Title of Proposal - Olympic Dam Operations - Tailings Storage Facility Six

Section 1 - Summary of your proposed action

Provide a summary of your proposed action, including any consultations undertaken.

1.1 Project Industry Type

Mining

1.2 Provide a detailed description of the proposed action, including all proposed activities.

This referral outlines BHP Billiton Olympic Dam Corporation Pty Ltd's (BHP's) proposal to construct, commission, operate and close an additional tailings storage facility cell (TSF6) at the Olympic Dam mine and processing facility. TSF6 is required to provide Olympic Dam with sufficient tailings storage capacity to enable operations of up to approximately 200,000 tpa copper and associated products – known as Business as Usual operations (BAU).

The action is related to both existing BAU operations as well as the separate Olympic Dam Resource Development Strategy (OD-RDS) proposed action (currently in preparation) to enable production of up to approximately 350, 000 tpa copper and associated products. Approval for this current TSF6 action is sought for the BAU phase operations only, up to the point of approval of the OD-RDS proposed action. Approval for OD-RDS will seek separate approval for the continuation of TSF6 as part of OD-RDS. Therefore in the event that the OD-RDS action is approved, from that point on the continuation of TSF6 will form part of the OD-RDS action.

The proposed TSF6 will be located to the west of, and adjacent to, the existing TSF5 cell in Olympic Dam's tailings retention facility. The new TSF6 cell will have an evaporative area of approximately 285 hectares (ha) and share a common wall with TSF5. The total footprint area for TSF6 is 416ha. The two facilities, TSF5 and TSF6, will be operated as a combined single system, as the disposals piping will be common to both cells. Approximately 116 ha within the TSF footprint has already been cleared.

Approximately 250ha of additional land within the Special Mining Lease (SML) may be required to support the construction and operation of TSF6 for soil stockpiles, borrow pits and laydown yards. These will be located on previously disturbed land where ever possible and some will be temporary in nature.
The use of previously disturbed areas where possible, will reduce total environmental disturbance from TSF6 activities.

Construction of TSF6 is currently planned to commence in November 2019, with commissioning commencing in June 2021.

A further detailed description including maps and schematic drawings are provided in Attachment A.

1.3 What is the extent and location of your proposed action? Use the polygon tool on the map below to mark the location of your proposed action.

Area	Point	Latitude	Longitude
TSF6 Cell	1	-30.408073002122	136.81989737791
TSF6 Cell	2	-30.408043390702	136.81986304878
TSF6 Cell	3	-30.420567456358	136.8236739282
TSF6 Cell	4	-30.420597063979	136.82566520122
TSF6 Cell	5	-30.420449034819	136.82693549437
TSF6 Cell	6	-30.425185856535	136.82837745412
TSF6 Cell	7	-30.42885673338	136.81110831855
TSF6 Cell	8	-30.426754874409	136.80733176826
TSF6 Cell	9	-30.410560175756	136.80300590208
TSF6 Cell	10	-30.408043390702	136.80475684761
TSF6 Cell	11	-30.403897958491	136.82109900755
TSF6 Cell	12	-30.405704204695	136.8218543218
TSF6 Cell	13	-30.408073002122	136.81989737791
supporting infrastructure north	1	-30.40392756665	136.82051536253
supporting infrastructure north	2	-30.403957179319	136.82044669379
supporting infrastructure north	3	-30.405260046521	136.81539985036
supporting infrastructure north	4	-30.403809124922	136.81488486623
supporting infrastructure north	5	-30.406326019131	136.80225059045
supporting infrastructure north	6	-30.399633896709	136.80231925396
supporting infrastructure north	7	-30.396406118884	136.81807776889
supporting infrastructure north	8	-30.40392756665	136.82051536253
supporting infrastructure west_1	1	-30.412425514395	136.8019072677
supporting infrastructure west_1	2	-30.412307082977	136.8018386042
supporting infrastructure west_1	3	-30.41221825706	136.80249091795
supporting infrastructure west_1	4	-30.422699053356	136.80534049524
supporting infrastructure west_1	5	-30.423172732243	136.80331489047
supporting infrastructure west_1	6	-30.418643056926	136.8019072677

Area	Point	Latitude	Longitude
supporting infrastructure west_1	7	-30.412425514395	136.8019072677
supporting infrastructure west_2	1	-30.425541105732	136.80609580687
supporting infrastructure west_2	2	-30.425511504128	136.80609580687
supporting infrastructure west_2	3	-30.425511504128	136.80613013862
supporting infrastructure west_2	4	-30.429241574206	136.80698844551
supporting infrastructure west_2	5	-30.430218475365	136.80197593382
supporting infrastructure west_2	6	-30.426488438125	136.8019072677
supporting infrastructure west_2	7	-30.425541105732	136.80609580687
supporting infrastructure south	1	-30.426429230967	136.8232962737
supporting infrastructure south	2	-30.425570707326	136.82762214249
supporting infrastructure south	3	-30.42565952109	136.82985374039
supporting infrastructure south	4	-30.426754872151	136.83157035416
supporting infrastructure south	5	-30.4305441039	136.83260032242
supporting infrastructure south	6	-30.434629204409	136.81371756834
supporting infrastructure south	7	-30.432083435981	136.81320258421
supporting infrastructure south	8	-30.429715221326	136.82418891495
supporting infrastructure south	9	-30.426429230967	136.82333060807
supporting infrastructure south	10	-30.426429230967	136.8232962737

1.5 Provide a brief physical description of the property on which the proposed action will take place and the location of the proposed action (e.g. proximity to major towns, or for off-shore actions, shortest distance to mainland).

TSF6 will be constructed adjacent to existing tailings storage facilities located on the SML and within the boundaries of the Olympic Dam mine site. The boundaries of the SML and key physical features of the Olympic Dam mine and processing plant are shown in Attachment A, Figure 1.

The nearest communities include the township of Roxby Downs approximately 16 kilometres to the south, established in 1988 to service the Olympic Dam operation and house the majority of the workforce. Current population of Roxby Downs is around 4,000. Other nearby communities include Andamooka, approximately 30 kilometres to the east, and Woomera, approximately 90 kilometres to the south.

1.6 What is the size of the proposed action area development footprint (or work area) including disturbance footprint and avoidance footprint (if relevant)?

666 hectares

1.7 Is the proposed action a street address or lot?

Lot

1.7.2 Describe the lot number and title. Volume 5140 Folio 575 (Section 1475 and 1516 Out of Hundreds (Andamooka))

1.8 Primary Jurisdiction.

South Australia

1.9 Has the person proposing to take the action received any Australian Government grant funding to undertake this project?

No

1.10 Is the proposed action subject to local government planning approval?

No

1.11 Provide an estimated start and estimated end date for the proposed action.

Start date 11/2019

End date 06/2021

1.12 Provide details of the context, planning framework and State and/or Local government requirements.

Olympic Dam operates subject to a number of State Acts, licenses and approval conditions including:

- The Roxby Downs (Indenture Ratification) Act 1982 (***Ratification Act***) – The Act provides statutory authority for an agreement (***Indenture***) between BHP and the State of South Australia. The Indenture establishes the legal framework for existing and future operations at Olympic Dam and defines the roles and responsibilities of the South Australian Government and BHP.

- Environmental Protection and Management Program (***EPMP***) –Defines BHP's commitments and obligations relating to protection, management and rehabilitation of the environment.

- South Australian Environment Protection Authority (***EPA***) Licence 1301 – This licence authorises BHP to undertake activities of environmental significance under the Environment Protection Act 1993 subject to certain conditions.

- Licence LM1 – issued under the Radiation Protection and Control Act 1982 for standards relating to the Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (***ARPANSA***)

- Special Water Licences (***SWLs***) – BHP holds two SWLs, issued under the Indenture, which provide conditional authorisation to extract water from the Great Artesian Basin for supply to the operation.

1.13 Describe any public consultation that has been, is being or will be undertaken, including with Indigenous stakeholders.

BHP's approach to engaging with and supporting communities and stakeholders is set out in the document *Our Requirements for Communications, Community and External Engagement and associated Community Standard*. Open and honest dialogue with stakeholders, providing opportunities to be involved and to provide feedback on expectations, concerns and interests are important tenets of the Community Standard.

BHP maintains ongoing relationships with Aboriginal groups. Following a comprehensive process of negotiation and consultation over a number of years, BHP entered a number of agreements with indigenous stakeholders that relate to BHP's operations at Olympic Dam. They are the Olympic Dam Agreement in 2008, the Olympic Dam ILUA in 2012 and the Kokatha Settlement ILUA which was registered in 2014. Those agreements form the foundation for BHP's engagement with indigenous groups, provide consent for BHP's activities at Olympic Dam, including TSF6, and outline how heritage values will be managed as per an agreed heritage protocol. In line with these Agreements, BHP meets with the Kokatha, Barngarla and Kuyani people (the Aboriginal Groups party to the Olympic Dam Agreement) regularly through the Advisory Council and Liaison Officer to discuss operational matters, including TSF6. BHP will continue to use this forum and other engagement mechanisms to provide information and seek feedback on the project as it progresses. Further detail on how heritage values have been assessed and will be managed for TSF6 is provided in section 3.9.

BHP maintains ongoing consultation with stakeholders regarding current and proposed operations at Olympic Dam through a number of avenues including regular meetings with its Aboriginal stakeholders and briefings to community groups and Government agencies.

Community consultation of BHP's operational plans at Olympic Dam is a continuing element of our community engagement activities through a variety of channels including regular discussions with the Roxby Downs Council, the Roxby Downs Community Board, discussions with nearby Pastoralist stations, and regular discussions with regional traditional owner groups. Most recently, following the release of the Company's financial results for the half year ended December 2018, BHP provided a technical update on the Company's tailings portfolio and stewardship in South Australia to Local, State and Federal Government as well as a community update via the Roxby Downs Community Board.

BHP has communicated with the Roxby Council, the Community board and the Kokatha Aboriginal Corporation advising them about TSF6 and requesting the opportunity to brief them in detail to undertake further consultation about the proposed project.

1.14 Describe any environmental impact assessments that have been or will be carried out under Commonwealth, State or Territory legislation including relevant impacts of the project.

Initial ODC operations commenced in 1988 following an Environmental Impact Statement (EIS) completed in 1982 for mining up to 150,000 tonnes per annum of copper (tpa Cu) and associated products. In 1997 an additional EIS was completed for a phased expansion of the underground mining and surface processing facilities to 350,000 tpa Cu (and associated products), with the first phase of up to approximately 200,000 tpa Cu and associated products. The first expansion phase has already been substantially implemented and is referred to as BAU. This included assessment of tailings storage facilities.

Since the 1997 EIS, the following approvals and required assessments relative to the Tailings Storage Facilities have been undertaken.

A. State Approvals

a. **TSF5 -** Construction, Operation and Commissioning (*Approval required under Section 2.9.2 and 2.9.3 of the Code of Practice: Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing' (**The Mining Code**) which Olympic Dam is required to comply with under the Radiation Protection and Control Act 1982 and the Roxby Downs (Indenture Ratification) Act 1982).*

Project Summary: A new TSF (TSF5) was constructed in 2011. The TSF was located north of the exiting TSF's (and immediately east of the proposed TSF6) to allow for additional tailings capacity to support ongoing operations.

Key Considerations

Embankment Stability.Impact to fauna due to interaction with tailings liquor.Impact to flora from a spill or lateral seepage.Impact to flora from airborne mist and dust.Impact to flora from a groundwater level rise resulting from base seepage.Impact to groundwater quality resulting from base seepage.Radiological impacts and controls.

Key Management Actions

The addition of a Y shaped decant arrangement, to facilitate control of the decant pond size and location and reduce the availability of attractive habitats, particularly to wading birds.Incorporation of internal and external windrows on embankment to restrict entry of terrestrial fauna.Pipeline integrity measures and bunding to reduce the potential impact of pipeline spills.Installation of a toe drain to intercept lateral seepage and minimise the impact to flora.Installation of central underdrainage system to reduce the potential for lateral seepage.Flexibility and robustness of the tailings delivery system and operational strategy to reduce potential for dust lift-off.

Assessment Conclusion

Construction approval - TSF5 was approved for construction (in accordance with section 2.9.2 of The Mining Code) by the Minister for Mineral Resources Development subject to conditions on 26 November 2010.

Commissioning and operation approval - TSF5 was approved for commissioning and operation (in accordance with section 2.9.3 of The Mining Code) by the Minister for Mineral Resources Development subject to conditions in August 2011.

b. TSF4 Wall Raise (*Approval under Section 2.9.5 of the Mining Code* which Olympic Dam is required to comply with under the *Radiation Protection and Control Act 1982* and the *Roxby Downs (Indenture Ratification) Act 1982).*

Project Summary – Original construction approval for TSF4 was to a maximum height of RL131. To prolong the life of TSF4 and delay the requirement to construct TSF6, BHP sought and received approval for a final wall height of RL141.

Key Considerations

Embankment Stability.Seepage.Radiological impacts.Fauna Interaction.

Key Management Actions

Continued implementation of the environmental monitoring regime.Comprehensive monitoring, data review and auditing programs to monitor the performance of embankment stability criteria.

Assessment Conclusion

The project to raise the final height of TSF4 was approved by the State regulatory authorities subject to conditions.

c. TSF4 buttress install (Approved under the *Radiation Protection and Control Act 1982* in

accordance with Section 2.9.2 of the Mining Code).

Project Summary –A buttress was installed on TSF4 to ensure the ANCOLD recommended factors of safety could be maintained as the height of the cell was increased.

Key Risks

Embankment Stability.Fauna Interaction.Radiological impacts.

Key Management Actions

Internal environmental Disturbance Permit process followed to reduce impact on regionally common flora and fauna.Continuation of existing comprehensive monitoring, data review and auditing programs as they relate to TSF Embankment Stability.

Assessment Conclusions

Construction of buttress was approved by the Director Mining, Radiation and Regulatory Support subject to conditions in January 2017

d. TSF6 Approval

TSF6 construction: approval will be sought under Section 2.9.2 of the 'Code of Practice: Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing', which is applicable by virtue ofthe

Roxby Downs (Indenture Ratification Act) 1982 (which requires compliance with the Mining Code); and*Radiation Protection and Control Act 1982* – Licence LM1 (which requires compliance with the Mining Code and includes requirement for Radiation Management Plan and Radioactive Waste Management Plan)

TSF6 commissioning and operation: approval under Section 2.9.3 of the 'Code of Practice: Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing' required by:

the Indenture (which requires compliance with the Mining Code); and*Radiation Protection and Control Act 1982* - Licence LM1 (which requires compliance with the Mining Code and includes requirement for Radiation Management Plan and Radioactive Waste Management Plan)

Works Approval pursuant to South Australian Environment Protection Authority (***EPA***) Licence 1301

Key Considerations

Embankment Stability.Seepage - Impact to flora from a groundwater level rise resulting from base seepage and/or impact to groundwater quality resulting from base seepage.Impact to fauna during construction and due to interaction with tailings liquor.Impact to flora during

construction, or from a spill or lateral seepage.Radiological impacts and controls.

Management measures

As described in detail in this referral

B. Commonwealth Assessments

TSF4 Wall Raise (Assessed in accordance with the *Environment Protection Biodiversity Conservation Act, 1999)*

Project Summary

Original construction approval for TSF4 was to a maximum height of RL 131. To prolong the life of TSF4 and delay the requirement to construct TSF6, BHP sought and received approval for a final wall height of RL 141. (Note that in the 4 (four) years since this approval, BHP has raised the height of TSF4 to RL 134. BHP does not intend to further raise the wall of TSF4 beyond RL 136. A trade-off study determined that a new TSF provided economic and operational benefits over the continued construction of a buttress on TSF4 (required to continue with the wall raise). As such, BHP is now pursuing the construction of TSF6 to meet operational needs. The environmental impacts of not raising to RL 141 will mean that the final life of mine tailings footprint will be slightly larger than if the raise to the fully approved height of RL 141 occurred. The heightened risk to avi-fauna is expected to be minimal given that the surface area of liquor will remain reasonably constant as TSF6 receives the tailings liquor previously going to TSF4.)

The proposed action triggered the Nuclear Action MNES, however, impacts to the environment were assessed as not significant at the time of referring.

Key Considerations

Impacts to the environment resulting from a Nuclear Action.Impacts to threatened species.Impacts to listed migratory species.Embankment Stability.Seepage.

Key Management Actions

Continued implementation of the existing environmental monitoring regime.Comprehensive monitoring, data review and auditing programs to monitor the performance of embankment stability criteria.

Assessment Conclusion

The proposed action was determined by the Department to be Not a Controlled Action.

Additional relevant assessment information

BHP has recently formulated the Olympic Dam Resource Development Strategy (OD-RDS) which involves a number of projects (currently the subject of feasibility studies) which, if approved by the Board of BHP, would provide for the potential to increase copper production from approximately 200,000 tpa Cu and associated products through a staged expansion to up

to 350,000 tpa Cu and associated products. This will be referred separately under the EPBC Act. OD-RDS will be a brownfields expansion and so utilise BAU facilities and operations (including TSF6) as much as possible.

TSF6 is required to enable BAU and so is being referred separately to OD-RDS. However, if and when OD-RDS is approved, TSF6 (being a BAU action) will then be used as part of the operating OD-RDS. The OD-RDS action will therefore seek approval for, and assess the impacts of, TSF6 as part of OD-RDS, and this current action is only seeking approval for TSF6 as part of BAU.

For completeness, it is noted that an EIS was also undertaken in 2009 and separate approvals granted in 2011 for a major open pit expansion referred to as Olympic Dam Expansion (ODX). There are no plans to progress with ODX at this time.

Previous EIS and current Management Plans are available at the BHP website https://www.bhp.com/environment/regulatory-information, under the headings ‘Copper’ and then ‘Olympic Dam’.

1.15 Is this action part of a staged development (or a component of a larger project)?

No

1.16 Is the proposed action related to other actions or proposals in the region?

Yes

1.16.1 Identify the nature/scope and location of the related action (Including under the relevant legislation).

See section 1.14 of this referral.

Section 2 - Matters of National Environmental Significance

Describe the affected area and the likely impacts of the proposal, emphasising the relevant matters protected by the EPBC Act. Refer to relevant maps as appropriate. The interactive map tool can help determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur in your area of interest. Consideration of likely impacts should include both direct and indirect impacts.

Your assessment of likely impacts should consider whether a bioregional plan is relevant to your proposal. The following resources can assist you in your assessment of likely impacts:

• Profiles of relevant species/communities (where available), that will assist in the identification of whether there is likely to be a significant impact on them if the proposal proceeds;

• Significant Impact Guidelines 1.1 – Matters of National Environmental Significance;

• Significant Impact Guideline 1.2 – Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies.

2.1 Is the proposed action likely to have ANY direct or indirect impact on the values of any World Heritage properties?

No

2.2 Is the proposed action likely to have ANY direct or indirect impact on the values of any National Heritage places?

No

2.3 Is the proposed action likely to have ANY direct or indirect impact on the ecological character of a Ramsar wetland?

No

2.4 Is the proposed action likely to have ANY direct or indirect impact on the members of any listed species or any threatened ecological community, or their habitat?

Yes

2.4.1 Impact table

Species	Impact
Thick-billed Grasswren Amytornus modestus (Vulnerable)	Thick-billed Grasswren's preferred habitat is chenopod shrublands dominated by Atriplex spp. and Maireana spp. which are present east

Species	Impact
	of the SML near Andamooka and also north of the operation, including the wellfields region. This habitat is not present in the TSF6 footprint and will not be affected by TSF6 operations. Numerous records exist from the Olympic Dam region, outside of the SML. The species was not recorded in targeted surveys of its preferred habitat east of the SML in surveys for the Olympic Dam Expansion. Given the lack of suitable habitat on the TSF6 site and the relatively small area of clearance relative to potential regional habitat, significant or even material impacts are very unlikely.
Curlew Sandpiper Calidris ferruginea (Critically endangered)	In Australia, Curlew Sandpipers occur around the coasts and are also quite widespread inland. In South Australia, they occur in coastal and subcoastal areas east of Streaky Bay. Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish water. None of these habitats exist on the TSF6 site and there are no key feeding grounds within the SML. There is only one record of the occurrence of this species at the existing TSFs between June 2005 and November 2018. Given such infrequent visitation, it is very unlikely that the proposed action will significantly or even materially impact this species.
Greater Bilby Macrotis lagotis (Vulnerable)	Locally extinct, the Greater Bilby was reintroduced to Arid Recovery fenced reserve. It has been recorded breeding outside Arid Recovery on the SML and surrounding pastoral properties, although the release of the Greater Bilby outside Arid Recovery has been largely unsuccessful due to predation. Its main threats are feral cats and foxes and, consequently, Arid Recovery represents an important population. The proposed action does not affect Arid Recovery. Therefore, the proposed action will not have a significant or material impact on this species.

Species	Impact
Numbat Myrmecobius fasciatus (Endangered)	The Numbat is locally extinct and was reintroduced to Arid Recovery. Two Numbat males were last seen in 2007 and the species is unlikely to have persisted. Therefore, the construction of TSF6 will not have a significant or material impact on this species.
Plains Rat Pseudomys australis (Vulnerable)	The Plains Rat is the only listed species that could be reasonably likely to occur in the proposed disturbance area for TSF6. Plains Rat critical habitat typically consists of canegrass (Eragrostis australasica) swamps and in swales with cottonbush (Maireana aphylla) gilgais containing deep cracking soils (Moseby 2012a). Chenopod shrublands dominated by Atriplex vesicaria and Maireana astrotricha as well as canegrass swamps dominated by Eragrostis australasica are favourable Plains Rat refuge habitat if they support areas of deep wide cracks in friable clay (Moseby 2012a). The current distribution of the Plains Rat is restricted to the gibber plains of northern South Australia over an area of about 600 km. The area of occupancy for the Plains Rat is estimated at approximately 20,000 km2 although the actual area of occupancy is considered to be much smaller (Moseby 2012b). It is likely that no population of this species is permanently associated with a particular habitat patch. Rather, the Plains Rat utilises a patchwork of primary core areas with only rare widespread dispersal between regions (Species Profile and Threats Database). The Plains Rat has been recorded within the SML and more extensively within Arid Recovery. Potentially suitable refuge habitat within the TSF6 construction footprint was surveyed for the presence of Plains Rats. The survey method involved identifying potential refuge habitats and observing for evidence of Plains Rats (including tracks and scats) within 43 survey sites (approximately 4ha in area) across the proposed disturbance footprint. The survey found no visible evidence of Plains Rats indicating that they are unlikely to be present in material numbers within the disturbance footprint. Cracking clay was found at only three of the 43 targeted survey sites, however no evidence of Plains Rat tracks, runways, scats or burrows were observed

Species	Impact
	within the survey sites. However, if there are areas used as refuge habitat, it is expected to be minor and in relatively poor condition due to its close proximity to previous disturbance and existing operations. In addition, the habitat at TSF6 is well represented across the region. Clearing for TSF6 would affect less than 0.01% of potential habitat for the Plains Rat and is, therefore, unlikely to have a significant or material impact on the Plains Rat population as a whole.
Other fauna species	The protected matters search tool (PMST) notes that translocated populations of the following EPBC listed species occur in the area: Burrowing Bettong (Bettongia lesueur), Greater Stick-nest Rat (Leporillus conditor), Western Barred Bandicoot (Perameles bougainville). These are all within Arid Recovery which will not be impacted by TSF6. While not identified by the PMST, the Western Quoll (Dasyurus geoffroii; Vulnerable) was also reintroduced to Arid Recovery in 2015. There are currently thought to be between 26-38 quolls in and nearby the reserve. The construction and operation of TSF6 will not have a significant or material impact on an important population of Western Quoll. The Plains Wanderer (Pedionomus torquatus; Critically Endangered), also not identified by the PMST, was recorded as a vagrant in the Roxby Downs Township. As this is a single record, TSF6 will not significantly or materially impact this species.
Frankenia plicata Endangered	The PMST notes that Frankenia plicata (Endangered) may occur in the area. Preferred habitat is minor drainage lines and outwash plains with stony surfaces and loamy sand or clay sand soils. The TSF6 site does not provide suitable habitat. It has not been identified on the SML despite 30 years of surveys. Consequently, the proposed action will not significantly or materially impact this species.

2.4.2 Do you consider this impact to be significant?

No

2.5 Is the proposed action likely to have ANY direct or indirect impact on the members of any listed migratory species, or their habitat?

Yes

2.5.1 Impact table

Species	Impact
Background – migratory species	The PMST identifies the following migratory species may occur in the area of the proposed action. Grey Wagtail, Yellow Wagtail, Common Sandpiper, Sharp-tailed Sandpiper, Curlew Sandpiper, Pectoral Sandpiper, Oriental Plover, Osprey. All of the above species have a very broad distribution across Australia, with many favouring coastal habitats. The Grey Wagtail and Yellow Wagtail are regarded as vagrants in South Australia and are, therefore, unlikely to be significantly or materially impacted by TSF6. In addition to the species identified in the PMST, the following species have been recorded at Olympic Dam: Red-necked Stint, Grey Plover, Caspian Tern, Gull-billed Tern, Common Greenshank. There is no preferred habitat for listed migratory species on the SML. Instead, the potential for impacts on migratory species derive from exposure to acidic liquor in the TRS. This could result in deaths of migratory species. The total recorded number of migratory species during weekly observations at the existing OD tailings retention system between June 2005 and November 2018 is as follows: Species Common Sandpiper (Actitis hypoleucos) 16 Sharp-tailed Sandpiper (Calidris acuminata) 42 Curlew Sandpiper (Calidris ferruginea) 1 Oriental Plover (Charadrius veredus)3 Red-necked Stint (Calidris ruficollis)27 Grey Plover (Pluvialis squatarola) 4 Caspian Tern (Hydroprogne caspia) 10 Gull-billed Tern (Gelochelidon nilotica) 50 Common Greenshank (Tringa nebularia) 3 These figures can only be regarded as indicative as monitoring only occurs once a week. Therefore, carcasses floating in the liquor may sink and disappear before being recorded; and some fauna species may leave the system and die elsewhere. Despite these limitations, they do provide an important and relevant indication of visitation to

Species	Impact
	the site. It is clear that the Curlew Sandpiper, Oriental Plover, Grey plover and Common Greenshank rarely visit the site. As there are no records of visitation for the Pectoral Sandpiper and Osprey, it can also be assumed they rarely, if ever, make use of the site. Consequently, these species are unlikely to be significantly impacted. The below assessment therefore focuses on the species above about which there is evidence of visitation.
Common Sandpiper Actitis hypoleucos	The Common Sandpiper is found along all coastlines in Australia and in many areas inland. The population in Australia is concentrated in northern and western Australia. It utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The species does not breed in Australia. The total population of the Common Sandpiper is around 2.5 – 4.0 million. The population within Australia is estimated at 3000. The proposed action is unlikely to have a significant or material impact on this species given its low level of visitation to both Australia and Olympic Dam compared to total species numbers.
Sharp-tailed Sandpiper Calidris acuminata	The Sharp-tailed Sandpiper spends the non-breeding season in Australia, mostly in the south-east. It is widespread in both inland and coastal locations and in both freshwater and saline habitats. Many inland records are of birds on passage. It prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. An estimated 85,000 Sharp-tailed Sandpipers occupy the East Asian-Australasian Flyway. During the non-breeding season, 39 important sites have been identified in Australia. A site is important if it is occupied by more than 1% of the bird’s total population (i.e. at least 1545 birds). Consequently, 44 observations during weekly monitoring over 13 years represents very low visitation to the SML. This is well below a level that could be considered an ecologically significant or even material proportion of the population or indicate the SML is an important site. Given this and the lack of suitable habitat, TSF6 is unlikely to have a

Species	Impact
	significant or material impact on this species.
Red-necked Stint Calidris ruficollis	The Red-necked Stint is distributed along most of the Australian coastline with large densities on the Victorian and Tasmanian coasts. It has been recorded in all coastal regions and found inland in all states when conditions are suitable. The Australian population is estimated at 353 000, although the latest estimate of world population may be as low as 315 000. Either way, with 27 recordings over 13 years, it is clear that the level of visitation is orders of magnitude below an ecologically significant proportion of the population. Consequently, TSF6 is unlikely to have a significant or material impact on this species.
Caspian Tern Hydroprogne caspia	The Caspian Tern has a widespread occurrence in Australia and can be found in both coastal and inland habitat. In South Australia, in addition to coastal locations, it is found inland along the Murray River with many records in north-eastern South Australia. Visitation to Olympic Dam would appear to be very low with 9 records over 13 years. Global population is estimated as 240 000 – 420 000 birds. TSF6 is unlikely to significantly or materially impact this species.
Gull-billed Tern Gelochelidon nilotica	The Gull-billed Tern is found on all continents except Antarctica. In Australia, it occurs along the coast and inland. The population in South Australia is considered to be secure. There are 32 573 occurrence records in the Atlas of Living Australia. Given the 39 recordings over 13 years on the SML, Olympic Dam does not support an ecologically significant proportion of the population. TSF6 is unlikely to significantly or materially impact this species.

2.5.2 Do you consider this impact to be significant?

No

2.6 Is the proposed action to be undertaken in a marine environment (outside Commonwealth marine areas)?

No

2.7 Is the proposed action to be taken on or near Commonwealth land?

No

2.8 Is the proposed action taking place in the Great Barrier Reef Marine Park?

No

2.9 Is the proposed action likely to have ANY direct or indirect impact on a water resource related to coal/gas/mining?

No

2.10 Is the proposed action a nuclear action?

Yes

2.10.1 Describe the nature and extent of the likely impact on the whole of the environment.

Please see Attatchmet B for a description and assessment of impacts to the environment as a whole.

2.10.2 Do you consider this impact to be significant?

No

2.11 Is the proposed action to be taken by the Commonwealth agency?

No

2.12 Is the proposed action to be undertaken in a Commonwealth Heritage Place Overseas?

No

2.13 Is the proposed action likely to have ANY direct or indirect impact on any part of the environment in the Commonwealth marine area?

No

Section 3 - Description of the project area

Provide a description of the project area and the affected area, including information about the following features (where relevant to the project area and/or affected area, and to the extent not otherwise addressed in Section 2).

3.1 Describe the flora and fauna relevant to the project area.

Surveys of the immediate area of the SML and Roxby Downs have identified 242 native flora species and 45 introduced species, 14 of which are declared weeds. Fauna species include 184 birds, 29 mammals, 47 reptiles and one amphibian. Further details on the flora and fauna potentially impacted by the proposed action is provided in Attachment B.

3.2 Describe the hydrology relevant to the project area (including water flows).

The area around Olympic Dam receives very little rainfall (the annual average is 167 mm) and has a high evaporation rate (the annual average is around 3,000 mm). However, when it does rain it is often in high intensity events, which can lead to localised flooding given the flat terrain of the area. Stormwater is held temporarily in swales or clay pans before it evaporates or infiltrates.

The region is characterised by many small, enclosed catchments, individually bound by east–west trending dunes, generally up to eight metres high. Typically, each catchment contains a boundary formed by the crest of sand dunes, an upper interdunal corridor (swale) and a lower depression, often a clay pan.

The sand ridges are highly permeable. Rainfall infiltrates quickly through the sandy profile, draining into the swale and clay pan after being redirected by a thick layer of clayey soil under the sand dunes. The clayey soils of the swales and clay pans are less permeable and, in periods of significant rainfall, collect water in low depressions. These dune-swale and clay pan catchments vary in size from 10–300 ha and are typically 1–3 km long.

Stormwater within the swales and clay pans infiltrates the surface cracks of the clay soils, causing them to swell. In most instances the swelling of the clay soils reduces infiltration significantly, leading to surface water ponding. Depending on the rainfall event, surface water may stay in the swales and clay pans from a few days to a few weeks, but only rainfall events of a significant intensity and duration result in ponding for more than one month. The ponded water in this land system is generally fresh and of high quality.

There are no defined watercourses in the area, and surface waters from the small catchments very rarely flow into the neighbouring catchments. No stormwater from the area of the existing operation flows off the SML.

3.3 Describe the soil and vegetation characteristics relevant to the project area.

The soil landscape of the area consists of sand dunes with interdunal clay pans and swales, with sand dunes consisting of red to reddish-brown sands. Interdunal areas consist of clayey soils with gibber surface rock and little vegetation, whilst clay pans generally have no surface rock or vegetation. The region is dominated by three vegetation communities (dunefields, swales and gibber plains) that occur repeatedly and are associated with the two major landform types: dunefields and stony tablelands. The dunefields are generally dominated by Acacia woodland and tall shrubland vegetation on the dune ridges, merging into low chenopod shrubland vegetation in the dune swales.

3.4 Describe any outstanding natural features and/or any other important or unique values relevant to the project area.

There are no outstanding natural features in the immediate area.

3.5 Describe the status of native vegetation relevant to the project area.

The vegetation types remaining in the TSF6 footprint predominantly consists of acacia and chenopod shrublands with Acacia ramulosa, A. aneura, A. ligulata, Dodonaea viscosa, Atriplex vesicaria and Maireana astrotricha as the dominant flora species. Further detail, including images of the project area are provided in Attachment B.

3.6 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.

The topography is of generally low relief, the area being dominated by a landform of low undulating dunes, swales and clay pans.

3.7 Describe the current condition of the environment relevant to the project area.

Native vegetation in the region is relatively intact, although some areas are highly disturbed. The area is too arid for agriculture but sheep and cattle grazing of the rangelands is extensive. Grazing by livestock and rabbits has degraded vegetation to varying degrees. Details pertaining to the environment condition within the projects area is decribed in Attachment B.

3.8 Describe any Commonwealth Heritage Places or other places recognised as having heritage values relevant to the project area.

none.

3.9 Describe any Indigenous heritage values relevant to the project area.

The proposed project area is situated within the Traditional Lands of the Kokotha People.

Archaeological and ethnographic heritage surveys were first conducted over the Olympic Dam project area (within which the proposed TSF6 is located) in the early 1980s and detailed studies have been ongoing in line with progressive expansions of the operations at Olympic Dam. The first ethnographic survey was conducted by Luise Hercus in 1982 for Kinhill and Associates as part of the Environmental Impact Statement. This regional survey focussed on the borefields and involved senior elders from the Kukata (now Kokotha) and Guyani (now Kuyani) Aboriginal groups. A further detailed ethnographic survey involving multiple field trips and senior elders was completed by Hagen and Marten in 1983 on behalf of the Kokatha Peoples Committee and the South Australian Department of Environment. Numerous ethnographic sites were identified as a result of these surveys, none of which are located within the TSF6 Project Area.

Large-scale baseline archaeological surveys were first completed over the Olympic Dam project area by Hughes and Hiscock in 1981 with an additional survey in 1982 as part of the original EIS. This was followed with detailed archaeological surveys of the Special Mine Lease including the TSF6 Project Area in 1996 by Archae-aus with Aboriginal participants from the Andamooka Land Council. A number of archaeological sites, mostly artefact scatters and stone quarries, were identified as a result of these surveys and have been recorded in detail.

As outlined in section 1.13, following a comprehensive process of negotiation and consultation over a number of years, BHP entered a number of agreements with indigenous stakeholders that relate to BHP's operations at Olympic Dam. They are the Olympic Dam Agreement (ODA) in 2008, the Olympic Dam ILUA in 2012 and the Kokatha Settlement ILUA which was registered in 2014. Those agreements form the foundation for BHP's engagement with indigenous groups, provide consent for BHP's activities at Olympic Dam, including TSF6, and include an agreed heritage protocol.

Under the ODA, the parties agreed to land disturbance across the SML, including the proposed TSF6 project area. To mitigate impacts caused by this land disturbance, BHP engaged Huonbrook Environment and Heritage (HEH) and representatives from the Kokatha people to undertake a large-scale salvage operation of archaeological sites across the SML. This salvage program has been ongoing since 2010 and has resulted in the collection and appropriate storage of thousands of artefacts in a manner that is respectful of Aboriginal culture.

Further, in July 2010, BHP received conditional approval from the Minister for Aboriginal Affairs and Reconciliation, in accordance with the Indenture and the *Aboriginal Heritage Act 1979* (SA) to;

excavate land within the Special Mining Lease (SML) (the ***Application Area***)explore for any items of Aboriginal Heritage; andremove or otherwise interfere with any items of Aboriginal Heritage that may be within the Application Area, whether or not those items have been identified, are known or recorded.

The TSF6 project is located within the Application Area referred to in the approval and no further heritage approvals are required. BHP will continue to manage any impacts to heritage values in line with the conditions of the Ministerial consent and Heritage Protocol of the Olympic Dam Agreement. In addition, BHP will continue to report heritage impacts and outcomes to Aboriginal groups party to the Olympic Dam Agreement through the ODA Advisory council.

3.10 Describe the tenure of the action area (e.g. freehold, leasehold) relevant to the project area.

The area of land covered by the SML for Olympic Dam, including the proposed location for TSF6, is freehold land owned by BHP.

3.11 Describe any existing or any proposed uses relevant to the project area.

A portion of the area upon which TSF6 will be constructed has been utilised for clay borrow for raising other cells. The remainder of the proposed footprint for TSF6 is subject to native vegetation which is common to the region (see site photos in attachment B).

The project area and the area of land immediately surrounding TSF6 within the SML has been identified for future waste management facilities as will be indicated in the OD-RDS referral.

The Olympic Dam mining and metallurgical facilities are located on the SML and include the following land uses:

Underground mining

Metallurgical processing

Quarry

Storage of solid and liquid wastes (TSF)

Storage of solid wastes (landfill)

Sewage treatment

Water treatment and storage

Supply of electricity (substation)

Buffer areas (vegetation/habitat)

Conservation (Arid Recovery – part).

Section 4 - Measures to avoid or reduce impacts

Provide a description of measures that will be implemented to avoid, reduce, manage or offset any relevant impacts of the action. Include, if appropriate, any relevant reports or technical advice relating to the feasibility and effectiveness of the proposed measures.

Examples of relevant measures to avoid or reduce impacts may include the timing of works, avoidance of important habitat, specific design measures, or adoption of specific work practices.

4.1 Describe the measures you will undertake to avoid or reduce impact from your proposed action.

The State regulatory framework that covers the assessment and approval for TSF's (and will be required for TSF6) at Olympic Dam is comprehensive. BHP will undertake assessments and receive approvals in accordance with the Code of Practice: Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing' (**The Mining Code**) for TSF6. These are then implemented under the *Radiation Protection and Control Act 1982 and The Roxby Downs (Indenture Ratification) Act 1982*. The South Australian Environment Protection Authority (***EPA***) Licence 1301 and Licence LM1 – issued under the Radiation Protection and Control Act 1982 - also apply to the TRS (and will apply to TSF6). The measures taken to avoid and reduce impact required by these State processes are discussed below.

In addition, as the construction and operation of TSF6 is a continuation of existing operations, and will be wholly contained within the existing Olympic Dam site, measures to avoid or reduce impacts are based on those successfully implemented and managed at Olympic Dam since 1988. The Tailings Retention System surveillance and monitoring activities, which TSF6 is proposed to be operated consistently with, are described in the internal procedural OD Tailings Operations and Surveillance manual. This sets out that monitoring is carried out on ten Critical Operating Parameters (COPs) described in the manual. These include items such as pond levels, embankment pore pressures and other leading indicators to ensure tailings containment. If the specified operating limits are exceeded ("triggered"), there are corresponding Trigger Action Response Plans (TARPs) in place. These define the actions required to be implemented. Examples of these actions are escalation to senior management, increased monitoring activities and additional testing - through to stopping deposition.

Management measures to reduce environmental impacts will be implemented during the design phase or will be implemented during the operational phase that specifically relate to managing and monitoring embankment stability and seepage (two significant causes of potential environmental impact). These are expected to be comprehensively assessed as part of the State approval process but are also described below.

The existing TSF's at Olympic Dam are subject to a number of independent audits and data reviews including:A clear designation of authorities and responsibilities including:Appointingf a permanent Engineer of Record for each BHP operation that manages tailings dams.Appointing

a responsible dam engineer for each site.Defining a single point accountability or Area Owner for tailings facilities at each operation.Appointing an independent Tailings Stewardship Team who visit the operation annually.Annual independent auditing of TRS operations.Third party embankment inspections and data reviews.Inspections by State regulators during site visits.2 yearly comprehensive review against the TRS Operation, Maintenance and Surveillance Manual.Increased monitoring and testing on TSF4 and TSF5.Installation of laser scanning technology to monitor walls for movement.

BHP has demonstrated ability to construct and operate TSF's that do not result in unacceptable impacts to the environment. BHP will construct and operate TSF6 to the same (or improved) standards. The design of TSF6 has also been independently reviewed by technical experts and BHP has undertaken additional measures to further increase confidence in the stability assessments as described above and discussed in detail in the State construction approval documentation.

Management measures and monitoring during construction

TSF6 construction will require approval under Section 2.9.2 of the 'Code of Practice: Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing', as required by:

SA Roxby Downs Indenture Ratification Act; and*Radiation Protection and Control Act 1982* – Licence LM1 (it will also include requirement for Radiation Management Plan and Radioactive Waste Management Plan.)

Past TRS construction approvals from the State indicate extensive and detailed conditions are likely to be imposed on TSF6 to ensure it is operated safely and with acceptable impacts to the environment. For example, the conditions on the TSF5 construction included:

Construction shall be in accordance with:the proposal to construct TSF 5;the design drawings; andother information provided in emails dated 2/2/2010, 3/2/201, 9/2/2010, 15/2/2010, 16/2/2010, 17/2/2010 and 18/2/2010.

Additional approval must be sought for any significant variation from the information contained in the documents listed above.

Final design plans and specifications must be submitted to the EPA and Chief Inspector of Mines before work is commenced on that area. A detailed construction schedule must also be provided to the Chief Inspector of Mines. Close liaison must be maintained with the EPA and Chief Inspector of Mines to enable inspections to be undertaken.A rehabilitation and closure plan for progressive rehabilitation must be developed.Construction of TSF 5 must include:a 1.5mm think high density polyethylene liner installed over the compacted clay liner;management measures to inhibit cracks forming in the clay liner;proof rolling of the TSF 5 footprint;sand dunes within TSF 5 being removed;existing boreholes within TSF 5 being sealed;all test pits and excavations being backfilled and compacted;groundwater monitoring bores installed around the perimeter of TSF 5; anda lysimeter installed in the floor of TSF 5.BHP must apply for:a further authorisation under the Code of Practice on Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005); andan approval to increase the height of TSF 5 above 30m.The application for approval to commission and operate TSF 5 shall be

submitted to the Minister and shall include:the final design drawings and specifications used for construction of TSF 5;confirmation of compliance with the Conditions of the approval to construct TSF Cell 5; andan updated Radiation Management Plan and Radioactive Waste Management Plan.

Land disturbance associated with the proposed action will be managed consistently with the internal procedural Environmental Disturbance Permit (EDP) process. The EDP requires a desktop and field assessment so that areas of environmental significance are avoided where possible. Internal permit conditions are imposed to mitigate or minimise impacts from the project during construction, for example dust suppression techniques. Due to the construction requirements for TSF6, complete avoidance of important habitat (e.g. cane grass) is not possible. However, locating the cell over an extensively previously disturbed area and adjacent to existing facilities reduces additional disturbance from TSF6.

To reduce fugitive particulate emissions during construction of TSF6, dust suppression by use of a water truck will be implemented. This method has been used effectively in the past at Olympic Dam. The internal procedural Air Quality Monitoring System (AQMS) at Olympic Dam continuously monitors particulate emissions at sensitive receptor sites (being Roxby Downs and Olympic Village). Operational contributions to air quality at those locations are consistently well below National Environmental Protection Measures (NEPM) limits and are expected to remain so during construction of TSF6.

Impacts to ecological species are minimised through restricting clearance activities to assessed and approved locations and controlling particulate emissions during construction. Vegetation and topsoil is removed and stockpiled in designated areas for re-use in rehabilitation of temporary disturbed areas or at final closure. This is consistent with existing site topsoil internal procedural management plans to promote soil stability, preserve biological attributes and encourage vegetation regrowth.

The construction of the new cell and pumping lines will be carried out as a project managed by BHP, with the onsite presence of the designing engineering consultants. The common embankment with TSF5 will not be altered but an additional embankment for TSF6 constructed against it to allow independent raising and deposition.

A formal quality assurance and control programme will be implemented to ensure that the civil construction programme is carried out to meet both Olympic Dam and Australian standards. The programme will include the following measures:

The construction specifications have been updated to reflect the new design and best practice. The specifications define testing requirements and frequencies.Construction supervision will be carried out by a qualified geotechnical engineer (from the designer) as part of the construction contract.The constructor will either be ISO 9001 accredited or will work to ISO 9001 standards.Testing will be carried out by a NATA registered laboratory to confirm compaction and moisture specifications are met.The testing records will be audited and approved by the Project QA/QC Engineer as well as the Design Engineer. Audits of the QA/QC will be undertaken by the independent Engineer of Record.

Consultation on, and assessment of, the management of construction impacts is expected to be comprehensively assessed as part of the State approval process, as has been experienced in

the past.

Management measures and monitoring during operation

TSF6 commissioning and operation will require approval under Section 2.9.3 of the ‘Code of Practice: Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing’ required by:

the Indenture (which requires compliance with the Mining Code); and*Radiation Protection and Control Act 1982* - - Licence LM1 (which requires compliance to the Mining Code and also includes requirement for Radiation Management Plan and Radioactive Waste Management Plan)

Past TRS approvals from the State indicate extensive and detailed conditions are likely to be imposed on TSF6 to ensure it is operated safely and with acceptable impacts to the environment. For example, the conditions on the TSF5 construction included:

Written confirmation to the Chief Inspector of Mines that:the groundwater monitoring bores have been monitored for water quality and water levels;TSF 5 has been constructed according to the design;relevant QA and QC documentation is available for inspection;the updated Radioactive Waste Management Plan will incorporate performance measures, operating systems and radiological for the operation of TSF 5;the results of TSF 5 monitoring will be provided in quarterly environmental reporting; andpersonnel working in the TSF 5 area will receive the necessary induction and training.Submission to the Chief Inspector of Mines:of an updated report addressing contingency measures and response plan for unexpected groundwater level increases below TSF 5; anda rehabilitation and closure plan for progressive rehabilitation.Further approval from the Minister is required for:approval of any substantial changes to the design of TSF 5; andany increase to the height of TSF 5 above 30m.

The existing TSFs are managed in accordance with the internal procedural TRS Operation Maintenance and Surveillance Manual and the Tailings Retention System Management Plan, which TSF6 is proposed to be operated consistently with. BHP monitors the operation and performance of the TSFs to identify potential for adverse environmental impacts. The environmental monitoring program focusses on the following operational aspects that if not managed, have the potential to significantly impact the environment:

size and location of supernatant liquor ponds;rate of rise of tailings;pore pressures within tailings adjacent to the external walls;a review of water balance on an annual basis;tailings seepage – groundwater is monitored under and adjacent to the TSF to determine changes to levels and quality; andfauna interaction.

Data pertaining to the performance of the aspects above, and the environmental impacts, are reported annually in the EPMP report which is submitted to the regulator and available to the public. A review of current performance is also provided below. The latest data can be found at https://www.bhp.com/-/media/bhp/regulatory-information-media/copper/olympic-dam/0000/annual-environment-reports/fy18-epmp-report.pdf.

No significant environmental impact arising from the operational aspects described above are known to have occurred. A summary of BHP’s environmental performance is provided below,

under the section titled ‘effectiveness of existing management and monitoring measures for construction and operations’.

Management measures for embankment stability

The embankment stability for the proposal has been assessed using the methodology recommended in ANCOLD (2012) ‘Guidelines on Tailings Dams – Planning, Design, Construction, Operation and Closure’. The stability of the TSF6 embankments at the proposed design height of RL 132m (30m high) exceeds the recommended ANCOLD factors of safety under static and seismic loading conditions. As with previous TSF approvals, the State approval process is expected to include a comprehensive review of the stability assessments completed for the design of TSF6.

The use of a factor of safety in design of earth slopes is a traditional method of facilitating judgement as to whether the embankment design is appropriate for the circumstances in which the dam slope is required to function. It is measured as a ratio between the activating (or loading) forces that may cause failure, against those that resist failure, along a particular failure surface. It is typically calculated assuming that a two-dimensional strip, 1 m thick is appropriately representative of the slope failure mechanism. Modern day three-dimensional techniques support this assumption for long uniform slopes, such as those at Olympic Dam.

The starter embankment will be constructed to meet the design specifications and a strict quality control and assurance program will manage the field testing records to ensure construction is consistent with the design. Testing will be undertaken to the specifications by a third party testing authority, supervised by BHP representatives and verified by the OD tailings dam Engineer of Record.

Stability risk controls are described in the current TRS Management Plan - TSF6 is proposed to be managed consistently with this and with any amendments as required.

Regular monitoring and independent annual auditing will ensure the required controls are being implemented correctly and monitoring will track any changes in the embankments.

While stability factors of safety can give some indication of the probability of failure, BHP recognises that other factors may lead to an embankment failure, and is therefore committed to ensuring the ongoing stability of the TSF embankments by continuing the rigorous inspection, surveillance and monitoring program currently in place and described below.

Ongoing strength monitoring will be supported by the local measurement of tailings strengths prior to the construction of upstream raises using simple methods including hand shear vane testing. These methods are accompanied by undertaking CPT at embankment cross sections and installing vibrating wireline piezometers (VWPs) for pore pressure monitoring approximately every two years. The first stage TSF6 buttress will occur approximately five years after startup. Instrumentation will be installed in the starter embankments and monitoring will be in place from startup that will provide data to refine the design of the buttress.

Additional VWPs will be installed as the facility increases in height progressively around the cell. The height increases in a similar schedule to TSF4 and TSF5, which results in a new set of VWPs approximately every two years. This proved effective as demonstrated by the data

provided from TSF4 that allowed BHP to predict a decrease in the factor of safety for stability and build a supporting buttress. Once the cell has reached its second raise (approximately 4 years after start-up), geotechnical testing will be carried out every 2 years thereafter.

The TSF6 design includes additional VWP's to monitor seepage and pore pressures to ensure sufficient data is available for ongoing monitoring and stability predictions.

This will facilitate performance monitoring to confirm that the undrained shear strength is developing as predicted, and that the stability factors of safety (being the ratio between resisting and driving forces for wall failure) are greater than the minimum design criterion of 1.5. The internal procedural Operation and Maintenance, Surveillance Management manual details the timing, recording and review criteria for data collected.

Should observations and/or monitoring indicate a trend towards a stability factor that may decrease to below 1.5, the cause of the measured reduction will be investigated e.g. lower tailings strength or higher phreatic surface than predicted, and a suitable control developed and implemented to regain the desired trend. An example of such a control is the buttress built on TSF4 to ensure embankment stability is maintained. The buttress was designed to improve the factor of safety such that the next five raises (up to RL 136 m) were covered. This will be confirmed by monitoring the phreatic level and comparing against trigger levels (values used in the design stability assessments). As the buttress covers the next five raises, the current factor of safety is significantly greater than target (1.5) and will only approach 1.5 with the final raise. Other measures include internal drains, or the embankment could be stepped in to reduce the overall slope.

Ensuring the rate of rise of tailings is limited to an average of 2 m per annum or less, which has been shown to provide adequate drying and consolidation of tailings to ensure adequate strength development, is another management measure implemented to support the embankment stability management strategy.

BHP has implemented additional technology (laser scanning sentries) along certain embankments to measure even small movements that will be used as an early warning, allowing measures such as buttressing to be carried out.

The operational procedures are outlined in the Tailings Management Plan and the Tailings Retention System Operation, Maintenance and Surveillance Manual, TSF6 is proposed to be operated consistent with this. In addition to regular internal data reviews, third party embankment inspections and data audits (six monthly), an annual operational audit and 2 yearly comprehensive review against the TRS Operation, Maintenance and Surveillance Manual are undertaken.

Consultation on, and assessment of, the management of embankment stability is expected to be comprehensively assessed as part of the State approval process as has been experienced in the past.

Management of Supernatant pond size

There may be occasions where the surface pond size increases in response to a major rainfall event. Under this temporary, short term loading condition, there will be little change in the

position of the phreatic surface from the conservative phreatic line assumed in the stability analysis. Under this conservative analysis the assumed phreatic surface is near the plausible maximum level under any condition. The operation typically returns the pond size to the normal operating area between 3 and 6 months after such storm events. The factor of safety for static condition is currently calculated at 1.97 for the proposed design and a high pond condition would only result in a negligible reduction from this normal operating condition and still be well above the recommended minimum factor of safety of 1.5.

Consultation on, and assessment of, the management of Supernatant pond size is expected to be comprehensively assessed as part of the State approval process as has been experienced in the past.

Management measures for Tailings seepage

Seepage occurs as a function of the normal operation of the TSF and will be minimised as far as practicable by implementing a number of management measures throughout the design, construction, operations and closure of the TSF6, including:

Lining the borrow pit and decant areas with an engineered clay liner or geomembrane;Careful deposition of tailings to coat the floor in areas where clay is thinner;Providing for effective drying and consolidation of deposited tailings;Minimising liquor area on the TSF as far as practicable by decanting to lined evaporation ponds;Lateral seepage is captured in interception trenches and returned to the TSF or evaporation ponds.

A network of groundwater monitoring bores provides warning of any significant seepage that may be occurring. Monitoring undertaken to achieve this includes routine groundwater level monitoring and routine groundwater quality monitoring around the TSF, evaporation ponds and regionally. In addition, a liquor balance of each evaporation pond is conducted to highlight potential significant leaks. Seepage would be considered significant if ground water levels rise close to or above 80mAHD or observed at the toe of the embankments during the daily inspection. Where significant seepage is identified (following an analysis of monitoring results or identified during daily inspection (for lateral seepage)), the seepage is investigated and contingency plans would be executed in line with the operations and surveillance manual, to manage any potential impacts to dam integrity and the environment. Contingency measures could include capture drains or dewatering of impacted aquifer and disposal of excess liquor to surface for evaporation.

A hydrogeological model has been updated to support the TSF6 design project. Consultation on, and assessment of, the hydrogeological modelling and expected seepage rates is expected to be comprehensively assessed as part of the State approval process as has been experienced in the past.

Effectiveness of existing management and monitoring measures for construction and operations

Olympic Dam has not experienced a loss of containment of tailings that has resulted in a significant environmental impact. Comprehensive internal and external auditing and leading indicators for monitoring data associated with embankment stability and tailings seepage have identified the desirability for additional controls in the past. For example, the recent buttress on

TSF4 described above.

The EPMP report provides evidence to support BHP's assessment that impacts from the existing TSFs are not significant and are confined to the SML. Data collected over many years support this conclusion and relevant examples are listed below:

Radiological impacts to non-human biota are well within regulatory limits. In FY18 the average deposition rate was determined to be 3.09 Bq/m2/y. Well below the compliance criteria of 25Bq/m2/y.Radiological and particulate emissions at sensitive receptor sites are consistently well below (ARPANSA and NEPM) limits.Analysis of seepage from the base of the existing TSF has shown that it undergoes a process of in-situ neutralisation and attenuation as it passes through the upper layers of the Andamooka Limestone. Groundwater chemistry around the TSF is similar to the regional groundwater chemistry, with the exception of slightly increased uranium concentrations and slightly reduced pH. Annual sampling of groundwater at locations off the SML have water quality similar to regional groundwater chemistry.Groundwater levels of bores along the SML are consistent with other regional bores. Seepage modelling has been updated to demonstrate that there are no expected future offsite impacts.No significant adverse impact to vegetation as a result of seepage from the TSF has occurred. Eighty metres AHD (20 m below ground level) is considered as the level below which groundwater cannot interact with the root zone of plants in the Olympic Dam region. Groundwater levels in the vicinity of the TSF remain below 80 mAHD.Land clearance to date has impacted upon individuals of relatively common flora and fauna species - impacts to threatened flora and fauna populations from TSFs as a whole is not indicated to have occurred.No embankment failures of any magnitude have occurred.The rate of rise of tailings has been limited to 2 m per annum or less for all cells, to ensure consolidation of tailings material. For example, during FY18, tailings were distributed to TSF Cells 4 and 5 with an average rate of rise of the perimeter tailings beach of 0.8 m per annum, with TSF4 and TSF5 at 0.72 m and 0.91 m per annum respectively.No significant adverse impacts to listed species as a result of interactions with the Olympic Dam Tailings Retention System (TRS) have occurred.

Management measures and Monitoring at Closure

Regular reviews of closure and rehabilitation planning will occur prior to permanent closure of TSF6. As TSF6 will not be the subject of any closure activities prior to the planned OD-RDS approval, it is planned that the assessment and approval process for OD-RDS will incorporate the closure requirements for TSF6, other TSF's and BAU activities. The information below is indicative of current day acceptable closure criteria and is likely to change to align with expectations at the time of on-ground implementation.

<u>Embankment Stability at Closure</u>

Once TSF6 has been decommissioned and has been allowed to drain down prior to construction of the closure cover, the phreatic surface will gradually decline, with an associated increase in the tailings strength.

The factor of safety for the operational static condition is calculated at 1.97 for the current proposed TSF6 embankment at its final height. The stability (factor of safety) of the embankment will increase as the phreatic surface recedes post-closure and the tailings strength increases.

Post-Seismic Stability

TSF6 facility will incorporate a progressively built buttress to reinforce the embankment. The design with the buttress achieves the minimum factor of safety required for the post seismic condition of 1.1. This is at the 1:10,000 year return period design earthquake. The design and size of the buttress will be confirmed during operations by obtaining actual tailings strength data as the facility matures, to meet minimum stability criteria at all stages of construction. All the stability analyses conducted have concluded that the design will meet the minimum requirements at the maximum credible earthquake as recommended in ANCOLD 2012.

Management measures and potential post-closure assessment criteria as they relate to TSF6

Regular reviews of closure and rehabilitation planning will occur prior to permanent closure of TSF6. As TSF6 will not be the subject of any closure activities prior to the planned OD-RDS approval, it is planned that the assessment and approval process for OD-RDS will incorporate the closure requirements for TSF6, other TSF's and BAU activities The information below is indicative of current day acceptable closure criteria and is likely to change to align with expectations at the time of on-ground implementation.

High level closure outcomes for Olympic Dam as they relate to TSF6 are summarised below. The environmental outcomes are based on post-closure, to be achieved in the long term following closure and rehabilitation activities.

Environmental Aspect: Embankment stability of TSF

Environmental Outcome

Final landforms geotechnically stable.

Environmental Aspect: Tailings Storage Facility (TSF) seepage

Environmental Outcome

No significant adverse impact on vegetation as a result of seepage from the TSF post-closure.No compromise of existing and future land uses on adjoining areas as a result of seepage from the TSF post-closure.

Environmental Aspect: Stormwater discharge

Environmental Outcome

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.

Environmental Aspect: Radioactive Waste

Environmental Outcome

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.

Post-closure monitoring, care and maintenance

A detailed post-closure monitoring and care and maintenance plan will be developed during the detailed planning for final closure to ensure that:

there is sufficient and appropriate monitoring in place to be able to track and demonstrate the achievement of closure performance criteria for the various closure landforms;there is a management plan in place to model the post-closure performance to provide predictive assessments of the post-closure landforms e.g. drain-down of the TSFs;there are sufficient resources allocated to ensure that all required inspections and monitoring is carried out, and that any care and maintenance activities required are carried out promptly and to the desired standard;there are adequate financial provisions to carry out the above activities, with a contingency allowance for post-closure 'risk events' .

Specific monitoring and care and maintenance planning may be required for the closed TSF cells and for other rehabilitated landforms. Preliminary requirements for post-closure inspections and monitoring are described below which lists the specific aspects to be monitored to address the high and moderate residual risks.

Monitoring and inspections

A geotechnical assessment of the stability of each tailings storage cell would be carried out prior to closure, leading to the closure design for that facility.

After closure, monitoring and inspection of the TSFs post-closure would include:

geotechnical inspections of the TSFs by a competent geotechnical engineer to validate: medium-term and long-term stability of the TSF slopes; long-term integrity of the tailings cover.groundwater levels and quality (i.e. to ensure the groundwater mound beneath the TSF was reducing); andradiation levels.

The monitoring frequency would be based on the findings of the progressive rehabilitation trials. It is estimated that the inspection and monitoring frequency would be of the order of six monthly for the first two to three years following closure works, extending to annually until relinquishment. Radiation levels would be monitored more frequently.

An inspection and monitoring report would be compiled after each inspection, including follow up of any care and maintenance work recommended in previous reports. The report would be submitted to the appropriate regulatory agency responsible for the confirmation of TSF closure completion criteria.

Consultation on, and assessment of, the closure issues is expected to be comprehensively assessed as part of the State approval process as has been experienced in the past.

4.2 For matters protected by the EPBC Act that may be affected by the proposed action, describe the proposed environmental outcomes to be achieved.

For listed species and threatened ecological communities

No significant or material adverse impacts to populations of listed species and threatened ecological communities from the construction, operations or closure of TSF6

For listed migratory species

No significant or material adverse impacts to listed migratory species as a result of interaction with TSF6

For the environment as a whole resulting from a Nuclear Action

No adverse impacts to public health as a result of particulate and radioactive emission from the construction, operations and closure of TSF6.

No significant or material adverse impact to populations of State and Commonwealth listed species as a result of radioactive emissions from the construction, operation and closure of TSF6.

No significant or material radiation contamination arising from uncontrolled loss of radioactive material as a result of an embankment or other failure to the natural environment.

No significant or material adverse impact on the environment as a result of seepage from TSF6.

No compromise of current and future land uses on the SML or adjoining areas as result of seepage from TSF6.

No compromise of the environmental values of groundwater outside the SML as a result of seepage from TSF6.

No material or significant impacts to the environment when cumulative impacts of TSF6, BAU activities, and indirect aspects are considered.

No material or significant adverse impact on populations of listed species from the construction, operations or closure of TFS6.

No material or significant impact on fauna

No material of significant impact on flora and regional remnant native vegetation

No material or significant impact on indigenous heritage

No material or significant impact on regional surface hydrogeology

Section 5 – Conclusion on the likelihood of significant impacts

A checkbox tick identifies each of the matters of National Environmental Significance you identified in section 2 of this application as likely to be a significant impact.

Review the matters you have identified below. If a matter ticked below has been incorrectly identified you will need to return to Section 2 to edit.

5.1.1 World Heritage Properties

No

5.1.2 National Heritage Places

No

5.1.3 Wetlands of International Importance (declared Ramsar Wetlands)

No

5.1.4 Listed threatened species or any threatened ecological community

No

5.1.5 Listed migratory species

No

5.1.6 Commonwealth marine environment

No

5.1.7 Protection of the environment from actions involving Commonwealth land

No

5.1.8 Great Barrier Reef Marine Park

No

5.1.9 A water resource, in relation to coal/gas/mining

No

5.1.10 Protection of the environment from nuclear actions

No

5.1.11 Protection of the environment from Commonwealth actions

No

5.1.12 Commonwealth Heritage places overseas

No

5.2 If no significant matters are identified, provide the key reasons why you think the proposed action is not likely to have a significant impact on a matter protected under the EPBC Act and therefore not a controlled action.

The construction of TSF6 to enable the continued operation of Olympic Dam BAU operations, does not represent a material change to Olympic Dam's existing operations, and will be wholly contained within the existing Olympic Dam site.

The proposed action falls within the definition of 'nuclear action'. However, on the basis of the potential interaction between the proposed action and the surrounding environment and the implementation of appropriate design, management and monitoring measures, the proposed action is very unlikely to have a significant or material impact on the environment and other MNES.

TSF6 does not propose any change to the method of tailings disposal, the operation of the tailings retention system or the method of TSF wall construction compared to previous TSFs constructed at Olympic Dam. We propose to use existing environmental management and mitigation measures successfully employed at Olympic Dam (as demonstrated through monitoring and reported on annually over many years).

The cumulative impact on the environment resulting from the construction, operation and closure of TSF6 in conjunction with other TSFs and BAU activities at Olympic Dam will be minimal and is expected to remain well within relevant compliance criteria (i.e ARPANSA and NEPM).

Section 6 – Environmental record of the person proposing to take the action

Provide details of any proceedings under Commonwealth, State or Territory law against the person proposing to take the action that pertain to the protection of the environment or the conservation and sustainable use of natural resources.

6.1 Does the person taking the action have a satisfactory record of responsible environmental management? Please explain in further detail.

The Olympic Dam mine has been operating since the commencement of underground mining in 1988. BHP has owned and operated the mine and processing facility since 2005. Extensive monitoring, regulation, reporting and review of the operation has occurred over that time and the operation has a good record of compliance against approved environmental outcomes.

Environmental performance is reported annually to the State Government. Past copies of the annual Environmental Management and Monitoring Report are available on the website of the SA Government Department for Energy and Mining.

(http://minerals.statedevelopment.sa.gov.au/mining/mines_and_quarries/olympic_dam,

6.2 Provide details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against either (a) the person proposing to take the action or, (b) if a permit has been applied for in relation to the action – the person making the application.

Not applicable

6.3 If it is a corporation undertaking the action will the action be taken in accordance with the corporation's environmental policy and framework?

Yes

6.3.1 If the person taking the action is a corporation, please provide details of the corporation's environmental policy and planning framework.

We propose to continue to manage environmental issues in a way this is consistent with the operation's AS/NZS ISO 14001:2015 certified environmental management system (EMS), a principal component of which is the EPMP. The EPMP is approved by both the State and Commonwealth Governments.

The overall structure of the BHP EMS and hierarchy of documents is illustrated in Attachment C. The scope of the EPMP is defined within the central, orange portion of the diagram.

Within BHP, the management of environment and community is guided by the BHP Charter and Our Requirements standards (ORs). The ORs cover the entire lifecycle of operations, from exploration and planning through to operation and closure (decommissioning, remediation and rehabilitation).

The relevant objectives of the ORs are to support the implementation of the Charter and the Code of Business Conduct across BHP and include:

Providing a risk-based environment and community management system framework, consistent with BHP Risk Management Policy; international policies, standards and management practices to which BHP has committed. These international standards and management practices include United Nations Global Compact; United Nations Universal Declaration of Human Rights; International Council on Mining and Metals (ICMM) Sustainable Development Framework; World Bank Operational Directive on Involuntary Resettlement; US-UK Voluntary Principles on Security and Human Rights; recommendations of the International Commission on Radiological Protection (specifically the system of dose limitation); negotiated agreements with local communities and other regional commitments.

Setting out and formalising the expectations for progressive development and implementation of more specific and detailed Environment and Community management systems at all levels of BHP;

Providing auditable criteria, against which environment and community management systems across BHP can be measured; and

Driving continual improvement towards leading industry practice.

Guided by the Charter and ORs, the EMS (and EPMP) at Olympic Dam are implemented through a four-tiered approach. These consist of an overarching policy (in the form of the sustainable development commitment), followed by the standards and procedures (the Environmental Management Manual (EMM), Environmental Management Program (EMP) and Monitoring Programs that together make up the EPMP).

The approved EPMP incorporates an environmental management program (EMP) that addresses the potentially significant environmental aspects and impacts that have been identified through an analysis and prioritisation of the environmental risks, legal obligations and community concerns relevant to BHP. It documents the processes, systems, criteria and other requirements designed to manage the prioritised aspects and impacts, including (as appropriate):

Environmental values, and the key risks to those values;

Environmental outcomes that BHP is required to achieve relating to potential environmental impacts;

Clear, specific and measurable compliance criteria that demonstrate achievement of the outcome(s);

Leading indicator(s) criteria, providing early warning of trends that indicate a compliance criterion may not be met;

Management and operational controls designed to deal with the environmental risk (of the impact), including any regulatory conditions (where specified);

Contingency options to be used in the event that identified risks are realised.

The EMP is divided into five distinct categories or ‘IDs’, each related to an area of the operation for which specific environmental management measures are required. Each ID is further subdivided into the specific EMP focused on one specific aspect and impact. The five top level IDs are:

Use and disturbance of natural resources. This includes measures for dealing with environmental impacts associated with land clearing and disturbance, spread of weeds and other pest species, and groundwater level drawdown.

Storage, transport and handling of hazardous materials. This includes prevention and mitigation of environmental impacts as a result of spills involving chemicals, hydrocarbons or radioactive process materials.

Operation of industrial systems. This includes control and prevention measures for emissions associated with the operation of the Olympic Dam mine and processing facility. These include particulate (dust) and radioactive emissions, sulphur dioxide and greenhouse gases.

Generation of industrial wastes. This includes measures for dealing with environmental impacts resulting from waste generation and storage. This includes issues associated with the storage of tailings, such as seepage to groundwater, embankment wall stability, and impacts to native fauna (birds) arising from contact with the tailings storage facilities. Also included are controls for waste rock storage, and the disposal and storage of radioactive and solid wastes.

Interaction with communities. This covers employment and accommodation of people and measures for social cohesion.

The EMP also refers to a number of monitoring programs describing how data is collected to support the outcomes and criteria of each ID in the EMP.

See Attachment C for the Olympic Dam Environmental Policy. Planning framework and the EPMP itself, can be found for the financial year 2018 (FY18) under Environmental Protection and Management Program; https://www.bhp.com/environment/regulatory-information) (under ‘Copper’ and then ‘Olympic Dam’).

6.4 Has the person taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?

Yes

6.4.1 EPBC Act No and/or Name of Proposal.

Wall height increase of tailings storage facility (TSF4), Olympic Dam, South Australia (EPBC 2015/7416) (Referral Decision – not controlled action).

Olympic Dam Heap Leach Trial (EPBC 2014/7280) (Referral Decision – not controlled action if undertaken in a particular manner).

Expansion of the Olympic Dam copper, uranium, gold and silver mine, processing plant and associated infrastructure (EPBC 2005/2270) (Approved with conditions)

Port Bonython pilot desalination plant, Olympic Dam expansion project (EPBC 2007/3391) (Referral Decision – not controlled action).

Section 7 – Information sources

You are required to provide the references used in preparing the referral including the reliability of the source.

7.1 List references used in preparing the referral (please provide the reference source reliability and any uncertainties of source).

Reference Source	Reliability	Uncertainties
BHP Billiton, 2009, 'Olympic Dam Expansion Draft Environmental Impact Statement', https://www.bhp.com/environment/regulatory-information (accessed 22/05/2019)	High	Low
BHP Billiton, 2011, 'Olympic Dam Expansion Supplementary Environmental Impact Statement', https://www.bhp.com/environment/regulatory-information (accessed 22/05/2019)	High	Low
BHP Billiton, 2017, 'Olympic Dam 2017 Environmental Protection and Management Programme', https://www.bhp.com/environment/regulatory-information (accessed 22/05/2019)	High	High
Kinhill Engineers Pty Ltd, 1997, 'Olympic Dam Expansion Project: Environmental Impact Statement', May 1997, https://www.bhp.com/environment/regulatory-information (accessed 22/05/2019)	High	Age of Information
Kinhill-Stearns Roger Joint Venture, 1982, 'Olympic Dam Project: Draft Environmental Impact Statement', https://www.bhp.com/environment/regulatory-information (accessed 22/05/2019)	High	Age of Information
Moseby K 2012a, Identification of critical habitat for the Plains	High	Low

Reference Source	Reliability	Uncertainties
Mouse (Pseudomys australis) and Thick?billed Grasswren (Amytornis textilis modestus) within the BHP Billiton Olympic Dam proposed Expansion areas. Unpublished Report for BHP Olympic Dam, Roxby Downs		
Moseby, K. (2012b), National Recovery Plan for the Plains Mouse Pseudomys australis. Department of Environment, Water and Natural Resources, South Australia. http://www.environment.gov.au/system/files/resources/1b308359-c8ec-49e7-aa41-be78ea7f68fe/files/pseudomys-australis.pdf	High	Low
SRK consulting (2015a), Olympic Dam Operations Assessment of Potential Groundwater Impacts Current Operation, SRK Project Number BHP146_1, Unpublished Report for BHP Olympic Dam, Roxby Downs	High	Low-Med
SRK consulting (2015b), Olympic Dam Operations Assessment of Potential Groundwater Impacts Life of Mine Operation, SRK Project Number BHP146_2, Unpublished Report for BHP Olympic Dam, Roxby Downs	High	Low-Med
Klohn Crippen Berger, 2019, ‘TSF6 Waste Finger Design’.	High	Low-Med

Section 8 – Proposed alternatives

You are required to complete this section if you have any feasible alternatives to taking the proposed action (including not taking the action) that were considered but not proposed.

8.0 Provide a description of the feasible alternative?

No feasible alternatives exist. A summary of the alternatives that were considered and discounted due to feasibility are listed below.

Alternative: “Do Nothing” – continue Olympic Dam Operations with tailings deposition into TSF5 only

Reasons for discounting: Discounted because Olympic Dam production would be limited to the maximum stable rate of rise for TSF 5, representing an approximate 35% production and revenue loss.

Alternative: Defer TSF6 by continuing to operate TSF4 beyond the current approved height of RL141m

Reason for discounting: Discounted as the risk associated with operating TSF4 beyond RL141 is not considered to be tolerable.

Alternative: Defer TSF6 by re-commissioning and raising TSF1-3 beyond the current approved RL131m.

Reason for discounting: Discounted as the risk associated with operating TSF1-3 beyond RL131 is not considered to be tolerable.

The ongoing operation of the Olympic Dam mine and processing plant requires the progressive construction of new tailings dams as existing tailings dams are taken off-line. In 2015, BHP received State approval (and an NCA decision under the EPBC Act) to increase the height of TSF4 beyond its approved height at the time, it was envisioned that this would delay the requirement for an additional tailings cell by approximately five years. Note that in the 4 (four) years since this approval, BHP has raised the height of TSF4 to RL 134. BHP does not intend to further raise the wall of TSF4 beyond RL 136. A trade-off study determined that a new TSF provided economic and operational benefits over the continued construction of a buttress on TSF4 (required to continue with the wall raise). As such, BHP is now pursuing the construction of TSF6 to meet operational needs.

8.1 Select the relevant alternatives related to your proposed action.

8.27 Do you have another alternative?

No

Section 9 – Contacts, signatures and declarations

Where applicable, you must provide the contact details of each of the following entities: Person Proposing the Action; Proposed Designated Proponent and; Person Preparing the Referral. You will also be required to provide signed declarations from each of the identified entities.

9.0 Is the person proposing to take the action an Organisation or an Individual?

Organisation

9.2 Organisation

9.2.1 Job Title

Asset President Olympic Dam

9.2.2 First Name

Laura

9.2.3 Last Name

Tyler

9.2.4 E-mail

Laura.Tyler@bhp.com

9.2.5 Postal Address

Level 1

55 Grenfell Street
Adelaide SA 5000
Australia

9.2.6 ABN/ACN

ABN

99007835761 - BHP BILLITON OLYMPIC DAM CORPORATION PTY LTD

9.2.7 Organisation Telephone

08 86718888

9.2.8 Organisation E-mail

OlympicDamCorporateAffairs@bhpbilliton.com

9.2.9 I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:

Not applicable

Small Business Declaration

I have read the Department of the Environment and Energy's guidance in the online form concerning the definition of a small a business entity and confirm that I qualify for a small business exemption.

Signature:..... Date: .....

9.2.9.2 I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations

No

9.2.9.3 Under sub regulation 5.21A(5), you must include information about the applicant (if not you) the grounds on which the waiver is sought and the reasons why it should be made

Person proposing the action - Declaration

I, LAURA TYLER, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.

Signature:..... Date: 24/05/19

I, _____, the person proposing the action, consent to the designation of _____ as the proponent of the purposes of the action describe in this EPBC Act Referral.

Signature:..... Date: .....

9.3 Is the Proposed Designated Proponent an Organisation or Individual?

Organisation

9.5 Organisation

9.5.1 Job Title

Asset President Olympic Dam

9.5.2 First Name

Laura

9.5.3 Last Name

Tyler

9.5.4 E-mail

Laura.Tyler@bhpbilliton.com

9.5.5 Postal Address

Level 1

55 Grenfell Street
Adelaide SA 5000
Australia

9.5.6 ABN/ACN

ABN

99007835761 - BHP BILLITON OLYMPIC DAM CORPORATION PTY LTD

9.5.7 Organisation Telephone

08 86718 888

9.5.8 Organisation E-mail

OlympicDamCorporateAffairs@bhpbilliton.com

Proposed designated proponent - Declaration

I, LAURA TYLER, the proposed designated proponent, consent to the designation of myself as the proponent for the purposes of the action described in this EPBC Act Referral.

Signature: ..... Date: 24/05/19

9.6 Is the Referring Party an Organisation or Individual?

Organisation

9.8 Organisation

9.8.1 Job Title

Manager Enviorment Analysis and Improvement

9.8.2 First Name

Greg

9.8.3 Last Name

Hill

9.8.4 E-mail

gregory.hill@bhp.com

9.8.5 Postal Address

Level 1

55 Grenfell Street
Adelaide SA 5000
Australia

9.8.6 ABN/ACN

ABN

99007835761 - BHP BILLITON OLYMPIC DAM CORPORATION PTY LTD

9.8.7 Organisation Telephone

08 86718 888

9.8.8 Organisation E-mail

OlympicDamCoporateAffairs@bhpbilliton.com

Referring Party - Declaration

I, Greg Hill, I declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and

correct. I understand that giving false or misleading information is a serious offence.

Signature:..... Date: 24.5.19.....

Appendix A - Attachments

The following attachments have been supplied with this EPBC Act Referral:

1. 1301 Licence Certificate Current April 2017.pdf
2. 2015-7416-referral-decision.pdf
3. 101126_Amended Construction Approval.PDF
4. EMS Policy.pdf
5. EPBCReferral_TSF6 Attachment B.pdf
6. EPBCReferral_TSF6_Attachment A.pdf
7. LM1.pdf
8. TSF4 Buttress Approval.pdf
9. TSF4 embankment raise Approval.pdf
10. TSF6_Plains Rat Habitat.pdf
11. TSF6_Previously_Disturbed_Ground.pdf
12. TSF6_general arrangement.pdf
13. TSF_InfrastructureAreas.zip
14. VegetationAssociationMap2.pdf