarlet-chested Parrot). All have broad ranges. Impacts of bushfires caused by the SRE Project are therefore predominantly on common flora and fauna species which are wide ranging throughout the arid lands of South Australia (and beyond).

Given the sparse nature of vegetation in and around the SRE Project Area, particularly areas with little or no dense understorey and a lack of plant litter cover, and the low likelihood of fires as a result of the SRE Project getting out of control, it has been assumed that if a bushfire were to start as a result of the SRE Project, it would be relatively small in extent and therefore the impact to ecological values has been assessed as significance of Level 2 (not significant).

10.1.5 Altered flow regimes

Surface water flows in newly developed areas of the SRE Project will flow back to existing operational areas. There may be a loss or reduction of surface water flow volume from the newly developed areas, however this will be localised and is expected to result in negligible changes to existing surface water catchments in the SRE Area due to the absence of significant surface water features.

No impact is expected at the EIGR Areas as no infrastructure development is proposed.

Impacts to ecological values because of changes to altered surface water flow regimes will be limited to the SML Area, minor and localised. As such, the impact of altered flow regimes has been assessed as significance Level 2 (not significant).

10.1.6 Uncontrolled releases of chemicals or hydrocarbons

During all phases of construction and operation, contamination due to chemical or hydrocarbon release is anticipated to be low or no risk due to the provision of bunding in accordance with:

- AS1940-2017: The storage and handling of flammable and combustible liquids (Standards Australia 2017)
- AS1894-1997: The storage and handling of non-flammable cryogenic and refrigerated liquids (Standards Australia 1997)
- AS 4897-2008: The design, installation and operation of underground petroleum storage systems (Standards Australia 2008)
- EPA liquid storage guidelines (EPA 2016).

Further, due to the lack of surface water in areas of proposed chemical or hydrocarbon storage (including temporary storage, and loading/offloading areas) and the nature of the topography of the SRE Project, it is considered that in the event a spill did occur, the lateral spread of contaminants would be generally contained to a very localised area, and remediated prior to reaching any waterways of environmental areas of significance. As a result, the impact significance has been assessed as Level 1 (not significant).

10.1.7 Deposited sediments

Impacts of increased sedimentation may occur, if uncontrolled, during construction (particularly relevant in areas of recent ground disturbance), operation (where surface water is unmanaged on unsealed surfaces) and during closure (where erosion of surfaces beneath recently demolished structures and rehabilitated areas may occur). Sediments transported to adjacent environments may impact the abundance and local diversity of native vegetation which represents habitat for common and threatened species.

All SRE Project-related site run-off is planned to be retained onsite within existing stormwater management systems, and the SRE Project's developed area would not contribute water to the surrounding environment during smaller rainfall events. Only large (rare) storm events are expected to marginally increase run-off due to stormwater discharges, such as from hardstand areas, compacted cleared ground, and stormwater basins.

Regarding erosion and sediment control, when disturbed through surface water flows, the presence of sandy/clay loam soils has the potential to mobilise and transport sediments before it evaporates or infiltrates in enclosed catchments or bunded areas. This process, therefore, has a low potential to carry

sediments across the landscape and smother surrounding vegetation, particularly small herbaceous species which are of lower prevalence in the makeup of vegetation communities. Sandy soils will naturally allow rapid infiltration of surface waters, meaning the distance of sediment transport across the landscape is likely to be relatively small, except during the most extreme uncontrolled run-off events. Although impacts as a result of sedimentation are therefore unlikely in terms of frequency, and most likely to be localised, the impacts may lead to a temporary reduction in overall local diversity or abundance of common flora species.

Impacts to ecological values are expected to be minor in the context of the volumes of water required to overtop run-off collection dams, or other impacts as a result of sedimentation within surface water run-off from the SRE Project, and therefore impacts from sedimentation on flora, fauna and habitat is assessed at a significance Level 2 (not significant).

10.1.8 Land clearance

Vegetation communities identified within the SRE Project Area are well represented within the wider region. Where clearance of land, and consequently habitat, is expected to occur, there would be localised impacts on both flora and fauna species within that immediate area. Home ranges of many small mammals and reptiles are small and therefore those individuals within the clearance area are likely to be directly impacted. However, vegetation, and therefore habitat clearance, is not expected to have significant impacts to those species at a local population, or species as a whole, level (i.e. it is clearance of non-essential, or not critical habitat only).

The SRE Project is expected to result in a total Disturbance Footprint (excluding existing disturbance) of 234.04 ha as presented in Table 6.4 (101.71 ha for the SRE Area, 64.01 ha for the General Infrastructure Area, 39.82 ha for the Water Infrastructure Area and 28.50 ha for the EIGR Areas). Disturbed areas without infrastructure (e.g. construction buffer areas, or where infrastructure is buried) would be rehabilitated either progressively following construction, or at final closure of the site. Impacts to non-threatened flora and fauna species are not expected to have a significant effect on either abundance or diversity of species present in the region. Impacts to common flora species are therefore considered to be localised only, and short-term during construction where rehabilitation following construction is proposed (e.g. over the buried water pipeline). As such, impacts to common species are assessed as Level 2 (not significant).

10.1.9 Increased weed abundance and diversity

During construction, whilst vehicles and machinery can act as vectors for weed dispersal, vehicle movements associated with SRE Project-related activities would not be expected to result in a significant increase in the abundance or diversity of weed species on the basis of existing weed management practices have been demonstrated to be effective. It is assumed weed monitoring within the disturbance areas would be undertaken on a routine basis and management activities undertaken as required to control any outbreaks, with an emphasis on declared weeds (as listed under the LSA Act) or WoNS, as per the existing EPMP (BHP 2023b). Therefore, no increase in the abundance or diversity of weed species is expected over the long-term, and the impact of weeds on ecological values has been assessed as significance Level 2 (not significant).

10.1.10 Controls and management strategies

The proposed management and mitigation strategies to reduce the significance of flora and vegetation-related impacts are presented in Table 10.1.

Table 10.1 | Indicative flora and vegetation-related mitigation and management strategies

Type of strategy	Description of mitigation and management strategies
Air	
Dust	BAU pollution control on stacks and future stacks. Controls as described in Appendix C3 Air Quality Impact Assessment
Dust, off-gas and fugitive gas emissions	Control of fugitive emission releases from RC handling and storage through the use of covers, wind breaks, enclosures and dust extraction to baghouse
	Controls including flue gas treatment as described in Appendix C3 Air Quality Impact Assessment
Radiation (design controls)	A wheel wash and vehicle washdown bay to minimise the spread of potential contamination around the site and off the site
	Provision of hose down facilities and sumps, access ways and sufficient room for equipment (such as bobcats) for clean-up of material spillages
	Secure compounds, appropriate ventilation, use of dedicated extraction systems in appropriate areas
	Consideration of control of process stream recirculation, to ensure that recirculating loads do not act to concentrate radionuclides
	Management of stormwater to ensure adequate containment of all run-off water
	Tailings pipeline corridor bunded to control spillage in the event of pipeline failures
	Specific spillage containment and ease of clean up designs for the core processing facility. This includes all tanks having concrete bunds, as secondary containment, to store at least the volume of the tank
Radiation (administrative controls)	Specific procedures to segregate, isolate and clean contamination or contaminated equipment
	Defined restricted access areas
	Specific procedures for equipment or materials leaving work areas of the SRE Project
	Radiation instruction and education for all workers associated with the SRE Project, including standards for the prevention of contamination release from the project, and monitoring to determine the effectiveness of control and for dose equipment
Land	
Land disturbance	A CEMP will be developed prior to construction, including targeted PFAS soil sampling where disturbance areas overlap known or potential PFAS-affected areas
	When choosing construction access track or infrastructure locations, where possible avoid environmentally and culturally sensitive and restricted areas, avoid disturbance of important native vegetation and fauna habitat (e.g. areas prone to erosion such as dunes with taller vegetation, old growth vegetation containing hollows)
	Wherever possible, all disturbances will be staged and progressively rehabilitated to help control total dust levels and limit erosive potential
	Where earthworks are required for new construction access tracks, laydown areas, or other infrastructure, the disturbance of vegetation will be limited as far as practicable

Type of strategy	Description of mitigation and management strategies
	Minimise vegetation removal by trimming limbs rather than removing entire trees or bushes, and leave rootstock in the ground to assist revegetation and to stabilise the soil
	Stockpile vegetative cuttings for respreading as mulch, soil protection and seed material for regeneration on completion
	Existing roads and fence lines will be utilised, where possible, to limit disturbance
	During construction, where there are no established tracks and it is intended to traverse the same ground more than once, where possible, the same wheel tracks will be used each time
	The width of access tracks shall be kept to the minimum required. Tracks should be just wide enough to safely meet the needs of the largest vehicle
	Development of a site-specific CEMP including an unexpected find protocol to manage ground disturbance
Water (surface water and groundwater)	
Surface water quality and quantity	Stormwater catchments in dune swales will be excluded from the site by bunding and the building up of pads above the stormwater pooling level.
	An erosion and sediment control plan to be developed as part of detailed design, would be implemented during construction
	Erosion protection (rock armour) would be applied at site discharge points, designed by an engineer with relevant qualifications
	Culverts and associated rock aprons would be designed to Austroads standards
	Excess stormwater would be conveyed to the existing Olympic Dam stormwater management system for reasonable design storm scenarios
	Update the site stormwater management plan to include the proposed SRE Project infrastructure
	Regular maintenance of onsite stormwater management systems.
Chemical and fuel management	Ensure hydrocarbon materials are securely captured within designed drains (i.e. oily water separators) within workshop areas
	All hydrocarbon and chemical storage locations and stockpiles would be bunded (includes temporary storage) and located away from stormwater flow paths in accordance with relevant Australian Standards
	All refuelling locations would be bunded
	BHP's fuel and chemical spills management procedure would be implemented

10.1.11 Description of uncertainty and sensitivity

An understanding of the level of uncertainty was determined for the pathway (effects) and impact assessment in accordance with the process described in Section 8.2.6 and the EIAF (Appendix E1). Details of the uncertainties associated with terrestrial flora and vegetation are presented in Appendix D1 Ecological Impact Assessment and are summarised in Table 10.2.

Table 10.2 | Description of uncertainties and sensitivities – terrestrial flora and vegetation

Pathway and/or Impact	Uncertainty and sensitivity description	Uncertainty	Sensitivity
Terrestrial flora and vegetation	There is a low level of uncertainty associated with knowledge regarding the existing flora species composition, vegetation associations and habitat types present within the SRE Project Area as ecological surveys and historical monitoring have been undertaken, including vegetation assessments across all EIGR Areas. Further surveys may still reveal additional species at the site however it is unlikely that any new vegetation associations would be found. Baseline ecological surveys have not identified unique vegetation or communities within the SRE Project that are not represented in the wider region.	Low	Low
State or Commonwealth threatened species	There is a low level of uncertainty associated with knowledge of threatened species as ecological surveys and historical monitoring have been undertaken, spanning multiple years and including monitoring within the SML Area and associated with the ARR. The Ecological Impact Assessment (Appendix D1) has an overall low sensitivity to uncertainty, primarily because the assessment assumes presence of conservation significant species based on the availability of habitat, and that these species are considered likely to be, or potentially, present.	Low	Low
Increased weed abundance and diversity	Project activities are not expected to significantly alter the current abundance or diversity of weed species where the impacts would result in a change in abundance or diversity to native flora and fauna. Routine weed monitoring and management at Olympic Dam demonstrates a capacity and capability to manage weeds on the SML.	Low	Low
Impact of sedimentation and modifications to surface water flows on terrestrial ecology	Surface water run-off and associated erosion and sediment control can be managed across the SRE Project with robust engineering design, including mitigation structures such as the use of bunding, sediment ponds and erosion protection where appropriate.	Low	Low
Impact of particulate matter on terrestrial ecology	Particulate matter concentrations associated with industrial processing operations are generally well understood, and there is a sufficient body of research into the effects of particulate matter on terrestrial ecology.	Low	Low

Pathway and/or Impact	Uncertainty and sensitivity description	Uncertainty	Sensitivity
Impact of off-gases and fugitive gases on terrestrial ecology	Gaseous pollutant concentrations associated with industrial processing operations are generally well understood, but there are limited technical studies on the effect of gaseous pollutants on arid zone ecology.	Moderate	Low
Impact of radiation on terrestrial ecology	The assessment of potential radiological impact to flora and fauna indicate that no additional controls are justified due to the very low potential impacts. The standard dust controls that mining and processing operations generally employ would act to control potential impacts, and baseline monitoring results would be verified as the results become available.	Low	Moderate
Bushfire	Bushfires are unpredictable by nature; however, a range of mitigation strategies would be employed in accordance with Olympic Dam's IMS and relevant regulations. There is limited fuel load in the SRE Project Area and surrounds, and vegetation is low and very low open shrublands, as described by Appendix D1 Ecological Assessment.	Low/Moderate	Low

10.1.12 Summary of impact significance

Following the assessment of impact significance of the confirmed impact events, it was determined that all flora and fauna-related impact events were significance Level 2 or below and no significant impacts are predicted.

10.2 Terrestrial fauna and habitat

The baseline ecological environment was described in Section 5.5, and the predicted effects of the SRE Project on baseline environmental (pathway) values was presented in Chapter 9. Details of the likely impacts to terrestrial fauna and habitat as a result of these effects are described in Appendix D1 and summarised in the following sections.

10.2.1 Noise and vibration

The potential impact of noise on terrestrial fauna may result in disturbance responses in individual animals or other behavioural changes. Sources of potential impact noise from surface infrastructure from proposed SRE Project activities, road traffic noise, and vibration from construction and operation activities. Appendix C2 Noise and Vibration Impact Assessment modelled only very marginal noise level increases above background noise levels arising from the proposed surface infrastructure and road traffic of 1dB(A) during construction and 4 dB(A) during operation. The single greatest noise sources from construction (117 dB(A)) were excavator operations and, during operation, was the FSF (135 dB(A)). These activities either already occur immediately adjacent to, or within the SML Area and are unlikely to occur in immediate proximity to vegetation or fauna. Existing fauna would already exhibit a level of management associated with noise sources of equivalent levels related to the existing plant (e.g. relocation away from noise sources, or tolerance to the noise sources), except for excavations associated with the Water Infrastructure Area (water pipeline to the south) and EIGR Areas during the construction phase only.

Given no blasting is proposed as part of the SRE Project, vibration levels are expected to be negligible. Impacts to the nearest sensitive residential receivers were not significant when assessed in accordance with the EIAF.

It is acknowledged that anthropogenic noise can affect communication, distribution, foraging, homeostasis and habitat quality of fauna species (Kunc and Schmidt 2019, Duarte et al. 2015). Fauna using audible cues for breeding activity, may also experience disruption to breeding cycles or reduced breeding success (Duarte et al. 2015). Different taxonomic groups also respond differently to noise, and there may be positive and negative impacts for prey and predator species.

At a local level, a literature review of available studies and monitoring results from other, similar, operations was undertaken to describe the expected impacts of noise and vibration on fauna abundance and diversity. OZ Minerals (2017c) described the results of fauna monitoring at the Prominent Hill operation, concluding that 'monitoring surveys undertaken at a variety of operational mine sites show no statistical variation in the abundance or species richness of fauna species at distances of approximately 200 m or less to operational areas such as waste rock dumps, access roads and tailings storage facilities. Short-term blasting may result in a short-term movement of fauna out of the area, however a return to these areas would be anticipated with no longer-term impact'.

Similarly, Biota (2015) studied the impact of noise on bat species at BHP's Mining Area C and 'found no evidence of disturbance response in a colony of Orange Leaf-nosed Bat (*Rhinonicteris aurantius*)' with blasting as close as 120 m to the roost site. A small number of Ghost Bats also utilised that roost and no evidence of disturbance response was detected for Ghost Bats either.

In a worst-case scenario, masking impacts could occur up to several hundred metres or more from these temporary noise sources. However, given the frequency of the noise, masking impacts are likely to be considerably less, particularly, given the species is known to occur adjacent busy highways and near other active mine sites on the Eyre Peninsula (e.g. Iron Baron).

In addition to the above, the baseline assessment indicates the habitat in the SML Area is not essential to threatened species, or to common fauna, and is widespread throughout the region. This type of habitat is present immediately adjacent (south of) the existing Olympic Dam mine and the ARR is located immediately north of the existing Olympic Dam mine, where both threatened and common fauna persist (Arid Recovery 2025).

Outside the SML, the EIGR Areas occur in non-urbanised areas adjacent and beneath an existing transmission lines and associated tracks. Noise impacts would occur only during construction, and not operation (given the transmission line is already present and there would be no additional noise sources).

The baseline assessment also indicates only one EPBC-listed species is known in the SRE Project Area, the highly mobile Southern Whiteface. Several highly mobile and broadly distributed State-listed fauna are considered to have potential to occur but have not been recorded in the SRE Project Area to date (Australian Bustard, Black Falcon, Flock Bronzewing, Little Eagle, Peregrine Falcon and Scarlet-chested Parrot).

In summary, it is acknowledged that noise may impact fauna, but due to the existing high background noise levels at and surrounding the existing Olympic Dam operations, only marginal (almost unmeasurable) localised increases in noise levels are predicted as a result of the SRE Project construction and operation. Construction impacts further away from the existing operation (e.g. the southern portion of the Water Infrastructure Area and the EIGR Areas) are localised and short-term. The impact significance to both threatened and non-threatened terrestrial fauna as a result of changes to the noise environment is therefore considered to be low to negligible and has been rated as Level 2 (not significant).

10.2.2 Lighting

DCCEEW (2023) outlines that light pollution has the potential to disrupt terrestrial fauna behaviour, particularly for nocturnal species. Disruption may include impacts to breeding, foraging and migration which in turn can stall recovery of threatened species. There are, however few studies that have documented effects of human-made light pollution at night on free-ranging mammals (Roberts 2018). Several case studies have found benefits in managing lighting to reduce impacts to marine reptiles (turtles) and marine birds (shearwaters) (documented in DCCEEW 2023).

The impacts of light emissions on fauna are poorly documented and there is uncertainty associated with direct impacts. It is expected that the lighting required for the SRE Project would have potential to impact fauna based on altering feeding patterns, whereby increased light pollution may attract higher concentrations of insects resulting in a potential increase of nocturnal fauna within the immediate SML Area. This would particularly relate to bats and nocturnal avian fauna. However, the SRE Project is adjacent an existing brownfield site with substantial existing light emissions arising from the operational Olympic Dam mine and associated processing plant and accommodation villages. Any changes as part of the SRE Project would be expected to be negligible. Any potential impacts are expected to be very localised, and it is noted that no nocturnal flying species of conservation significance (EPBC-listed or State-listed) have been identified in the SRE Project Area.

Considering the locality of the SRE Project in relation to the existing Olympic Dam operation and accommodation areas which are already well-lit environments, it is predicted that there would be negligible impact as a result of the additional artificial lighting required for the SRE Project. Given no EPBC or State listed species which potentially occurring the Project Area are nocturnal, impacts to listed species are assessed as Level 1 (not significant). Minor behavioural changes as a result of the additional lighting are plausible for common nocturnal fauna, and impacts are assessed as Level 2 (not significant).

10.2.3 Dust deposition

Studies of the effect of dust deposition on the abundance and diversity of fauna in proximity to unsealed roads found little change in abundance of species as a result of dust. For example, Jones et al. (2015) found that pre-upgrades to roads (i.e. road produced dust) trapping surveys confirmed that a forest environment supported a diversity and abundance of ground-dwelling mammal species in highly dust-affected sites which was equivalent to that detected following road upgrades. They suggested the results indicated that, in certain environments, dust may have far less impact on ground-dwelling mammals than expected (Jones et al. 2015). In addition, given the existing dust levels in the semi-arid environment of the SRE Project Area, any impacts that occur (primarily during construction) are likely to be localised and short-term.

Specific to the SRE Project, impacts to fauna from dust deposition are primarily likely to arise due to reduced habitat quality. As per the impacts of dust deposition to flora (Section 10.1.1), impacts to vegetation (as habitat for common and threatened species) are likely to be localised and minor due to relatively low predicted dust deposition during construction and operation. Only the highly mobile EPBC-listed (Vulnerable) Southern Whiteface is known to occur in the SRE Project Area, and several highly mobile State-listed fauna have potential to occur, but all have broad distributions and extensive available habitat away from the SRE Project Area.

Due to the relatively low rate of dust deposition expected in the SML Area from related-activities and vehicle traffic, impacts to both listed and non-listed fauna species are expected to be very minor within and surrounding the SML Area. The EIGR Areas would only be disturbed for vegetation clearance associated with meeting safety requirements under the existing transmission line, and ongoing impacts

as a result of dust deposition on both listed and non-listed fauna are not expected. Overall, the impacts of dust deposition on terrestrial fauna are expected to be unmeasurable and have been assessed as significance Level 1 (not significant).

10.2.4 Impact of off-gases and fugitive gases

Modelling results presented in Appendix C3 Air Quality Impact Assessment indicate that increases in concentrations of off-gases and fugitive gases due to SRE Project operations would be restricted to the immediate vicinity of the SRE Project plant activities, within an area which is already subject to such emissions from the existing Olympic Dam operations. While the modelling results indicate emissions of sulphur-related pollutants would increase as a result of the SRE Project relative to BAU operations, the predicted impacts are below applicable health and safety impact assessment criteria at all sensitive receptor location areas. Therefore, the likelihood of adverse odour impacts is considered low. As such, the impact of fugitive gases on terrestrial ecology is considered to result in little or no reduction or change (likely immeasurable) in species viability and is assessed as a worst case as Level 2 (not significant).

10.2.5 Radiation

Like all environments, there is naturally occurring background radionuclide levels associated with the SRE Project. During stockpiling and smelting of copper concentrates, emissions of dust from stacks and subsequent deposition/release into the surrounding environment, results in an increased potential for exposure of fauna habitat and fauna to radionuclides, impacting the diversity of fauna habitat and terrestrial fauna.

In relation to flora and thereby extension to supporting terrestrial fauna, the accepted method for assessing potential risk is the ERICA Assessment Tool (ARPANSA 2010), whereby the method uses changes in soil concentrations and standard species uptake factors to calculate radiological risk. The assessment of impact significance indicated potential radiological impact to fauna is low with no additional controls justified due to the very low potential impacts. Therefore, the significance for impacts to fauna has been assessed as Level 1 (not significant).

10.2.6 Land clearance

Localised land clearing is expected to have minor impacts on local and commonly occurring habitat types and therefore local populations of fauna species. The removal of habitat may result in a short-term reduction in abundance of those species, if present. No critical threatened species habitat, or habitat which any common or conservation significant fauna are reliant on, has been identified in the SRE Project Area. One EPBC listed (Vulnerable) species, the Southern Whiteface, is known to occur within the SRE Project Area, with several State listed species considered likely to be present, or potentially present. Impacts to threatened fauna have been conservatively assessed as an impact significance of Level 2 (not significant); due to the potential short-term removal of non-essential habitat for Southern Whiteface.

Impacts to non-threatened fauna species are not expected to have a significant effect on either abundance or diversity of species present in the region. Impacts to common flora and fauna species are therefore considered to be localised only, and short-term during construction where rehabilitation following construction is proposed (e.g. over the buried water pipeline). As such, impacts to common species are assessed as Level 2 (not significant).

10.2.7 Increased pest abundance and diversity

During operation, increased occupancy of Olympic Dam accommodation due to the SRE Project workforce may result in unmanaged food waste materials that cause an increase in pest fauna species. This may in turn result in a decrease in native fauna abundance and diversity through elevated predation pressure (e.g. if there are increases to existing presence of feral predators such as European Fox and Feral Cat). An increase in European Rabbits may result in competition and grazing of emerging flora. Standard waste management practices would apply for the required worker accommodation, as per current practice at Olympic Dam (BHP 2023b). Therefore, no increase in the abundance feral/pest fauna that would result in a change in abundance and diversity to native flora and fauna is expected over the long-term, and impacts to ecological values as a result of pest animals attributable to the SRE Project have been assessed as significance Level 2 (not significant).

10.2.8 Controls and management strategies

The proposed management and mitigation strategies to reduce the significance of fauna-related impacts would include the flora and vegetation controls presented in Table 10.1. In addition, the surface noise infrastructure and light mitigation and management strategies listed in Table 10.3 (additional to Table 10.1) would apply to reduce the significance of fauna-related impacts.

Table 10.3 | Indicative fauna-related mitigation and management strategies

Type of strategy	Description of mitigation and management strategies
Air	
Surface infrastructure noise	Impacts will be mitigated in accordance with the standard operating procedures and designs to minimise the impact from noise as far as reasonably practicable
Lighting	Compliance with obtrusive lighting standards
	Use of lighting only where needed

10.2.9 Description of uncertainty and sensitivity

An understanding of the level of uncertainty was determined for the pathway (effects) and impact assessment in accordance with the process described in Section 8.2.6 and the EIAF (Appendix E1). Details of the uncertainties associated with terrestrial flora and vegetation are presented in Appendix D1 Ecological Impact Assessment and are summarised in Table 10.2.

Table 10.4 | Description of uncertainties and sensitivities – terrestrial flora and vegetation

Pathway and/or Impact	Uncertainty and sensitivity description	Uncertainty	Sensitivity
Terrestrial fauna and habitat	There is a low level of uncertainty associated with knowledge of fauna diversity present in the SRE Project Area as ecological surveys and historical monitoring have been undertaken, spanning multiple years and including monitoring sites within the SML Area.	Low	Low
State or Commonwealth threatened species	There is a low level of uncertainty associated with knowledge of threatened species as ecological surveys and historical monitoring have been undertaken, spanning multiple years and including monitoring within the SML Area and associated with the ARR.	Low	Low

Pathway and/or Impact	Uncertainty and sensitivity description	Uncertainty	Sensitivity
	The Ecological Impact Assessment (Appendix D1) has an overall low sensitivity to uncertainty, primarily because the assessment assumes presence of conservation significant species based on the availability of habitat, and the fact that these species are considered likely to be, or potentially, present.		
Impact of noise and vibration on terrestrial ecology	Noise levels associated with industrial and traffic noise are generally well understood, there are comparable existing noise sources already present, and there is a significant body of research into the effects of industrial noise on terrestrial ecology.	Low	Low
Impact of light	Limited studies have been undertaken specifically in relation to disruption of natural behaviours of fauna due to artificial lighting associated with mine site and industrial operations, however, in this instance the additional light from the SRE Project is an incremental increase only, and there are no conservation significant nocturnal fauna species in the area.	Low	Moderate
Impact of particulate matter on terrestrial ecology	Particulate matter concentrations associated with industrial processing operations are generally well understood, and there is a sufficient body of research into the effects of particulate matter on terrestrial ecology.	Low	Low
Impact of off-gases and fugitive gases on terrestrial ecology	Gaseous pollutant concentrations associated with industrial processing operations are generally well understood, but there are limited technical studies on the effect of gaseous pollutants on arid zone ecology.	Moderate	Low
Impact of radiation on terrestrial ecology	The assessment of potential radiological impact to flora and fauna indicate that no additional controls are justified due to the very low potential impacts. The standard dust controls that mining and processing operations generally employ would act to control potential impacts and baseline monitoring results would be verified as the results become available.	Low	Moderate
Increased pest abundance and diversity	Project activities are not expected to significantly alter the current abundance or diversity of weed or pest species where the impacts would result in a change in abundance or diversity to native flora and fauna. BHP has established and effective waste management practices for accommodation villages located on and off the SML.	Low	Low

10.2.10 Summary of impact significance

Following the assessment of impact significance of the confirmed impact events, it was determined that all fauna and habitat-related impact events were significance Level 2 or below and no significant impacts are predicted.

10.3 Cultural amenity (heritage and communities)

Baseline cultural amenity was described in Section 5.6.9, and the predicted effects of the SRE Project on baseline environmental (pathway) values was presented in Chapter 9. Details of the likely impacts to historic heritage as a result of these effects are described in Appendix D4 Historic Heritage Impact Assessment and summarised in the following sections.

10.3.1 Disturbance of cultural heritage

The Aboriginal heritage sites identified within the SML Area predominantly consisted of archaeological scatters that reveal very limited information about past human activities (sites with low Aboriginal heritage significance).

In addition to the archaeological sites, several sites of ethnographic importance such as claypans have also been reported within the SML Area, though these have been avoided through modification of the disturbance footprint during design development.

Prior to any ground disturbance that has the potential to affect Aboriginal heritage values, BHP will complete any required heritage assessments, consultation processes and statutory authorisations in accordance with the applicable legislative framework and approved heritage management arrangements.

While the aboriginal significance has been assessed as low, project-related disturbance would result in impact requiring cultural materials to be fully relocated via salvage prior to disturbance. On this basis, the impact has been assessed as Level 3 (significant).

10.3.2 Restriction of access to sites of cultural value

BHP would endeavour to facilitate ongoing access to Aboriginal heritage sites identified within the SRE Project Area (including data and stored material culture). Restriction of access to sites of cultural value, however, would be imposed for safety reasons (i.e. in proximity to operation area etc). On this basis, the impact has been assessed as Level 2 (not significant).

10.3.3 Disturbance of historic heritage values

Due to the low to very low potential for the historic heritage Study Area to contain subsurface historical archaeological features that may be encountered during ground disturbing construction activities, a precautionary approach has been adopted, and the potential for impact to historic heritage values has been carried through to impact assessment.

On this basis, the impact has been assessed as Level 1 (not significant).

10.3.4 Controls and management strategies

The proposed management and mitigation strategies to reduce the significance of cultural amenity-related impacts would include the controls presented in Table 10.5.

Table 10.5 | Indicative cultural amenity-related mitigation and management strategies

Type of strategy	Description of mitigation and management strategies
Cultural heritage	
Pre-construction	• Prior to any ground disturbance that has the potential to affect Aboriginal heritage values, BHP will complete any required heritage assessments, consultation processes and statutory authorisations in accordance with the applicable legislative framework and approved heritage management arrangements • Activities within the EIGR Areas will be undertaken in accordance with the requirements of the AH Act 1988, including any required authorisations • The applicable heritage authorisation pathway for each package of disturbance works will be confirmed during detailed design and prior to construction.
Construction	• Avoidance of harm to Aboriginal heritage sites and values through avoidance during design where possible • No activity will proceed where Aboriginal heritage impacts cannot be appropriately managed through avoidance, mitigation and completion of all required approvals and authorisations • Impacts to Aboriginal heritage managed in accordance with ODA Heritage Protocols, specifically: o Detailed site recording and salvage of artefacts prior to impact, conducted by professional archaeologist(s) or anthropologist (s) nominated by NTPRC. o Develop a thorough inventory of salvaged artefacts. o Rehabilitation (repository) of cultural materials in a culturally appropriate manner. o Access to the cultural materials is provided to heritage representatives nominated by NTPRC. o Heritage monitoring during the SRE Project execution (initial ground disturbance) by heritage representatives nominated by NTPRC. o In the event of a new discovery, adopt Aboriginal Affairs and Reconciliation Discovery Protocols and report the new discovery as per section 20 of *Aboriginal Heritage Act 1988* (SA).
Operations	• On the SML, project and operational activities are controlled through the application of the Copper SA Operational Heritage Management Plan to all activities. This management plan provides a framework that supports BHP's commitment to mitigate impact to heritage sites through activities undertaken within Copper SA operational and exploration leases. It provides guidance and instruction on operational controls required for land disturbance activities.
Historic heritage	
Construction	Implementing a stop works procedure for unexpected historical archaeological finds in the CEMP.

10.3.5 Description of uncertainty and sensitivity

An understanding of the level of uncertainty was determined for the pathway (effects) and impact assessment in accordance with the process described in Section 8.2.6 and the EIAF (Appendix E1). Details of the uncertainties associated with cultural amenity are presented in Appendix D4 Historic Heritage Impact Assessment and are summarised in Table 10.2.

Table 10.6 | Description of uncertainties and sensitivities – cultural amenity

Pathway and/or Impact	Uncertainty and sensitivity description	Uncertainty	Sensitivity
Cultural heritage	The SML Area has been archaeologically and ethnographically surveyed in its entirety, between 1981 and 2024. Past engagement records indicated that all heritage engagements within the SML Area were completed in consultation with the Traditional Owner groups who were/are culturally associated with the Olympic Dam and broader Roxby Down area, with the support from their preferred heritage professionals (i.e. archaeologist and anthropologist). Under the ODA, pre-clearance surveys of the EIGR Areas will be undertaken once land disturbance areas have been refined with a sufficient level of certainty. However, a moderate level of uncertainty has been assigned pending these surveys.	Moderate	Moderate
Historic heritage	There is low to very low potential for subsurface archaeological sites to be within the SRE Project Area (i.e. high level of certainty) due to: • absence of historic records • no unidentified archaeological sites having been encountered during earthworks/excavations associated Olympic Dam site infrastructure within the SML.	Low	Low

10.3.6 Summary of impact significance

Following the assessment of impact significance of the confirmed impact events, it was determined that one cultural heritage-related impact event (L4) was significance Level 3, while the remaining two impact events (L5 and L33) were significance Level 2 or below.

10.4 Local community (community values, health, safety, amenity)

The baseline local community environment was presented in Section 5.4.5 and Section 5.6, and the effects of the SRE Project on environmental (pathway) values was described in Chapter 9. The assessment of impact significance for impacts to the local community, including community values, health, safety and amenity is summarised in the following sections with details provided in:

- Appendix C2 Noise and Vibration Impact Assessment
- Appendix C3 Air quality Impact Assessment
- Appendix C4 Radiological Impact Assessment
- Appendix C7 Traffic Impact Assessment
- Appendix D2 Social Impact Assessment
- Appendix D3 Economic Assessment
- Appendix D5 Visual Impact Assessment.

10.4.1 Noise (health and amenity)

10.4.1.1 Impact of surface infrastructure noise on amenity

Community and/or individual perceptions of impacts to amenity do not always correlate to measured levels of pollutants (including noise), and are likely to vary with consideration to:

- the baseline noise environment prior to the addition of noise-generating activities
- the receptor's previous exposure to noisy environments
- the nature of the receptor's relationship with the generator of the noise
- the variability (impulsive, low frequency, modulating or tonal characters) of the noise.

The assessment of effects for surface infrastructure noise (Section 9.1.3.1) predicted noise levels would increase as a result of activities associated with the SRE Project but did not exceed noise limits derived from the Environment Protection (Commercial and Industrial Noise) Policy 2023. As such, the impact significance has been rated as Level 1 (not significant).

10.4.1.2 Impact of road traffic noise on amenity

The increase in noise levels associated with road traffic for the SRE Project is below the guidance noise criteria set out in the NSW Road Noise Policy (DECCW 2011), with the exception of two minor exceedances of the day criteria by 1 dB on Olympic Dam Highway, located north of Roxby Downs, and the night criteria by 3 dB on Olympic Dam Way. As such, the impact significance has been rated as Level 1 (not significant).

10.4.2 Air quality (health and amenity)

10.4.2.1 Construction phase air emissions

The emissions intensity during peak construction activities is expected to be lower than BAU operations or future operations involving the operation of the SRE Project. Furthermore, any construction-related air pollution emissions would be generated well within the SML and distant from sensitive receptor locations to the south. Consequently, air quality impacts from the construction phase are expected to be lower than BAU or future SRE Project operations. On the basis of the above, the impact significance has been rated as Level 1 (not significant).

10.4.2.2 Operational air emissions

The Air Quality Impact Assessment showed that no exceedances of ambient air quality impact assessment criteria were predicted at any sensitive receptor area. On the basis of the above, the impact significance for impact events associated with operational air quality emissions has been rated as Level 1 (not significant).

10.4.3 Radiation (health)

The dose assessment indicates that radiological impacts to both health and amenity would be low and below the recognised public dose limit of 1 mSv/y and dose constraint of 0.3 mSv/y. As such, the impact significance has been assigned as Level 1 (not significant).

In accordance with the ICRP (2007) and the IAEA (2014) statement that controls are to be commensurate with the magnitude of the impact, no additional controls for the purposes of radiation protection are considered necessary, other than standard controls.

10.4.4 Traffic (community values)

10.4.4.1 Intersection performance

Intersection performance was assessed in Section 9.9.3.6. The assessment of impact significance is as follows:

- Olympic Dam Highway/Olympic Dam Way (north of Roxby Downs) – the intersection can effectively accommodate SRE Project traffic volumes associated with both construction and operation without significantly impacting its performance and therefore the impact significance has been determined to be Level 2 (not significant).
- Olympic Dam Highway/Olympic Dam Way (south of Roxby Downs) – the intersection can effectively accommodate SRE Project traffic volumes associated with both construction and operation without significantly impacting its performance and therefore the impact significance has been determined to be Level 2 (not significant).

10.4.4.2 Traffic volume impacts

The traffic volume assessment for SRE Project Stage 2 construction and Stage 1a and Stage 1b operation impacts (worst case), comprising construction traffic, operational transport of concentrate to Olympic Dam for processing, operational materials delivery (i.e. import and export), are summarised in Table 10.7.

Table 10.7 | Summary of outcomes traffic volume assessment

Road section	Summary of outcomes	Impact significance
Stage 2 construction and Stage 1a and Stage 1b operations		
Olympic Dam Highway (north of Roxby Downs)	Traffic volumes are expected to increase by 15.8%. The impact is minimal due to already high baseline traffic volumes (4,600 vehicles per day) from township and Olympic Dam traffic.	Level 2 (not significant)
Olympic Dam Highway (south of Roxby Downs)	A large percentage increase in traffic (107.6%) is projected due to low existing volumes (500 vehicles per day). This route mainly serves traffic coming from the south of Roxby Downs.	
Olympic Dam Way	Traffic volumes are predicted to rise by 43.7%, driven by light vehicles for mine operations and personnel movements. This road typically carries lower traffic (430 vehicles per day), so the relative increase is significant. No heavy vehicle impact during this phase, as trucks avoid this road to bypass the township.	
Olympic Dam Highway (Pimba)	A large percentage increase in traffic (29.8%) is projected due to low existing volumes (650 vehicles per day). This route mainly serves traffic coming from Stuart Highway.	

Road section	Summary of outcomes	Impact significance
Stuart Highway (east of Stuart Highway /Olympic Dam Highway intersection)	An increase of 18.1% in traffic volumes is projected, driven by heavy vehicles for the mine operation and construction deliveries. The existing road has moderate baseline volumes (950 vehicles per day).	
Stuart Highway (west of Stuart Highway /Olympic Dam Highway intersection)	A minor increase in traffic (5.0%) is projected for this section. Existing volumes are low (440 vehicles per day), and the impact from project traffic is expected to be negligible.	
Stuart Highway (north-west of Port Augusta)	A minor increase in traffic (2.6%) is projected for this section. Existing volumes are high (4,700 vehicles per day), and the impact from project traffic is expected to be negligible.	
Augusta Highway (south-east of Port Augusta)	A minor increase in traffic (0.8%) is projected for this section. Existing volumes are very high (16,100 vehicles per day), and the impact from project traffic is expected to be negligible.	
Stage 2 operations		
Olympic Dam Highway (north of Roxby Downs)	A 25.0% increase in traffic is expected due to more delivery vehicles and personnel commuting between Roxby Downs and Olympic Dam.	Level 2 (not significant)
Olympic Dam Highway (south of Roxby Downs)	Traffic volumes are projected to more than double, with a 152% increase. The low baseline volume amplifies the impact of additional traffic, which also reflects BHP's transition from rail to heavy vehicle at the Pimba intermodal by Stage 2 with 2039, representing the highest traffic movements for the SRE Project.	
Olympic Dam Way	Large impact (90.7% increase), as this road becomes a major route for personnel travelling between the township and Olympic Dam, significantly increasing traffic volumes on a road typically handling lower traffic levels. No heavy vehicle impact during this phase, as trucks avoid this road to bypass the township.	
Olympic Dam Highway (Pimba)	A moderate increase of 26.2% is projected due to low existing volumes (650 vehicles per day). This route mainly serves traffic coming from Stuart Highway.	
Stuart Highway (east of Stuart Highway/ Olympic Dam Highway intersection)	A small increase of 14.7% in traffic volumes is projected, driven by heavy vehicles for the mine operation. The existing road has moderate baseline volumes (950 vehicles per day).	
Stuart Highway (west of Stuart Highway/ Olympic Dam Highway intersection)	A minor increase in traffic (6.8%) is projected for this section. Existing volumes are low (440 vehicles per day), and the impact from project traffic is expected to be negligible.	
Stuart Highway (north-west of Port Augusta)	A minor increase in traffic (1.5%) is projected for this section. Existing volumes are high (4,700 vehicles per day), and the impact from project traffic is expected to be negligible.	
Augusta Highway (south-east of Port Augusta)	A minor increase in traffic (0.4%) is projected for this section. Existing volumes are very high (16,100 vehicles per day), and the impact from project traffic is expected to be negligible.	

These findings highlight the differing traffic impacts predicted on each route during the construction and operational phases of the SRE Project, with Olympic Dam Highway (south of Roxby Downs) and Olympic Dam Way experiencing the largest percentage increases due to their low baseline volumes which also reflects BHP's transition from rail to heavy vehicle at the Pimba intermodal by Stage 2 of the SRE Project. However, the estimated traffic increase in Olympic Dam Way would comprise only light vehicles associated with the SRE Project Stage 1a, Stage 1b and Stage 2 operation phases.

On the basis of the above, the overall impact significance of traffic-related impacts has been assessed as Level 2 (not significant).

10.4.4.3 Railway level crossing impacts

On the basis of the assessment of effects presented in Section 9.9.3.6, the increase in queue length between the baseline and worst-case scenario is 14.8 m at Pimba and 15.6 m at Kootaberra, which is considered negligible given the ample road space available for vehicle queuing and on this basis, the impact significance has been rated as Level 1 (not significant).

10.4.4.4 Parking provision

All workers parking during construction and operation would be accommodated within designated parking areas. Hence, there should be no new or minimal impact to the public roads.

On the basis of the above, the impact significance has been rated as Level 1 (not significant).

10.4.5 Traffic (safety)

10.4.5.1 Austroads turn warrant assessment

Intersection operations were assessed from a combination of the peak hourly through and turning traffic movements that occur at each intersection. This determined the need for additional intersection turning lanes (e.g. basic, auxiliary lane and channelised) in accordance with the current intersection design standards (Austroads 2023).

The warrant for turn treatments was assessed using the 2039 baseline + operation (SRE Project Stage 1a, Stage 1b and Stage 2) traffic volumes, representing the worst-case scenario.

The assessment of Austroads turn warrant concluded that the only turn made by the additional operation traffic is the intersection located at north of Roxby Downs township, and that the existing intersection would not require any further upgrade. The southern intersection has no projected additional turn movement, hence turn treatment warrant assessment was not required.

The turn warrant assessment adopted a design speed of 110 km/hr (based on a posted speed limit of 100 km/hr) and assessed heavy vehicles coming from the north on Olympic Dam Highway to determine whether left turn treatment was required. The existing intersection adopts a channelised left-turn treatment with a high entry angle which meets the minimum requirement.

The assessment of Austroads turn warrant concluded that the existing intersection does not require any further upgrade. Similarly, the Olympic Dam Highway, Stuart Highway and Augusta Highway are fully upgraded to accommodate for high truck volumes and meet the Austroads design standards for rural roads.

On the basis of the above, the impact significance has been rated as Level 2 (not significant).

10.4.5.2 Road safety sight distance assessment

The SISD was assessed for each intersection (Section 9.9.3.6), indicating that the sight distances on both sides of all intersections assessed meet the minimum SISD requirements. On this basis, the impact significance has been rated Level 2 (not significant).

10.4.5.3 Impact on public transport, school buses, cyclists and pedestrians

The SRE Project would be unlikely to have any significant impact on the public transport, cyclists and pedestrians. Due to the remote location of the SRE Project, there is no notable presence of pedestrians or cyclists. The heavy vehicles passing regional townships would adopt an appropriate care and control, which would be covered in drivers' code of conduct.

On the basis of the above, the impact significance has been rated as Level 2 (not significant).

10.4.5.4 Swept path assessment

As Olympic Dam Highway, Stuart Highway and Augusta Highway are arterial roads and major freight routes servicing the Olympic Dam mine site, the existing intersections have generally large geometry, designed to accommodate longer vehicles. The mine currently utilises 53.4 m long BAB-Quad trucks to transport materials which would continue to occur in the future. Based on this, no specific swept path assessment is necessary.

On the basis of the above, the impact significance has been rated as Level 1 (not significant).

10.4.5.5 OSOM

OSOM deliveries for the SRE Project would be undertaken by heavy vehicles that are within the Heavy Vehicle National Law and associated regulations (i.e. up to 25 m long, 3.5 m wide and 5 m high). These OSOM vehicles can travel independently (i.e. no pilot or police escort vehicle(s)) with OSOM signs at the front and back of the vehicle under Heavy Vehicle National Law and associated regulations.

OSOM deliveries greater than 25 m long, 3.5 m wide and 5 m high would require escort (e.g. pilot load, police escort load, Table 9.40) for the road safety reasons and would be subject to separate OSOM assessment and secondary permitting from DIT and the NHVR. It is expected that OSOM drivers would take due diligence care with safety features embedded into the heavy vehicles e.g. flashing lights, flags/lights at the side for the vehicles to alert oncoming motorists of their dimensions and presence.

On the basis of the above, the impact significance for OSOM vehicles has been rated as Level 2 (not significant).

10.4.5.6 Transportation of dangerous goods

For any transportation of dangerous goods, necessary approval would be sought from the SafeWork SA and NHVR (i.e. secondary permits, approvals and licences). The *Dangerous Substances Act 1979* (SA) and Dangerous Substances (Dangerous Goods Transport) Regulations 2023 (SA) require that all heavy vehicles intended to transport dangerous goods must meet the requirements set out in the Australian Code for the Transport of Dangerous Goods by Road and Rail (NTC 2018).

Operators must obtain a Performance Based Standards (PBS) vehicle approval from the NHVR, and approval from the Competent Authority, in the jurisdiction they wish to operate for the carriage of

dangerous goods. The PBS vehicle approval describes the requirements for PBS-approved tankers carrying dangerous goods.

On the basis of the above, the impact significance has been rated Level 2 (not significant).

10.4.5.7 Incidence of road accidents

Materials and equipment required for the SRE Project would be transported via heavy vehicles, with the primary route being Olympic Dam Highway. Heavy vehicles would not utilise Olympic Dam Way, thereby bypassing the township of Roxby Downs. Additionally, workers would be transported to and from the SRE Project to Olympic Dam Airport and Roxby Downs via buses, which would increase vehicle movements on Olympic Dam Highway and Olympic Dam Way.

However, given the existing intersection design and performance, crash history, and the minor increase in traffic volumes generated by the SRE Project, the probability of vehicle-vehicle incidents on Olympic Dam Highway and Olympic Dam Way would be low. As such, the impact significance has been rated Level 2 (not significant).

10.4.6 Visual amenity

10.4.6.1 Impact of lighting on visual amenity

Additional night lighting for the SRE Project in the immediate vicinity of the existing Olympic Dam mine would cause no significant loss of visual amenity within the visual study area, assuming the adoption of Australian Standard (AS 4282) for lighting that requires shielding the lights and minimising light spill directly from light sources.

While a number of lights may be visible immediately around the surface infrastructure, most of the visible lighting is expected to be reflected off surfaces (walls, structures and ground).

On this basis, the impact significance has been rated no higher than Level 1 (not significant).

10.4.6.2 Impact of surface infrastructure on visual amenity and landscape character

The Olympic Dam mine has a landscape with a high VAC rating given its established mining industrial setting within the SML that is considered capable of absorbing a higher degree of modification/addition, as proposed by the SRE Project, without significantly changing the landscape character. The contained footprint of new infrastructure and the similar scale of the SRE Project to existing development further minimises possible changes to landscape character.

The visibility analysis for the SRE Project relied on the ZVI which was limited to a relatively small radius. This equates to approximately 8 km distance from the SRE Project infrastructure. The photomontages support the ZVI by illustrating that the SRE Project elements are predicted to be visible only from a short distance away from the SRE Project and not impact visual amenity.

The SRE Project elements would not be visible from any sensitive receptors beyond local roads and the ODV. No SRE Project elements would be visible from Roxby Downs township or surrounding pastoral stations. This is primarily due to the distance and topography between the receptors and the SRE Project.

On this basis, the impact significance has been rated no higher than Level 2 (not significant).

10.4.7 Access to emergency services (community values)

The SRE Project would require a peak construction workforce of 1,829 workers and a peak operational workforce of 784 workers, with the presence of a large workforce in a remote setting potentially increasing demand for emergency services due to the heightened risk of traffic and workplace accidents at the SML Area, ODV, ODS, and along Olympic Dam Highway or Olympic Dam Way. While on-site first aid facilities would provide immediate medical response, the significant increase in non-resident workers has the potential to place additional demand on public emergency services. As such, the impact significance has been rated Level 3 (significant).

10.4.8 Impact on community cohesion

The SRE Project would increase the number of non-resident FIFO workers in the region, potentially exacerbating existing negative community sentiment towards FIFO workforce expansion. Concerns over community disengagement, reduced local investment, and declining population stability have historically been raised, and the SRE Project may intensify these perceptions.

This could lead to a significant impact on Roxby Downs, potentially prompting some community members to leave the area, further weakening local cohesion and economic sustainability. Notwithstanding this, community perceptions are inherently subjective and may evolve over time. Further engagement with the local community will be essential to better understand concerns and gauge the extent of potential impacts. As such, the impact significance has been rated Level 3 (significant).

10.4.9 Crime rates and anti-social behaviour

The SRE Project would increase the number of non-resident FIFO workers in the region, contributing to existing community concerns that a higher FIFO presence may correlate with increased crime and antisocial behaviour. This perception could negatively impact residents' sense of safety and overall enjoyment of living in Roxby Downs. However, this impact is not expected to be significant due to existing measures such as workforce screening and security protocols. As such, the impact significance has been rated Level 1 (not significant).

10.4.10 Economic prosperity of local communities

The SRE Project is estimated to deliver a net incremental economic benefit to the South Australia community of approximately $342 million in NPV terms (FY26 AUD$) over the period of FY27 to FY76, or a BCR of 18.4. Including a potential economic benefit to suppliers, the net benefit could reach up to $763 million in present value terms attributed to the Project (Appendix D3 Economic Assessment).

One of the primary effects of the SRE Project on the locality is generating employment. Overall, the Economic Assessment (Appendix D3) estimated additional wages to workers to total an incremental benefit to South Australia of $147 million in present value terms (or $771 million in undiscounted terms). Employment is expected to peak during the construction period, where the SRE Project is expected to generate up to 1,313 FTE positions in Stage 1a. Further, the SRE Project Stage 2 operational workforce will support 508 additional FTEs (Appendix D3 Economic Assessment).

Locally, 10% of operations positions are expected to reside in Roxby Downs. Further to this, it has been estimated that 96% of direct employment will be supplied by South Australia, with 22% of total direct employment supplied by the local region.

As a result, the total economic benefit to workers is estimated to be driven by BHP's internal operational workforce. This is due to the high-skill requirements needed to operate the smelter and refinery. The economic benefit to South Australian workers is estimated to be $147 million in present value terms (or $771 million in undiscounted terms). This is in addition to an estimated economic benefit to South Australian suppliers of $421 million in present value terms above the base case (or $1,174 million in undiscounted terms).

Within the local region, the wage premiums paid to workers during the SRE Project are estimated to generate a total increase in net income of $1 million per year (equivalent to 8 new FTEs) over the construction phase and $4 million per year (equivalent of 38 new FTEs) over the operations phase.

An overall benefit to local communities is expected. On this basis, the impact significance has been rated Level 1 (not significant), as there will be no measurable adverse impact on local communities or business.

10.4.11 Controls and management strategies

The proposed management and mitigation strategies to reduce the significance of impacts to the local community are presented in Table 10.8.

Table 10.8 | Indicative local community-related mitigation and management strategies

Type of strategy	Description of mitigation and management strategies
Noise (health and amenity)	
Surface infrastructure and traffic noise	Impacts are to be mitigated in accordance with the standard operating procedures and designs to minimise the impact from noise as far as reasonably practicable
Air quality (health and amenity)	
Dust	BAU pollution control on stacks and future stacks. Controls as described in Appendix C3 Air Quality Impact Assessment
Dust, off-gas and fugitive gas emissions	Control of fugitive emission releases from concentrate handling and storage through the use of covers, wind breaks, enclosures and dust extraction to baghouse
Radiation (health and amenity)	
Radiation (design controls)	All tanks containing radioactive process slurries to be bunded to collect and contain spillages and for ease of clean up
	Provision of hose down facilities and sumps, access ways and sufficient room for equipment (such as bobcats) for clean-up of material spillages
	Secure compounds, appropriate ventilation, use of dedicated extraction systems in appropriate areas
	Consideration of control of process stream recirculation, to ensure that recirculating loads do not act to concentrate radionuclides
	Management of stormwater to ensure adequate containment of all run-off water
	Tailings pipeline corridor bunded to control spillage in the event of pipeline failures
Radiation (administrative controls)	Specific procedures to segregate, isolate and clean contamination or contaminated equipment
	Defined restricted access areas
	Specific procedures for equipment or materials leaving work areas of the SRE Project
	Radiation instruction and education for all workers associated with the SRE Project, including standards for the prevention of contamination release from the project, and monitoring to determine the effectiveness of control and for dose equipment
Radiation (monitoring)	Olympic Dam environmental and occupational radiation monitoring program to be amended to included SRE Project, if required
Waste management	Waste generated during construction would be managed as follows: • where practicable, demolition materials would be removed from site and recycled • materials not suitable for removal from site would be managed on the SML via existing waste management facilities
Traffic (safety and community values)	
Prior to construction	Undertake a pre-condition visual pavement assessment of Olympic Dam Highway and Olympic Dam Way prior to the commencement of construction and operational haulage activities associated with the SRE Project. The purpose of this assessment is to establish the existing pavement condition along these portions of the haulage route and provide a baseline for monitoring any changes during the construction and operational phases of the SRE Project
Construction traffic	Implement a Construction Transport Management Plan (CTMP) prior to commencement of construction, in consultation with the relevant authorities and the nominated construction contractor, to ensure the safety of all workers and road users within the vicinity of the SRE Project. The CTMP would cover all OSOM deliveries that are able to travel independently (i.e. up to 25 m long, 3.5 m wide and 5 m high). The objective of the CTMP would be to: • minimise the impact of the construction vehicle traffic on the local and regional road network and with other road users (e.g. school bus operators) • ensure continuous, safe and efficient movement of traffic for both the general public and construction workers • install appropriate advance warning signs to inform users of the changed traffic conditions • provide information regarding the changed access arrangements and a description of the proposed external routes for vehicles, including the construction vehicles accessing the site.
	Notify public of changes to traffic conditions due to SRE Project transport and logistics
	Consultation Plan for the construction activities – BHP consultation plan to address traffic and transport with associated complaint management system to enable active and positive community consultation with local residents on the SRE Project
	OSOM deliveries greater than 25 m long, 3.5 m wide and 5 m high would require escort (e.g. pilot load, police escort load) for road safety reasons and would be subject to separate OSOM assessment and secondary permitting from DIT and the NHVR. It is expected that OSOM drivers would take due care with safety features embedded into the heavy vehicles (e.g. flashing lights, flags/lights at the side for the vehicles to alert oncoming motorists of their dimensions and presence).
Operational traffic	Implement an Operational Traffic Management Plan (OTMP) in consultation with the relevant road authorities which should include a Driver's Code of Conduct to outline all relevant site and locality road safety and traffic management measures including: • operation site access, primary and material delivery transport routes • compliance with all road rules and regulations • driver behaviour near Olympic Dam township and regional settlements • courtesy to other road users • fatigue management • checking vehicles and covering loads

Type of strategy	Description of mitigation and management strategies
	• hazards of driving in varying weather conditions including fog and sun glare • the appropriate use of compression braking • safety procedures for accidents and breakdowns.
Visual amenity	
Siting project elements	No design and control measures, with the exception of lighting for project elements, are considered relevant to the assessment of effects for visual amenity.
Lighting	Adoption of good lighting design to minimise light pollution of the night sky. Design standards, such as Australian Standard 4282 Control of obtrusive effects of outdoor lighting, National Light Pollution Guidelines for Wildlife (DCCEEW 2023), and the Dark Sky Planning Guideline (DPE 2023) should be applied during the design of SRE Project elements. Design considerations adapted from these guidelines may include: • eliminating upward spill light • directing light downwards, not upwards • use of shielded fittings • avoiding over lighting • switching lights off when not required • use of energy efficient bulbs • use of asymmetric beams, where floodlights are used • ensuring lights are not directed towards reflective surfaces • use of warm white colours.
Social	
Access to essential services	Olympic Dam mine to continue provision of first aid facility and if necessary, utilise BHP employed paramedics based at the site.
	BHP to collaborate with local emergency services providers (including police, ambulance and Royal Flying Doctor Service (RFDS)) on SRE Project activities and update to the Emergency Response Plan where relevant.
	Continued implementation of a community grievance mechanism for the public to raise grievances and receive an appropriate response.
Community cohesion	Partners and community engagement and complaint management via existing and project specific processes, including continued implementation of a community grievance mechanism for the public to raise grievances and receive an appropriate response.
	Continued implementation of BHP Social Investment initiatives (e.g. in Roxby Downs).
	SRE Project workforce to abide by worker code of conduct.
	Quarterly BHP/Community – Community connect activity.
	Introduction of Roxby Downs Township group.
	SRE Project construction roster to be day-shift only with plans for half day Saturday to enable better workforce/community cohesion and participation in recreational activities.
Economic	
Environmental strategies	Implementation of noise, air quality, radiation, traffic, visual amenity and social mitigation strategies outlined above are expected to contribute to the reduction of long-term environmental impacts.

10.4.12 Description of uncertainty and sensitivity

An understanding of the level of uncertainty was determined for the pathway (effects) and impact assessment in accordance with the process described in Section 8.2.6 and the EIAF (Appendix E1). Details of the uncertainties associated with local community impacts are presented in the applicable technical appendices (listed in Section 10.4) and are summarised in Table 10.2.

Table 10.9 | Description of uncertainties and sensitivities – local community

Pathway and/or Impact	Uncertainty and sensitivity description	Uncertainty	Sensitivity
Noise and vibration	Low – Assumptions made in surface infrastructure noise modelling are highly conservative. Measured noise levels are significantly lower than predicted baseline noise levels, confirming that the noise model is conservative. Medium – Traffic volumes have been based on preliminary modelling and have not been confirmed at this stage.	Low to moderate	Low
Air quality	The potential changes to the baseline environment are well-understood. The atmospheric dispersion model used in the assessment is widely used and has been extensively tested and validated. The predicted SRE Project concentrations of air pollutants are well below the corresponding impact assessment criteria at all surrounding sensitive receptor locations. Emissions from future SRE Project sources are derived from monitoring data collected at comparable existing sources at the site. However, there remains uncertainty regarding the contribution of emissions from bypass stacks. While infrequent, have been excluded from the modelling undertaken.	Low to moderate	Low
Radiation	Baseline and existing operational monitoring results verify previous modelling outputs which provides a high degree of confidence on impact assessment. Ongoing monitoring to confirm assessment conclusions.	Low	Low
Traffic (community values and safety)	Construction traffic for the SRE Project would comprise of materials and equipment deliveries, as well as workforce traffic. However, workforce traffic is confined to travel between the accommodation villages and the SRE Project. The exact number and origin of vehicle traffic cannot be known with certainty, but is unlikely to affect the assessed significance. Appendix C7 Traffic Impact Assessment has determined that the SRE Project will generate negligible changes to existing traffic patterns on Olympic Dam Highway and Olympic Dam Way. These negligible changes are unlikely to generate a tangible social impact. The Traffic Impact Assessment has been undertaken for the worst-case construction and operational scenarios for the SRE Project.	Low	Low

Pathway and/or Impact	Uncertainty and sensitivity description	Uncertainty	Sensitivity
Visual Amenity	The Olympic Dam mine has a landscape with a high VAC rating given its established mining industrial setting within the SML that is considered capable of absorbing a higher degree of modification/addition, as proposed by the SRE Project, without significant impact on visual amenity or landscape character.	Low	Low
Social infrastructure and utilities	No consultation has been undertaken with relevant social infrastructure and utilities providers at this time, however engagement will be undertaken during EIS public exhibition to enhance understanding and verify significance of impact.	Moderate	Moderate
Community values, health and wellbeing	Community perceptions are inherently subjective and may evolve over time. Further engagement with the local community as part of the EIS public exhibition will be essential to further understand concerns, gauge the extent of potential impacts, and identify opportunities for mitigation.	Moderate	Moderate
Economic	The results of the CBA are subject to assumptions that are applied to each cost and benefit. As the largest quantified benefit in the central case, labour surplus benefits for South Australian workers have a notable effect on the estimated net benefits. Downside sensitivities were tested for this parameter, as the estimate assumes that BHP pays a wage premium above prevailing market rates. While this is estimated to be the case currently, the extent of this premium may reduce over time as the SRE Project progresses and labour market conditions evolve.	Moderate	High

10.4.13 Summary of impact significance

Following the assessment of impact significance of the confirmed impact events, it was determined that:

- Four local community-related impacts were significance Level 3 (SE9, SE10, SE21 and SE22). These related to impacts to social values from increased potential for road and workplace accidents and potential impacts to community cohesion from an increase in the non-resident population.
- Nine local community-related impact events were significance Level 2 (SE3, SE4, SE5, SE6, SE23 and SE24). These related to visual impacts to amenity, traffic impacts to social values and health and safety and impacts to social values from an increase in the non-resident population.
- Twelve local community-related impact events were significance Level 1 (A6, A7, A13, A14, A18, A19, A23, A29, A33, A37, SE15 and SE16). These related to air quality, radiation and noise impacts to amenity and safety associated with air quality emissions, radiation, noise and light, with two events related to economic impacts.

10.5 State and Commonwealth matters

The baseline climate and economic environment were described in Section 5.1.5 and Section 5.6, respectively, with details of the predicted change in environmental (pathway) values presented in Chapter 9. Details of the likely impacts of these changes resulting from the SRE Project to State and Commonwealth matters are described in Appendix D3 Economic Assessment and Appendix C5 Greenhouse Gas Impact Assessment and are summarised in the following sections.

10.5.1 Contribution to climate change effects

10.5.1.1 Unmitigated emissions

The emission calculations presented within Appendix C5 Greenhouse Gas Impact Assessment, summarised in Section 9.5, show that the SRE Project would generate annual Scope 1 and Scope 2 GHG emissions greater than 100,000 t CO_2-e/annum.

Emissions from the construction phase would be relatively short-lived and would constitute a small proportion of total annual GHG emissions from the Olympic Dam site. On this basis, an impact significance of 1 (not significant) has been assigned to construction phase GHG emissions.

The annual average Scope 1 and Scope 2 emissions during the staged development of the SRE Project are estimated to be 178,377 t CO_2-e/year for Stage 1A, 193,486 t CO_2-e/year for Stage 1B and 203,305 t CO_2-e/year for Stage 2. Relative to estimated annual average BAU projected smelter and refinery emissions (251,021 t CO_2-e/year), the SRE Project returns a reduction of approximately 29% for Stage 1A, 23% for Stage 1B and 19% for Stage 2.

As the SRE Project would generate annual Scope 1 and Scope 2 GHG emissions greater than 100,000 t CO_2-e/annum, an impact significance of 5 (significant) has been assigned to operations phase GHG emissions.

10.5.1.2 Pathway to net zero emissions

As required by Assessment Requirement CCRE2, GHG emissions were estimated with abatement measures in place to assess the implications of proposed measures (the P2NZ scenario). The P2NZ scenario identified the following in-built engineering improvements for the SRE Project that have the benefit of reducing energy consumption and associated Scope 1 GHG emissions relative to existing smelter operations:

- oxygen enrichment for the FSF, leading to a 19% reduction in diesel/fuel oil consumption
- upgrade of the anode furnace oxy-fuel burner, leading to a 54% reduction in LPG consumption
- replacement of the matte mill heating system from LPG heating to steam air heating supplied from process co-generation.

For Scope 2 GHG emissions, the 2025 federal government annual grid emissions factors for South Australia (DCCEEW 2025b) have been applied for FY25 onwards. This projection accounts for the expected decarbonisation of the grid, however the projections only extend to FY40, with the FY40 emission factor extended to FY66.

During detailed design, additional energy reduction opportunities for the SRE Project comprising of the following options will be considered:

- Scope 1:
  - alternative fuels or electrification of fleet and stationary equipment for construction phase emissions
  - bio-LPG replacement in the launder burners, anode furnace and other LPG users
  - bio-diesel replacement in the flash furnaces
  - use of a 50% bio-diesel blend in the mobile fleet
  - either electrification, bio-LPG or thermal energy storage system for the auxiliary boiler (options to be evaluated)
  - carbon offsets: used only to neutralise residual emissions.
- Scope 2:
  - fully abated in accordance with the BHP Renewable Energy Plan.

The viability and timing of the above P2NZ mitigation strategy options are currently under consideration by BHP and will by shaped by factors such as biofuel availability, feasibility for implementation by site, economic feasibility and sufficient power purchase agreement to supply renewable energy to the Olympic Dam mine. Accordingly, as the readiness, commercial availability and commercial viability of technology suitable for safe and reliable operation in BHP's mining environments evolves, BHP will continue to assess options, explore partnerships and refine these potential GHG emission reduction opportunities.

It is clear from the above calculations that the implementation of the P2NZ Roadmap measures could assist BHP with meeting net zero emission commitments and Safeguard Mechanism emission reduction obligations.

10.5.2 Economic impacts to the State and Commonwealth

Specific to the South Australian economy, Appendix D3 Economic Assessment has estimated the following impacts in NPV terms (FY26 AUD$):

- a net benefit of approximately $342 million and an increase in royalties to the Government of South Australia of $29 million, reflecting higher-value output from existing mining activities and improved recovery through the expanded smelter and refinery
- an increase in company income tax attributable to South Australia of $119 million, reflecting higher forecast producer surplus generated by the Project
- an expected economic benefit to South Australian workers of $147 million, associated with wage premiums paid by Olympic Dam smelter and refinery operations relative to alternative employment opportunities.

At the national level, the SRE Project is projected to deliver a net benefit to Australia of $3.195 billion (NPV), comprising $963 million in producer surplus, $1.73 billion in company income tax, $154 million in labour surplus, and $29 million in royalties, partially offset by $200 million in externality costs.

Overall, the assessment concludes that the SRE Project will deliver an overall benefit to both the South Australian and Australian economies. On this basis, the impact significance has been rated Level 1 (not significant), as there will be no measurable adverse impact on local communities or business.

10.5.3 Controls and management strategies

The proposed indicative management and mitigation strategies to reduce the significance of impacts to State and Commonwealth matters are presented in Table 10.10.

Table 10.10 | Indicative State and Commonwealth matter-related mitigation and management strategies

Type of strategy	Description of mitigation and management strategies
Greenhouse gas	
Construction and operation	The following management practices are recommended to minimise emissions from the combustion of diesel from construction fleet: • minimise material haulage distances as far as practicable to reduce diesel consumption • routinely maintain haul roads to reduce truck tyre rolling resistance • review construction practices to minimise double handling of materials • consider the use of alternative fuels (e.g. low-sulphur fuel) where economically and practically feasible • minimise the idling of diesel equipment wherever feasible • routinely service all equipment to maintain manufacturers' emission specifications to ensure that operational efficiency • perform pre-start inspections at each shift on mobile plant and vehicles • track fuel usage.

10.5.4 Description of uncertainty and sensitivity

An understanding of the level of uncertainty was determined for the pathway (effects) and impact assessment in accordance with the process described in Section 8.2.6 and the EIAF (Appendix E1). Details of the uncertainties associated with local community impacts are presented in Appendix D3 Economic Assessment and Appendix C5 Greenhouse Gas Impact Assessment, and are summarised in Table 10.11.

Table 10.11 | Description of uncertainties and sensitivities – State and Commonwealth matters

Pathway and/or Impact	Uncertainty and sensitivity description	Uncertainty	Sensitivity
GHG	The estimation of GHG emissions relies on emission factors and assumptions regarding the future decarbonisation of the electricity grid, and as such are subject to a moderate to high uncertainty. The sensitivity of impact significance to this uncertainty is low, and changes to the emission factors or decarbonisation pathway are unlikely to materially alter the assessment outcomes.	Moderate to high	Low

Pathway and/or Impact	Uncertainty and sensitivity description	Uncertainty	Sensitivity
Economic	The results of the CBA are subject to assumptions that are applied to each cost and benefit. Sensitivity analysis shows that results are very sensitive to changes in revenue streams. In particular, changes in commodity prices have the largest impact on the net benefits to South Australia. Similarly, changes in treatment and refinery charges also materially impact the results. These charges reflect the incremental revenue generated from processing copper concentrate and are based on international benchmark prices. Combining all sensitivities into best-case and worst-case scenarios, the NPV of the Project Case can increase or decrease by over $1 billion, subject to differences in key inputs including commodity prices, BHP wage premiums, input costs, and treatment and refinery charges.	Moderate	High

10.5.5 Summary of impact significance

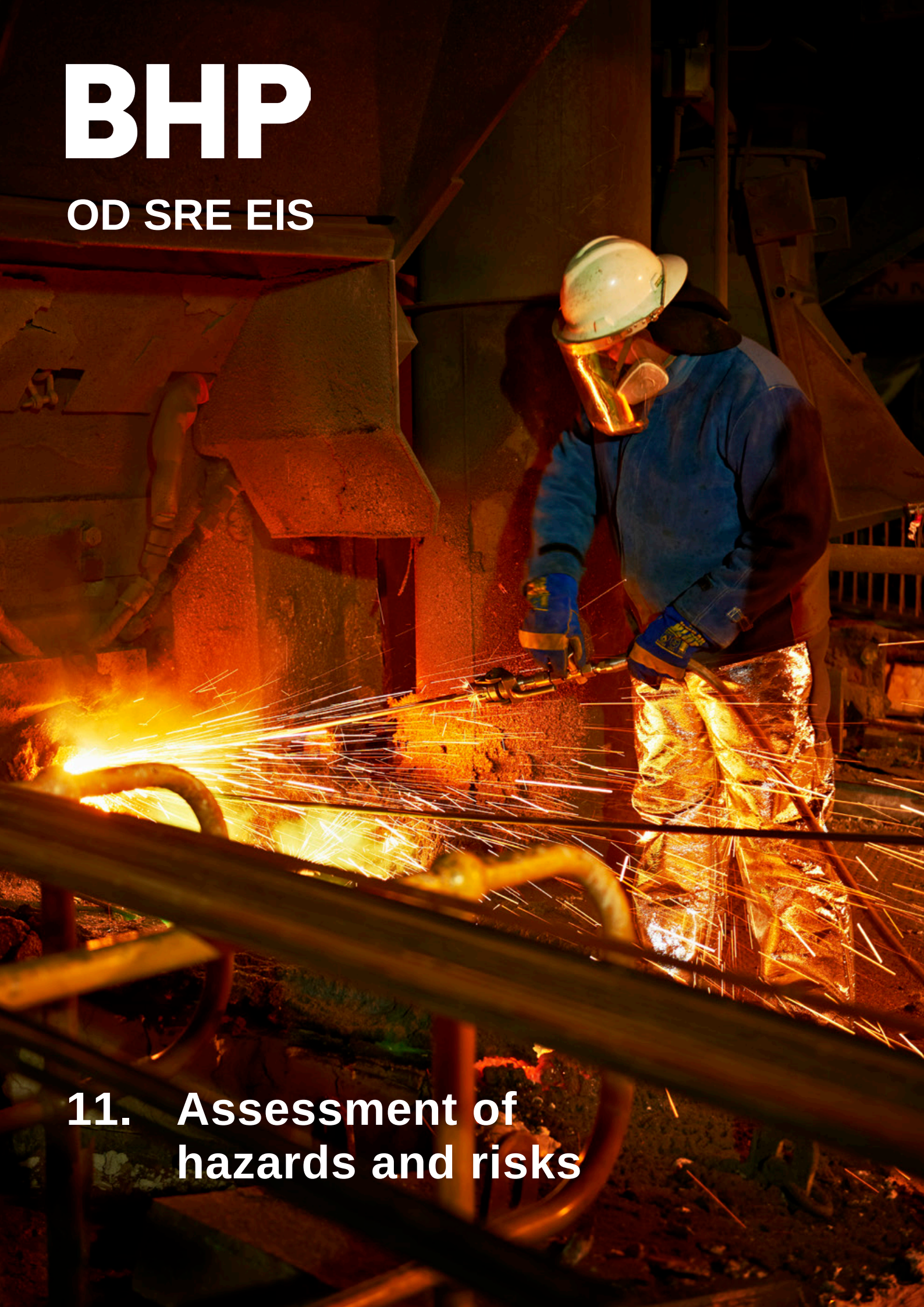
Following completion of the assessment of effects investigation, it was determined that there was a total of three confirmed impact events.

These events were assessed to quantify the likely significance of the impact against BHP's EIAF impact significance criteria:

- one event, the contribution of SRE Project operations to Scope 1 and Scope 2 GHG emissions during operations (A2), has been assessed significance Level 5 (significant)
- two Economic impacts to the State (SE17, SE18) have been assessed with a significance Level 1 (not significant).

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11. Assessment of hazards and risks

11. ASSESSMENT OF HAZARDS AND RISKS

This chapter provides an overview of environmental and social hazard and risk management for the SRE Project. It identifies and evaluates a range of potential and perceived hazards in accordance with BHP's Risk Management Global Standard and associated Risk Framework, noting that this framework provider a more stringent approach to risk that the concepts of 'so far as is reasonably practicable' (SFAIRP) and 'as low as reasonably practicable' (ALARP) that form the basis for health and safety legislation in South Australia.

11.1 Assessment Requirements

The Assessment Requirements (Appendix A2) require description of SRE Project elements and controls that are fundamental to the assessment of hazard and risk as well as evaluation of a range of risks. The Assessment Requirements relevant to the assessment of hazard and risk are identified in Table 11.1. This assessment of hazards and risks is also based on the description of the SRE Project provided in Chapter 6.

Table 11.1 | Assessment Requirements related to hazard and risk

Reference	Objective	Method of investigation
AA1	To ensure the selection of the site and concept design considered mitigation of impacts and risks to the surrounding environment.	• Describe location and design options considered, reasons for selection and how the proposed location and/or design avoids and/or mitigates potential impacts and risks to the surrounding environment. Outline and justify any trade-offs in the design or operation of the development.
CCRE1	**Climate change adaption** To ensure that development and design are climate resilient and risks from climate change are reduced.	• Undertake a climate risk assessment of the relevant potential impacts on the development of projected climate change over the lifetime of the development (e.g. increasing temperatures, extreme heat and heat waves, decline in rainfall, increased drought, extreme rainfall events, harsher fire weather, and sea level rise) and the risk of environmental harm being caused from the development. Include proposed adaptive management strategies. • For developments with a lifetime to 2050 or before, the risk assessment should be based on climate projections from the representative concentration pathway (RCP)8.5 scenario (high greenhouse gas emissions scenario). For developments with a lifetime beyond 2050, the risk assessment should be based on climate projections under both the RCP8.5 and RCP4.5 scenario (moderate greenhouse gas emissions scenario).
CCRE4	**Waste management** To ensure that waste generated, transported or received as part of the development is managed in accordance with the waste hierarchy and in a manner that protects all environmental values. Further, in manner that promotes the objectives of the EP Act, the Environment Protection (Waste to Resources) Policy 2010 and the principles of the circular economy.	• Describe the quantity, and physical and chemical characteristics of all waste types expected to be generated during construction and operation, including each hazardous waste, any attributes that may affect its dispersal in the environment, and its associated risk of causing environmental harm. • Include details of design and management measures that will be used to minimise the risk of leakages/spills and prevent site contamination.
HR1	**Hazard assessment and risk management** To ensure the risk of, and adverse impacts from natural and man-made hazards from the development are avoided, minimised or mitigated to protect people, property and the environment.	• Describe the application of the MHF provisions of the Work Health and Safety Regulations 2012 to the development. • Undertake a quantitative risk assessment of the MHF to identify the construction and operational hazards associated with the facility, determine the potential frequencies and consequences of the identified hazards, determine the systems availability of the protection systems and quantify the risks associated with a facility. The assessment should: o Address the risks and hazards associated with all components of, and activities associated with, the proposed development. The plan should address public and workplace safety, emergency response strategies and identify third party restricted and exclusion zones. o Address fire risk at and to/from the site, resources and training required, sources of water to fight fires, and how this water will be accessed, and options to utilise and coordinate with other operations in the region/area, and cost recovery.
HR1	**Hazard assessment and risk management** To ensure the risk of, and adverse impacts from natural and man-made hazards from the development are avoided, minimised or mitigated to protect people, property and the environment.	Specifically related to radiation: • Describe and assess the radiation exposure pathways to workers, the public, biota and the environment from relevant components of the development during ongoing operations. • Describe the measures to control and minimise radiation exposures to workers, the public, biota and the environment from relevant components of the development during construction and ongoing operations. • Outline how the radiation exposure pathways to workers, the public, biota and the environment from relevant components of the development would be monitored during construction and operation. • Describe existing radiological characteristics of the environment (original baselines and current conditions) that could be impacted by construction or operation of the development (e.g. air quality, soils, surface and groundwater etc).
HR2	**Flooding** To ensure the risk of, and adverse impacts from natural and man-made hazards from the development are avoided, minimised or mitigated to protect people, property and the environment.	• Identify the potential impacts on people, property, infrastructure and the environment from potential flood risk (where relevant). • Provide evidence to demonstrate that the securing of storage containers of hazardous contaminants during flood events meets relevant requirements of the EP Act.
HR3	**Site and groundwater contamination** To ensure the risk of, and adverse impacts from natural and man-made hazards from the development are avoided, minimised or mitigated to protect people, property and the environment.	• Describe the historical land use and potential for contamination of soils and sediments and describe any known or suspected soil contamination that could be re-suspended, released or otherwise disturbed as a result of the development.
HR4	**Dangerous substances (excluding nuclear)** To ensure the risk of, and adverse impacts from natural and man-made hazards from the development are avoided, minimised or mitigated to protect people, property and the environment.	• Identify all dangerous and hazardous substances to be used, transported, stored, processed or produced, and the rate of usage. • Describe the use, handling and disposal of these materials during construction and operation, with reference to storage, including any associated fire protection facilities. • Describe how hazardous contaminants and waste substances produced by the development will be treated or contained until their disposal at an approved facility. • Evaluate the potential effects of any accidents involving dangerous substances on the environment and public health in the vicinity of the site.

11.2 BHP risk framework

The BHP risk framework is described within the BHP Risk Management Global Standard (BHP 2025d) which outlines the minimum requirements for risk management at BHP assets, including Olympic Dam.

11.2.1 Risk identification

Risk identification is undertaken through considering:

- what can go wrong and what must go right
- internal standards, statements, processes and deliverables
- internal and external sources of risk
- intended and unintended consequences when introducing change.

The identification of risks is undertaken in accordance with BHP's risk architecture which categorises all risks that BHP is exposed to on a top-down, aggregate basis. These risk categories are described in Table 11.2 and have been aligned to the focus areas of BHP's corporate strategy.

11.2.2 Assessing risk

Risks are evaluated and assessed in accordance with the BHP impact and likelihood tables, with consideration to the BHP risk level descriptors to determine the maximum foreseeable impact (Table 11.3), the likelihood of the risk occurring (Table 11.4) and the resultant residual risk rating (Table 11.5)

Table 11.2 | BHP risk architecture

Risk category	Risk subcategory	Risk category	Risk subcategory
Strategy	**Portfolio and commodities strategy** Risks associated with the design and implementation of the corporate strategy, as they relate to choice of strategy and commodities	Sustainability	**Environment** Risks to biodiversity generated by BHP's operational activities including closure rehabilitation – excluding water catchments
	Transactions and business development Risks associated with mergers, acquisition and divestment of assets, resources or other businesses		**Climate change** Risks arising from climate change, both physical risks (acute and chronic) and transition risks (from transitioning to a low carbon economy)
Resource and asset development	**Tailings storage** Risks to the structural integrity of BHP's tailings and designated water storage facilities	Health, safety and security	**Aviation** Risks associated with commissioned and internally provided air travel for BHP employees and BHP's usage of remotely piloted aircraft systems
	Resource development Risks related to appropriate selection of mining methodologies		**Physical security and business resilience** Risks to the security of BHP assets and personnel posed by emergency events, including natural disasters
	Exploration Risks related to the identification and estimation of appropriate greenfield opportunities		**Mental and physical health** Risks posed to the mental or physical health of BHP personnel
	Operational water management Risks associated with terrestrial water and water-related risks within BHP assets and the catchments in which we operate and hold trailing liabilities		**Fire and explosion** Risks associated with flammable/combustible materials excluding process safety and explosives
	Asset integrity Risks to the operational integrity and performance of fixed plant infrastructure		**Dropped and failing objects and persons** Risks arising from personnel or equipment exposure to gravitational energy
	Geotechnical stability Risks related to the integrity of structures including pit walls, underground excavations and interactions with civil facilities/natural systems – excluding tailings dams		**Machinery energy** Risks associated with the entanglement or crushing of personnel in rotating equipment
	Closure Asset value loss from failure to manage closure liabilities throughout the entire lifecycle of the asset		**Electrical and arc flash** Risks associated with direct or indirect contact with electrical energy
	Asset expansion and projects Risks associated with the execution of asset expansions and other major projects within assets		**Stored energy release** Risk associated with release of stored energy including hydraulic, pneumatic and mechanical – excluding gravitational and electrical
	Process safety and hazardous materials containment Risks related to the containment of hazardous materials involving flammable, explosive, toxic, corrosive or molten materials or other materials at high pressure or temperature		**Vehicle interaction** Risks associated with the interaction of vehicles with other vehicles, pedestrians and the environment
			Other fatal Fatal risks to personnel not captured by other risk architecture elements
Production and operations	**Operational productivity** Risks to the operation and maintenance performance of BHP assets which have an impact on production, volume and cost	People and culture	**Employee and labour relations** Risks associated with interactions between BHP, its workforce, the industrial relations system and workforce representative bodies
	Joint venture performance Risk associated with the performance of our joint ventures and joint venture partners		**End-to-end payroll** Risks associated with BHP's ability to meet its global legal, regulatory and contractual obligations relating to pay, benefits and other employee entitlements
	Strategic partnerships Risks associated with new types of ventures and new partners outside formal joint ventures		**Skills and capabilities** Risks posed to the acquisition and sustainment of employee talent and the capabilities they require to operate and transform BHP
	Rail and port Risks associated with movement and management of materials via rail and within our ports		**Diversity, inclusion and equal opportunity** Risks posed to the organisational culture including diversity and inclusion goals and mandate

Risk category	Risk subcategory
Commercial	**Procurement and inbound supply** Risks associated with the cost, quality, social value proposition and availability of procured goods and services to our businesses
	Maritime Risks associated with movement and management of materials via sea
	Credit risk Risks associated with the failure of a creditor to pay in full and on time
	Market risk Risks associated with key markets in which BHP operates including currency and commodity markets
	Sales security and concentration Risks associated with the ongoing access to and concentration of customers and commodities
Technology and innovation	**Data** Risks associated with the acquisition, processing and disclosure of data including intellectual property
	Cyber security Risks to online and web-based operations and infrastructure
	Service availability Risks to the continuity of critical technology services
	Artificial intelligence Risks arising from artificial intelligence and its use in automation and digital technology
	Innovation Risks arising from sourcing, developing and embedding innovations from novel physical and digital technology

Risk category	Risk subcategory
Financial management	**Financial control and reporting** Risks to BHP's reporting of financial results and compliance with accounting governance standards
	Tax Risk to the management of taxation law and regulation
	Corporate planning and capital allocation Risks to the identification, evaluation and ranking of investment decisions, cash prioritisation and budgeting
	Balance sheet, liquidity and funding Risks to BHP's ability to raise debt, remain financially liquid and maintain a robust balance sheet
External affairs	**Legal and regulatory** Risks of non-compliance with relevant material legal and regulatory obligations
	Ethics and compliance Risks associated with compliance-related issues, whistle-blower laws and fraud
	Community and Indigenous peoples Risks to the wellbeing and satisfaction of communities, including indigenous relationships
	Human rights Risks associated with BHP's management of human rights
	Government relations and public policy Risks associated with BHP's relationships with governments and related external stakeholders, potential changes in the public policy landscape and public engagement
	Geopolitics Risks posed to BHP by changes in the global geopolitical environment

Table 11.3 | Maximum foreseeable impact

Health and safety	Legal	Sustainability	Reputation	Financial
Impact level 5				
• Six or more fatalities or chronic life-threatening illnesses – where chronic life-threatening illnesses are those occupational illnesses that even with treatment will result in prolonged and serious impact to the quality of life and/or pose a significant risk to reducing the life expectancy.	• Severe impact on Company legal rights or compliance at a global level. • Severe and irremediable breach of legal obligation compromising access to opportunities that impact multiple assets or one or more countries for an extended period.	Significant and lasting impact to environment, climate, community or Indigenous peoples resulting in irreversible damage or fundamental change persisting for multiple decades from acute or cumulative events. This may include long-term or permanent loss of ecosystem function, extinction of species, long-term contamination of land or water resources. Impacts will require extensive and long-term remediation and management and/or compensation measures are likely. This may include six or more community fatalities, six or more instances of permanent loss of physical or mental capacities, permanent disruption in standard of living/livelihood, or loss of customary lands, cultural heritage, or resources of communities or Indigenous peoples.	• Significant and sustained impact on Company reputation at a global level. • A movement in the public or shareholder perception of BHP globally, or in key markets or places of business.	US$4 billion or more cash impact (BHP share) on revenue, operating cost and capital cost or cash equivalent impact (net present value). Impact to be assessed for the full life cycle of a single immediate occurrence of the event.
Impact level 4				
• One to five fatalities or chronic life-threatening illnesses – where chronic life-threatening illnesses are those occupational illnesses that even with treatment will result in prolonged and serious impact to the quality of life and/or pose a significant risk to reducing the life expectancy.	• Serious impact on Company legal rights or compliance at a national level. • Serious breach of legal obligation impacting BHP's access to a jurisdiction, exposure to national reparations/sanction, or materially impacting the operation of one or more assets for a moderate period.	Significant impact to environment, climate, community or Indigenous peoples with widespread affects requiring active remediation and long-term management. While recovery is achievable, it is expected to take up to ten years to return to baseline or acceptable conditions. Impacts may include major degradation of land, prolonged water quality exceedances, or moderate biodiversity loss. Compensation may be required. This may include one to five community fatalities, chronic life-threatening illnesses, direct bodily harm, lasting psychological damage, major change in standard of living/livelihood, or major change in customary lands, cultural heritage, or resources of communities or Indigenous peoples.	• Significant and sustained alteration to Company reputation at a national level. • Direct, targeted and sustained scrutiny resulting in a change in the public or shareholder perception of BHP within one key market or nation.	Between US$850 million and up to US$4 billion cash impact (BHP share) on revenue, operating cost and capital cost or cash equivalent impact (net present value). Assess the impact for the full life cycle of a single immediate occurrence of the event.
Impact level 3				
• Life altering or long-term/permanent disabling injury or illness to one or more persons. • An injury or non-life shortening illness that results in long term disability, full or partial permanent loss of an internal organ or damage to brain or spinal cord.	• Moderate impact on Company legal rights or compliance at a regional level. • Breach of legal obligation leading to moderate fines, penalties, compensation or conditions, or otherwise a moderate impact on the operation of an asset.	Moderate impact to environment, climate, community or Indigenous peoples with degradation extending beyond the immediate site, requiring extensive remediation efforts, and/or exceeds level of disturbance to, or contamination of, the environment authorised by environmental permit. Recovery is anticipated to take between one to five years to restore ecological function, environmental quality or community wellbeing. This may be a life altering or long-term permanent disabling injury or illness, medium-term psychological damage, medium-term change to standard of living/livelihood, or medium-term change in customary lands, cultural heritage, or resources of communities or Indigenous peoples.	• Moderate impact to Company reputation at a state or regional level. • A temporary change in the public perception of BHP within one state or intra-country region of operations.	Between US$125 million and up to US$850 million cash impact (BHP share) on revenue, operating cost and capital cost or cash equivalent impact (net present value). Assess the impact for the full life cycle of a single immediate occurrence of the event.
Impact level 2				
• Non-life altering or short-term disabling injury or illness to one or more persons. • An injury or illness not meeting the definition of life altering; or long-term/permanent disabling; injury or illness; but results in medical treatment, restricted work or lost time. Worker returns to work within 60 days and fully recovered to pre-injury or illness within six months.	• Measurable but limited impact on Company legal rights or compliance. • Breach of legal obligation leading to minor fines, penalties, compensation or conditions, with no material impact for BHP.	Measurable but limited or temporary impact to environment, climate or community or Indigenous peoples with effects limited to the site or immediate surrounding area. While the impact does not pose a long-term threat to the broader environmental systems, recovery is expected to take less than one year through targeted/low-cost remediation or natural regeneration. Minor and non-critical breaches of permit conditions and only very limited impact to environmentally sensitive areas. This could include minimal bodily harm, short-term psychological damage, short-term change to standard of living/livelihood, or short-term change in customary lands, cultural heritage, or resources of communities or Indigenous peoples.	• Measurable but limited impact on Company reputation at a local level. • A short-term change in the public perception of BHP within a small locality.	Between US$5 million and up to US$125 million cash impact (BHP share) on revenue, operating cost and capital cost or cash equivalent impact (net present value). Assess the impact for the full life cycle of a single immediate occurrence of the event.
Impact level 1				
• Low level impact resulting in first aid only.	• Minor or temporary impact on Company legal rights or compliance. • Breach of local law or bylaw with no ongoing sanction, or breach of contract or infringement on legal rights with little or no impact.	Minor, low-level impact to the environment, climate, community or Indigenous peoples, confined to a localised area and managed using routine controls. The impact does not breach regulatory limits. Recovery is straightforward and expected to occur within six months either through natural processes or minor intervention. This would not involve physical or psychological harm but may include an inconvenience to standard of living or livelihood.	• Minor, temporary impact on Company reputation. • A one-off, local protest or media article harmful to BHP's interests.	Less than US$5 million cash impact (BHP share) on revenue, operating cost and capital cost or cash equivalent impact (net present value). Assess the impact for the full life cycle of a single immediate occurrence of the event.

Table 11.4 | Risk likelihood

Likelihood	Frequency	Probability	Likelihood factor
Highly likely	Risk likely to occur within a 1-year period	≥80% chance of the risk occurring	3
Likely	Risk likely to occur within a 1 to 5-year period	60 – 79% chance of the risk occurring	1
Possible	Risk likely to occur within a 5 to 20-year period	30 – 59% chance of the risk occurring	0.3
Unlikely	Risk likely to occur within a 20 to 50-year period	10 – 29% chance of the risk occurring	0.1
Highly unlikely	Risk likely to occur beyond a 50-year period	<10% chance of the risk occurring	0.03

Table 11.5 | Residual risk rating

Likelihood	Impact level				
	1	2	3	4	5
Highly likely (3)	30	90	300	900	3,000
Likely (1)	10	30	100	300	1,000
Possible (0.3)	3	9	30	90	300
Unlikely (0.1)	1	3	10	30	100
Highly unlikely (0.03)	0.3	0.9	3	9	30

11.2.3 Treating risk

For each assessed risk with a maximum foreseeable impact level of greater than or equal to 4 (Table 11.3), it is a BHP requirement to:

- ensure that preventative and mitigating controls (referred to as critical controls) are implemented
- the level of effort applied is commensurate with the level of risk.

A critical control is a preventative or mitigating measure that significantly reduces the likelihood and/or impact of the risk. For each critical control applied, it is necessary to determine:

- the critical aspects of the design and operating performance criteria required to achieve the critical control's primary objective
- the verification activities required to check that the critical control is operating effectively according to its design.

To determine whether the critical control is adequate or deficient, the critical controls are tested via a control effectiveness test that utilises:

- information obtained from verification activities
- any trends related to actual or similar control failures
- verification of contractor compliance with the control
- internal and external audits
- management reviews

If the critical control is deemed deficient, to what level the critical control is deficient is assessed, in accordance with Table 11.6.

Table 11.6 | Control effectiveness test outcomes and issue rating

Ratings	
Critical control rating	
Adequate	The design, operation and verification of the critical control are appropriate, effective and achieve the control objective
Deficient	The design, operation or verification of the critical control is not appropriate, not effective or does not achieve the control objective
Issue rating	
Low	The deficiency is unlikely to compromise the achievement of the control objective
Medium	The deficiency may compromise the achievement of the control objective
High	The deficiency is likely to compromise the achievement of the control objective

11.2.4 Acceptability criteria

Risks are considered acceptable if they meet one of the criteria nominated in Table 11.7. Risks that do not meet these criteria are unacceptable and the activities and or infrastructure must be redeveloped and reassessed prior to progressing.

Table 11.7 | Risk outcome evaluation

Rating	Criteria	Description
Within target	• The residual risk rating for all risk scenarios is <90. • There are no deficient control effectiveness tests with a high issue rating where the deficiency is specifically related to the risk being assessed.	The management of the risk is effective, and no further action is required
Outside target with remediation	• The residual risk rating for any risk scenario ≥90. • One or more control effectiveness tests are rated as deficient with a high issue rating, and the deficiency is specifically related to the risk being assessed. • Approval has been granted to continue to operate while compensating controls (if required) and remediation activities are implemented to bring the risk back within target.	The level of risk is higher than acceptable and remediations designed to bring the risk within target will be implemented
Outside target – tolerated	• The residual risk rating for any risk scenario ≥90. • One or more control effectiveness tests are rated as deficient with a high issue rating, and the deficiency is specifically related to the risk being assessed. • There are no reasonable remediation actions to bring the risk within target. • The activity has been stopped, or approval has been granted to operate, while the risk is tolerated.	The level of risk is unable to be substantially lowered by remediation activity and is tolerable

11.3 Key risks

11.3.1 Site location and infrastructure design (AA1)

Alternatives to the SRE Project as proposed were presented and described in Section 4.4, together with a justification for the SRE Project as presented in Section 4.2 and Section 4.3.

The assessment of effects and assessment of impact significance for the preferred SRE Project configuration were presented in Chapter 9 and Chapter 10, demonstrating that the SRE Project can be implemented without unacceptable impacts. The risk assessments presented in this chapter similarly demonstrate that the SRE Project can be implemented without exposing the community or environment to unacceptable risks.

11.3.2 Climate change adaption (CCRE1)

11.3.2.1 Climate change and greenhouse gas emissions

Climate change refers to long-term alterations in the Earth's climate, including changes in temperature, precipitation, and weather patterns. Greenhouse gases (GHGs) are atmospheric constituents that absorb and re-radiate infrared radiation (heat), a mechanism that regulates the temperature of the planet and keeps it at a level suitable to sustain life. The most notable GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), water vapour and a variety of synthetic gases. Changes in the concentrations of GHGs in the atmosphere may result in changes to the climate, a process is known as the 'greenhouse effect'.

Human-induced, or anthropogenic, climate change is the long-term alteration of the Earth's climate caused by human activities such as burning of fossil fuels, agriculture practices and deforestation. These activities result in increased concentrations of GHGs, enhancing the natural greenhouse effect and contributing to contemporary climate change. Observed climate change impacts include more frequent extreme weather events and increased variability, melting glaciers and ice sheets, rising sea levels and disruptions to ecosystems.

Key risks associated with human-induced climate change are broad and systemic. These include a range of significant material risks to environment, social and economic constructs including an increased frequency and severity of extreme weather events (e.g. storm events, heatwaves, floods, and droughts) and sea-level rise affecting coastal and low-lying areas. Additionally, climate change also poses a significant risk to ecological values and biodiversity with alterations in temperature, hydrological cycles and seasonal patterns potentially resulting in shifts in species distribution, habitat degradation, and increased vulnerability of threatened species. These changes may exacerbate existing environmental pressures and contribute to cumulative impacts on sensitive receptors. There are also material risks to water resources, built infrastructure, energy demand and availability and human health, including an increased risk of heat stress, an increased potential for the spread of diseases and impacts to health arising from extreme weather events.

Greenhouse gas emissions

Given that various GHG have different global warming potentials, emissions are expressed using a common unit, carbon dioxide equivalent (CO_2-e). For any quantity and type of GHG, CO_2-e signifies the amount of CO_2 which would have the equivalent global warming impact. CO_2-e emissions are calculated on the global warming potentials of specific gases adopted by the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol.

For accounting and reporting purposes, GHG emissions are referred to as either direct or indirect, and defined according to three scopes (1, 2 and 3), where:

- Scope 1: relates to direct emissions from sources within the boundary of an organisation, as a result of the organisation's activities. Scope 1 emissions are determined for the point of release (onsite).
- Scope 2: relates to indirect emissions associated with the purchase of electricity, steam, heat or cooling at a site. These are physically generated outside of an organisation's boundaries, such as an external power station, but are included in the organisation's emission inventory as they are as a result of the organisation's energy use.

- Scope 3: relates to all other indirect emissions (other than Scope 2), which occur outside the boundary of an organisation, but as a result of actions by the organisation. As such, they are generated in the wider economy and may occur upstream, such as during the extraction and production of fossil fuels, or downstream, such as from the transport of an organisation's product to customers.

The annual average Scope 1 and Scope 2 emissions during the staged development of the SRE Project are estimated to be 160,218 t CO_2-e/year for Stage 1a, 182,697 t CO_2-e/year for Stage 1b and 192,524 t CO_2-e/year for Stage 2.

Relative to estimated annual average BAU period (i.e. FY26 to FY32) projected smelter and refinery emissions (117,834 t CO_2-e/year), the SRE Project returns an increase of approximately 36% for Stage 1a, 55% for Stage 1b and 63% for Stage 2.

Following completion of the assessment of effects, it was determined that there was a total of two confirmed impact events, which were subsequently assessed to quantify the likely significance of the impact against BHP's EIAF impact significance criteria. The outcomes of this indicate that the SRE Project construction phase GHG emissions have a significance Level 1 (not significant), and the SRE Project operational GHG emissions have an assessed impact significance Level 5 (significant). The latter is related to Scope 1 emissions impacts from fuel consumption being greater than 100,000 t CO_2-e/annum.

11.3.2.2 Regulatory context

The SRE Project Assessment Requirements for GHG are for a Sustainability and Climate Change Assessment to be prepared by a suitably qualified environmental expert (Appendix C5). The assessment is to measure the ecological footprint of the SRE Project and continuing BAU and should address sources of GHG emissions and the implications of climate change, the use of renewables or alternative technologies, energy and water efficiency measures, GHG reductions and other suitable initiatives during the construction and operational phases.

On an international scale, climate change is governed by the:

- IPCC which is a United Nations body for assessing the science in relation to climate change, supported by development of comprehensive reports, guidance and frameworks to assess climate change and GHG
- UNFCCC, which provides the basis for concerted international action to mitigate climate change and adapt to its impacts
- Paris Agreement, signed by the Australian Government, which is a legally binding international agreement between countries party to the UNFCCC to strengthen efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so.

Within Australia, climate change is governed by the:

- *Climate Change Act 2022* (Cth), which provides the legislative framework for implementing Australia's net-zero commitments under the Paris Agreement, and sets out Australia's GHG emission-reduction targets
- Global Methane Pledge, which Australia has signed, that is a voluntary commitment to reduce global methane emissions across all sectors by at least 30% below 2020 levels by 2030
- NGER Act, which establishes a national framework for corporations to report GHG emissions, energy consumption and energy production

- Safeguard Mechanism supported by the NGER Act, which provides the framework for Australia's highest emitting facilities to manage and report on their GHG emissions to ensure facilities will contribute to meeting Australia's GHG emission reduction targets.

In South Australia, the overarching legislation relating to GHG emissions and climate change management is the *Climate Change and Greenhouse Emissions Reduction Act 2007* (SA) (CCGER Act), which was amended in 2024 with the Climate Change and Greenhouse Emissions Reduction (Miscellaneous) Amendment Bill 2024 (SA). The CCGER Act intends to provide measure to address climate change, establish targets to achieve a reduction in GHG emissions, promote renewable sources of energy, promote understanding surrounding climate change and facilitate early development policies and programs to address climate change.

11.3.2.3 Climate change projections

The South Australian climate change projections viewer (DEW 2026) is an online tool displaying data on how the state's climate is expected to change in the future. It is designed to assist members in the industry to assess climate risk and plan for a future with more extreme weather events. The tool allows projections in key climate variables, geographic scales, landscape regions, emission scenarios or local health network areas. A summary of the interpretation of climate projections for the SRE Project is provided in Table 11.8.

Specifically, as relating to the SRE Project, the tool was used to understand climate projections for near future (2020 to 2039) and far future (2060 to 2079) scenarios. A range of parameters were considered, including change in temperature, rainfall, droughts, fire danger and storms. Additionally, medium emissions (from RCP4.5) and high emissions (RCP8.5) from projected future GHG emission-scenarios were applied (Table 11.9). NSW and Australian regional Climate Modelling (NARCliM) was used for the basis of the assessment, in conjunction with climate change adaptation (CCA) for rangeland landscapes to provide interpretations for input to a climate change risk assessment (CCRA).

Table 11.8 | Summary and interpretation of climate projections

Parameter	Baseline historical	Near future (2020 to 2039)				Far future (2060 to 2079)			
		NARCliM (annual)	CCA (Rangeland)	Interpretation for use in CCRA	Confidence (from CCA)	NARCliM 1.5 (annual)	CCA (Rangeland)	Interpretation for use in CCRA	Confidence (from CCA)
Change in temperature									
Daily average (ºC)	-	+1.2	+1.0	Moderate increase in average temperature	Very high	+2.9	+3.0	Large increase in average temperature	Very high
Daily maximum (ºC)	-	+1.4	+1.2	Moderate increase in maximum temperature	Very high	+3.2	+3.4	Large increase in maximum temperature	Very high
Cold nights <2ºC	-	-2.0	-	Large reduction in frequency of cold nights	High	-3.0	-	Large reduction in frequency of cold nights	High
Hot days >35ºC	-	+18.0	-	Increased frequency, severity and duration of extreme high temperature	Very high	+42.0	-	Increased frequency, severity and duration of extreme temperature	Very high
Change in rainfall									
Change in rainfall (%)	-	-8.0	-1.0	Based on NARCliM 1.5, rainfall projected to decrease significantly	High for sign of change and low for the size of change	-29.0	-2.7	Based on NARCliM 1.5, rainfall projected to decrease by a significantly large amount	High for sign of change and low for the size of change
Change in max. 1-day rain (%)	-	-	+4.8	Based on NARCliM 1.5, rainfall projected to decrease significantly	High for sign of change and low for the size of change	-	+7.8	Increased intensity of extreme rainfall events	High for increase in intensity and low for size of increase
Droughts									
Time spent in drought (%)	38	-	40	Longer periods of drought	Medium	-	45	Long periods of drought	Medium
Frequency of extreme drought (/20y)	1.3	-	1.7	Increase in frequency	Low	-	1.9	Increase in frequency	Low
Fire danger									
Change in high fire danger (days)	-	-	-	Increase in frequency and severity of bushfires	High for harsher fire-weather in general, low for the magnitude of the change	-	-	Increase in frequency and severity of bushfires	High for harsher fire-weather in general, low for the magnitude of the change
Storms									
Extratropical cyclones (ETCs)	-	-	-	ETCs are projected to become less frequent, but with an increase in the proportion of intense storms	Medium	-	-	ETCs are projected to become less frequent, but with an increase in the proportion of intense storms	Medium

Table 11.9 | Parameters considering emission pathways

Parameter	Statistic	Annual near future (2020 to 2039)	Annual far future (2060 to 2079)
Medium emissions RCP4.5			
Change in temperature	Daily average ºC	1.2	2.0
	Daily maximum ºC	1.4	2.3
	Daily minimum ºC	1.0	1.8
Change in cold nights under 2ºC		-2.0	-3.0
Change in hot days over 35ºC		18.0	33.0
Change in rainfall (%)		-9.0	-17.0
Change in high fire danger days		-	-
High emissions RCP8.5			
Change in temperature	Daily average ºC	1.2	2.9
	Daily maximum ºC	1.4	3.2
	Daily minimum ºC	1.1	2.6
Change in cold nights under 2ºC		-2.0	-3.0
Change in hot days over 35ºC		18.0	42.0
Change in rainfall (%)		-8.0	-29.0
Change in high fire danger days		-	-

11.3.2.4 Climate change risk assessment

A climate change risk assessment was undertaken for the SRE Project and is summarised in Table 11.10. The risk assessment considered climate parameters across 29 construction and operation potential impacts events with the following breakdown:

- temperature – 1 construction impact event and 2 operation impact events
- fire danger – 4 construction impact events and 5 operation impact events
- rainfall and floods – 4 construction impact events and 5 operation impact events
- drought – 1 construction impact event and 1 operation impact event
- storms (other than extreme rainfall) – 3 construction impact events and 3 operation impact events.

With no mitigation measures applied, high risk ranked events were identified for potential impact pathways across temperature, fire danger, rainfall and floods, and drought considering worst case risk rating climate change projections. The assessed potential impact pathways for storms (other than extreme rainfall events) were found to be within acceptable ranking criteria without mitigation measures applied.

Table 11.10 | Climate change risk assessment

Impact ID	Project description				Base risk – no mitigation					
					Worst-case risk on 2030 projections			Worst-case risk on 2070 projections		
	Project phase	Climate hazard	Impact area/aspect	Specific impact on project	L*	C*	R*	L*	C*	R*
CON-T-01	Construction	Increase in average and maximum temperatures Increased frequency, severity and duration of extreme (high) temperature periods	Health and safety/heat stress	Extreme temperatures lead to heat stress on workers, or restricted working conditions/hours due to Work Health and Safety (WHS) policies, resulting delays to construction.	Likely	3	100			
OP-T-01	Operation		Physical assets/damage to site infrastructure and equipment	Higher temperatures, more frequent hot days and heatwaves lead to damage, deterioration or performance of site infrastructure and equipment, requiring repair and increased maintenance, with disruption to operation (Deloitte 2024).	Possible	3	30	Possible	3	30
OP-T-02	Operation		Health and safety/heat stress	Extreme temperatures lead to heat stress on workers (or restricted working conditions/hours due to WHS policies), affecting the functioning of the site. Heat stress can also reduce the productivity of underground mine workers (UNEP 2024). Risk of heat stress could cause skilled workers to become less willing to work in the sector (UNEP 2024).	Likely	3	100	Likely	3	100
CON-F-01	Construction	Trends towards increased fire risk Number of severe fire weather days projected to increase 35% in the Rangelands by 2030. By 2090 it is projected that severe fire weather days will increase 117%	Access/damage to transport routes	Fire damage to transport network prevents access to site, delaying construction.	Possible	3	30			
CON-F-02	Construction		Physical assets/damage and destruction	Fire damage to the site infrastructure/equipment (and/or electricity network, supply chains, worker accommodation) during construction. Delays to construction.	Unlikely	3	10			
CON-F-03	Construction		Health and safety/dangerous working conditions	Smoke – risk to health results in evacuation of construction workers, causing delays to construction.	Unlikely	3	10			
CON-F-04	Construction			Fire – risk of injury or death	Unlikely	5	100			
OP-F-01	Operation		Access/damage to transport routes	Fire damage to transport network prevents access to site, resulting in the suspension or reduction of operation.	Possible	3	30	Possible	3	30
OP-F-02	Operation		Physical assets/damage and destruction	Fire damage to the site infrastructure/equipment (and/or electricity network, supply chains, worker accommodation) during operation. Suspension or reduction of operation.	Unlikely	3	10	Possible	3	30
OP-F-03	Operation		Health and safety/dangerous working conditions	Smoke – risk to health results in evacuation of construction workers, causing suspension or reduction of operation.	Unlikely	3	10	Possible	3	30
OP-F-04	Operation			Fire – risk of injury or death.	Unlikely	5	100	Possible	5	300
OP-R-05	Operation		Environment and community/evacuation	Fires lead to evacuation of workforce and residents (workforce impacts).	Unlikely	4	30	Possible	4	90
CON-R-01	Construction	Moderate reduction in annual rainfall in the near future, with a more significant decrease in the far future Increase in rainfall in summer in near future Increased intensity of extreme rainfall events	Access/damage to transport routes	Flooding – damage to transport network prevents access to site, delaying construction.	Possible	3	30			
CON-R-02	Construction		Physical assets/damage and destruction	Flooding – damage to the site infrastructure/equipment (and/or electricity network, supply chains, worker accommodation) during construction. Delays to construction.	Possible	3	30			
CON-R-03	Construction			Extreme rain can delay the setting of concrete due to increased water content, which impacts the final product, increases construction costs and causes project delays (Deloitte 2024).	Unlikely	2	3			
CON-R-04	Construction		Health and safety/dangerous or unhealthy working conditions	Flooding – dangerous working conditions.	Possible	3	30			
OP-R-01	Operation		Access/damage to transport	Flooding – damage to transport network prevents access to site, leading to suspension of operation.	Unlikely	3	10	Possible	3	30
OP-R-02	Operation		Physical assets/damage to mining infrastructure	Extreme rainfall causes flooding and damage to site infrastructure/equipment (and/or electricity network, supply chains) that requires suspension or cessation of mine operations, thereby decreasing production (UNEP 2024).	Unlikely	4	30	Possible	4	90
OP-R-03	Operation		Health and safety/dangerous working conditions	Flooding can lead to dangerous working conditions (UNEP 2024).	Unlikely	3	10	Possible	3	30
OP-R-04	Operation		Environment and community/environmental pollution	Overflow of tailings dams posing significant risk of downstream pollution entering waterways and ecosystems.	Unlikely	5	100	Possible	5	300
OP-R-05	Operation		Environment and community/evacuation	Flooding leads to evacuation of workforce and residents (workforce impacts).	Unlikely	4	30	Possible	4	90
CON-D-01	Construction	Increase in drought duration	Environment and community	Reduced water availability for dust control.	Possible	2	9			

Impact ID	Project description				Base risk – no mitigation					
					Worst-case risk on 2030 projections			Worst-case risk on 2070 projections		
	Project phase	Climate hazard	Impact area/aspect	Specific impact on project	L*	C*	R*	L*	C*	R*
OP-D-01	Operation	Increase in drought frequency	General operation/conflicting needs for water resources	The site is heavily reliant on water for various essential procedures, such as mineral processing, dust control, the transportation and storage of slurry, extraction processes, and general site usage. Water shortages may result from conflicts with the needs of other sectors, thus affecting production.	Possible	3	30	Likely	3	100
CON-S-01	Construction	For the Rangeland South, it is anticipated that the overall number of ETC will decrease in the future The intensity of associated rainfall will likely increase	Access/damage to transport routes	Storms – damage to transport network prevents access to site, delaying construction.	Unlikely	3	10			
CON-S-02	Construction		Health and safety/dangerous working conditions	Storms can lead to dangerous working conditions (UNEP 2024). On-site staff could be vulnerable to storm-related injury and death (e.g. wind-blown objects, electric shock). Delays to construction.	Unlikely	3	10			
CON-S-03	Construction		Physical assets/damage and destruction	High winds and /or lightning can cause damage to the site infrastructure/equipment (and/or electricity network, worker accommodation) during construction. Delays to construction.	Unlikely	3	10			
OP-S-01	Operation		Access/damage to transport routes	Storms – damage to transport network prevents access to site. Reduction or suspension of operation.	Unlikely	3	10	Unlikely	3	10
OP-S-02	Operation		Physical assets/damage and destruction	High winds and/or lightning cause damage to the site infrastructure/equipment (and/or electricity network, worker accommodation) during operation. Reduction or suspension of operation.	Unlikely	3	10	Possible	3	30
OP-S-05	Operation		Health and safety/dangerous working conditions	Storms can lead to dangerous working conditions (UNEP 2024). On-site staff could be vulnerable to storm-related injury and death (e.g. wind-blown objects, electric shock). Reduction or suspension of operation.	Unlikely	3	10	Possible	3	30

* L = likelihood, C = consequence, R = risk rating

11.3.3 Waste management (CCRE4)

Waste management aspects related to the SRE Project were presented in Section 6.5.6, describing the overarching approach to waste management across the various waste categories including:

- industrial and commercial wastes
- hazardous wastes
- contaminated wastes
- low-level radioactive wastes
- wastewater.

Details regarding design and management measures that would be applied to minimise the risk of leaks and spills and prevent site contamination are detailed in the respective areas of Chapter 6 and throughout this chapter with respect to the implementation of MHF requirements (Section 11.3.4.1), the management of site and groundwater contamination (Section 11.3.6) and the management of dangerous substances (Section 11.3.7).

11.3.4 Hazard assessment and risk management (HR1)

11.3.4.1 Major Hazard Facility

Context

The MHF provisions of the Work Health and Safety Regulations 2012 (SA) (Regulations) detail a framework that applies to high-risk industrial sites (e.g. refineries, chemical processing plants, large fuel/chemical storage and distribution sites) where a loss of control of hazardous chemicals could result in an incident affecting workers, the public and the environment. The MHF provisions exist to:

- prevent catastrophic incidents (e.g. toxic releases, fires, explosions) by requiring a higher standard of hazard identification, control and assurance than general workplaces
- protect workers and the community by explicitly considering offsite consequences and surrounding land use and occupancy
- drive systematic risk management through safety assessment, safety management systems and safety case arguments
- improve emergency preparedness by requiring coordinated emergency planning with emergency services and other relevant stakeholders.

A facility is typically an MHF if it has, or is likely to have, one or more Schedule 15 hazardous chemicals at or above the chemical's threshold quantity (including via an aggregation rule wherever multiple Schedule 15 chemicals are present) as prescribed in the Work Health and Safety Regulations 2012 (SA). A facility may also be determined to be an MHF even when it is below the threshold quantity, once it meets the notification trigger (nominally 10% of the chemical's threshold quantity) and the regulator considers there is potential for a major incident.

The surface facilities at Olympic Dam were determined by SafeWork SA to be a MHF in May 2013. The determination was based on the inventory of Schedule 15 chemicals at Olympic Dam exceeding at least one threshold quantity. As such, Olympic Dam is licensed under the Regulations as an MHF (MHF2565).

Once a site is nominated as an MHF, several subsequent obligations are triggered, specifically:

- notification to the regulator when Schedule 15 chemicals are present or likely to be present at/above the notification trigger (nominally 10% of the threshold quantity) or when there is a change in the quantity of stored Schedule 15 chemicals
- identification of major incident hazards, defined as events involving Schedule 15 chemicals that could create serious risk to health and safety, including offsite consequences
- safety assessment, including a comprehensive, systematic investigation and analysis of major incident scenarios, their likelihood and consequences, and the effectiveness of controls
- implementation of controls and or measures to eliminate or minimise the risk of a major incident, consistent with the hierarchy of controls
- establishing and maintaining a Safety Management System (SMS) that provides governance, procedures, competency, maintenance, management of change, contractor management, etc. to ensure controls remain effective
- preparation, testing and maintenance of an emergency plan coordinated with emergency services and other relevant parties
- preparation of a safety case (and safety case outline), which is a structured demonstration and argument, supported by evidence, that the SMS and controls are adequate to manage major incident risk
- consultation and review of the safety case by stakeholders, including workers, maintaining the safety case current, and reviewing the safety case following changes, incidents or at required intervals.

The existing Olympic Dam Major Hazard Facility Safety Case meets the requirements of the Regulations, the most recent revision being developed in 2022 (BHP 2022a). This document summarises Olympic Dam's safety management system, including how planned and unplanned process, equipment, material, people and organisational changes at Olympic Dam are identified, are assessed for potential health, safety and environment risks, are assessed for process safety and quality impacts, and are approved and communicated. The next revision of the Olympic Dam Major Hazard Facility Safety Case is currently being prepared and is expected to be submitted to the regulator in the second quarter of 2026 (HFJV 2026b).

Preliminary assessment of SRE Project on MHF Safety Case

BHP must review and, if necessary, update the safety case after any review of the safety assessment, emergency plan or SMS that is required by the Regulations. Such a review is required if:

- a modification to the MHF is proposed
- a control measure implemented does not minimise the relevant risk so far as is reasonably practicable
- a new major incident hazard is identified
- consultation with stakeholders indicates a review is needed
- a health and safety representative reasonably requests the review, or the regulator requires the review.

Operators of licensed MHFs must review the safety assessment in any case at least once every five years and must include the revised Safety Case as part of the application for licence renewal.

The SRE Project activities and infrastructure that fall outside the scope of the current Olympic Dam Major Hazard Facility Safety Case (BHP 2022a) would be managed with a revision or addendum, including a suitable and appropriate risk assessment once updated. Since the Regulations require each safety case to reflect the current, as-built, operating state of any MHF, the current Olympic Dam Major Hazard Facility Safety Case (BHP 2022a) does not specifically consider the SRE Project components. Depending on the exact timing of execution of the SRE Project, it is anticipated that the SRE Project construction phase would be referenced in BHP's planned 2031 Olympic Dam Major Hazard Facility Safety Case revision and that the SRE Project operations phase would be subsequently included as an addendum to the Olympic Dam Major Hazard Facility Safety Case after 2031.

With respect to changes associated with the SRE Project that may change the existing operational risk profile or introduce new risks, a review of the quantities of Schedule 15 chemicals was undertaken for the existing and post-SRE Project operations, presented in Table 11.11. A preliminary assessment of the impact of the SRE Project on MHF potential major incidents is presented in Table 11.12.

Table 11.11 | SRE Project changes to Schedule 15 hazardous chemical inventories

Schedule 15 hazardous chemical	United Nations (UN) number	Existing Olympic Dam inventory (t)	Additional SRE Project inventory (Stage 2) (t)	Total (post-SRE Project Stage 2) inventory (t)	Revised (post-SRE Project Stage 2) usage rate
Ammonia, anhydrous	1005	157	0	157	No change
Diispropyl ether	1159	0.1	0	0.1	No change
Ethanol	1170	105	0	105	No change
Hydrofluoric acid solution	1790	0.1	0	0.1	No change
Hydrogen peroxide	2014	53	0.25	53.3	~19 kg/h
Kerosene	1223	5,000	0	5,000	No change
LPG	1978 and 1075	354	0.1	354.1	~2.5 t/h
Oxygen	1073	180	1,822	2,002	~110 t/h
Sodium chlorate (solid)	1495	1,877	0	1,877	No change
Sodium cyanide and hydrogen cyanide	1689 and 1051	60	50	110	~330 kg/h
Sodium isobutyl xanthate (SIBX), sodium ethyl xanthate and carbon disulphide	3342 and 1131	67	5	72	~155 kg/h
Thiourea (not otherwise specified)	2811	3	1	4	~7 kg/h
Uranium oxide and ammonium diuranate	2912	1,000	0	1,000	No change
Ammonium nitrate	1942	540	0	540	No change
Detonators and high explosives	241, 82 and 42	31	0	31	No change

Table 11.12 | Preliminary assessment of SRE Project on MHF potential major incidents

Location of Schedule 15 chemicals at Olympic Dam	Description of the change in plant, process, structure or chemical introduced by the SRE Project	New potential major incident hazard?	Does the change significantly increase the likelihood of a major incident occurring	Does the change significantly increase the potential severity of a major incident?
Acid plant	The acid plant installed for the 1100 ktpa case (Acid Plant 3) would be debottlenecked and upgraded to 3,900 ktpa capacity. Existing acid import facility would be left redundant and replaced with a new acid export facility to the north of Acid Plant 3. The existing acid plant (Acid Plant 2, at 1,820 tpd acid capacity) would be debottlenecked and upgraded to 2,300 tpd capacity under the existing process flow. Acid Plant 2 and Acid Plant 3 would not require any new Schedule 15 chemicals.	Existing wet gas cleaning plant onsite and acid import facility onsite – no new potential major incident hazard identified	Yes. Significantly greater processing capacity over the current capacity would increase the likelihood of a major incident event at the acid plant area	No. Severity is the same as existing process – loss of containment of SO_2 – toxic exposure. Individual storage is the same or smaller than existing. Sulphur dioxide consequence modelling conducted as per Olympic Dam Major Hazard Facility Safety Case Section 3.4.17 toxic exposure. No increase in severity for major incidents identified.
Feed preparation	New external concentrate (filter cake) receipt/storage and new bedding plant to process 2,000 ktpa concentrate for smelting (vs. ~500 ktpa processed currently). No new process or Schedule 15 chemicals.	None identified	Yes. Significantly greater storage capacity over the current capacity would increase the likelihood of a major incident event at the feed preparation area	No. Severity is the same as existing process – personnel exposure to large release of SO_2 during the combustion of copper concentrate.
Concentrator	Additional greenfield concentrate leach tank and filtration area; analogous to existing process. Upgrade of existing brownfield concentrate leach area (currently treating ~ 600 ktpa concentrate) to ~950 ktpa concentrate, otherwise the same as existing process. Replacement of the near-end-of-life slag concentrator with a new concentrator. Addition of new reagent (SIBX) not currently used on site.	None identified	Yes. Significantly greater concentrate processing capacity vs current, would increase the likelihood of a major incident event at the concentrator plant area, as well as analogously for the slag concentrator area	No. Severity is the same as existing process – personnel exposure to NO_x gases evolving from top of the concentrate leach tanks, release of sodium chlorate leading to flare fire, explosion or toxic exposure.
Electrorefining	Brownfield expansion of the electrorefinery tankhouse built in the 1,100 ktpa case. Additional cells, circulation equipment, cathode wash and stripping machine, anode scrap wash machine, anode insertion machine, cranes for greenfield ER tankhouse and machines, expansion of buildings.	None identified	Yes. Increasing the capacity would increase the likelihood of a major incident event at the electrorefining plant area	No. Severity is the same as existing process – loss of containment or evolution of hazardous material (arsine, sulphuric acid, NO_x, caustic solution, steam) in electro-refinery. Increase in electrolyte volumes, however, loss of containment of electrolyte not identified as a major incident event in the current risk analysis (not a Schedule 15 chemical). Note the Olympic Dam Major Hazard Facility Safety Case states 'scenarios where the generation and evolution of arsine vapour could potentially occur from the Electrorefinery electrolyte are currently under assessment'.
Electrowinning	No changes associated with the SRE Project			
Precious-metal refinery	Additional capacity added to existing PMR via brownfield and greenfield expansion	Change of wet filter cake to Cupel furnace vs dry to roaster today creating a steam explosion risk (reaction between molten material and water). Manual movement of filter cake and flux kibbles to the Cupel furnace (vs automated to roaster)	Yes. Increase PMR capacity and throughput would increase the likelihood of major incident event within the PMR	No. Severity is the same as existing process
Laboratories	No changes associated with the SRE Project			
Hydrometallurgical plant and solvent extraction	No changes associated with the SRE Project			
LPG storage and distribution	No change. The upgrade to oxy-fuel burners is intended to optimise LPG consumption, however overall throughput increase drives LPG consumption proportionally. No new LPG storage.	None identified	No.	No.
Anode furnace	The existing AFs (AF No.3 and AF No.4) combustion air burners would be replaced with new oxy-fuel burners. Two new AFs (AF No.5 and AF No. 6) of the same capacity (400 t) would be installed in line with, and to the east of, the existing. A new anode casting machine would be installed to service the new AFs.	None identified	Yes. Installation and operation of new anode furnaces would increase the likelihood of a major incident event at the anode furnace area	No. Severity is the same as existing process –exposure to anode furnace hazards which include molten material, cranes, fire and furnace gases (toxic exposure).

Location of Schedule 15 chemicals at Olympic Dam	Description of the change in plant, process, structure or chemical introduced by the SRE Project	New potential major incident hazard?	Does the change significantly increase the likelihood of a major incident occurring	Does the change significantly increase the potential severity of a major incident?
Electric slag reduction furnace	EF may be decommissioned, otherwise would be left unchanged	None identified	No. No change (if operation is maintained) or a reduction in likelihood of major incident (due to decommissioning of EF)	No. No change if operation maintained. If EF is decommissioned, this would eliminate toxic exposure and or explosion consequences identified in the existing risk assessment.
Flash furnace	New flash smelting furnace and ancillary equipment. New hybrid nitrogen/water matte granulation system processes, material handling, blended storage, matte grinding and pneumatic conveying, process gas cleaning and hygiene ventilation scrubbing. Changes to existing process include existing DBF to be converted to an FCF – with future change/transition from the existing iron silicate slag system to a calcium ferrite slag system. The flux feed would therefore change from silica flux to burnt lime flux. The existing concentrate burner would be replaced with a new matte burner sized for the required duty. FCF slag would be tapped from the furnace into slag pits for cooling and reclaim.	Steam explosion from reaction between molten material and water within the new matte granulation system. A similar incident is currently documented for the Acid Plant as per current approved Olympic Dam Major Hazard Facility Safety Case (specifically steam explosion from reaction between molten sulphur and water).	Yes. Increase in the likelihood of a major incident event at the flash furnace area which includes the new flash smelting furnace, matte granulation system and flash converting furnace	No. Severity is the same as existing process – flash furnace foaming event, steam explosion, loss of containment of SO_2 or concentrate fire.
LPG distribution and burners	Expansion to existing LPG distribution network. Additional launder burners for new FSF matte launders and modification or existing and addition of new launder burners for blister copper and anode casting sized for the required duty.	None identified	Yes. Increasing the size of the LPG distribution network increases the likelihood of major incident event	No. Severity is the same as existing process – loss of containment of LPG from distribution network.
Waste heat boiler	New waste heat boiler for the FSF, new boiler in acid plant, analogous to existing. Upgrades to existing FCF waste heat boiler. No new process or Schedule 15 chemicals.	None identified	Yes. Installation of a new waste heat boiler would increase the likelihood of a major incident event at the waste heat boiler area	No. Severity is the same as existing process – toxic exposure – loss of containment of sulphuric acid/acidified raffinate; exposure to NO_x, SO_2, dust.
Oxygen plant	New oxygen plant and distribution network.	None identified	Yes. Greater processing capacity vs current, would increase the likelihood of a major incident event at the oxygen plant area	No. Severity is the same as existing process – cold burn/fire, explosion.
Other site-wide processes	Minor changes only, unlikely to result in the introduction of new or changed major incident hazards. To be assessed at an appropriate level of engineering definition			

11.3.4.2 Emergency response strategies

Under the current approved Olympic Dam Major Hazard Facility Safety Case (BHP 2022a) and the Olympic Dam Integrated Management System (IMS), comprehensive emergency plans have been established for the existing MHF operations and aligned with BHP Olympic Dam IMS Element 18 – Security, Crisis & Emergency Management Standard (BHP 2021c).

BHP's current Olympic Dam Major Hazard Facility Safety Case (Part 3 – Safety Assessment and Part 4.21.3.6 – External Emergency Support and Mutual Aid Arrangements) describes that there are no credible MHF major incidents at Olympic Dam that could impact communities nearby to the SML and there are, therefore, no specific or prescribed emergency response actions to be followed by surrounding communities during a MHF major incident or emergency event. Community members are advised to follow any directions provided by local emergency services in the event of an emergency.

Current assessments of the SRE Project (Table 11.12) indicate that this would not change and the SRE Project would not change offsite emergency impacts. This would be reviewed during operational readiness preparations.

Representatives from BHP participate in the Roxby Downs Zone Emergency Management Committee, ensuring regular consultation and a close working relationship with external emergency response organisations to ensure the emergency planning for Olympic Dam remains appropriate.

11.3.4.3 Fire

At site fire risks

Fire risks at Olympic Dam are presently managed by a system including risk-assessed fire detection and prevention equipment, instrumented protection systems, alarms, automatic activation of fire suppression and minimisation systems, and manual response (e.g. fixed monitors, hoses, and fire trucks). The fire detection and protection systems are inspected, tested, calibrated and maintained as required to ensure reliability. These measures support trained emergency services personnel to respond in accordance with a suite of emergency preparedness and response documents, including Area Emergency Response Plans.

The SRE Project has undertaken fire systems studies that evaluates credible fire scenarios associated with the proposed SRE Project facilities, reviews potential consequences of those fire events, reviews proposed fire protection and detection systems to relevant Australian Standards and legislation, and provides the foundation for delivery of a Fire Safety Study as the SRE Project moves towards execution.

The fire systems studies note that, subject to final engineering design, the suitability of existing BHP Olympic Dam fire infrastructure (e.g. fire water supply, dam, and pumps) to support the new protection systems is adequate.

To site fire risks

Fire risk to the SRE Project (and greater Olympic Dam operation) from sources outside the SML are not expected to require any changes to the existing emergency and crisis management system.

Resources and training

Resources and training for the emergency response teams would continue to be managed through Olympic Dam's existing IMS and existing Work Management System (1SAP).

Regional coordination

Olympic Dam maintains an independent capacity to respond to all credible emergency scenarios at the Olympic Dam site, and continues to maintain close working relationships with external emergency agencies.

These are described in the Olympic Dam Major Hazard Facility Safety Case (BHP 2022a), and include Memoranda of Understanding (MoUs) with the South Australian Ambulance Service and South Australian Country Fire Service. The MoUs cover reciprocal arrangements for supporting Roxby Downs and neighbouring community emergencies.

Through participation in the Roxby Downs Zone Emergency Management Committee meetings, BHP personnel maintain close working relationships with the South Australia Police, South Australia Metropolitan Fire Service and South Australian State Emergency Service.

Cost recovery

As described above, Olympic Dam operates an emergency response capability in an independent capacity, while working closely with other state-based emergency response agencies in mutual support arrangements.

For fire risk located within the SML boundaries, the SRE Project would not directly require any scaling up of resources or capability in offsite emergency response agencies. Therefore, no cost recovery or cost sharing arrangement with external emergency response agencies would be necessary on account of fire risks within the SML.

Cost recovery for BHP response to offsite (external to the SML) emergencies during construction and operation of the SRE Project would continue in accordance with existing arrangements.

11.3.4.4 Third-party restricted and exclusion zones

Olympic Dam's activities do not restrict or exclude the community from accessing or approaching any areas outside the SML, though the community and third parties are restricted from entering the SML.

Internal to the SML, worker exclusion zones are managed by IMS Element 6 – Management of Operational Risks (BHP 2025e) and IMS Element 14 – Systems of Work (BHP 2026a).

11.3.4.5 Radiation

The assessment of radiation-related effects was presented in Section 9.4, with subsequent assessment of impact significance presented in the following sections:

- impact of radiation on terrestrial flora and vegetation – Section 10.1.3
- impact of radiation on terrestrial fauna and habitat – Section 10.2.5
- impact of radiation on local community values, health, safety and amenity – Section 10.4.3.

11.3.5 Flooding (HR2)

11.3.5.1 Surface water effects

Extensive surface water-related studies have been undertaken to support the SRE Project EIS, specifically:

- The assessment of the baseline surface water environment is summarised in Section 5.3.
- The assessment of the effects of the SRE Project, including infrastructure and activities, on the baseline surface water environment is presented in Section 9.7.

Detailed assessment of the baseline surface water environment and how this may change with the implementation of the SRE Project is presented in Appendix C6. This assessment concluded that the SRE Project is not at risk from regional flooding. There are no rivers, creeks or floodplains in the vicinity of the SRE Project. Stormwater which collects in dune swales would be excluded from the site by bunding and the building up of pads above the stormwater pooling level. Rainfall runoff collected from proposed infrastructure would be directed to the proposed stormwater management system. Additional storage capacity would be constructed to allow for collection of water from the SML Area.

Larger water level changes may occur along some of the bunds and access roads, however this is expected to be ameliorated through the addition of culverts and detailed drainage design on the southern infrastructure pads.

Flood modelling indicated that 27 dune swales may have altered flood hydrology following SRE Project development, with negligible differences in wet and dry areas in these swales. At the interface of the proposed infrastructure and the natural environment, future dune swale stormwater water levels may vary from current in the order of ±20 cm in a 1% AEP storm with negligible change in pooling water levels during smaller runoff events. The total post-development swale area (from crest to crest) affected by the SRE Project development is approximately 196 ha, however the surface area of pooling following rain would be significantly smaller.

11.3.5.2 Storage of hazardous contaminants

Existing BHP procedures for secure storage of containers of hazardous contaminants would continue to be applicable to the SRE Project. These include Olympic Dam's IMS Element 7 – Olympic Dam Radiation Management Plan (BHP 2025f) document, and the Occupational Hygiene Exposure Management (OHEM) Hazardous Materials Management Plan (BHP 2024f). These plans define the process to prevent workplace exposure to hazardous materials by providing guidance and methods on the safe management of any material deemed hazardous by a current Australian Safety Data Sheet (SDS).

The defined process relevantly includes:

- design of storage and processing facilities for hazardous materials to published engineering standards
- development of site or tasks-specific area emergency response plans to mitigate the potential impacts of incidents involving hazardous materials.

BHP's existing spill prevention and containment system incorporates the following 3 levels of containment for hazardous substances and dangerous goods:

- primary (e.g. drums, pipelines, and tanks)
- secondary (e.g. bunded storage areas and purpose-built transfer systems)
- tertiary (e.g. site design including stormwater retention pond system).

This containment strategy would continue to be implemented as part of the SRE Project.

Bunding designs for the storage of hazardous substances on the SRE Project would be designed in accordance with the relative Australian Standards and requirements specific to the substances packing group with respect to the volume to be contained, segregation/separation, and the distance of the vessel from the edge of the bund. Provision would be made in the SRE Project design such that entry and exit by personnel into and out of the compound, under both normal conditions and emergency conditions, shall be ergonomically safe.

In the event of a spill or leakage, BHP's IMS Element 8 – Spill Response and Management Procedure (BHP 2024e) provides details of the steps required to respond to, and manage, a spill or leak.

11.3.6 Site and groundwater contamination (HR3)

11.3.6.1 Existing site conditions

A detailed assessment of the baseline soil and groundwater contamination was undertaken, summarised in Section 5.4.5.3 and presented in detail in Appendix C1. A targeted soils and geochemistry sampling program was undertaken to provide contamination, geochemistry and acid sulphate soils (ASS) data to characterise the existing soils and geochemistry environment within the SRE Area, as this location is proposed to be the primary location for the smelter, refinery and associated infrastructure for the SRE Project. The soil assessment collected a total of 38 primary samples from 19 locations (two samples per test pit), submitted for contamination laboratory analysis for total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, and xylenes group chemicals (BTEX), polycyclic aromatic hydrocarbons (PAH) and metals. All concentrations were below the adopted human health and ecological SAC.

With respect to geochemistry, all samples analysed were NAF with low metal and metalloid concentrations, with the exceptions of arsenic and copper contents. These were targeted during the leachate testing. Copper leachate concentrations displayed a reasonable correlation with the corresponding whole-sample (solid) copper content and suggested that leachate copper may become more significant as whole-sample copper concentrations reach and exceed approximately 5,000 mg/kg (0.5% copper). All other analyte leachate concentrations, including arsenic concentrations, were reported at or below the LOR with the exception of two zinc leachate contents of 0.2 mg/L, which were marginally above the LOR of 0.1 mg/L, indicating that the overall risk of leachate from the disturbed material is low.

Comparison of the laboratory results with monitored surface water and groundwater concentrations showed that water around site is already variable and characterised in many places as highly saline. Although metal and metalloid concentrations are generally low, exceedances are reported in guideline values for metals such as manganese.

11.3.6.2 Risk of site or groundwater contaminations

The soil and geochemistry assessment (Appendix C1) did not identify any confirmed SPR linkages related to the SRE Area, being the primary location for proposed smelter and refinery expansion infrastructure for the SRE Project.

A known contaminated site associated with historical hydrocarbon leakage from diesel storage tanks, first identified in 2002, is located within the SRE Area. The tanks were subsequently decommissioned in 2003 and environmental investigations, monitoring, and remediation activities have been undertaken by BHP since that time. The 3 ML tank was demolished and removed in 2021, with no residual hydrocarbons remaining in the soil beneath the location of the former tank.

BHP has completed a PSI and DSI Stage 1 to understand the extent of PFAS chemicals at Olympic Dam, with investigations ongoing in consultation with the EPA. Existing PFAS impacts identified by the Stage 1 DSI (JBS&G 2026b) represent pre-existing site contamination rather than contamination generated by the proposed SRE Project. The potential for SRE Project activities to increase exposure to or mobilise existing PFAS chemicals can be appropriately managed through targeted investigation of work areas during construction.

The potential contamination risk, related to SRE Project operations and construction, are considered low. The potential for contamination can be appropriately mitigated and managed in accordance with relevant Australian Standards, construction environmental management and operational control measures, and relevant environmental legislation, guidelines and policies, all of which are currently in place at Olympic Dam.

Any leaching from material disturbed by the SRE Project activities is likely to have less impact on the receiving environment than existing mine-affected water present on site, such as that affected by the TSF.

While the targeted soil assessment identified no exceedances of CoPC above the SAC, the following proposed management and mitigation measures would be applied (where applicable), aimed at reducing any potential impact event significance to as low as reasonably achievable (ALARA):

- All hydrocarbon and chemical storage locations would be bunded for containment in accordance with relevant Australian Standards in order to prevent discharge in the event of a spill.
- Development of a site-specific CEMP, including:
    - targeted PFAS soil sampling where disturbance areas overlap known or potential PFAS-affected areas
    - an unexpected-find protocol to manage ground disturbance during SRE Project development works.
- Implementation of BHP's existing hydrocarbon and chemical spills procedures.
- Soils identified during construction with elevated copper concentrations (whole-sample copper contents exceed 5,000 mg/kg; 0.5% copper), would be managed in accordance with existing management procedures. This may include stockpiling within existing run-of-mine ore stockpiles for copper recovery in existing processing operations, segregation from general fill, controlled handling and placement, and minimisation of contact with water to reduce the potential for copper leaching.
- Ensuring best practice engineering controls, bunding of chemical and hydrocarbon storage, spill response procedures and implementation of BHP's site contamination management systems to further reduce the likelihood of contaminant migration to groundwater.

- Groundwater quality would continue to be monitored under BHP's existing site-wide groundwater monitoring program. Groundwater quality results would continue to be reviewed as part of BHP's standard environmental reporting to identify any changes from baseline and post-baseline conditions.

11.3.7 Dangerous substances (HR4)

11.3.7.1 Dangerous substance use and storage

Hazardous substances listed within Schedule 15 of the Work Health and Safety Regulations 2012 (SA) are proposed to be used by the SRE Project were listed in Table 11.11. Hazardous chemicals are not listed within Schedule 15 but proposed to be used by the SRE Project are listed in Table 11.13.

The SRE Project would follow the processes defined in BHP's IMS Element 7 – OHEM: Hazardous Materials Management Plan (BHP 2024f) with respect to the identification of any new dangerous or hazardous substances being introduced to site. If any new substances are identified, a process of reviewing and updating relevant risk assessments and operating procedures would then follow.

All materials on site would be stored in accordance with their SDS. Copies of the SDS that describe the properties of the substances that are kept or handled on the site, and the appropriate first aid measures for them, would be kept in a readily accessible location and kept up to date.

Table 11.13 | SRE Project changes to non-Schedule 15 hazardous chemical inventories

Schedule 15 hazardous chemical	Existing Olympic Dam inventory (t)	Additional SRE Project inventory (Stage 2) (t)	Total post-SRE Project Stage 2 inventory (t)	Revised post-SRE Project Stage 2 usage rate
Sulphuric acid	37,000	~15,000	52,000	~260 t/h produced
Hydrochloric acid	0.23	Increased usage, but no additional storage	0.23	<1 kg/h
Nitric acid	3	Increased usage, but no additional storage	3	<1 kg/h
Sodium sulphide (hydrated)	3	Increased usage, but no additional storage	3	~2 kg/h
Steam	Significant quantity produced from process	Increased steam production	N/A	~160 t/h consumed
Sodium hydroxide (caustic solution)	390	30	420	~4 t/h
Sulphur	10,000	No additional storage		~3 t/h
Diesel / fuel oil	490	340	830	~2 t/h
Molten metal	Significant quantity produced from process	Increased molten metal production	N/A	~1,930 t/h
Calcium oxide (quicklime)	Not applicable to the existing operations	327	327	~4.5 t/h
Copper telluride	Not applicable to the existing operations	To be disposed of to the TSF	N/A	~19 kg/h
Borax (flux)	2	Increased usage, but no additional storage	2	~4 t/h
Sodium nitrate	Not applicable to the existing operations	2	2	~1 kg/h
Zinc dust	0.8	1.6	2.4	~48 kg/h

11.3.7.2 Dangerous substance risk management

Accidents involving dangerous substances have been comprehensively assessed for existing dangerous substances on site through the MHF safety assessment process (Section 11.3.4) and, more generally, through the BHP process safety risk management system. The outcome is a comprehensive set of risk assessments and management plans for risks originating at the Olympic Dam smelter and refinery.

The outcomes from the SRE Project's sustainability in design activities will inform the review, update and development of any relevant risk assessments in both the definition phase and execution phase of the SRE Project. The credible risks deemed to be capable of creating a MHF major incident have been fully documented in the existing MHF safety case. In due course, the MHF safety case will be revised and re-submitted to the WHS regulator in accordance with the requirements of the Work Health and Safety Regulations 2012 (SA). A preliminary assessment of the impact of the SRE Project on MHF potential major incidents is presented in Table 11.12.

For more general risks:

- In the event of a spill or leakage, whether onsite or offsite, BHP's IMS Element 8 – Spill Response and Management Procedure (BHP 2024e) details the steps required to respond to, and manage, a spill or leak.
- Where contractors are involved, such as transport operators, BHP's IMS Element 11 – Contractor Management Standard (BHP 2025g) applies to ensure that contractors are evaluated, selected, engaged and managed such that they perform in a manner that is consistent with the BHP's health, safety and environment requirements, process safety requirements and quality requirements.

11.4 Risk assessment

11.4.1 Summary of risk assessment outcomes

As a component of the SRE Project sustainability in design process, a sustainability in design risk workshop was undertaken, expanding upon earlier risk work undertaken during the earlier project phases. Results from risk workshops and reviews, along with any individually identified sustainability in design hazards, are recorded in the SRE Project's Sustainability in Design and Hazard Risk Register. This register documents the identified hazards with the existing controls, existing risk rating, applicable mitigation actions and an assessment of the post-mitigation residual risk rating in accordance with the BHP risk framework. The outcomes of this assessment are included as Appendix E3, presented as the SRE Project's risk register.

The risk register analysed risk across 151 potential events for the SRE Project. Risks were grouped into the following four location-based categories:

- infrastructure
- site-wide
- processing plant
- non-specified.

Of the categories, a total of 7 risks were analysed for infrastructure, 5 for site-wide, 138 for the processing plant, and one as non-specified.

Applying the BHP risk framework demonstrated that, of the 151 risk events analysed, 37 exceeded target for the initial risk ranking (without additional control measures applied), with 34 risk events calculated to have an initial risk ranking of 90, and 3 having a rating of 100 (the highest rating calculated for risks analysed). These 3 risks were:

- ID56 Metallurgical Plant (flash converting furnace to blister) – uncontrolled ignition of LPG within blister/anode launders
- ID143 Metallurgical Plant (electrolytic refining) – lifting of cathode blanks onto tables and racks to a horizontal position
- ID144 Metallurgical Plant (electrolytic refining) – operator hands stuck in pinch-points during feeding of cathode blank.

Additional control measures have subsequently been proposed for the management of the high-ranking risks prior to the residual risk ranking being calculated. Across the 151 risk events, with controls applied, only 3 remained as exceeding target with values of 90. These high residual risks relate to:

- ID1 Infrastructure (high voltage 132 kV supply switchyard) – operators contact with 132 kV cable during road/ground excavations as part of standard operational maintenance activities
- ID49 Metallurgical Plant (matte handling) – blocked/insufficient emergency egress
- ID98 Metallurgical Plant (slimes treatment) – operators exposed to polonium during handling of copper telluride product.

Preventative controls proposed for the management of the above risks include further mechanical protection in high traffic/high density areas, and additional materials testing for copper telluride-related materials prior to further interactions.

A summary of risk register statistics is presented in Table 11.14.

11.4.2 Future risk management studies and assessments

In addition to the sustainability in design risk workshops, several further risk management workshops are proposed as the SRE Project progresses, including:

- hazard and operability (HAZOP) workshops
- machine safety risk assessments
- functional safety assessments
- layers of protection analyses (LOPA)
- control hazard and operability (CHAZOP) studies
- constructability and commissioning reviews.

Table 11.14 | Summary of sustainability in design risk register – risk areas

Sub-category	Number of events	Initial risk ranking		Residual risk ranking	
		Exceeding target (≥90)	Acceptable (<90)	Exceeding target (≥90)	Acceptable (<90)
Infrastructure	7				
High voltage 132 kV supply switchyard	5	1	4	1	4
Water storage and reservoirs	2		2		2
Sitewide	5				
Transport and logistics	1		1		1
Sitewide	4		4		4
Metallurgical Plant	138				
Anode furnaces and casting wheels	3		3		3
Concentrator 3 flotation, thickening and regrinding	1		1		1
Electrolytic refining	8	4	4		8
Feed preparation	10	5	5		10
Flash converting furnace to blister	3	2	1		3
HV power supply	1		1		1
Matte handling	1	1		1	
Refinery slimes treatment 2	7	4	3		7
Site development	1		1		1
Sitewide	1		1		1
Slag handling and electric furnace	1	1			1
Slimes treatment	17	1	16	1	16
Smelter 2 acid plant	12	4	8		12
Smelter 2 anode furnace and copper casting	7	1	6		7
Smelter 2 feed preparation and concentrate storage	14	2	12		14
Smelter 2 flash furnace	14	2	12		14

Sub-category	Number of events	Initial risk ranking		Residual risk ranking	
		Exceeding target (≥90)	Acceptable (<90)	Exceeding target (≥90)	Acceptable (<90)
Smelter 3 feed preparation and concentrate storage	5	2	2 (1 uncalculated)		4 (1 uncalculated)
Smelter 3 flash furnace	2		2		2
Smelter 3 gas and dust handling	4	1	3		4
Smelter 3 matte handling	14	3	11		14
Smelter 3 oxygen plant	3	1	2		3
Smelter 3 slag handling	6	2	4		6
Smelter 3 utilities	2		2		2
Utilities and service	1		1		1
Non-specified	1				
Non-specified	1		1		1

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12. Management of environmental impacts

12. MANAGEMENT OF ENVIRONMENTAL IMPACTS

This section describes the existing frameworks and systems that are implemented to manage the impacts of its operations by BHP Group at a corporate level, and by BHP at Olympic Dam. It also identifies the changes that would be required to the Olympic Dam environmental management system (EMS) due to the SRE Project.

12.1 Environmental management system

12.1.1 BHP sustainability framework

Sustainability is key to BHP Group's purpose of bringing people and resources together to build a better world, as detailed in the following sections.

12.1.1.1 Ambition

BHP Group is committed to finding new ways of operating more sustainably while supplying products that are essential for the global transition towards a more sustainable future. BHP Group recognises that it can only achieve this purpose through collective effort, and BHP Group values the opportunity of partnering across the value chain to make their business more sustainable and to contribute to global sustainable development goals.

12.1.1.2 Approach

BHP Group's approach to sustainability includes identifying opportunities to create a positive contribution to society through social value. Social value is BHP Group's positive contribution to society – their people, partners, the economy, the environment and local communities and is about creating enduring, mutual benefit for the company, their shareholders and the broader community.

BHP Group's social value framework, approach to governance and annual performance against the social value scorecard are detailed on the social value webpage and discussed in the BHP Annual Report 2025 (BHP 2025a, Section 9.4 '2030 goals and social value scorecard').

BHP Group defines the approach to sustainability through Our Charter, guided by Our Code, which is governed through the Our Requirements standards. These standards describe our mandatory minimum performance requirements and provide the foundation to develop and implement management systems at our operated assets.

12.1.1.3 Materiality assessment

Each year BHP Group identify the sustainability topics most material to business, partners and stakeholders, by assessing the economic, social, environmental and cultural impact of BHP Group activities and business relationships. In alignment with the recommendations of the Global Reporting Initiative (GRI), BHP Group consider the actual and potential negative and positive impacts of their business in order to determine material sustainability topics. As part of this assessment, consideration is given to a broad range of inputs, including BHP Group's priority and emerging risks, information recorded in an internal event management system, social value framework, insights from interviews with senior leaders and subject matter experts across the business. BHP Group seek to ensure external partners'

and stakeholders' perspectives inform the assessment by including consideration of issues raised at BHP Group's Annual General Meetings and investor roundtables, industry sustainability standards and guidance, sustainability-related regulatory focus areas, relevant media articles about impacts and input from the Forum on Corporate Responsibility. Material sustainability topics are reviewed by the Sustainability Committee.

BHP Group has been conducting sustainability materiality assessments for many years and has a well-developed understanding of the organisation's context and is actively involved in sector-specific initiatives such as the International Council on Mining and Metals (ICMM) and regularly engage with our stakeholders.

The materiality assessment process has the following key inputs:

- Identification of negative impacts – BHP Group's event management system is used to identify both actual and potential negative impacts arising from our operations. The system is designed to capture events that have or could have resulted in adverse consequences to people (health and safety), the environment or local community, and to our legal, reputational or financial standing. Hazard reporting is also encouraged as a proactive measure to help reduce the likelihood of actual and high potential impacts.
- Assessing the significance of the negative impacts – BHP Group uses an internal severity rating scale (tiered from one to five by increasing severity), as defined in our mandatory minimum performance requirements for risk management, to assess the significance of actual or potential negative impacts. For actual negative impacts, all events recorded in the event management system are assigned a severity level based on their actual or potential impact. BHP Group considers actual events from our event management system with a severity level of three or above to be 'material' for GRI reporting purposes.
- Identification and assessment of positive impacts – Positive impacts on the economy, environment and people are captured through the social value framework and social investment. The social value framework was developed through extensive consultation and identified the opportunity to build value, beyond minimum compliance, through proactive initiatives and investments that focus on sustaining long-term, mutual value with those who help to enable the realisation of BHP Group's sustainability purpose.

12.1.1.4 Governance and oversight

Corporate governance underpins the way BHP conduct business. BHP are committed to the highest level of governance and strive to foster a culture that values and rewards exemplary ethical standards, personal and corporate integrity and respect for others. The BHP Group Board has oversight of the approach to, and delivery on, sustainability and is supported by each of its committees:

- The Board's Sustainability Committee advises and assists the Board in its oversight of BHP Group's management and performance in relation to health, safety, environmental, climate and community matters.
- The Sustainability Committee also advises the People and Remuneration Committee in setting safety and sustainability-related scorecard targets and evaluating performance against those targets.
- The Board's Risk and Audit Committee is responsible for assisting the Board in overseeing and reviewing emerging and priority group risks, risk management and internal controls. The Risk and

Audit Committee also reviews and recommends to the Board public financial disclosures related to sustainability matters.

- The Nomination and Governance Committee is responsible for reviewing and making recommendations to the Board on the Group's significant social, community and sustainability policies. The Nomination and Governance Committee also reviews and makes recommendations to the Board on the Group's public sustainability targets and goals.
- The People and Remuneration Committee is responsible for considering and assessing the performance measures for the Executive Leadership Team and performance outcomes against those measures. In doing so, the People and Remuneration Committee considers recommendations from the Sustainability Committee in relation to health, safety, environment, climate and community measures.

More information on the Board and each Committee is set out in the BHP Board Governance Document and Committee Charters on the BHP Corporate Governance webpage.

12.1.1.5 Engagement

As a global company, BHP Group interacts with a range of partners and stakeholders. The methods, frequency of engagement and approach to listening to partners and stakeholders are diverse, and BHP Group use a range of formal and informal communication and engagement channels to understand partner and stakeholder views.

BHP Group also seeks advice from external experts and forums on issues relating to sustainability as inputs into our policy development and decision-making processes. The BHP Forum on Corporate Responsibility (FCR) is a key part of the governance approach and stakeholder engagement program. The FCR comprises independent civil society leaders in various fields of sustainability, who make an important contribution to the sustainability approach over a range of social and environmental issues and to the development of BHP Group policies, strategies and standards. They provide insight into current and emerging issues, challenge our thinking and allow BHP Group to understand and consider the broader impacts of BHP Group actions.

12.1.1.6 Performance

BHP Group use various metrics to measure sustainability progress and performance. Sustainability performance metrics are independently audited, as discussed in the BHP Annual Report 2025 (BHP 2025a, Section 9.14 Independent Assurance Report).

Further information with respect to sustainability performance data and social values is available within BHP Group's ESG Standards and Databook and the Environmental, Social and Governance (ESG) and Sustainability webpage.

12.1.1.7 Risk management

Under the Group-wide Risk Framework, BHP Group's aim is to identify risks (both threats and opportunities) associated with business and activities, including risks and potential impacts that relate to sustainability issues. This enables the prioritisation and management of risks that matter most.

All risks to which BHP Group is exposed are classified using the Group Risk Architecture. This is a tool to identify, analyse, monitor and report risk, which provides a platform to understand and manage risks. Similar risks are considered together in categories, such as 'People and culture', 'Health and safety' and

'Environment, climate change and community'. Each category is then further comprised of groups of risks, which include 'Occupational safety', 'Human rights', 'Climate change' and other sustainability risks. This gives the Board and management visibility over the aggregate exposure to risks, including sustainability risks, on a Group-wide basis and supports performance monitoring and reporting against BHP Group's risk appetite.

When BHP Group assess the materiality of a current risk, the Risk Framework requires consideration of all potential impacts, including to health and safety, the environment, communities, human rights and social value. This is designed to support the consideration of all potential impacts in risk assessments and means potential sustainability impacts are required to be considered in the context of all identified risks.

Risk management is embedded into work processes and critical business systems to help develop a risk-informed approach to sustainability. Workplace health, safety, environment and community standards are set for operated assets and their application enforced. Contractors working at BHP Group-operated assets must comply with BHP Group standards and requirements, and BHP Group seek to ensure that suppliers, agents and service providers maintain business practices and workplace standards comparable to theirs.

The Internal Audit Team is responsible for providing independent and objective assurance over the control environment (governance, risk management and internal controls) to the Board and Executive Leadership Team. Third-party assurance providers visit selected operating assets and evaluate the sustainability approach to ensure we accurately represent our commitments and actions.

12.1.1.8 Disclosure

BHP Group is committed to a number of sustainability frameworks, standards and initiatives and disclose data both as required by law and according to the requirements of those frameworks, standards and initiatives. Sustainability performance data is included in relevant sections of the BHP Annual Reports, Operating and Financial Review, and in BHP Group's ESG Standards and Databook releases. BHP's Annual Reporting Suite also includes the Economic Contribution Report, Sustainability Reporting, and a Modern Slavery Statement, prepared in accordance with the *Modern Slavery Act 2018* (Cth) and *Modern Slavery Act 2015* (UK).

12.1.2 Olympic Dam environmental management system framework

The Olympic Dam EMS framework sits within Olympic Dam's integrated management system and is used to develop and implement its environmental policy and manage its environmental aspects. The core elements of the EMS are described in the EPMP which is a compilation of documents that describes how the environmental requirements of BHP's IMS apply and are incorporated into BHP's operations at Olympic Dam.

The EPMP also serves the following legal obligations:

- submission of a programme for the protection, management and rehabilitation (if appropriate) of the environment under clause 11 of the Indenture
- collection of data from a monitoring system approved by the State for the management of the use of underground water resources under clause 13 of the Indenture

- development, approval, implementation and regular review and re-approval of a Radioactive Waste Management Plan (RWMP) to comply with the Mining Code (ARPANSA 2005) as required under Licence LM1, the RPC Act and clause 10 of the Indenture.

12.1.2.1 Environmental Protection and Management Program

The EPMP includes the following documents:

- Environmental Management Manual (EMM)
- Environmental Management Program (EM Program)
- Monitoring Programs (MPs).

The scope of the EPMP covers the environmental aspects of BHP within the SML and associated GAB abstraction from Wellfield A and Wellfield B.

Environmental Management Manual

The EMM provides background information, explains the EMS used to manage environmental risks and obligations in relation to BHP's Olympic Dam operations and explains the regulatory framework for the EPMP and how the EPMP operates, including the enforcement regime.

Environmental Management Program

The EM Program sets out potential significant environmental aspects and impacts and the processes, systems and actions used to manage them, including as relevant to the SRE Project:

- environmental values and the key risks to those values
- environmental outcomes that BHP aims to achieve
- clear, specific and measurable compliance criteria to demonstrate achievement of the outcome(s)
- leading indicator criteria providing early warning of trends that indicate a compliance criterion may not be met
- management and operational controls to deal with risk of environmental impact and address regulatory conditions where specified
- contingency options to be used in the event identified environmental risks are realised
- self-improvement goals and continuous improvement opportunities.

The EM Program is organised and presented in distinct categories, each relating to different environmental aspects of BHP's Olympic Dam operations:

- ID 1: Use of natural resources
  - land use and rehabilitation
  - aquifer level drawdown
- ID 2: Storage transport and handling of hazardous materials
  - chemical and hydrocarbon spills
  - radioactive process material spills

- ID 3: Operation of industrial systems
  - particulate emissions
  - sulphur dioxide emissions
  - radioactive emissions
  - greenhouse gas emissions
- ID 4: Generation of industrial waste
  - embankment stability of TSF
  - tailings seepage
  - fauna interactions with the TRS
  - solid waste disposal
  - radioactive waste
- ID 5: Interaction with communities
  - community interactions.

Monitoring Programs

The MPs set out how requirements of the EM Program are measured, documenting the process to collect and interpret data used to assess the performance of the EM Program's outcomes, criteria, controls, management actions, legal and other obligations. The results from these MPs are compiled and inform submissions to Government in various regulatory reports.

The MPs comprise:

- fauna
- flora
- groundwater
- Great Artesian Basin
- airborne emissions
- energy use and greenhouse gas emissions
- environmental radiation
- waste
- social effects.

Review of Olympic Dam EPMP

The Olympic Dam EPMP would be updated following approval and implementation of the SRE Project. Should the SRE Project approval be granted, the update to the EPMP would broadly include:

- revision of descriptive elements of the EPMP to reflect the additional scope (i.e. infrastructure and activities) associated with the SRE Project (Chapter 6)

- revision of Environmental Outcomes and associated aspects within the EPMP to reflect the impacts and risks identified and assessed within this EIS (Section 12.1.4.2)
- revision of administrative elements of the EPMP to reflect the conditions of approval associated with the SRE Project.

A summary of the more significant proposed changes to the components of the EPMP are described in the following sections.

12.1.3 Changes to the EMM

Proposed changes to the EMM following approval of the SRE Project are described in Table 12.1.

Table 12.1 | Proposed changes to the EMM

EMM section	Proposed changes
Section 5.4.1 Basis of environmental outcomes and criteria for measurement	Revision to reflect that the basis for Environmental Outcomes and criteria includes compliance with conditions of approval associated with regulatory approvals as granted
Section 6.1 History	Update to reflect SRE Project
Section 6.4 Olympic Dam region operating environment	Update of baseline environment descriptions to align to baseline studies presented in this EIS
Section 6.5 Process overview	Revision of process description to reflect the changes associated with the SRE Project
Section 7.3.1 Environmental aspects and impacts	Revision to acknowledge the consideration of impacts and risks identified during the development of regulatory approvals into the review of the environmental aspects and impacts register and associated documentation of process controls
Section 7.4.3.3 Interested parties register	Revision to clarify that stakeholders identified in the course of the development of regulatory approvals are to be added to the interested parties register
Section 7.5.1 Monitoring and measurement	Update of monitoring and measurement aspects to reflect the conditions of approval associated with the SRE Project, including additional reporting and/or the need for additional MPs (if any)
Appendix B EPA (SA) licence and exemption cross-references	Updated to reflect revised (post-SRE Project) EPA Licence 1301 (as required)
Appendix C EM Program ID, Environmental Outcomes, compliance criteria and leading indicators	Updated to reflect the environmental aspects and impacts register, revised with consideration to the outcomes of this EIS and the conditions of approval for the SRE Project (Section 12.1.4.2)

12.1.4 Changes to the EM Program

12.1.4.1 General

The current EM Program would be reviewed to ensure that the existing EM Programs IDs adequately cover the potential impacts and risks associated with the SRE Project as identified in this EIS and within the conditions of approval. The nature of this review is described in Table 12.2.

Table 12.2 | Proposed changes to the EM Program

General EM Program section	Proposed changes
Section X.X.2 Scope	The scope of each EM Program ID would be reviewed to ensure it reflects the change in scope associated with the SRE Project
Section X.X.6 Key risks	The key risks would be reviewed to ensure they reflect any additional risks identified within this EIS associated with the addition of SRE Project infrastructure and activities
Section X.X.7 Environmental Outcome(s)	The Environmental Outcomes, compliance criteria and leading indicators would be reviewed, following revision of the environmental aspects and impacts register with the outcomes of impact assessments presented in this EIS (Section 12.1.4.2) to ensure that they remain relevant and appropriate. See also changes to Appendix C to the EMM, described in Section 12.1.3
Section X.X.8 Compliance criteria	
Section X.X.9 Leading indicators	
Section X.X.10 Management plan(s)	The referenced management plans would be reviewed as necessary to ensure they remain relevant in the context of the addition of the SRE Project infrastructure and activities. Should additional or new management plans be required, cross-references would be added to the relevant EM Program ID
Section X.X.12 Control and management actions	Control and management actions are to be updated to reflect those identified for each confirmed impact events within this EIS. Where there is a reliance on a control and or management action to mitigate an impact or risk to an acceptable level, these control and management actions would also have a leading indicator developed, where an appropriate indicator can be identified

12.1.4.2 Review of Environmental Outcomes and criteria

Chapter 10 presented the assessment of impact significance for the confirmed impact events. Impact significance was assigned a level between Level 1 to Level 5. Confirmed impact events which were assessed as having an impact significance of Level 1 or Level 2 were considered not significant, and those with an assessed impact significance of Level 3 to Level 5 considered significant.

The 131 potential impact events were distributed by impact significance as follows, with the balance determined not to have an SPR linkage:

- not significant:
  - significance Level 1 – 30 impact events
  - significance Level 2 – 64 impact events
- significant (Table 12.3):
  - significance Level 3 – 5 impact events
  - significance Level 4 – 0 impact events
  - significance Level 5 – 1 impact event.

A review of the adequacy of the existing Environmental Outcomes and compliance criteria nominated within the existing EM Program was undertaken for those confirmed impact events that were determined to be significant. This review was undertaken on the basis that these impact events were likely to be ranked more highly within the site aspects and impacts register due to their potential for more significant impacts. The review of Environmental Outcomes and compliance criteria is presented in Table 12.4.

The outcome of the review indicates that the existing Environmental Outcomes and compliance criteria adequately address some of the identified significant impact events, however additional 'Community Interaction' Environmental Outcomes and compliance criteria would be required to ensure that these impact events are managed appropriately. Indicative Environmental Outcomes and compliance criteria are proposed in Table 12.5, with final wording to be determined following receipt of the granted approval conditions, should the SRE Project be approved.

Table 12.3 | Confirmed impact events assessed as likely to have a significant impact

SPR ID	Impact event	Impact significance level	Receptor
A2	During operation, the combustion of fossil fuels leads directly to the emission of GHGs from combustion of fossil fuels in smelting activities and indirectly via the consumption of purchased non-renewable electricity from the National Electricity Market impacting on State and Commonwealth matters	5	State and Commonwealth matters
L4	During construction, the clearing of native vegetation for placement of SRE Project infrastructure may result in disturbance, removal or damage of cultural artefacts	3	Cultural heritage
SE9	During construction, the SRE Project results in reduced access to emergency services for existing residents in nearby communities due to increased demand for emergency services to respond to increased risk of traffic accidents and workplace accidents at Project site and on Olympic Dam Highway	3	Social value
SE10	During operations, the SRE Project results in reduced access to emergency services for existing residents in nearby communities due to increased demand for emergency services to respond to increased risk of traffic accidents and workplace accidents at Project site and on Olympic Dam Highway	3	Social value
SE21	Construction of the SRE Project results in potential community impacts (e.g. cohesion and vitality) in Roxby Downs due to an increase in non-resident workers	3	Social value
SE22	Operation of the SRE Project results in potential community impacts (e.g. cohesion and vitality) in Roxby Downs due to an increase in non-resident workers	3	Social value

Table 12.4 | Review of EM Program Environmental Outcomes and compliance criteria

EM Program	EM Program outcome[1]	Compliance criteria[1]	Leading indicators[2]	Opportunities, actions and targets[2]	SPR significance (Level 3 or above) cross-check	Revisions associated with the SPR Project
ID 3 Operation of industrial systems						
3.4 Greenhouse gas emissions	Contribute to stabilising global atmospheric greenhouse gas concentrations to minimise environmental impacts associated with climate change.	Progress on GHG and energy reduction and abatement opportunities that contribute to BHP strategy and response to climate change, and OD's contribution to that strategy, reported annually (EG3.2).	None applicable	Opportunity: • Continue to identify and implement energy efficiency projects for the existing operation to support Asset level GHG reductions Action: • None applicable Target: • None applicable	Relevant to SPR ID A2 SRE Project climate adaptation could comply with this existing criterion.	No changes proposed[3]
ID 5 Interaction with communities and State principles						
5.1 Community interaction	Residents in Roxby Downs, Andamooka and Woomera have a favourable view of ODC	Community concerns are tracked and all legitimate complaints are addressed where reasonably practicable (SE3.1)	None applicable	Opportunity: • Maximise opportunities for South Australian and Aboriginal employment and business participation at Olympic Dam by developing and implementing local procurement plans, and continue to explore opportunities to enable Aboriginal people and businesses to participate in Olympic Dam • Maintain and enhance the amenity and lifestyle of Roxby Downs as a desirable place to live and work by undertaking a regular (five yearly) assessment to understand key issues, and continue to build on best practice and learnings from other remote Australian mine sites • In collaboration with the South Australian Government and key stakeholders, identify indicators to assist in planning, delivering and monitoring social infrastructure provision • Work collaboratively with the South Australian Government and key stakeholders to investigate and deliver appropriate social services and infrastructure Action: • Complete and implement Olympic Dam Social Value Plan • Undertake the biennial Community Perception Survey to monitor local community perceptions of ODC, and of local services and facilities • Establish a formal community engagement mechanism which will provide regular engagement with community representatives and the provision of measurable shifts in community sentiment • Review and update local procurement plans with targets to maximise the participation of local, regional and State businesses and employment in supplying goods and services to Olympic Dam.	Relevant to SPR IDs SE9, SE10, SE21 and SE22	No changes proposed[3]

(1) Source: IMS Element 8 Environmental Management Manual
(2) Source: IMS Element 8 EM Program Annual Targets, Actions and Major Changes 2023
(3) The existing EM Program (outcome, compliance criteria and opportunities) was assessed as adequately covering the potential impacts and risks associated with SRE Project

Table 12.5 | Indicative additional Environmental Outcomes and compliance criteria

EM Program	EM Program outcome[1]	Compliance criteria[1]	Leading indicators[1]	Opportunities, actions and targets[2]	SPR significance (Level 3 or above) cross-check	Revisions associated with the SPR Project
ID 5 Interaction with communities and State principles						
5.2 Community health and safety	No significant adverse impacts to the health and safety of residents in Roxby Downs, Andamooka and Woomera	• Community concerns are tracked and all legitimate complaints are addressed where reasonably practicable • No significant increase in incident reports relating to community health and safety	None applicable	As new criteria, not associated with existing opportunities, actions or targets specified in the IMS Element 8 Environmental Management Program Annual Targets, Actions and Major Changes 2023	Relevant to SPR ID SE10	New criteria
5.3 Cultural heritage	During construction, operation and post completion ensure that there is no damage, disturbance or interference to Aboriginal heritage sites, objects or remains unless it is authorised under the relevant legislation	Prior to any ground disturbance that has the potential to affect Aboriginal heritage values, BHP will complete any required heritage assessments, consultation processes and statutory authorisations in accordance with the applicable legislative framework and approved heritage management arrangements	Land clearing has not been undertaken outside of areas defined in the associated land disturbance permit	As new criteria, not associated with existing opportunities, actions or targets specified in the IMS Element 8 Environmental Management Program Annual Targets, Actions and Major Changes 2023	Relevant to SPR ID L4	New criteria
		Activities within the EIGR Areas will be undertaken in accordance with the requirements of the AH Act 1988, including any required authorisations				
		No activity will proceed where Aboriginal heritage impacts cannot be appropriately managed through avoidance, mitigation and completion of all required approvals and authorisations				
		The applicable heritage authorisation pathway for each package of disturbance works will be confirmed during detailed design and prior to construction				

(1) Source: IMS Element 8 Environmental Management Manual
(2) Source: IMS Element 8 EM Program Annual Targets, Actions and Major Changes 2023

12.1.5 Changes to the Monitoring Programs

As with the EM Program, the various MPs would be updated to reflect additional monitoring as required to demonstrate the Environmental Outcome (via the compliance criteria and target criteria) are being achieved. Also, leading indicator criteria would be updated to ensure they continue to demonstrate that applied control and management actions are effective at mitigating potential impacts and reducing risks.

A review of the environmental aspects and impacts register, and the resultant Environmental Outcomes and criteria may identify the need for additional MPs (e.g. noise), subject to the outcomes of that review and the conditions of approval associated with the SRE Project.

A summary of the potential changes to each MP is detailed in Table 12.6.

Table 12.6 | Proposed changes to the MPs

Monitoring Program	Proposed changes
General (all MPs)	Updates throughout all MPs to reflect the addition of SRE Project infrastructure and activities to the existing operational scope
Airborne emissions	• Addition of section related to the additional smelter, detailing the new stacks to be monitored to demonstrate compliance with the Environment Protection (Air Quality) Policy 2016 and the requirements of an amended EP Licence 1301 • Revision of Section 3.3 to reflect the addition of the new slimes treatment plant and PMR, and related monitoring requirements
Energy use and greenhouse gas	No specific changes proposed
Environmental radiation	No specific changes proposed
Fauna	No specific changes proposed
Flora	• Review of the adequacy of existing perennial vegetation monitoring sites (Appendix A of the Flora MP) in the context of additional emissions sources associated with the SRE Project • Review of Section 3.4 and Section 3.5 to ensure that additional (if any) environmental offsets (SEB locations and characteristics) are described within the MP • Update to Appendix D of the Flora MP to reflect updates to SEB areas, as may be required
Great Artesian Basin	No specific changes proposed
Groundwater	No specific changes proposed
Waste	No specific changes proposed

12.1.6 Changes to Closure and Rehabilitation Management Plan

12.1.6.1 Current Closure and Rehabilitation Management Plan

IMS Element 8 – Closure and Rehabilitation Management Plan (BHP 2023e) is the IMS element that documents the current Olympic Dam closure objective and commitments and details how those will be met over the full life cycle of the operation. This document supports closure cost estimates, guides progressive rehabilitation, and outlines any knowledge gaps that need addressing throughout the life of the asset. The Closure and Rehabilitation Management Plan also specifies how Olympic Dam will implement the closure actions to achieve the agreed post-closure land-uses and the Environmental Outcomes.

Goals, objectives and post-mining land use

General rehabilitation goals for Olympic Dam are to create a post-mine land use that is safe to humans and wildlife, self-sustaining, stable and able to sustain an agreed post-mine land use. The rehabilitation objective for Olympic Dam is to create a safe, stable and self-sustaining landscape that is consistent with key stakeholder-agreed social and environmental values and creates optimal business value. Final land uses have been defined, as far as is reasonably achievable, as:

- within SML:
  - land use for rehabilitation at original ground level – revegetated vacant crown land with potential for restricted grazing
  - above-ground TRS facilities and below ground-level open pit – vegetation free (to the extent possible) vacant crown land with restricted public and fauna access
  - above ground RSF – naturally revegetated vacant crown land with restricted public and fauna access
- outside of SML:
  - land use consistent with neighbouring properties.

Closure domains

For closure planning purposes, Olympic Dam has been divided into 20 closure domains (Table 12.7) which are comprised of features which require similar closure methodologies, have similar landforms and similar post-mining land uses. Closure requirements and implementation works are similar within each domain, however, may vary between domains. The various elements within each domain will be closed and rehabilitated, where applicable, to a specified standard.

Table 12.7 | Olympic Dam closure domains

Closure domains	
Airport facilities	Haul roads
Town and village facilities	Mine roads, tracks, car parks and linear infrastructure
Processing plant, administration and other general buildings	Underground mine
TRS	Backfill areas
Pilot plant	Dam break barrier wall
Open (starter) pit	Low-level radioactive disposal facility
RSF	Exploration areas
Wellfields and associated infrastructure	General disturbance (low)
RRC and CWDF	General disturbance (medium)
Quarry	General disturbance (high)

Closure outcomes and criteria

High-level closure outcomes, assessment criteria and leading indicators have been defined for land disturbance, pest species, groundwater, air quality and radiation, TSF and RSF, waste disposal, and community interactions. These would continue to be developed as the closure knowledge base matures throughout the life of the asset. The closure outcomes are based on post-closure, to be achieved in the long-term following closure and rehabilitation activities and broadly align with the operational environmental management outcomes in the EPMP. Proposed indicators and criteria will be refined through ongoing trials, monitoring and investigation. A monitoring program would be established and updated as required, to track progress of rehabilitation, inform ongoing management and to demonstrate that rehabilitation has achieved or is trending toward the rehabilitation goals.

Closure risk management

The Closure and Rehabilitation Management Plan is supported by risk-based concept-level closure and engineering designs that use best practice technology. The risk assessment is used to ensure appropriate management of unplanned events that might occur at Olympic Dam during or post-closure. The level of detail in the plan is commensurate with the current stage of the Olympic Dam operations within the asset life cycle. Seven risk events were identified during the risk assessment that have the potential to influence the outcomes of achieving Olympic Dams closure objectives and outcomes. Within these, 37 (non-unique) scenarios were identified as potential contributors to the risk events eventuating. The risk events included impacts related to stakeholder engagement, financial resourcing, inability to relinquish and early closure, post-execution and post-closure and offsite impacts.

Progressive rehabilitation

The implementation of a successful, planned progressive rehabilitation program of disturbed areas will ensure that the obligations and liability associated with completing closure activities is progressively reduced consistent with closure planning principles. The operation has rehabilitated several disturbed areas that are no longer required by the mining or processing operations, as well as exploration sites and will continue to progressively rehabilitate lesser disturbances as the opportunity arises.

BHP is currently undertaking progressive closure trials to inform closure principles at Olympic Dam. These include TSF cover trials, evaporation pond dredging proof of concept, and implementation schedule for detailed planning for final mine closure execution. The integrated closure planning system followed within BHP ensures that additional studies (and research where required) is carried out to provide design data and to increase certainty and confidence in the design and implementation strategy well in advance of closure execution works. Outcomes from the research, study and consultation would be fed into the Closure and Rehabilitation Management Plan review, as part of the continuous improvement and development of the plan.

Post closure monitoring

Post-closure monitoring is included in the document to ensure requirements are appropriately understood and costed. At the current stage of planning, the monitoring requirements are generalised, but over time the post-closure monitoring program and schedule would be tailored to suit agreed completion criteria requirements. Ongoing monitoring, data collection and observation during operations are acknowledged as a key component in the eventual relinquishment of the site. The post-closure monitoring timeframe will depend on the complexity of the closure landforms, the post-closure land-use, and the completion criteria. The current proposed post-closure monitoring period is estimated to occur for 20 years. Monitoring will span across rehabilitation works, the TRS, open (starter) pit and RSF, surface water, groundwater, fauna weed and feral animal control, radiation and air quality, GAB recovery, and safety monitoring.

Stakeholder engagement

Planned stakeholder engagement will occur closer to the closure date when the implications of closure on the post-closure community can be better defined and understood. Effective stakeholder engagement throughout the project lifecycle will allow BHP to gather organisational and community perspectives to help inform the mine closure process and goals.

Unplanned closure

The document outlines closure planning practices in the event of unplanned or temporary closure. In the event of unexpected or unplanned closure, the mining operation would continue to be treated as an operational asset under BHP Group Standards, with the necessary resources being provided to meet all existing health, safety, environment and community standards until closure, rehabilitation and relinquishment are complete. In the unlikely event that the operation is required to be shut down on a temporary basis, similar management controls would be put in place as described for unplanned closure. Temporary closure would also trigger a thorough risk assessment, the development of a care and maintenance plan, and a full review of the Closure and Rehabilitation Management Plan in response to an increased risk of early closure.

12.1.6.2 Changes identified

Considering the above, an initial gap analysis has been undertaken for the SRE Project components against the current Closure and Rehabilitation Management Plan (BHP 2023e) to highlight the extent and nature of revisions that may be required. This analysis indicates:

- SRE Project infrastructure would need to be allocated to a closure domain, however, is likely to fall within the existing Metallurgical Plant, Administration and Other General Buildings Domain and the General Disturbance – High Domain.
- Minor consistency-related updates to the Closure and Rehabilitation Management Plan may be required in the following sections:
    - Section 4 Project Overview – the project overview would need to be updated to include SRE Project-specific information as outlined in Section 6.1 of this EIS, and how they tie into overall closure requirements.
    - Section 4.1.3 Environmental Authorisations – environmental authorisations within the existing Closure and Rehabilitation Management Plan are up to date as of 30 June 2022. Table 4.2 within this section would require review and may be updated with additional licences and exemptions if granted, for the SRE Project.
    - Section 4.3 Current Disturbance – within the existing Olympic Dam Closure and Rehabilitation Management Plan current unrehabilitated surface disturbance is listed in Section 4.3 as 5,538 ha. This would be updated to align with Section 6.2.4.2, which specifies the addition of 479.90 ha of ground disturbance required for the SRE Project, of which 335.66 ha would occur on ground that has been subjected to existing disturbance, and 234.04 ha would require disturbance to vegetation.
    - Section 5.2 Legal and Statutory Commitments and Obligations – this section outlines all legal and statutory documentation and approvals relevant to the existing operation. Inclusive of environmental disturbance permits, historical EIS, EPBC Act approval, Ministerial approval, EPA approval, Retention Lease and Extractive Minerals Lease quarry permits, and the closure plan itself. This section would be updated to include the approval conditions associated with this EIS once granted.
    - Section 8 Site Characteristics and Knowledge Base – relevant updates to the site characteristics of Olympic Dam since May 2023 can be developed with consideration of the proposed SRE Project.
    - Section 8.3 Waste Material Characteristics – waste as a result of the SRE Project and associated waste management are discussed in Section 6.3.1.4, Section 6.3.2.1, Section 6.3.3.4, and Section 6.5.6, respectively. Where relevant, this information would need to be interbedded as to account for appropriate rehabilitation and closure considerations as a result of the SRE Project.
    - Section 8.10 Visual Amenity – the visual amenity of the existing Olympic Dam site may be impacted as a result of SRE Project activities. Consideration of components, and infrastructure associated with the construction and operation of the SRE Project should be considered when reviewing this section.

- Section 10.1.3 Metallurgical Plant, Administration and Other General Buildings – considering the SRE Project includes the addition of infrastructure, this section would need to be updated to specify the additional buildings, along with a review against the basis of design and activities listed in Table 10.4 to ensure alignment.

In addition to the above, a review of the description of the baseline environment would be undertaken, including consideration of the studies undertaken to support this EIS. A review of Closure Outcomes and Assessment Criteria (Table 12.8) would also be undertaken to confirm whether the SRE Project approval conditions (if granted) require changes to the Olympic Dam EPMP management outcomes which subsequently relate to the Closure and Rehabilitation Management Plan.

The current Closure Outcomes have been summarised below (Table 12.8) from the Closure and Rehabilitation Management Plan. An additional closure-related outcome has been identified in EM Program ID 1.1 (use of natural resources – land use and rehabilitation) and is included in Table 12.8. Given Olympic Dam's long mine life, specific, measurable, achievable, realistic and timely (SMART) closure criteria would continue to be developed as the closure knowledge base matures throughout the life of the asset. Performance indicators would continue to monitor whether closure objectives are on the trajectory of being achieved. The current closure outcomes are based on post-closure, to be achieved in the long-term following closure and rehabilitation activities, and broadly align with the operational environmental management outcomes in the EPMP.

Table 12.8 | Current closure outcomes and assessment criteria

EM Program	Environmental Outcomes	Assessment criteria	Leading Indicator	Applicable Domain(s)	Revision associated with the SRE Project
Use of Natural Resources					
Land disturbance and rehabilitation	• Rehabilitation provides a geotechnical and geochemically stable and safe environment to reduce the need for long-term monitoring and maintenance	• Rehabilitation of sites and their integration into adjacent land uses occurs as soon as reasonably practical and in accordance with the Leading Practice Sustainable Development Program for the Mining Industry. • Erosion resistant landforms achieved such that post-closure remediation works are not required. • Contaminated areas assessed in accordance with NEPM 1999 and where necessary remediated to EPA requirements under the EP Act and relevant guidelines criteria at the time of closure. • Monitoring (e.g. ecosystem function analysis) shows satisfactory rehabilitation progress with diversity and structure approaching that observed at appropriate reference areas	• Post-closure monitoring that indicates results trending away from completion criteria and other relevant criteria at the time of closure	• All rehabilitated domains	No changes proposed
Land use and rehabilitation*	• No significant adverse impacts to populations of listed species (South Australian, Commonwealth) as a result of the construction, operation and closure of Olympic Dam.	• No significant impact to the size of an important population of a community of native species dependent on natural discharge of groundwater from the Great Artesian Basin, including *Eriocaulon carsonii* • Note: Significant impact is as defined in the Significant Impact Guidelines and greater than predicted in the ODX EIS (BHP Billiton 2009). • No loss of an important population of Plains Rat (*Pseudomys australis*)	• None applicable	• Wellfields and Infrastructure (Stuart Shelf aquifer within the SML and Wellfield A and Wellfield B of the GAB) • All domains where *Pseudomys australis* are known to be present	No changes proposed
Spread of pest plants and animals	• No significant increase in the areas of infestation or abundance of declared pest plants, plant pathogens or pest animal populations as a result of closure.	• No material difference in abundance of declared pest species compared to appropriate reference areas. • No introduction of new self-sustaining declared pest populations post-closure as a result of BHP activities	• Post-closure monitoring that indicates abundance of declared pest species significantly higher than reference areas, or new introduced pest populations	• All domains	No changes proposed
Aquifer level drawdown	• No significant adverse impact on groundwater-dependent listed species or ecological communities associated with Olympic Dam activities. • No significant adverse impact on third-party groundwater users	• Groundwater yield for third-party users commensurate with agreed future land use.	• Groundwater availability trend in the Stuart Shelf area that may impact on existing third-party users • Groundwater availability trend in the GAB area that may impact on groundwater-dependent listed species or ecological communities associated with Olympic Dam activities	• Wellfields and Infrastructure (Stuart Shelf aquifer within the SML and Wellfield A and Wellfield B of the GAB)	No changes proposed
Groundwater quality	• No significant adverse impact on third-party groundwater users	• Groundwater quality for third-party users commensurate with agreed future land use.	• Evidence of water quality change (measured as pH or conductivity) at GAB springs. • Changes in groundwater quality in the Stuart Shelf area that may impact on existing third-party users	• Wellfields and Infrastructure (Stuart Shelf aquifer within the SML and Wellfield A and Wellfield B of the GAB)	No changes proposed
Operation of Industrial Systems					
Particulate emissions	• No adverse impacts to public health as a result of particulate emissions from the final landforms achieved.	• NEPM (ambient air) criteria for public exposure, or the relevant criteria at the time of closure, applied to final landforms.	• Evidence of particulate emissions trending towards NEPM (ambient air) criteria for public exposure, or the relevant criteria at the time of closure.	• All rehabilitated domains	No changes proposed
Radioactive emissions	• No adverse impacts to public health as a result of radioactive emissions from final landforms. • No significant adverse radiological impacts to ecological communities as a result of radioactive emissions from final landforms.	• A dose limit for radiation doses to members of the public of 1 mSv/y above natural background • Deposition of closed site originated ^{238}U less than 25 $Bq/m^2/y$ at non-human biota assessment sites	• Indications that a dose constraint of 0.3 mSv/y to members of the public above natural background will be exceeded • Indications that a reference level of 10 µGy/h for impacts on non-human biota above natural background will be exceeded	• All domains with potential for radioactive emissions	No changes proposed

EM Program	Environmental Outcomes	Assessment criteria	Leading Indicator	Applicable Domain(s)	Revision associated with the SRE Project
Generation of Industry Wastes					
Embankment stability of TSF	• Final landforms geotechnically stable.	• No significant TSF embankment failure.	• Indicator that the factors of safety are trending towards the values specified in the applicable ANCOLD guidelines for the closure design life	• Tailings Retention System	No changes proposed
Tailings and Rock Storage Facility seepage	• No significant adverse impact on vegetation as a result of seepage from the TSF or RSF post-closure. • No compromise of existing and future land uses on adjoining areas as a result of seepage from the TSF or RSF post-closure. • No compromise of the environmental values of groundwater outside the SML as a result of seepage from the TSF	• Surface and groundwater quality commensurate with agreed future land use (for third party users). • All TSF seepage attenuated within the SML, as demonstrated by a numerical geochemical model and confirmed by monitoring	• Groundwater monitoring that indicates surface and/or groundwater quality trending outside of agreed parameters • A numerical geochemical model trend that indicates that all TSF seepage may not be attenuated within the SML should the trend continue	• Tailings Retention System and Rock Storage Facility	No changes proposed
Stormwater discharge	• No significant adverse impact on local drainage patterns and water quality, arising from discharge associated with the final landform, which would compromise existing water use and water-dependent ecosystems.	• All contact storm water maintained within designated storm water management areas.	• Monitoring data that indicates surface water, groundwater or air quality trending outside of relevant criteria	• All domains with the potential to discharge stormwater	No changes proposed
Solid and liquid waste disposal	• No significant adverse impacts from solid or liquid wastes as a result of rehabilitation and closure.	• Relevant criteria at the time of closure, for surface water and groundwater and for air quality. • Landfill facility decommissioning and/or rehabilitation in accordance with EPA landfill guidelines and requirements.	• Monitoring data that indicates surface water, groundwater or air quality trending outside of relevant criteria	• All domains with the potential to generate solid or liquid waste	No changes proposed
Radioactive waste	• No adverse impacts to public health as a result of radioactive waste within final landforms. • No significant adverse radiological impacts to ecological communities as a result of radioactive waste within final landforms.	• A dose limit for radiation doses to members of the public of 1 mSv/y above natural background. • Deposition of closed site originated ^{238}U less than 25 Bq/m^2/y	• Indications that a dose constraint of 0.3 mSv/y to members of the public above natural background will be exceeded • Indications that a reference level of 10 µGy/h for impacts on non-human biota above natural background will be exceeded	• All domains containing radioactive waste	No changes proposed
Containment of waste rock	• Prioritise the re-use of waste rock throughout the Life of Asset or at closure. • In the event a permanent RSF, maintain structural integrity of the RSF.	• No unplanned structural failure to the RSF resulting in a significant adverse impact to third-party surface and groundwater users.	• Geotechnical monitoring indicating stability design criteria are not being met	• Rock Storage Facility	No changes proposed
Employment and Accommodation of People					
Community interactions and workplace interactions	• Communities in which BHP operates value their relationship with us.	• Safe conditions and controls to restrict inadvertent access to unsafe environments following rehabilitation	• None applicable	• All rehabilitation domains	No changes proposed

* This closure requirement reflects closure commitments with the EM Program ID 1.1 that are outside of the closure outcomes and assessment criteria currently reflected in the Olympic Dam Closure and Rehabilitation Management Plan



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13. Supporting information

13. SUPPORTING INFORMATION

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13.2 Abbreviated terms

13.2.1 Abbreviations and Acronyms

Table 13.1 | Abbreviations and acronyms

A	
Abbreviation	Definition
ADU	ammonium diuranate
AEP	annual exceedance probability
AEQ	Amenity and Environmental Quality
AH Act 1979	*Aboriginal Heritage Act 1979* (SA)
AH Act 1988	*Aboriginal Heritage Act 1988* (SA)
AI	artificial intelligence
AIM	anode insertion machine
Air Quality EPP	Environment Protection (Air Quality) Policy 2016
ALA	Andamooka Limestone Aquifer
ALARA	as low as reasonably achievable
ALARP	as low as reasonably practicable
ALS	Australian Laboratory Services
ANC	acid neutralising capacity
ANFO	ammonium nitrate fuel oil
APM	anode preparation machine
AQMS	air quality monitoring station
AR6	Sixth Assessment Report
AR7	Seventh Assessment Report
ARI	average recurrence interval
ARR	Arid Recovery Reserve
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measures 1999 (as amended in 2013)
ASS	acid sulphate soils
ASWM	anode scrap washing machine
AWS	automatic weather station

B	
Abbreviation	Definition
BAU	business-as-usual
BCR	benefit-cost ratio
BDAC	Barngarla Determination Aboriginal Corporation
BDBSA	Biological Database of South Australia

Abbreviation	Definition
BE	Biological Environment
BFX	Brownfield Expansion Project
BHP	BHP Olympic Dam Corporation Pty Ltd
BHP Group	BHP Group Limited
BoM	Bureau of Meteorology
BOO	build-own-operate
BOS	BHP Group Operating System
BPIP-PRIME	Building Profile Input Program – Plume Rise Model Enhancements
BTEX	benzene, toluene, ethylbenzene, and xylenes group chemicals
BTEXN	benzene, toluene, ethylbenzene, xylenes, and naphthalene

C	
Abbreviation	Definition
CBA	cost-benefit analysis
CCA	climate change adaptation
CCD	counter current decantation
CCGER Act	*Climate Change and Greenhouse Emissions Reduction Act 2007* (SA)
CCRA	climate change risk assessment
CCRE	Climate Change and Resource Efficiency
CEO	Chief Executive Officer
CEMP	construction environmental management plan
CET	control effectiveness test
CHAZOP	control hazard and operability
CoPC	contaminants of potential concern
CoRTN	Calculation of Road Traffic Noise
CONCAWE	Conservation of Clean Air and Water Europe
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSM	conceptual site model
CT	certificate of title
Cth	Commonwealth jurisdiction
CTMP	Construction Transport Management Plan
Cu:S ratio	copper-to-sulphur ratio
CWDF	Contaminated Waste Disposal Facility
CWMP	Contaminated Waste Management Plan
CWSM	cathode washing and stripping machine

D	
Abbreviation	Definition
DBF	direct-to-blister flash furnace
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEM	Department for Energy and Mining
DEW	Department for Environment and Water
DHUD	Department for Housing and Urban Development
DIT	Department for Infrastructure and Transport
DO	Desired Outcome
DSI	Detailed Site Investigation

E	
Abbreviation	Definition
EF	electric slag reduction furnace
EC	electrical conductivity
EIAF	Environmental Impact Assessment Framework
EIGR Area	Electricity Infrastructure Ground Re-profiling Area
EIL	Ecological Investigation Levels
EIS	Environmental Impact Statement
EL	exploration licence
EMM	Environmental Management Manual
EM Program	Environmental Management Program
EMS	environmental management system
EP Act	*Environment Protection Act 1993* (SA)
EPA	South Australian Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPMP	Environmental Protection and Management Program (EMM, EM Program and MPs)
ER	electrorefinery
ESG	environmental, social and governance
ESL	Ecological Screening Level
ESP	electrostatic precipitator
ETC	extratropical cyclone
EV	electric vehicle

F	
Abbreviation	Definition
FCF	flash converting furnace
FCR	Forum on Corporate Responsibility
FIFO	fly-in/fly-out

Abbreviation	Definition
FPIC	Free, Prior and Informed Consent
FSF	flash-smelting furnace
FTE	full-time equivalent
FY	financial year

G	
Abbreviation	Definition
GAB	Great Artesian Basin
GAI	geochemical abundance index
GDE	groundwater dependent ecosystem
GED	general environmental duty
GEL	geothermal exploration licence
GHG	greenhouse gas
GRI	Global Reporting Initiative
GRP	Gross Regional Product

H	
Abbreviation	Definition
H2H	Hill-to-Hill
HAZOP	Hazard and Operability
HDPE	high-density polyethylene
HFJV	Hatch | Fluor Joint Venture
HILs	Health Investigation Levels
HR	Hazards and Risks
HSEC	health, safety, environment and community
HSL	Health Screening Level
HSU	hydrostratigraphic unit

I	
Abbreviation	Definition
IBRA	Interim Biogeographic Regionalisation for Australia
ICMM	International Council on Mining and Metals
ICRP	International Commission on Radiological Protection
IMS	integrated management system
Indenture	Olympic Dam and Stuart Shelf Indenture
IPCC	Intergovernmental Panel on Climate Change
IPS	Identification Phase Study

J	
Abbreviation	Definition
No abbreviations	

K	
Abbreviation	Definition
KAC	Kokatha Aboriginal Corporation
KRI	Key Risk Indicator
KYA	Kuyani Yartah Association

L	
Abbreviation	Definition
LED	light-emitting diode
LGA	Local Government Area
LLRW	low-level radioactive waste
LM1	Olympic Dam Licence to Mine
LOPA	layers of protection analyses
LOR	limit of reporting
LOS	level of service
LPG	liquified petroleum gas
LRSE	Land, Regional and State Economics
LSA Act	*Landscape South Australia Act 2019* (SA)
LUSC	Land Use and Site Conditions

M	
Abbreviation	Definition
MDL	minimum detectable limit
metgas	metallurgical gas
MFG	Maximum Foreseeable Gain
MFI	Maximum Foreseeable Impact
MFL	Maximum Foreseeable Loss
MHF	Major Hazard Facility
Mining Act	*Mining Act 1971* (SA)
MLR WPA	Mount Lofty Ranges Water Protection Area
MNES	Matters of National Environmental Significance
MoU	Memoranda of Understanding
MP	Monitoring Program
MPA	maximum potential acidity

N	
Abbreviation	Definition
NAF	non-acid forming
NAG	net acid generation
NAPP	net acid production potential
NARCliM	NSW Australian Regional Climate Modelling
NATA	National Association of Testing Authorities
NEMP	National Environment Management Plan
NGER Act	*National Greenhouse and Energy Reporting Act 2007* (Cth)
NGO	non-government organisation
NHVR	National Heavy Vehicle Regulator
NMA	Northern Mining Area
Noise EPP	Environment Protection (Commercial and Industrial Noise) Policy 2023
NPI	National Pollution Inventory
NPR	neutralisation potential ratio
NPV	net present value
NPW Act	*National Parks and Wildlife Act 1972* (SA)
NTPRC	Native Title Party Representative Corporation
NV Act	*Native Vegetation Act 1991* (SA)
NVC	Native Vegetation Council
NWP	Northern Water Project

O	
Abbreviation	Definition
ODA	Olympic Dam Agreement
OD RDS	Olympic Dam Resource Development Strategy
ODS	Olympic Dam South
ODV	Olympic Dam Village
ODX	Olympic Dam Expansion Project
OHEM	Occupational Hygiene Exposure Management
OKDUGA Project	Oak Dam Underground Access Project
ONWD	Office of Northern Water Delivery
OTMP	Operational Traffic Management Plan
OSOM	oversize and over mass

P	
Abbreviation	Definition
P2NZ	pathway to net zero
PAF	potentially acid forming

Abbreviation	Definition
PAH	polycyclic aromatic hydrocarbons
PAM	prefabricated or preassembled module
PBS	Performance Based Standards
PDI Act	*Planning, Development and Infrastructure Act 2016* (SA)
PE	Physical Environment
PELA	petroleum exploration licence application
PETN	pentaerythritol tetranitrate
PFAS	per- and polyfluoroalkyl substances
PGR	Priority Group Risk
PHA	Process hazard Analysis
PHMP	Project Heritage Management Plan
PLUS	Planning and Land Use Services
PM_{10}	particulate matter less than 10 micrometres in aerodynamic diameter
$PM_{2.5}$	particulate matter less than 2.5 micrometres in aerodynamic diameter
PMR	precious-metal refinery
PMST	Protected Matters Search Tool
PPE	personal protective equipment
PSI	Preliminary Site Investigation

Q	
Abbreviation	Definition
QRA	quantitative risk assessment

R	
Abbreviation	Definition
Ratification Act	*Roxby Downs (Indenture Ratification) Act 1982*
RCP	representative concentration pathway
RDV	Roxby Downs Village
RFDS	Royal Flying Doctor Service
RnDP	radon decay products
RNP	Road Noise Policy (DECCW 2011)
RO	reverse osmosis
RPC Act	*Radiation Protection and Control Act 2021* (SA)
RRC	Resource Recovery Centre
RRR	residual risk rating
RWMP	Radioactive Waste Management Plan

S	
Abbreviation	Definition
SA	South Australia
SAAL	South Australian Arid Lands
SAAS	South Australia Ambulance Service
SAC	site assessment criteria
SAG	semi-autogenous grinding
SC	Social and Community
SCM27	Schedule Campaign Maintenance 2027
SDS	Safety Data Sheet
SEB	significant environmental benefit
SEG	Stakeholder Engagement Group
SFAIRP	so far as is reasonably practicable
SIA	social impact assessment
SIBX	sodium isobutyl xanthate
SISD	safe intersection sight distance
SLOS	sub-level open stope
SMA	Southern Mining Area
SMART	specific, measurable, achievable, realistic and timely
SML	special mining lease
SMS	Safety Management System
SPC	State Planning Commission
SPR	source-pathway-receptor
SPS	Selection Phase Study
SRE	Smelter and Refinery Expansion

T	
Abbreviation	Definition
TAPM	The Air Pollution Model
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TEC	threatened ecological community
THA	Tent Hill Aquifer
TRH	total recoverable hydrocarbons
TRS	tailings retention system
TSF	tailings storage facility
TSP	total suspended particulate

U	
Abbreviation	Definition
UC	uncertain
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UOC	uranium oxide concentrate

V	
Abbreviation	Definition
VAC	visual absorption capacity
VOC	volatile organic compound

W	
Abbreviation	Definition
WHB	waste heat boiler
WHS	Work Health and Safety
WMP	Waste Management Plan
WWTP	wastewater treatment plants

X	
Abbreviation	Definition
No abbreviations	

Y	
Abbreviation	Definition
No abbreviations	

Z	
Abbreviation	Definition
ZVI	zone of visual influence

13.2.2 Units of measure

Table 13.2 | Units of measure

Unit	Description	Unit	Description
^{o}C	degrees celcius	L	litre
%	per cent	L_{Aeq}	A-weighted, equivalent continuous sound level, in decibels having the same total sound energy as the fluctuating level measured
$/AUD$	Australian dollars	L_{Amax}	maximum A-weighted sound pressure level and is the 95 percentile of the highest value of the A-weighted sound pressure level reached within the day or night
US$	United States dollars	m^2	square metre
µBq	microbecquerel	m^3	cubic metre
µg	microgram	m	metre
µJ	microjoules	mbgl	metres below ground level
µm	microns	mAHD	metres Australian Height Datum
µS	microsiemen	mBq	milli becquerel
µSv	microSievert	mg	milligram
Bq	becquerel	ML	megalitre
Bqh	becquerel hour	mm	millimetre
Bt	billion tonnes	mSv	milliSievert
CO_2-e	carbon dioxide equivalent	Mt	million tonnes
cm	centimetre	Mtpa	million tonnes per annum
d	day	MVA	megavolt-ampere
dB	decibel	Mw	moment magnitude
dBA	A-weighted decibels	nJ	nano joules
g	gram	Nm^3	normal cubic metre
GWh	gigawatt hour	nSv	nanoSieverts
h	hour	oz.	ounce
ha	hectare	ppm	parts per million
kg	kilogram	pSv	picoSievert
kg H_2SO_4/t	kilograms of sulphuric acid per tonne	s	second
kL	kilolitre	t	tonne
km	kilometre	tpa	tonnes per annum
km^2	square kilometre	t/d or tpd	tonnes per day
ktpa	kilotonnes per annum	y	year
kV	kilovolt		

BHP