# Decision Report

## Application for Works Approval

### Part V Division 3 of the *Environmental Protection Act 1986*

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| **Works Approval Number** | W6538/2021/1 |
| **Applicant** | BHP Nickel West Pty Ltd |
| **ACN** | 004 184 598 |
| **File Number** | DER2021/000130 |
| **Premises** | Nickel West Leinster Nickel Operations<br>Legal description - Mining tenements ML255SA, M36/4, M36/87, M36/102, M36/103, M36/131, M36/156, M36/230, M36/389, M36/439, L36/93, G36/49, G36/50 and G36/51<br>LEINSTER WA 6437<br>As defined by the Premises Maps attached to the issued works approval. |
| **Date of Report** | 18 August 2021 |
| **Decision** | Works approval granted |

Carmen Standring
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**A/MANAGER, RESOURCE INDUSTRIES**
**REGULATORY SERVICES**
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

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# 1. Decision summary

This Decision Report documents the assessment of potential risks to the environment and public health from emissions and discharges during the construction and operation of the Premises. As a result of this assessment, Works Approval W6538/2021/1 has been granted.

# 2. Scope of assessment

## 2.1 Regulatory framework

In completing the assessment documented in this Decision Report, the department has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at https://dwer.wa.gov.au/regulatory-documents.

## 2.2 Application summary and overview of Premises

BHP Nickel West Pty Ltd (the Applicant) is currently licenced under Part V of the *Environmental Protection Act 1986* (EP Act) under Licence L4612/1989/11 for the Nickel West Leinster Nickel Operations (the Premises), for prescribed premises categories 5, 6, 12, 57, 64, and 85.

On 5 March, the Applicant submitted an application for a works approval to the department under section 54 of the EP Act.

The application is to undertake construction works relating to Category 5: Processing or beneficiation of metallic or non-metallic ore; for an embankment raise to Tailings Storage Facility (TSF) 2 and cell E of TSF3 at the Premises. The Premises is located within the Shire of Leonora, approximately 370km north of Kalgoorlie and 4.7km east of the Leinster Township.

The Premises relates to the categories and assessed production capacities under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in Works Approval W6538/2021/1. The infrastructure and equipment relating to the Premises category and any associated activities which the department has considered in line with *Guidance Statement: Risk Assessments* (DER 2017) are outlined in Works Approval W6538/2021/1.

## 2.3 Premises description

The Premises comprises of a series of nickel sulphide open cut and underground mines with a processing plant that uses conventional crushing, semi-autogenous grinding and ball milling and flotation extraction and recovery to produce nickel sulfide concentrate. Tailings that are generated through the nickel concentrating process are pumped through as a slurry and discharged to four above ground paddock style TSF's through multiple spigots located along the perimeter of the embankment of the TSFs. Nickel concentrate is transported via road to Leonora, then via rail to the Kalgoorlie Nickel Smelter for smelting (L8653/2012/2).

Figure 1 shows the location of the TSF's at the Premises being TSF2 and TSF3 Cells AB, CD and E which are located approximately 2.5 kilometres north of the nickel concentrator plant. The TSF's operate under a rotating deposition strategy whereby tailings deposition are cycled between TSF2 and one of the TSF3 cells, while a second TSF3 cell is raised and the third is left to dry or used to source tailings in generating paste backfill for the nearby Cliffs underground mine. A fifth TSF, TSF 3 Cell F, was recently constructed in April 2021 at the Premises under Works Approval W6280/2019/1 with the deposition of tailings into the cell having recently commenced in accordance with the conditions of L4612/1989/11.

The site is authorised to process up to 3,600,000 tonnes of ore annually and during the 2019-2020 annual period approximately 2,685,215 tonnes of tailings were produced requiring on site disposal to TSF2 (southern cell) and TSF3 (Cells AB, CD and E).

Cells AB and CD of TSF3 have reached their maximum approved crest heights of Relative Level

(RL) 10,559m under works approval W6270/2019/1 and deposition of tailings into these cells has ceased. Tailings are currently being deposited into TSF2 and TSF3 Cell E and have also reached their maximum approved crest height of RL 10,550m and RL 10,547.5m respectively. In order for on-going production to continue, additional tailings storage capacity at the Premises is required. Therefore, the Applicant is proposing an embankment raise to TSF2 and TSF 3 Cell E to a final crest elevation of RL 10,560m which is the subject of this works approval. Section 2.5.1 below discusses in further detail the proposed construction works associated to the embankment raises of the TSF cells.

## 2.4 Legislative context and other approvals

### 2.4.1 *Nickel (Agnew) Agreement Act 1974 (WA)* – State Agreement

The proposed works will be undertaken within Mineral Lease ML255SA within the existing Prescribed Premises boundary under L4612/1989/1. ML255SA is tenure granted under the *Nickel (Agnew) Agreement Act 1974* (WA) which was ratified by the parliament as a State Agreement to develop a major nickel project within the boundary of Western Australia. The key regulator is therefore the Department of Jobs, Tourism, Science and Innovation (JTSI).

Activities that are carried out under the State Agreement which include ore processing and tailings storage, are done so in accordance with a range of proposals approved by the Minister for State Development (the Minister). It was determined through the stakeholder consultation process through JTSI that there were inconsistencies with the company's State Agreement approved proposals and the works approval. This matter was resolved by the Applicant following the provision of a letter to the Minister on 26 July 2021, requesting a correction to the description of the maximum embankment height for TSF3 Cell E be made which was approved under the additional proposal titled *"Additional Development Proposal Tailings Storage Facility 3 Cell E Leinster Nickel Operations*" on 28 September 2000. The description of the maximum height for TSF3 Cell E was requested to be changed to RL 10,560m which is consistent with this works approval application.

### 2.4.2 *Mining Act 1978* – Mining Proposal

As the proposed works and associated activity are to be undertaken solely on ML255SA, approval under the *Mining Act 1978* is not required.

### 2.4.3 *Environmental Protection Act 1986* – Native Vegetation Clearing Permit

The Applicant was granted a native vegetation clearing permit (CPS 8877/1) on 22 October 2020 under section 51E of the EP Act. The permit, which is valid until 30 September 2035, authorises the clearing of up to 6,000 hectares of native vegetation for the purposes of mineral exploration, mineral production and associated activities. The approved clearing envelope includes the area surrounding TSF2 and TSF3 Cell E, however the Applicant has advised that no clearing is required for the proposed construction works associated to the embankment raises.

## 2.5 Description of Proposed Activity

The Applicant is seeking authorisation to undertake embankment raises to TSF2 and TSF3 Cell E using the upstream method of construction for TSF's. The cell embankments will be raised in 2.5m vertical intervals to a maximum crest height of RL 10,560m, with TSF2 being raised in 4 stages and TSF3 Cell E being raised in 5 stages. The construction works for each 2.5m interval of the embankment raises will be completed within a timeframe of approximately three months (BHP Nickel West Pty Ltd, 2021a).. Table 1 below provides an indicative timeline of the stages and associated storage capacity for each interval of the embankment raises.

**Table 1: Stages for raising TSF 2 and TSF3 Cell E to a final crest height of RL 10,560m**

| Stage | Height (m) | Storage Capacity ($Mm^3$) | Storage life (days) | Annualised rate of rise (m/year) |
|---|---|---|---|---|
| TSF 2 | | | | |
| 1 | 10 552.5 | 1.37 | 172 | 1.06 |
| 2 | 10 555 | 1.31 | 164 | 1.04 |
| 3 | 10 557.5 | 1.22 | 153 | 1.09 |
| 4 | 10 560 | 1.13 | 142 | 1.15 |
| TSF 3E | | | | |
| 1 | 10 550 | 1.05 | 132 | 2.15 |
| 2 | 10 552.5 | 1.20 | 151 | 0.98 |
| 3 | 10 555 | 1.20 | 151 | 1.04 |
| 4 | 10 557.5 | 1.18 | 149 | 1.09 |
| 5 | 10 560 | 1.17 | 147 | 1.40 |

Regulatory requirements for the construction of each 2.5m interval of the embankment raises for TSF2 and TSF3 Cell E (up to RL 10,560 m) will be managed via works approval W6538/2021/1. The Applicant will be required to submit an Environmental Compliance Report (ECR) to DWER for review following the construction of each stage of the embankment raises for TSF2 and TSF3 Cell E to ensure that there are no issues with seepage as a result of each raise as discussed further in the risk assessment under Section 3.

### 2.5.1 Proposed construction works

#### 2.5.1.1 Embankment raises

The upstream embankment raises will be constructed using compacted tailings sourced from the adjacent tailings beaches, using the same process that has been implemented for all existing TSF cells at the Premises. The external side slopes of the embankments and benches will have an oxide capping layer applied to thickness of 0.8m and 0.3m respectively, which will help to protect the tailings embankment against erosion.

The design of the embankment raise will have a crest width of 8m (including both the compacted tailings and oxide capping layer) and an upstream and downstream side slope of 1V:1.5H and 1V:2.75H respectively. A 6m wide bench will be included at Stage 2 of the embankment raises being at RL 10,555m for TSF2 and RL 10,552.5m for TSF3 Cell E. Embankment crests will have a 2% slope towards the internal crest to allow surface water runoff and tailings spillage to drain towards and onto the TSF beach. Safety berms will be constructed with 1V:1.3H side slopes along the upstream and downstream sides of the embankment crest. Following the construction of the embankment lift, the existing tailings discharge pipeline will be raised to the internal embankment crest against the safety berm. Slots will be excavated in the safety berms to allow for the installation of the spigots and conductor pipes. Spigots will be installed at approximately 40m centrelines along the distribution pipelines.

#### 2.5.1.2 Buttressing of TSF external walls

A widening of the existing buttress will be required along the complete perimeter of TSF 2 and along the eastern and western flanks of TSF3 Cell E. The western flank of TSF3 Cell E is buttressed by Rocky's Reward East Waste Rock Landform. Regular stability assessments will be conducted to determine the specific design requirements of the waste rock buttress to ensure that it is constructed to maintain factors of safety for embankment stability above the minimum requirements as set out in the ANCOLD (2019) guidelines and to internal BHP standards.

#### 2.5.1.3 Decant system and Return Water Pond

TSF2 and TSF3 Cell E have centrally located concrete decant towers that transfer decant water and stormwater under gravity collection via HDPE outfall pipelines to the return water pond located to the north of TSF3 Cell AB. Decant water recovered from the decant systems is pumped back to the plant for re-use in the process circuit. There are no changes to the existing

decant and return water systems for the embankment raise associated to TSF2 and TSF3 Cell E.

#### 2.5.1.4 Stormwater management

A stormwater diversion channel is located along the eastern flank of TSF3 which captures upstream surface water from the catchments to the east of the site. Stormwater is then diverted towards the north-east corner of TSF3 Cell AB which connects to a stormwater diversion drain located at TSF3 Cell F. The topography along the south flank of TSF2 naturally slopes away from the TSF, therefore a stormwater drain is not required to capture flow from the south of TSF2.

Runoff of contaminated stormwater from TSF2 and TSF3 Cell E is captured at the toe of the waste rock buttress in toe drains. The toe drains are sloped towards the existing return water pond located to the north of TSF3 Cell AB. The Applicant notes that there are no changes or additional stormwater control mechanisms associated to the proposed embankment raise to TSF2 and TSF3 Cell E.

### 2.5.2 Operation of TSF 2 and TSF3 Cell E at RL 10,560m

Once the construction works for each stage of the proposed embankment raise to TSF2 and TSF3 Cell E are completed, tailings will be deposited along the perimeter embankment through sub-aerially rotating spigots located approximately 40m apart along the perimeter main ring. As detailed in Table 1 above, following the completion of each stage of the embankment raise, tailings are proposed to be discharged for just under 5 months before the commencement of the next interval. Tailings are deposited in thin layers to form a thin beach adjacent to the perimeter embankment with the decant water released from the settled tailings and collected in a pool around the centrally located decant tower. Decant water is pumped and diverted to the return water pond located to the north of TSF3 Cell AB.

The proposed embankment raises will accommodate up to an additional 5 million tonnes (Mt) and 6.3Mt of tailings storage capacity to TSF2 and TSF3 Cell E respectively. The TSF embankment raises have been designed with a total operational freeboard of 500mm (includes operation and beach freeboards) that will be maintained at all times within the TSF cells. The cells will be inspected at minimum every 12 hours including:

- Tailings delivery lines;
- Return water lines;
- Tailings Deposition;
- Pond on surface of the TSF;
- Internal embankment freeboard; and
- The external walls of the TSF.

The applicant will be authorised to deposit tailings into TSF2 and TSF3 Cell E following the submission and approval of the ECR for each stage of construction.

As discussed under Table 2 of Section 3.1.1 of this report, the Applicant has proposed to install an additional recovery bore as a control for managing seepage impacts and increasing groundwater levels as a result of tailings deposition. This regulatory control has been included as a condition on the works approval. The Applicant will need to apply for an amendment to Licence L4612/1989/12 to include this control on Licence following the submission of the first ECR associated to the works approval.

In addition, the Licence currently stipulates the maintenance of a 300mm operational freeboard within all TSF cells. As noted above and as discussed under Table 2, the design of the TSF2 and TSF3 Cell E lifts is based on the maintenance of a 500mm total freeboard. In

order to link the works approval freeboard operational requirement to the current requirements of the licence, a condition which refers to the total freeboard definition in the DMP guidelines has been included. To provide clarity of the freeboard requirements for the TSF's, it is recommended that the same freeboard design parameters referred to in the works approval are amended in the Licence.

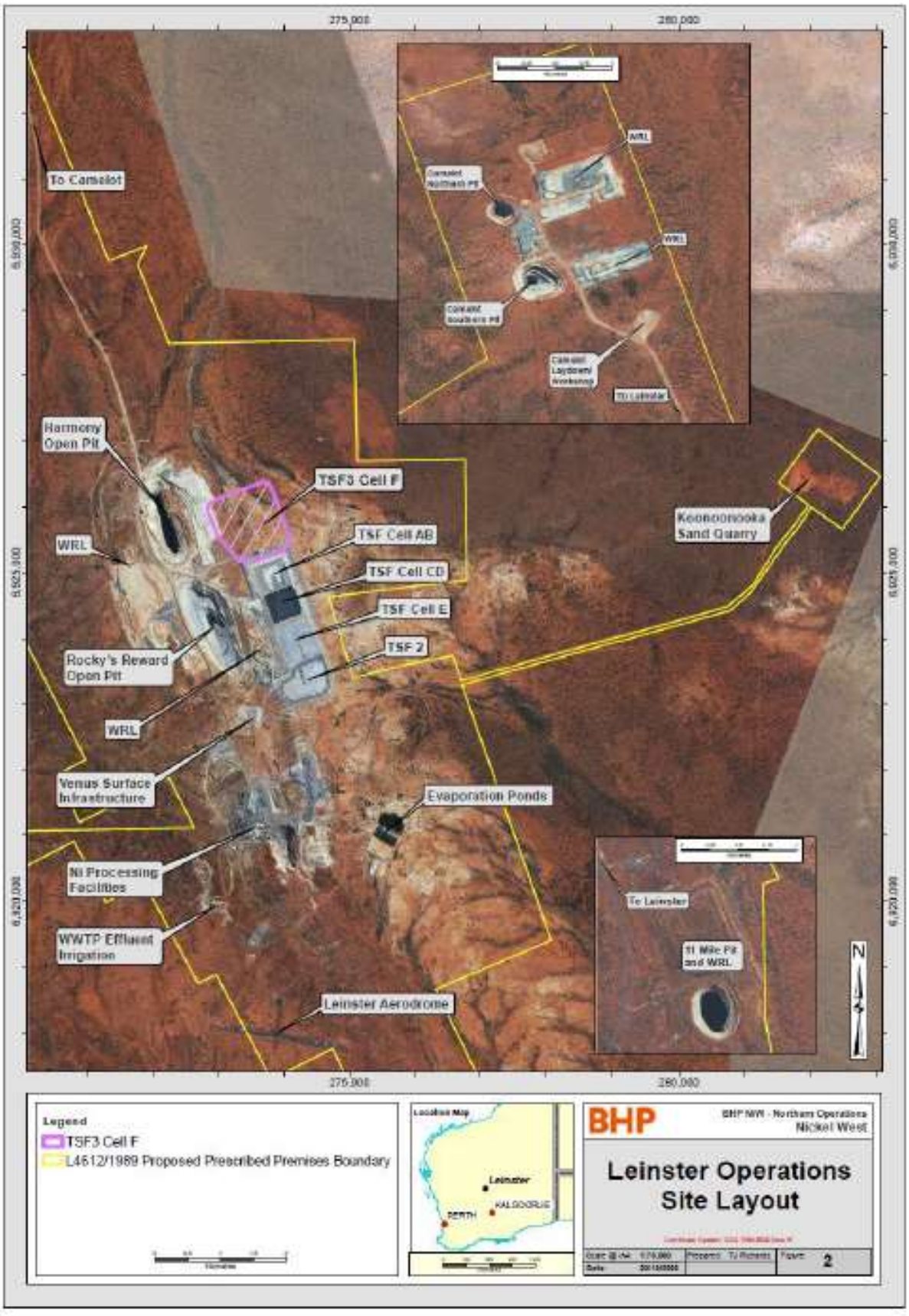


**Figure 1: Site layout of the operational TSF's at the Premises.**

# 3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guidance Statement: Risk Assessments* (DER 2017).

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

## 3.1 Source-pathways and receptors

### 3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction and operation which have been considered in this Decision Report are detailed in Table 2 below. Table 2 also details the proposed control measures the Applicant has proposed to assist in controlling these emissions, where necessary.

**Table 2: Proposed applicant controls**

| Emission | Sources | Potential pathways | Proposed controls |
|---|---|---|---|
| **Construction** | | | |
| Dust | Earthworks, construction, mobilisation and positioning of infrastructure associated with TSF3 Cell E and TSF2 embankment lift | Air/windborne pathway | Dust suppression/water sprays as required.<br>Dust control equipment shall be maintained in efficient operating condition.<br>Active waste collection on site to reduce the risk of dust generation from accumulation of waste materials.<br>On-site employees and contractors to be educated on the importance of reducing dust emissions. |
| | Vehicle movements on unsealed roads | | Water cart used (as required) on unsealed roads for dust suppression<br>Vehicle speeds restricted on unsealed roads. |
| Noise | Earthworks, construction, mobilisation and positioning of infrastructure associated with TSF3 Cell E and TSF2 embankment lift<br>Vehicle movements on unsealed roads | Air/windborne pathway | Noise managed as per the *Environmental Protection (Noise) Regulations 1997*. |
| **Operation** | | | |
| Seepage of tailings | Tailings slurry deposited into TSF3 | Direct discharge to | The applicable controls from the existing licence that are suitable for managing the risks |

| Emission | Sources | Potential pathways | Proposed controls |
|---|---|---|---|
| leachate from TSF | Cell E and TSF2 | soils and groundwater via seepage from base and embankments of TSF3 Cell E and TSF2 | associated with seepage following construction of TSF2 and TSF 3 Cell E embankment raise include:<br>• Existing Condition 15 for maintenance of seepage collection infrastructure downstream of the TSF's, evaporation ponds and concentrate storage ponds to effectively manage groundwater mounding due to seepage from the containment infrastructure;<br>• Existing Licence Conditions 16, 17, 18 and 19 for the installation, maintenance and monitoring of groundwater wells and recovery bores for the purpose of monitoring and recovering seepage in the vicinity of the TSF's;<br>• Existing Condition 20 for minimum required depth to groundwater that must be maintained for monitoring bores associated to TSF2;<br>• Existing Conditions 21 and 22 triggering and specifying requirements of a groundwater recovery program to minimise vegetation impact should the target of 6m below ground level be exceeded in any compliance monitoring bore;<br>• Existing Condition 23 for monitoring to detect any vegetation impacts, so that further control measures can be implemented if any impact is identified; and<br>• Existing Condition 28 for the inspection of the TSF's at least once every 12 hours and to note the ponding of decant within the TSF cells, seepage on the embankment walls and tailings deposition.<br>The applicant has also proposed the following controls to manage seepage impacts and increasing groundwater levels (BHP Nickel West Pty Ltd, 2021c):<br>• Install an additional recovery bore approximately six metres south of recovery bore MB06. It is anticipated that the additional recovery will lower the groundwater levels by several metres within a radius of up to 180m from the installed bore;<br>• Increased monitoring of groundwater |

| Emission | Sources | Potential pathways | Proposed controls |
|---|---|---|---|
| | | | standing water levels (SWL);<br>• Installation of an alternate recovery pump within the MB06 to increase recovery (pump was installed post submission of the 2020 Annual Environmental Report (AER)); and<br>• Conduct a review of the pipeline network from the recovery pump to determine whether recovery rates can be improved by increasing pipe sizing to minimise head losses. |
| Overtopping of TSF3 Cell E and TSF2 containing saline tailings slurry and decant water containing soluble metals and metalloids | Overtopping of TSF3 Cell E and TSF2 | Direct discharge to land | The applicable controls from the existing licence that manage the risk of overtopping of TSF3 Cell E and TSF2 are outlined below:<br>• Existing Licence Condition 13 requires stormwater diversion away from TSFs;<br>• Existing Licence Condition 27 requires the maintenance of a 300mm freeboard within all TSF cells to accommodate extreme rainfall events without over topping; and<br>• Existing Licence Condition 28 requires 12 hourly visual inspections of the TSFs including for ponding on the surface, and internal embankment freeboard.<br>The Applicant has advised that the TSF lifts have been designed with a total freeboard of 500mm in accordance with the *Guidelines on Tailings Dams Planning, Design, Construction, Operation and Closure* (ANCOLD, 2019), and the *Guide to the preparation of a design report for tailings storage facilities (TSFs)* (DMP, 2015) (BHP Nickel West Pty Ltd, 2021a).<br>The Works Approval includes the requirement to maintain a 500mm total freeboard (including an allowance for a 1:100 AEP 72-hour rainfall event) above the normal operating pond, with a sub-minimum of 300mm operational freeboard.<br>Embankment downstream slopes covered with oxide capping to protect from erosion.<br>Crest of each embankment raise will be sloped at 2% towards the internal crest to allow any tailings spillage to drain towards and onto the TSF beach. |
| Discharge of tailings slurry and decant | Rupture or leak of pipelines | Direct discharge to | The applicable controls from the existing licence that manage the risk associated with a pipeline failure between the processing plant |

| Emission | Sources | Potential pathways | Proposed controls |
|---|---|---|---|
| return water to land | | land | and TSF3 Cell E and TSF2 are outlined below:<br>• Existing Condition 11 requires tailings delivery and return water lines to be managed to prevent damage to vegetation, and pollution to surface or groundwater resources;<br>• Existing Condition 27 requires 12 hourly visual inspections of infrastructure including tailings delivery and return water pipelines;<br>• Condition 28 requires a log book to be kept and available for inspection; and<br>• Existing Condition 29 require pipelines to be buried or bunded with appropriate catch pits to contain any spills. |
| Contaminated stormwater | Stormwater coming in contact with tailings or decant liquor | Direct contamination of surface water and soils | The applicable controls from the existing licence that manage the risk associated to stormwater runoff are outlined below:<br>• Existing Licence Condition 14 which requires stormwater runoff to be diverted away from areas adjacent to TSF's; and<br>• Existing Licence Condition 15 requires the installation and maintenance of perimeter drains downstream of the external toes of TSF's which primarily are for the collection and recovery of seepage or materials from a low level breach of the embankments; but that will also serve to collect contaminated stormwater.<br>The Tailings Storage Water Management Plan allows for up to 30 days for removing excess water from the TSF3 Cell E following an extreme rainfall event. |

### 3.1.2 Receptors

In accordance with the *Guidance Statement: Risk Assessment* (DER 2017), the Delegated Officer has excluded employees, visitors and contractors of the applicant's from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 3 and Figure 2 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises *(Guidance Statement: Environmental Siting* (DER 2016)).

**Table 3: Sensitive human and environmental receptors and distance from prescribed activity**

| **Human receptors** | **Distance from prescribed activity** |
|---|---|
| Township of Leinster | Approximately 13.5km south west of TSF 2.<br>Distances of prescribed activity to closest sensitive land uses is sufficient to inform that project activity impacts as not foreseeable. Human receptors are not considered to be impacted during construction or operations and therefore not further considered in the risk assessment. |
| **Environmental receptors** | **Distance from prescribed activity** |
| Groundwater | The Premises is located within the Goldfields Groundwater Area proclaimed under *Rights in Water and Irrigation Act 1914.*<br>The groundwater level prior to operations was approximately 30m below ground level (bgl) (Berry, 2007). It has been locally modified by the TSF operations.<br>Groundwater abstraction is permitted under the Applicant's Licences to Take Water (GWL58111(5), 63834(4), 66248(6) and 167071(5)) under Section 5C of the *Rights in Water and Irrigation Act 1914.*<br>The 11 mile borefield, located approximately 10.5km south west of TSF2, is the only operating potable borefield which supplies up to 80% of the potable supply to the Leinster township and the Leinster Nickel Operations (Golder, 2021). The remainder is used for potable or low salinity water requirements of the mine (Golder, 2021). Groundwater is abstracted from potable bores that are screened 40 – 86 mbgl and salinity is 580-820 mg/L (Golder, 2021). The 11 mile borefield is located predominately to the west of the perseverance fault which acts as a groundwater barrier.<br>Two historical pastoral bores, namely an un-named bore and MacArthur's bore are located approximately 6km to the east and 4.8kms north of the TSFs respectively (Golder, 2021). Given these bores are historical, they are unlikely to be in use. |
| Surface Water Lines | There are no surface water lines that intersect the boundary of the proposed activity. A minor non-perennial watercourse is mapped approximately 285m from the boundary of TSF 2. |
| Remnant native vegetation | The eastern boundary of TSF3 Cell E and TSF2 adjoins remnant native vegetation.<br>The area surrounding the TSF complex is a mixture of habitat types including (Nickel West Pty Ltd, 2020):<br>• drainage tract Mulga shrubland; |

| | |
|---|---|
| | • lateritic Mulga/Wanderrie shrubland;<br>• stony ironstone Mulga shrubland;<br>• granite rock Mulga shrubland; and<br>• breakaway chenopod low shrubland.<br><br>Condition W10 of Licence L4612/4989/1 requires the Applicant to undertake a vegetation monitoring program to detect any impacts on native vegetation resulting from TSF seepage.<br><br>Twelve historical monitoring quadrats have been established around the TSF complex, with eight quadrats located to the north of TSF3 Cell E and six quadrats to the southeast of TSF2 (BHP Nickel West Pty Ltd, 2020). Two additional monitoring quadrats were established 1.5km north of TSF3 Cell E during the 2017 monitoring round. The expansion of the TSF 3 and construction of a haul road south of TSF 2 resulted in four quadrats being destroyed from mining activities. Eight new monitoring quadrats were installed in 2020, six north of the new TSF 3 Cell and two south of the TSF 2 (BHP Nickel West Pty Ltd, 2020).<br><br>Annual monitoring of the TSF quadrats conducted over the last few reporting years observed no change in vegetation condition across the majority of the quadrats between yearly assessments and determined vegetation ranged between degraded to excellent condition. The majority of the individually assessed plants across the TSF quadrats have also observed little to no change over the last few annual reporting years. |
| Priority flora species | Two records of the Priority 3 flora species *Thryptomene sp. Leinster* (B.J. Lepschi & L.A. Craven 4362) have been mapped on the Department of Biodiversity, Conservation and Attractions (DBCA) database approximately 880m northeast of TSF3 Cell E and 1.5km northwest of TSF2.<br><br>Figure 2 shows the locations of priority flora species recorded during surveys located in close proximity to the TSF's (BHP Nickel West Pty Ltd, 2021b). The record of *Thryptomene sp. Leinster* (B.J. Lepschi & L.A. Craven 4362) located in close proximity to the south of TSF2 was recorded in 2007 by Western Botanical from back captured data from 1996/1997 (BHP Nickel West Pty Ltd, 2021c).<br><br>It is noted that CPS 8877/1 has a flora management condition that allows for the clearing of up to 233 individuals of the Priority 3 flora species *Thryptomene* sp. *Leinster* (B.J. Lepschi & L.A. Craven 4362) where their location has been identified and reported within the document '*BHP Billiton Nickel West, Northern Operations, Strategic Native Vegetation Clearing Permit (NVCP) Application, Supporting Information, April 2020'*.<br><br>Note: *Olearia xerophila-ásens*. lat. (G.Cockerton & K. |

| | |
|---|---|
| | Stratford WB3135) as shown on Figure 2 was given this phrase name by Western Botanical during a survey as the specimens were similar to the common species *Olearia Xerophila* (BHP Nickel West, 2021c). *Olearia xerophila-ásens*. lat. (G.Cockerton & K. Stratford WB3135) is not a listed as species of conservation significance, therefore is not listed on the DBCA database. |
| Priority Ecological Community | A priority ecological community (PEC) (P1) Lake Miranda east calcrete groundwater assemblage types on Carey palaeodrainage on Yakabindie Station is located 12.4kmnortheast of TSF 3E. |
| Conservation significant fauna species | Biota's Strategic Fauna Assessment (2020) identified 10 conservation significant fauna species that are known to occur or have potential to occur at the Premises including:<br><br>(Three fauna species known to occur):<br><br>• brush-tailed mulgara (*Dasycercus blythi*);<br>• Peregrine Falcon (*Falco peregrinus*); and<br>• Striated Grasswren (*Amytornis striatus striatus*).<br><br>(Five species may potentially occur)<br><br>• The Long-tailed Dunnart (*Sminthopsis longicaudata*);<br>• Malleefowl (*Leipoa ocellata*);<br>• Fork-tailed Swift (*Apus pacificus*);<br>• Night Parrot (*Pezoporus occidentalis*); and<br>• Black-footed Rock Wallaby (*Petrogale lateralis lateralis*).<br><br>(Two migratory bird species may potentially occur when water is available)<br><br>• the Sharp-tailed Sandpiper (*Calidris acuminata*); and<br>• Common Greenshank (*Tringa nebularia*).<br><br>The Biota 2020 assessment also identified two records of priority listed mygalomorph spiders being *Kwonkan moriartii* (Priority 2), recorded just south of the Premises and *Idiosoma clypeatum* (Priority 3) recorded within the Premises. |


**Figure 2: Locations of priority flora in the vicinity of TSF2 and TSF3 Cell E**

### 3.1.3 Pathways

Through consideration of the source-pathway-receptor analysis and review of groundwater data described below, there is a risk of tailings seepage to groundwater from the base or embankments of TSF2 and TSF3 Cell E. This is in turn causes alteration of groundwater quality and groundwater mounding into the root zone of vegetation causing vegetation stress or deaths. As a result, the local geology, hydrogeology and depth to groundwater have been considered.

#### 3.1.3.1 Local hydrogeology

TSF2 and TSF3 Cell E are located to the east of a regional Perseverance Fault situated on granitoid basement overlain by up to 40m of saprolite clays and weathered rock (Golder, 2021). Beneath the TSF's, is a thin cover of alluvial soil that is of moderate permeability to a depth of less than 5m, which overlies low permeability saprolite clay (Berry, 2017). Highly weathered granite-gneiss extends in most cases to 15 – 20m, grading from an approximately 10m thick saprolite/saprock into fresher granitoids beneath (Golder, 2021). Variably fractured gneissic-granitic basement occurs beneath the weathered layer. The basement granitoid rocks have low permeability, except for the fractured granitoid zones where permeabilities are higher and groundwater may be encountered (Golder, 2021). Granitoid rocks outcrop on a topographic high to the east of TSF2 and TSF3 Cell E (Golder, 2021).

The groundwater modelling undertaken by Golder in 2020 identified that the general direction of groundwater flows pre-mining mimics topography, in a south to north direction (BHP Billiton Nickel West, 2021a; Golder, 2021). The modelling also determined that seepage from tailings deposition has resulted in localised mounding of groundwater beneath the TSF cells with an increased hydraulic gradient and changed the direction of groundwater flow (BHP Nickel West, 2021). The model determined that groundwater will also flow in a southern direction following the hydraulic gradient as a result of local groundwater mounding (BHP Nickel West, 2021). The results of electromagnetic surveys and exploration drilling of the perseverance fault to the south of TSF2 indicate that the fault is essentially dry and considered to act as a groundwater flow barrier to the west and flow is inferred to flow predominately towards the north west towards the paleo drainage (Golder, 2021).

#### 3.1.3.3 Groundwater levels

Baseline groundwater beneath TSF3 footprint area was observed at approximately 30mbgl pre-mining (Berry, 2017). Groundwater monitoring commenced in the 1990's and first recorded groundwater levels at approximately RL 10, 475m to RL 480m (Golder, 2021). Post development, the depth to groundwater level varies around the TSF's and is dependent on which cell is receiving tailings deposition. Based on groundwater data from the monitoring bores located around the TSF's, groundwater levels in the vicinity of the TSF's have risen to levels between RL 10, 490m and RL 10, 505m due to localised mounding beneath the TSF's (Golder, 2021).

During the 2019-2020 annual reporting period, tailings were deposited to TSF2 from December 2018 to August 2019 and to TSF3 Cell E from August 2019 to December 2019 (Nickel West Pty Ltd, 2020). Current groundwater standing water levels (SWL) surrounding the TSF complex based on BHP Nickel West Pty Ltd's 2020 annual reporting determined ranges between 1.78mbgl (MB33) close to the TSF wall and 26.34mbgl (MB62) (BHP Nickel West Pty Ltd, 2020). Monitoring bores closest to TSF2 range in depth from 5.01mbgl (LWB039) close to the TSF wall to 26.34mbgl (BHP Nickel West Pty Ltd, 2020). Monitoring bores closest to TSF3 Cell E range from 2.34mbgl (MB57) to 10.33mbgl (BHP Nickel West Pty Ltd, 2020).

#### 3.1.3.4 Groundwater quality

Groundwater surrounding the TSF complex is saline with TDS levels surrounding TSF2 and TSF3 Cell E ranging between 18,600mg/L (MB39) and 27,000 mg/L (LNOPB02) (BHP Nickel West Pty Ltd, 2020). Groundwater salinity data has remained generally stable since historical

sampling began in the early 1990s, with the exception of monitoring bores MB64 and MB65 which have observed a large increase in salinity from the top of the groundwater profile to 1m below for some of the monitoring rounds (BHP Nickel West Pty Ltd, 2020). MB31 and LRC614 have also recorded an increasing trend in salinity levels (BHP Nickel West Pty Ltd, 2020). Annual reporting as required by L4612/1989/11 has demonstrated that nickel concentrations have remained low and within historical ranges in recent years, except for MB50, MB63 and LWB039 (TSF2 monitoring bore) which show an increasing trend. Section 3.2.3 discusses the potential impacts of seepage to remnant native vegetation adjacent to TSF2 and TSF3 Cell E.

## 3.2 Modelling and monitoring data review

### 3.2.1 Numerical Groundwater modelling

The Applicant engaged Golder to undertake Groundwater Modelling to gain a greater understanding of the seepage process during TSF operations to date which also incorporated the proposed raises to TSF2 and TSF3 Cell E (Golder, 2021). Golder determined that 2D modelling would be appropriate for predicting general flow conditions down-gradient of the TSFs for future tailings deposition given the existing mounding to the north and south of the current TSF's (Golder, 2021). The following key assumptions were simulated into the model;

- the general direction of pre-mining groundwater flows is south to north following topography;
- groundwater flows in an east-west direction were not considered to be significant due to the presence of the fault (to the west) and a topographic high (to the east) which act as barriers;
- a constant head boundary at the north and south of the cross section were used in the model; and
- it is considered unlikely that the low permeability granites will contribute significantly to the shallow groundwater system due to the significant depth to the fractured/weathered granites and thickness of the overlying saprolite, therefore were excluded from the model (Nickel West Pty Ltd, 2021c).

The results from the modelling inferred that localised mounding underneath TSF2 and TSF3 Cell E will increase from current levels with a maximum rise of 3m in the area of monitoring bore MB60 which is very close to the southern wall of TSF2 (Golder, 2021 and BHP Nickel West Pty Ltd, 2021c). Groundwater levels located further away from TSF2 at MB62 are predicted to be less than 1m. Figure 3 shows the location of MB60 and MB62 along the modelled plane that runs in a north to south direction. The conclusions from the results of the model determined that seepage in the sub-surface is likely to extend less than 1km to the north and south of the TSF (Golder, 2021). The analysis of the model also concluded that there is the possibility of discrete seepage migration through the higher permeability zones within the saprock or basement or where preferential pathways occur in the fractured/weathered granite zones (Golder, 2021). Golder recommended that groundwater monitoring during TSF operation should continue to occur and a risk review followed by an action plan be implemented should there be deviation from the predicted groundwater levels (Golder, 2021).


**Figure 3: Location of monitoring bores along 2D modelled plane**

### 3.2.2 Analysis of SWL for TSF2 and TSF3 Cell E

Noting the existing localised mounding occurring to the north and south of the TSF complex, the continued predicted increase of current groundwater levels due to tailings deposition, and that the groundwater model did not consider East to West changes, an analysis of SWL data from

the groundwater monitoring bores surrounding TSF2 and TSF Cell E contained within the Annual Environmental Reports (AER) was conducted (Golder, 2021). The analysis identified that groundwater levels around TSF2 and TSF 3 Cell E are quite shallow with 10 of the 19 monitoring bores (TSF2 and TSF3 Cell E combined) recording less than 6mbgl (BHP Nickel West Pty Ltd, 2020).

Condition W7 of the existing Licence L4612/1989/11 contains a limit for SWL of 4mbgl within TSF2 monitoring bores MB39, MB42, MB54, MB61, MB62 requiring the Licence Holder to ensure groundwater levels for these bores are deeper than 4mbgl. In addition, condition W8(a) requires a groundwater recovery program to be implemented within six months of SWL in monitoring bores reaching 6.0mbgl. The data contained within AER's indicate that the SWL for monitoring bore MB42 has been shallower than 6mbgl for the last 3 years. It is noted that the implementation of a Groundwater Recovery Program (GRP) as required by Condition 8(a) was implemented in 2018 which did see SWL reduce in 2019, however SWL have since increased again in the last annual period and were back to below 6mbgl (5.12mbgl) in the last quarter of AER 2019-2020 (BHP Nickel West Pty Ltd, 2020).

To ensure that the groundwater level limit for the monitoring bores outlined above are not exceeded and that groundwater level targets are met, the Applicant has proposed a number of controls which are outlined in Table 2. The primary contingency measure to manage increasing SWL's is the installation of an additional seepage recovery bore to the South of TSF2 as shown in Figure 4. The additional recovery bore will have a larger bore diameter to accommodate a higher capacity pump to manage SWL and ensure groundwater levels are kept below the groundwater level limit and targets stipulated in the Licence (BHP Nickel West Pty Ltd, 2021c).

The Premises existing Licence L4612/1989/11 requires the monitoring of groundwater surrounding TSF2 and TSF3 Cell E. See Figure 4 and Figure 5 below for locations of groundwater monitoring and recovery bores.

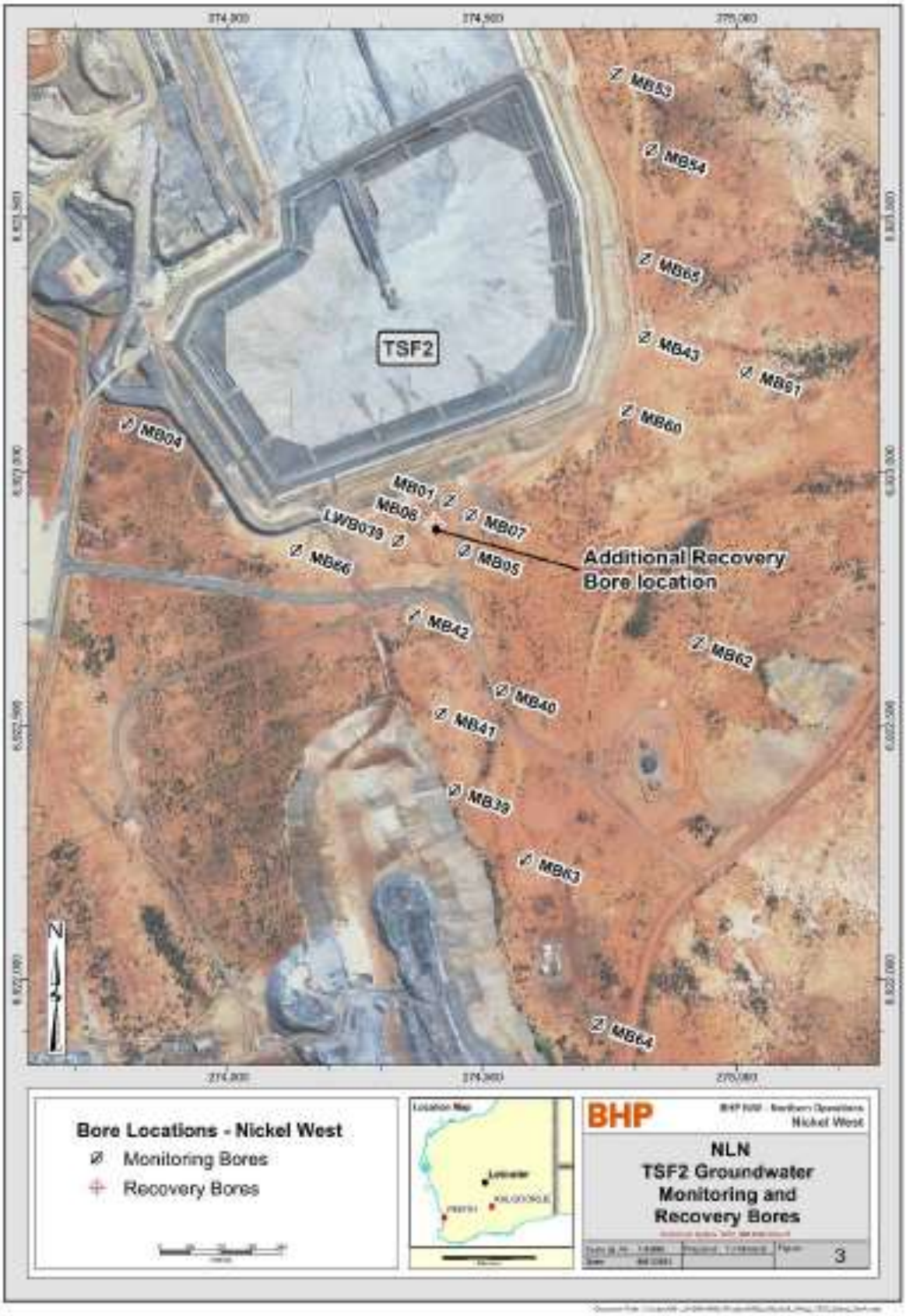


**Figure 4: Groundwater monitoring and recovery bores surrounding TSF2**


**Figure 5: Groundwater monitoring and recovery bores surrounding TSF3 Cell E**

### 3.2.3 Seepage impacts to sensitive receptors

As described in Table 3 of this report, a record of the priority flora species *Thryptomene sp. Leinster* (B.J. Lepschi & L.A. Craven 4362) was recorded in close proximity to the south of TSF2 and next to MB42 that is already recording shallow SWL's. Noting this is a historical record, that there is uncertainty this record still exists, that the Applicant has a permit to clear up to 233 individuals of this species under CPS 8877/1 and that this species is not groundwater dependent, it is unlikely this species will be impacted due to increasing groundwater levels. An additional two records of the Priority 3 flora species *Thryptomene sp. Leinster* (B.J. Lepschi & L.A. Craven 4362), recorded in DBCA's database located 880m northeast of TSF3 Cell E and 1.5 kilometres northwest of TSF2 are unlikely to be impacted due to the topographic high situated to the east of TSF3 Cell E.

Tailings slurry and return (decant) water contain soluble metals and metalloids which are toxic to native vegetation and fauna. The tailings liquor has elevated salinity, typically ~ 15,000 mg/L. Should seepage rise to the root zone of adjacent native vegetation (expected to be at least 6mbgl) stress or death of deep-rooted vegetation may result due to impacts from the saline water. While the proposed embankment raise has the potential to increase groundwater levels, the presence of the high topography located to the East of TSF3 Cell E and the proposed controls as stipulated in Table 2 are likely to protect the native vegetation adjacent to the TSF cells.

## 3.3 Risk ratings

Risk ratings have been assessed in accordance with the *Guidance Statement: Risk Assessments* (DER 2017) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the applicant has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 4.

Works Approval W6538/2021/1 that accompanies this Decision Report authorises construction and emissions associated with the operation for all stages of the embankment raise for TSF2 and TSF3 Cell E. The conditions in the issued Works Approval, as outlined in Table 4 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

**Table 4: Risk assessment of potential emissions and discharges from the Premises during construction, time-limited operations and operation**

| Risk Event | | | | | Risk rating[1]<br>C = consequence<br>L = likelihood | Applicant controls sufficient? | Conditions[2] of works approval | Justification for additional regulatory controls |
|---|---|---|---|---|---|---|---|---|
| **Source/Activities** | **Potential emission** | **Potential pathways and impact** | **Receptors** | **Applicant controls** | | | | |
| ***Construction*** | | | | | | | | |
| Earthworks, construction, mobilisation and positioning of infrastructure associated with TSF3 Cell E and TSF2 embankment lift<br>Vehicle movements on unsealed roads | Dust | Air/windborne pathway causing impacts to health and amenity | Remnant native vegetation located adjacent to TSF3 Cell E and TSF2.<br>Priority 3 flora species *Thryptomene sp. Leinster* (B.J. Lepschi & L.A. Craven 4362). | Refer to Section 3.1 | C = Minor<br>L = Rare<br>**Low Risk** | Y | **Condition 1 and Table 1** outlines the authorised staged construction heights for the embankment raises for TSF2 and TSF3 Cell E.<br>Condition 2 and Table 2 outlines the design and construction requirements for the TSF2 and TSF3 Cell E embankment raises.<br>**Conditions 4 and 5** require an Environmental Compliance report to be submitted once construction of each staged embankment raise has been completed. | Ensure TSF2 and TSF3 Cell E embankment raises have been constructed as proposed.<br>An Environmental Compliance report confirms the infrastructure as proposed (including emission controls) has been constructed. |
| ***Operation***<br>***(including time-limited-operations operations)*** | | | | | | | | |
| Tailings deposition into TSF3 Cell E and TSF2 Cell Embankment raise | Seepage of tailings from TSF | Seepage of leachate from base and embankments of TSF3 Cell E and TSF2 resulting in increased groundwater/soil contamination and mounding of the groundwater | Remnant native vegetation located adjacent to TSF3 Cell E and TSF2.<br>Priority 3 flora species *Thryptomene sp. Leinster* (B.J. Lepschi & L.A. Craven | Refer to Section 3.1 | C = Minor<br>L = Unlikely<br>**Medium Risk** | Y | Condition 2 and Table 2 outlines the design and construction requirements for the TSF2 and TSF3 Cell E embankment raises.<br>Condition 3 requires the construction of an additional recovery bore to ensure groundwater levels are managed and meet the groundwater limit | As discussed in detail under section 3.2 of this report, the results of numerical groundwater modelling and an analysis of SWL data from AER's indicate that groundwater mounding is occurring in the vicinity of TSF2 and TSF3 Cell E and will continue to rise due to seepage from tailings deposition. The groundwater model predicted a 3-metre increase to the south of TSF2 in the area of monitoring bore 60.<br>While the proposed embankment raises are predicted to increase groundwater levels |

| Risk Event | | | | | Risk rating[1]<br>C = consequence<br>L = likelihood | Applicant controls sufficient? | Conditions[2] of works approval | Justification for additional regulatory controls |
|---|---|---|---|---|---|---|---|---|
| **Source/Activities** | **Potential emission** | **Potential pathways and impact** | **Receptors** | **Applicant controls** | | | | |
| | | table causing vegetation stress or deaths. | 4362).<br>Conservation significant fauna that are known to occur or have the potential to occur at the Premises. | | | | requirements of the licence.<br>Conditions 6 to 8 outline the records and reporting requirements of the works approval. | surrounding TSF2 and TSF3 Cell E which increases the likelihood of seepage impacting on nearby environmental receptors, the Delegated Officer has taken into consideration that although the applicant is not proposing to clear the adjacent native vegetation to the TSF's for the proposed activity, the applicant does have authorisation to clear this native vegetation under clearing permit CPS 8877/1. In addition, as discussed under section 3.1.2, the applicant has authorisation under CPS 8877/1 to clear up to 233 individuals of the Priority 3 flora species *Thryptomene sp. Leinster* (B.J. Lepschi & L.A. Craven 4362), therefore the historical record located to the south of TSF2 has the potential to be cleared. The additional records of the Priority 3 flora species *Thryptomene sp. Leinster* (B.J. Lepschi & L.A. Craven 4362),recorded in DBCA's database located 880mnortheast of TSF3 Cell E and 1.5km northwest of TSF2 are unlikely to be impacted due to the topographic high situated to the east of TSF3 Cell E.<br>In consideration of the clearing approval discussed above, the existing controls on the licence and additional controls to manage the predicted rising groundwater levels as outlined in section 3.1, the Delegated Officer has determined these measures are sufficient in managing this risk event.<br>A detailed risk assessment of this risk event did determine that the groundwater level limit of 4mbgl for monitoring bore MB42 stipulated under condition W7 of the licence had been exceeded and that the SWL's have been shallower than 6mbgl for the last 3 years. To ensure that the groundwater level limit for the monitoring bores outlined under condition W7 of the licence are |

| Risk Event | | | | | Risk rating[1]<br>C = consequence<br>L = likelihood | Applicant controls sufficient? | Conditions[2] of works approval | Justification for additional regulatory controls |
|---|---|---|---|---|---|---|---|---|
| **Source/Activities** | **Potential emission** | **Potential pathways and impact** | **Receptors** | **Applicant controls** | | | | |
| | | | | | | | | not exceeded and that groundwater level targets are met, the Applicant has proposed a number of controls which are outlined in section 3.1. The primary contingency measure to manage increasing SWL's is the installation of an additional recovery bore to the south of TSF2. A construction requirement to install this additional recovery bore has been included in the works approval. The Delegated Officer considers these additional controls adequate to ensure the existing conditions in the Licence continue to be met. |
| | Discharge of tailings and decant return water between TSFs and processing plant from pipeline rupture or leak. | Seepage through the soil profile to groundwater may result in the contamination of soils and the deterioration of groundwater quality.<br>Soil contamination may inhibit the growth and survival of remnant native vegetation located adjacent to TSF3 Cell E and TSF2. | Remnant native vegetation located adjacent to TSF3 Cell E and TSF2.<br>Priority 3 flora species *Thryptomene sp. Leinster* (B.J. Lepschi & L.A. Craven 4362).<br>Conservation significant fauna that are known to occur or have the potential to occur at the Premises. | Refer to Section 3.1 | C = Minor<br>L = Unlikely<br>**Medium Risk** | Y | Condition 2 and Table 2 outlines the design and construction requirements for the TSF2 and TSF3 Cell E embankment raises.<br>**<u>Conditions 4 and 5</u>** require an Environmental Compliance report to be submitted once construction of each staged embankment raise has been completed.<br>Conditions 6 to 8 outline the records and reporting requirements of the works approval. | There is potential for the discharge of tailings slurry or return water to the environment through pipeline failure between the processing plant and TSF3 Cell E and TSF2.<br>The Delegated Officer has taken into account that although the proposed activity will not require any clearing of native vegetation, the Applicant does have a permit to clear native vegetation under CPS 8877/1, which therefore reduces the likelihood of sensitive receptors being impacted. In addition, the additional records of the Priority 3 flora species *Thryptomene sp. Leinster* (B.J. Lepschi & L.A. Craven 4362),recorded in DBCA's database located 880m northeast of TSF3 Cell E and 1.5km northwest of TSF2 are unlikely to be impacted due to the topographic high situated to the east of TSF3 Cell E.<br>Noting the above, and the controls outlined under Section 3.1, the Delegated Officer has determined that these measures adequately regulate the risk of spills or leaks from pipelines. |
| | Overtopping of TSF3 Cell E and TSF2 | Overtopping of tailings and overland runoff | Remnant native vegetation that may contain | Refer to Section 3.1 | C = Moderate<br>L = Possible | Y | Condition 2 and Table 2 outlines the design and construction requirements | There is a risk of overtopping of the TSF cells if deposition into the cell exceeds the holding capacities or during a significant rainfall event. |

| Risk Event | | | | | Risk rating[1]<br>C = consequence<br>L = likelihood | Applicant controls sufficient? | Conditions[2] of works approval | Justification for additional regulatory controls |
|---|---|---|---|---|---|---|---|---|
| **Source/Activities** | **Potential emission** | **Potential pathways and impact** | **Receptors** | **Applicant controls** | | | | |
| | containing saline tailings slurry and decant water containing soluble metals and metalloids | during significant rainfall events may result in soil contamination and reduced native vegetation health or native vegetation death. | priority flora taxa located adjacent to TSF3 Cell E and TSF2.<br>Conservation significant fauna that are known to occur or have the potential to occur at the Premises. | | **Medium Risk** | | for the TSF2 and TSF3 Cell E embankment raises.<br>Condition 3 requires the construction of an additional recovery bore to ensure groundwater levels are managed and meet the groundwater limit requirements of the licence.<br>Conditions 6to 8 outline the records and reporting requirements of the works approval. | The Delegated Officer has taken into account the existing regulatory controls on the licence for managing overtopping and the water balance assessment that was developed to ensure there is sufficient storage capacity within the cells to accommodate a 1 in 100 year, 72-hour rainfall event during operation including the maintenance of a 500mm freeboard above inflow, and determined these measures adequately manage the risk of TSF2 and TSF3 Cell E overtopping.<br>It is noted that Condition W15 on the existing Licence requires the maintenance of a 300mm freeboard within all TSF cells to accommodate extreme rainfall events without over topping. The Works Approval has included the requirement to maintain a 500mm freeboard to reflect the design of the TSF lifts. This operational requirement will need to be amended through a licence amendment. |
| | Stormwater runoff contaminated with tailings and tailing liquor | Sheet runoff during rainfall events potentially causing contamination to soil and surface water bodies located in close proximity to the TSF's.<br>Soil contamination may degrade the quality of native vegetation adjoining the | Surface water lines located in close proximity to the TSF's (closest being 285 metres from the boundary of TSF 2).<br>Adjoining native vegetation to TSF 3 Cell E and TSF2 that may contain priority flora taxa. | Refer to Section 3.1 | C = Minor<br>L = Unlikely<br>**Medium Risk** | Y | N/A | The Delegated Officer considers that the existing regulatory controls on the Licence as outlined under Section 3.1 are adequate for managing the risk associated to stormwater runoff. No additional regulatory controls are required. |

| Risk Event | | | | | Risk rating[1]<br>C = consequence<br>L = likelihood | Applicant controls sufficient? | Conditions[2] of works approval | Justification for additional regulatory controls |
|---|---|---|---|---|---|---|---|---|
| **Source/Activities** | **Potential emission** | **Potential pathways and impact** | **Receptors** | **Applicant controls** | | | | |
| | | TSF's and impact upon priority flora. | | | | | | |

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guidance Statement: Risk Assessments* (DER 2017).

Note 2: Proposed applicant controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

# 4. Consultation

Table 5 provides a summary of the consultation undertaken by the department.

**Table 5: Consultation**

| Consultation method | Comments received | Department response |
|---|---|---|
| *Application advertised on the department's website (24/05/2021)* | None received | N/A |
| *Local Government Authority advised of proposal (19/05/2021)* | None received | N/A |
| *Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal (19/05/2021)* | None received | N/A |
| *Department of Jobs, Tourism, Science and Innovation (JTSI) advised of proposal (19/05/2021)* | JTSI replied on 2 June 2021. The following summarises the comments made:<br>• the Applicant is currently in the process of making changes to its approved proposals through the *Nickel (Agnew) Agreement Act 1974* (State Agreement), and at present it is unclear on which State Agreement proposal(s) the works approval relates to.<br>• JTSI are currently consulting with the Applicant in regard to the works approval as part of the review process regarding the proposed changes to the State Agreement proposal(s).<br>• JTSI requested additional time to 18 June 2021 to be able to provide comments in relation to the works approval following receiving the additional information requested from the applicant. | DWER confirmed an extension to the 18 June 2021 for JTSI to provide comments on the referral. |
| | On 21 June 2021, JTSI provided the additional comments summarised below:<br>• A meeting was carried out on 16 June 2021 with the Applicant which facilitated discussion on the inconsistencies between the company's State Agreement approved proposals and the works approval. | DWER advised JTSI that the assessment of the works approval application will continue, however DWER will not make a decision on the application until the relevant approvals have been determined by JTSI under the State Agreement for implementation of the activities sent out in the Works Approval Application. |

| | | |
|---|---|---|
| | • JTSI is working with the Applicant on a draft additional proposal which when approved would enable the Applicant to implement the changes to its Tailings Storage Facilities under the State Agreement.<br>• JTSI advised that once the Applicant has provided the draft additional proposal for review, they will refer to the relevant stakeholders for comments and then compile these comments to provide to the Applicant to complete final revisions before submitting to the Minister for State Development for approval.<br>• JTSI outlined the timeframes for the referral process and Ministerial approval.<br>• JTSI advised that they are unable to provide further comments on the activities proposed until the Applicant has submitted the draft additional proposal. JTSI sought comment from DWER as to whether DWER can proceed with the assessment of the works approval given the above information. | DWER requested JTSI advise once the State Agreement approvals are determined. |
| | On 29 July 2021, JTSI provided the following comments summarised below:<br>• The Applicant wrote to the Minister for State Development requesting a correction to the description of the maximum embankment heights of TSF3 Cell E which were approved under the additional proposal titled “Additional Development Proposal Tailings Storage Facility 3 Cell E Leinster Nickel Operations”. A copy of the correspondence letter to the Minister was attached.<br>• JTSI advised that it has been determined that no further approvals through the State Agreement are required for this works approval application.<br>• JTSI advised that the Applicant is still required to gain relevant approvals under the *Environmental Protection Act* | Noted. |

| | | |
|---|---|---|
| | *1986* and *the Mine Safety and Inspection Act 1994* for the proposed embankment lifts for TSF 2 and 3E. | |
| *Applicant was provided with draft documents on 12 August 2021* | Comments from Applicant received on 16 August 2021. Comments are summarised in Appendix 1. | Refer to Appendix 1. |

# 5. Conclusion

Based on the assessment in this Decision Report, the Delegated Officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

# References


1. ANCOLD 2019, *Guidelines on Tailings Dams – Planning, Design and Closure – Revision 1*, dated July 2019.
2. Berry K 2017, Nickel West Leinster Assessment of Groundwater Characteristics, dated April 2017, DWER reference A1435498.
3. BHP Nickel West Pty Ltd 2021, *BHP Billiton Nickel West – Leinster Nickel Operations – Tailings Storage Facility TSF2 & 3E Cell Raise to RL 10560m - Works Approval Application – Attachment 8 Supporting Information*, dated March 2021, DWER reference A1986331.
4. BHP Nickel West Pty Ltd 2020, Nickel West Leinster Annual Environmental Report – DWER – 1st August 2019 – 31st July 2020, DWER reference DWERDT358899.
5. BHP Nickel West Pty Ltd 2021a, Works Approval Holder's response to request for further information, dated 22 April 2021, DWER reference DWERDT443107.
6. BHP Nickel West Pty Ltd 2021b, Works Approval Holder's response to request for further information, dated 10 June 2021, DWER reference A2018469.
7. BHP Nickel West Pty Ltd 2021c, Works Approval Holder's response to request for further information, dated 8 July 2021, DWER reference A2025568.
8. Department of Environment Regulation (DER) 2016, *Guidance Statement: Environmental Siting*, Perth, Western Australia.
9. Department of Water and Environmental Regulation (DWER) 2021, Request for further information dated 29 March 2021, DWER reference A1992469.
10. Department of Water and Environmental Regulation (DWER) 2021, Request for further information dated 28 June 2021, DWER reference A2021969.
11. DER 2017, *Guidance Statement: Risk Assessments*, Perth, Western Australia.
12. DER 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
13. Department of Mines and Petroleum (DMP) 2015, *Guide to the preparation of a design report for tailings storage facilities (TSFs)*, dated August 2015, East Perth, Western Australia.
14. Golder Associates Pty Ltd (Golder) 2021, *Seepage and hydrogeological assessment for the tailings storage facilities at BHP Nickel West Leinster Operations – Technical Memorandum 19134759-009-M-Rev 1*, dated 10 June 2021, DWER reference A2018469.

# Appendix 1: Summary of applicant's comments on risk assessment and draft conditions

| Condition | Summary of Applicant's comment | Department's response |
|---|---|---|
| **Works Approval** | | |
| Title Page of Works Approval | The Applicant requested that the Works Approval Holder name be amended from 'BHP Billiton Nickel West Pty Ltd' to 'BHP Nickel West Pty Ltd' which is reflective of the certification of name change issued by the Australian Securities and Investments Commission on 30 April 2021. | Noted and updated Works Approval Holder name on Works Approval accordingly. |
| Point 5, Item 1 of Table 2 of the Works Approval - Tailings Storage Facility (TSF) 2 (Stages 1-4) and TSF3 Cell E (Stages 1 – 5) embankment raises | The Applicant requested that the reference to the waste rock buttressing being constructed to a specific width and height be removed.<br>The Applicant noted that the TSF design states that "extension of the buttress would be required when the TSFs are raised to 10 560m, with construction by mining fleet requiring a 30m working width and details of the buttress to be contained in a separate design and construction package…". The Applicant asserted that regular stability assessments of the TSF will be undertaken to determine the specific design requirements of the buttress to ensure the factors of safety for embankment stability are maintained above the minimum requirements in accordance with the ANCOLD (2019) guidelines and BHP's internal standards.<br>The Applicant requested that the condition be updated with the following wording:<br>"A waste rock buttress will be constructed that ensures the factors of safety for embankment stability are maintained above the minimum requirements as set out in the ANCOLD (2019) guidelines." | As the buttressing is related more to the technical stability as opposed to the environmental risk and noting the suggested alternative wording refers to compliance with the ANCOLD (2019) guidelines, which are primary Australian guidelines for the design and management of TSF's, the Department accepts this request and has updated the condition accordingly. |
| Condition 4 of the Works Approval – Compliance Reporting | The Applicant requested that the reporting period for an item of infrastructure being constructed as required by conditions 1, 2 and 3 of the Works Approval and the provision of an Environmental Compliance Report be amended from 30 calendar days to 60 calendar days as per previous granted works approvals for the Premises. | Noted and amended the reporting period associated to Condition 4 of the Works Approval to 30 days as requested by the Applicant. |
| **Decision Report** | | |

| Condition | Summary of Applicant's comment | Department's response |
|---|---|---|
| Title page of Decision Report | The Applicant requested that the Applicant name be amended from 'BHP Billiton Nickel West Pty Ltd' to 'BHP Nickel West Pty Ltd' which is reflective of the certification of name change issued by the Australian Securities and Investments Commission on 30 April 2021. | Noted and updated Applicant name on Decision Report accordingly. |
| Section 2.2 of the Decision Report – Application summary and overview of Premises | As noted above, the Applicant requested the Applicant name referred to under Section 2.2 of the Decision Report be amended to BHP Nickel West Pty Ltd to reflect the change of company name. | Noted and updated Applicant name under Section 2.2 of the Decision Report. |
| Section 2.2 of the Decision Report – Application summary and overview of Premises | The Applicant requested that Category 12 be included in the description of the prescribed premises categories as approved under the licence amendment issued on 27 July 2021 for L4612/1989/11. | Noted and updated Section 2.2 of the Decision Report to include Category 12 in accordance with the revised licence L4612/1989/11. |
| Section 2.5.1.2 of the Decision Report - Buttressing of TSF external walls | As noted above under comments related to Table 2 of the Works Approval, the Applicant has requested to remove the reference to the specific width or height of waste rock buttress requirements. The regular stability assessments of the TSF will determine the specific design requirements of the buttress to ensure the factors of safety for embankment stability are above the minimum requirements as set out in the ANCOLD (2019) guidelines and to internal BHP standards. | As the buttressing is related more to the technical stability as opposed to the environmental risk and noting the specific design requirements of the buttress are to be compliant with the ANCOLD (2019) guidelines, the Department accepts this request and has updated Section 2.5.1.2 of the Decision Report accordingly. |
| Section 2.5.2 of the Decision Report | The Applicant referred to the text under Section 2.5.2 of the Decision Report which notes that the current licence stipulates the maintenance of a 300mm freeboard within all TSF cells which differs to the design of the TSF2 and TSF3 Cell E lifts which is based on the maintenance of a 500mm freeboard.<br><br>The Applicant noted that condition 2, table 2 of the Works Approval states that the TSF2 and TSF3 Cell E embankment raises are to be "Constructed and operated to provide a minimum 500mm total freeboard (including an allowance for a 1:100 AEP 72-hour rainfall event) above the normal operating pond" which is consistent with the definition of a 'total freeboard' as defined in the 'Guide to the preparation of a design report for tailings storage facilities (TSFs)' (DMP, 2015).<br><br>The Applicant noted the difference between the 'total freeboard' to the 'operational freeboard' which is the height from the embankment crest to tailings which is 300mm minimum as per the DMP guideline. | To ensure that the freeboard operational requirements for the TSF2 and TSF3 Cell E lift stipulated in the works approval are consistent with the current requirements in the Licence, the wording for condition 2 (Table 2) of the Works Approval has been updated using DMP's (now DMIRS) definition of a total freeboard. DMP defines the total freeboard as the total freeboard = 500mm with a sub-minimum of 300mm operational freeboard. This information has been updated under Section 2.5.2 and Table 2 of the Decision Report. It is recommended that the same design parameters are updated in the Licence through a Licence Amendment. |

| Condition | Summary of Applicant's comment | Department's response |
|---|---|---|
| | The Applicant referred to condition 26 of L4612/1989/11 which references maintaining a minimum top of embankment freeboard of 300 millimetres within all storage facilities.<br><br>The Applicant advises that they propose to amend L4612/1989/11 in the future to provide clarity of the freeboard requirements for TSF's versus other storage facilities on site. | |
| Table 2 of the Decision Report – Proposed applicant controls | The Applicant noted that the proposed controls in Table 2 of the Decision Report refer to condition numbers associated to the previous version of L4612/1989/11. The Applicant requested that the condition references be updated to the most current version of L4612/1989/11 issued on 27 July 2021. | The condition numbers referred to in Table 2 have been updated to the condition references as stipulated in the most current version of L4612/1989/11. |

# Appendix 2: Application validation summary

| SECTION 1: APPLICATION SUMMARY | | | | | |
|---|---|---|---|---|---|
| **Application type** | | | | | |
| Works approval | ☒ | | | | |
| Licence | ☐ | Relevant works approval number: | | None | ☐ |
| | | Has the works approval been complied with? | | Yes ☐ No ☐ | |
| | | Has time limited operations under the works approval demonstrated acceptable operations? | | Yes ☐ No ☐ N/A ☐ | |
| | | Environmental Compliance Report / Critical Containment Infrastructure Report submitted? | | Yes ☐ No ☐ | |
| | | Date Report received: | | | |
| Renewal | ☐ | Current licence number: | | | |
| Amendment to works approval | ☐ | Current works approval number: | | | |
| Amendment to licence | ☐ | Current licence number: | | | |
| | | Relevant works approval number: | | N/A | ☐ |
| Registration | ☐ | Current works approval number: | | None | ☐ |
| Date application received | | 5 March 2021 | | | |
| **Applicant and Premises details** | | | | | |
| Applicant name/s (full legal name/s) | | BHP Nickel West Pty Ltd | | | |
| Premises name | | Leinster Nickel Operations | | | |
| Premises location | | ML255SA | | | |
| Local Government Authority | | Shire of Leonora | | | |
| **Application documents** | | | | | |
| HPCM file reference number: | | DER2021/000130 | | | |
| Key application documents (additional to application form): | | Supporting Documents (DWERDT423706 and DWERDT423763) including:<br>• *BHP Billiton Nickel West (2021) 'Leinster Nickel Operations – Tailings Storage Facility TSF 2 & 3E Cell Raise to RL 10560m – Works Approval Application – Supporting Information, dated March 2021 (Attachment 8)*<br>• *Golder Associates Pty Ltd (2019) 'Leinster Nickel Operations – Tailings Storage Facilities 2 and 3 – Dam Break Assessment and Run-out Modelling 1788205-066-R-Rev1, dated 27 September 2019 (Appendix D)* | | | |
| **Scope of application/assessment** | | | | | |

| | |
|---|---|
| Summary of proposed activities or changes to existing operations. | The applicant is proposing to construct upstream embankment raises to the above ground Tailings Storage Facility's (TSFs) TSF 2 and TSF3 Cell E located at Leinster Nickel Operations which have reached their maximum approved crest heights of 10 550 mRL and 10547.5 mRL respectively. The cell embankments will be raised to a maximum crest height of 10,560mRL, with TSF2 being raised in 4 stages and TSF3 Cell E being raised in 5 stages. The proposed embankment raises will accommodate up to an additional 5 Mt and 6.3 Mt of tailings respectively. |

**Category number/s (activities that cause the premises to become prescribed premises)**

**Table 1: Prescribed premises categories**

| **Prescribed premises category and description** | **Proposed production or design capacity** | **Proposed changes to the production or design capacity (amendments only)** |
|---|---|---|
| Category 5: Processing or beneficiation of metallic or non-metallic ore | 3,600,000 tonnes per annum | *Is there a proposed change to the previously assessed production or design capacity?* |

**Legislative context and other approvals**

| | | |
|---|---|---|
| Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal? | Yes ☐ No ☒ | Referral decision No:<br>Managed under Part V ☐<br>Assessed under Part IV ☐ |
| Does the applicant hold any existing Part IV Ministerial Statements relevant to the application? | Yes ☐ No ☒ | Ministerial statement No:<br>EPA Report No: |
| Has the proposal been referred and/or assessed under the EPBC Act? | Yes ☐ No ☒ | Reference No: |
| Has the applicant demonstrated occupancy (proof of occupier status)? | Yes ☒ No ☐ | Certificate of title ☐<br>General lease ☐ Expiry:<br>Mining lease / tenement ☒<br>ML255SA Expiry: 2040<br>Other evidence ☒ ASIC company extract provided show BHP Billiton Nickel West Pty Ltd is a registered company. |
| Has the applicant obtained all relevant planning approvals? | Yes ☐ No ☐ N/A ☒ | Approval:<br>Expiry date:<br>If N/A explain why? |
| Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal? | Yes ☐ No ☒ | CPS No: N/A<br>No clearing is proposed. |

| | | |
|---|---|---|
| Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal? | Yes ☐ No ☒ | Licence/permit No: N/A<br>No clearing is proposed. |
| Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal? | Yes ☐ No ☒ | Licence/permit No:<br>GWL63834, GWL 66248 and GWL 16701). |
| Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)? | Yes ☒ No ☐ | Name: Goldfields<br>Type: Proclaimed Groundwater Area<br>Has Regulatory Services (Water) been consulted?<br>Yes ☐ No ☐ N/A ☒ |
| Is the Premises situated in a Public Drinking Water Source Area (PDWSA)? | Yes ☐ No ☒ | Name: N/A<br>Priority: N/A<br>Are the proposed activities/ landuse compatible with the PDWSA (refer to WQPN 25)?<br>Yes ☐ No ☐ N/A ☒ |
| Is the Premises subject to any other Acts or subsidiary regulations (e.g. *Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx*) | Yes ☒ No ☐ | Mining lease ML255SA is tenure granted under the *Nickel (Agnew) Agreement Act 1974 (WA)* which was ratified by the parliament as a State Agreement to develop a major nickel project within the boundary of Western Australia. The key regulator is therefore the Department of Jobs, Tourism, Science and Innovation (JTSI). As the proposed works and associated activity are to be undertaken solely on ML255SA, approval under the *Mining Act 1978* is not required. |
| Is the Premises within an Environmental Protection Policy (EPP) Area? | Yes ☐ No ☒ | N/A |
| Is the Premises subject to any EPP requirements? | Yes ☐ No ☒ | N/A |

| | | |
|---|---|---|
| Is the Premises a known or suspected contaminated site under the *Contaminated Sites Act 2003*? | Yes ☐ No ☒ | Classification: N/A<br>Date of classification: N/A |