BHP

Eastern Pilbara Water Resource Management Plan

November 2024
Version 8.1

Document Amendment Record

Version	Version description	Key changes	Date
7.0	Revised draft for Traditional Owner review	Update for the Jimblebar Hub Iron Ore Mining Operations Significant Amendment proposal Addresses DWER's comments on Versions 6.1, 6.2 and 6.3	16 September 2023
8.0	Final version as part of the EPA referral of the Jimblebar Hub Significant Amendment	Update of content to reflect current management and revision of groundwater level criteria	12 December 2023
8.1	Final version as part of the EPA referral of the Orebody 29/30/35 Significant Amendment	Addition of Orebody 29/30/35 Proposal. Minor clarifications	18 November 2024

Abbreviations

Term	Meaning
BC Act	*Biodiversity Conservation Act 2016* (WA)
BHP	BHP Iron Ore Pty Ltd
CEO	Chief Executive Officer
DWER	Department of Water and Environmental Regulation
Ethel Gorge TEC	Ethel Gorge aquifer stygobiont Threatened Ecological Community
EMP	Environmental Management Plan
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986*
EPWRMP	Eastern Pilbara Water Resource Management Plan
km	kilometre
MAR	Managed Aquifer Recharge
mbgl	metres below ground level
mg/L	milligram per litre
ML/d	megalitres per day
MS	Ministerial Statement
TDS	Total Dissolved Solids
RiWI Act	*Rights in Water and Irrigation Act 1914*

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Eastern Pilbara Water Resource Management Plan	
Proposal names	Eastern Ridge Revised Proposal (MS1037) Newman Hub (Orebody 32 Below Water Table) (Pilbara Expansion Strategic Proposal MS1105) Newman Hub (Western Ridge) (Pilbara Expansion Strategic Proposal MS1105) Jimblebar Hub Iron Ore Mining Operations (MSXXXX) Orebody 29/30/35 (MSXXXX)
Proponent name	BHP Iron Ore Pty Ltd
Ministerial Statements	1037, 1105, XXXX, XXXX
Purpose of the EMP	To meet the requirements of MS1037 Condition 8, MS1105 Conditions 6, 9 and 10, MSXXXX Conditions B1-2 and B4-2 and MSXXXX Conditions B1-2 and B2-2.
Key environmental factors and EMP outcomes	**Inland Waters** (1) Maintain groundwater levels and salinity within the Ethel Gorge aquifer to support the stygofauna habitat of the Ethel Gorge TEC (2) Maintain the (altered) ephemeral surface water regime to the Fortescue River downstream of Ophthalmia Dam due to releases of water from Ophthalmia Dam **Subterranean Fauna** Maintain the habitat of, and minimise impacts to, the Ethel Gorge Aquifer Stygobiont Community
Condition clauses	MS1037: Condition 8 Subterranean Fauna – Ethel Gorge Aquifer Stygobiont Community MS1105: Condition 9 Subterranean Fauna Environmental Management Plan and Condition 10 Water Environmental Management Plan MSXXXX: Condition B1-2 Inland Waters environmental management plan Condition B4-2 Subterranean Fauna environmental management plan MSXXXX: Condition B1-2 Inland Waters environmental management plan and Condition B2-2 Subterranean Fauna environmental management plan
Key components in the EMP	Outcomes-based components, including trigger and threshold criteria for: • groundwater levels and water quality (salinity) in the Ethel Gorge aquifer • releases from Ophthalmia Dam to the Fortescue River
Proposed construction date	Eastern Ridge Revised Proposal, Jimblebar Hub Iron Ore Mining Operations and Orebody 29/30/35: Not applicable - approved proposals are in operations Newman Hub (Orebody 32 Below Water Table): Q3, 2024 Newman Hub (Western Ridge): Q2, 2024
EMP required pre-construction?	Not applicable. Required for multiple approved proposals which are in operations.

1 Context, scope and rationale

BHP Iron Ore Pty Ltd (BHP) has prepared the Eastern Pilbara Water Resource Management Plan (EPWRMP) to meet the requirements under Part IV of the *Environmental Protection Act 1986* (EP Act). BHP has prepared the EPWRMP to be consistent with the *Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans* (EMP Instructions) (EPA 2024).

1.1 Proposals

The scope of the EPWRMP is the management of water-related activities that have the potential to impact the Ethel Gorge aquifer stygobiont Threatened Ecological Community (Ethel Gorge TEC) and the Fortescue River associated with the following BHP proposals in the Eastern Pilbara water management area (Figure 1):

- Ministerial Statement (MS) MS1037: Eastern Ridge Revised Proposal (approved)
- MS1105: Newman Hub (Orebody 32 Below Water Table) (authorised by the Pilbara Expansion Strategic Proposal, Notice: Statement 1105 – No 1)
- MS1105: Newman Hub (Western Ridge) (authorised by the Pilbara Expansion Strategic Proposal, Notice: Statement 1105 – No 2)
- MSXXXX: Jimblebar Hub Iron Ore Mining Operations (proposed significant amendment to Jimblebar, Orebody 31 and Orebody 18 approved proposals)
- MSXXXX: Orebody 29/30/35 (proposed significant amendment to the Orebody 29/30/35 Mining Below Water Table approved proposal).

The purpose of the EPWRMP is to meet the requirements of MS1037 Condition 8, MS1105 Conditions 6, 9 and 10, MSXXXX Conditions B1-2 and B4-2 and MSXXXX Conditions B1-2 and B2-2.

All of the proposals are in operations except for the Orebody 32 Below Water Table and Western Ridge proposals. Below is a summary of the proposals.

Eastern Ridge Revised Proposal

The Eastern Ridge proposal is to undertake mining and associated activities at Eastern Ridge, located approximately 3 km north-east of Newman. The proposal involves open-pit mining above the water table at Orebody 32 and below the water table at Orebody 24, Orebody 25, and Orebody 25 West. The proposal includes pit dewatering, discharge of surplus dewater into Ophthalmia Dam and the construction and operation of associated mine infrastructure.

Newman Hub (Orebody 32 Below Water Table)

The Orebody 32 Below Water Table proposal is a derived proposal for the expansion of existing mining operations at Newman, authorised by the Pilbara Expansion Strategic Proposal, MS1105 and EP Act s45B Notice: Statement 1105 – No 1.

The proposal is to expand the existing Orebody 32 above water table iron ore mine (authorised by the Eastern Ridge Revised Proposal, MS1037) in BHP's Newman Hub to below the water table and to construct and operate a new surplus water pipeline from Orebody 32 to Ophthalmia Dam. The proposal is located approximately 3 kilometres (km) north-east of Newman (Figure 1) and includes pit dewatering and the discharge of surplus dewater into Ophthalmia Dam.

Newman Hub (Western Ridge)

The Western Ridge proposal is a derived proposal for the expansion of existing mining operations at Newman, authorised by the Pilbara Expansion Strategic Proposal, MS1105 and EP Act s45B Notice: Statement 1105 – No 2.

The proposal is for mining of iron ore deposits above and below the water table at Western Ridge, located approximately 2 kilometres (km) south-west of Newman (Figure 1). The proposal includes the construction and operation of mine infrastructure, including pit dewatering and the discharge of surplus dewater into Ophthalmia Dam.

Jimblebar Hub Iron Ore Mining Operations

The Jimblebar Hub is located approximately 40 km east of Newman. The Jimblebar Hub comprises existing operations at Jimblebar, Orebody 31 and Orebody 18, currently approved under Part IV of the EP Act by MS1126, 1021 and 439 (as amended by 1012). Mining of iron ore deposits is undertaken above and below the water table. Mining operations include open pits, overburden storage areas and the construction and operation of associated mine, processing and rail infrastructure. Groundwater is abstracted for water supply and to dewater the orebodies. Surplus water management includes transfer to Ophthalmia Dam, controlled discharge to watercourses and managed aquifer recharge (MAR).

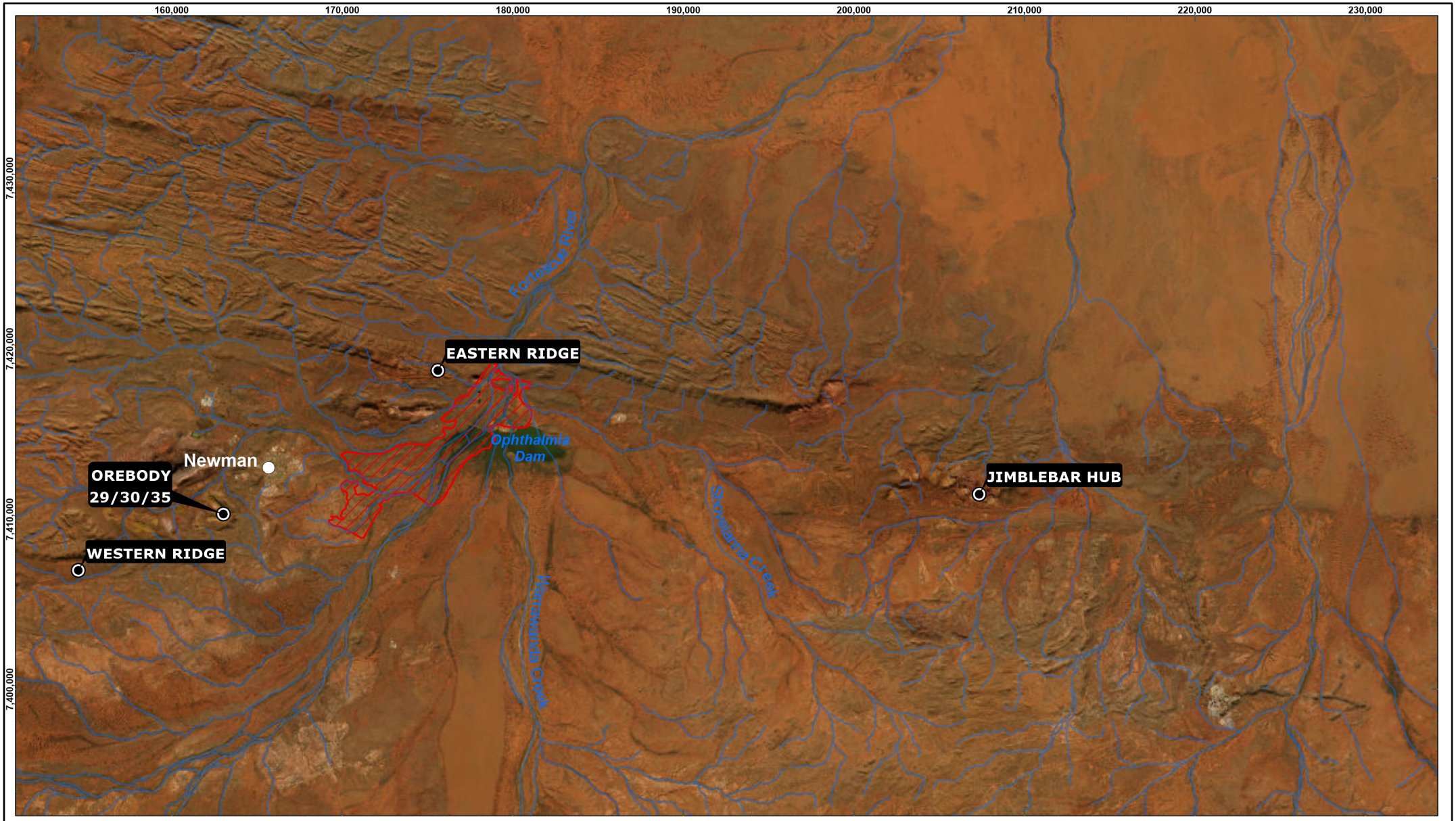
The Jimblebar Hub Iron Ore Mining Operations Significant Amendment (BHP 2023a) includes an increase in surplus water at the Jimblebar mine. However, no increases are proposed to the limits and extents for the discharge of surplus water to Ophthalmia Dam previously assessed and approved under Part IV and Part V of the EP Act.

The Proposal also includes the amalgamation of the Approved Proposals for the Jimblebar, Orebody 31 and Orebody 18 (which includes the Orebody 17 deposit) mines. BHP has requested that one new MS is issued for the Amended Proposal (Approved Proposals as amended by the Significant Amendment) (BHP 2023a).

Orebody 29/30/35

The Orebody 29/30/35 mine is located approximately 7 km west south-west of Newman. The Orebody 29/30/35 below water table mine is currently approved under Part IV of the EP Act by MS963. Mining of iron ore deposits at Orebody 29/30/35 is undertaken above and below the water table. Mining operations include open pits, groundwater abstraction for below water table mining, discharge of surplus water to Ophthalmia Dam and operation of associated mine infrastructure.

The Orebody 29/30/35 Significant Amendment (BHP 2024a) proposes to increase groundwater abstraction and an associated increase in surplus water discharge to Ophthalmia Dam via a new surplus water pipeline. BHP has requested that one new MS is issued for the Amended Proposal (Approved Proposal as amended by the Significant Amendment) (BHP 2024a).



BHP mine
Watercourse
Ethel Gorge TEC

N

0 5 10
KILOMETRES

GDA 1994 MGA ZONE 51

BHP

PUBLIC

EASTERN PILBARA WATER RESOURCE MANAGEMENT PLAN

Eastern Pilbara water management area

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:300,000	PREPARED:	SPATIAL DATA	FIGURE:	1
DATE:	21/08/2024	REQUESTOR:	ENV. APPROVALS	NO:	1021/124C

Document Path: Y:\Jobs\A1001_A1500\A1021\3Project\A1021_124_E_JMB_EPWRMP_EasternPilbaraWaterManagementPlan_RevC.aprx

1.2 Key environmental factors

The key environmental factors relevant to this EPWRMP are Inland Waters and Subterranean Fauna. Table 1 summarises the environmental values, proposal activities and actual or potential impacts on the key environmental factors addressed by this EPWRMP.

Table 1: Key environmental factors, values and activities

Key environmental factor	Environmental values	Proposal activities	Actual/Potential impacts
Inland Waters and Subterranean Fauna	*Ethel Gorge aquifer Stygobiont community Threatened Ecological Community* (Ethel Gorge TEC)	Dewatering of mine pits (Eastern Ridge Revised Proposal[1]) Discharge of surplus mine dewater to Ophthalmia Dam (Eastern Ridge Revised Proposal, Orebody 31 Iron Ore Project, Jimblebar Hub Iron Ore Mining Operations, Orebody 32 Below Water Table, Western Ridge and Orebody 29/30/35)	**Direct impacts** Changes to groundwater levels and groundwater quality (salinity) in the Ethel Gorge aquifer **Indirect impacts** Potential changes to stygofauna habitat and reduction in stygofauna species abundance and diversity
Inland Waters	Fortescue River	Releases of water from Ophthalmia Dam to Fortescue River tributaries	**Direct impacts** Changes to existing (altered) surface water regime

1. The EPWRMP addresses the potential impacts of dewatering from Eastern Ridge due to the proximity of OB23 and OB25 which are adjacent to the Ethel Gorge TEC.

BHP manages other water-related environmental values through other Part IV EMPs and other legislation. The relationship between this EPWRMP and other water management and regulation for the proposals addressed in the EPWRMP is outlined in Section 1.4.1.

1.3 Condition requirements

BHP has provided the condition requirements of Eastern Ridge MS1037 Condition 8, Pilbara Expansion Strategic Proposal MS1105 Conditions 6, 9 and 10, Jimblebar Hub MSXXXX Conditions B1-1, B1-2, B4-1, B4-2 and C3 and Orebody 29/30/35 MSXXXX Conditions B1-1, B1-2, B2-1, B2-2 and C3, in Schedules (see Section 2), which the EMP Instructions allow for, where there are multiple conditions and/or condition clauses.

Condition 4-1 of MS1037 and Condition 5-1 of MS1105 require BHP to make environmental data (including environmental plans) publicly available and Condition C1-6 of MSXXXX and MSXXXX requires publication of EMPs. BHP will publish the endorsed EPWRMP on the BHP website and provide to Department of Environmental and Water Regulation (DWER) in a suitable electronic form for online publication, to meet the condition requirements.

1.4 Rationale and approach

As required by the EMP Instructions, this section provides a concise description of the rationale and approach for the components in this EPWRMP.

BHP applied a risk-based approach to identify and prioritise components in this EPWRMP. The purpose of the components is to protect the environmental values in Table 1. In updating the components, BHP has used available scientific information from recent ecohydrological investigations, studies and monitoring.

1.4.1 Management approach

1.4.1.1 Sub-regional and site level management

BHP uses a regional and site-specific approach to manage the impacts of its operations on water-related environmental values, which includes statutory and non-statutory (BHP internal) management. At the Pilbara scale, BHP applies a regional approach to water management, as outlined in the *Pilbara Water Resource Management Strategy* (BHP 2020), which feeds into sub-regional and site level management.

BHP applies the following approach to EP Act Part IV EMPs for water management:

- Sub-regional level EMPs are developed to manage potential impacts to regional environmental values (e.g. Ethel Gorge TEC) from multiple BHP mines/hubs.
- Site level EMPs are developed to manage potential impacts to local environmental values from one BHP mine/hub.

Both levels of EMPs are complemented by monitoring and/or controls in other statutory decision-making processes for water-related activities. This includes regulation administered by the Department of Water and Environmental Regulation (DWER), through the EP Act Part V and the *Rights in Water and Irrigation Act 1914* (RiWI Act).

The water management framework for the proposals and the environmental values addressed in the EPWRMP is shown in Figure 2.

Other Part IV water EMPs relevant to the EPWRMP

BHP has developed water management plans to address potential impacts from per- and polyfluoroalkyl substances (PFAS) for OB32 BWT, Western Ridge and Orebody 29/30/35 (Figure 2). BHP has developed site level water (PFAS) management plans because the risk posed by PFAS is different for different mines, and hence the criteria, monitoring and mitigation are different for different mines. Therefore, BHP has developed a staged approach to PFAS monitoring and management, where PFAS monitoring and mitigation is targeted at the site scale (i.e. at the mine site) and monitoring and management at the sub-regional scale (i.e. in Ophthalmia Dam) will only be required if certain PFAS levels are reached in the surplus dewater from a particular mine, prior to discharge to Ophthalmia Dam. BHP notes that Part V regulates emissions and discharges, including substances that have the potential to contaminate surface and groundwater.

Other Part IV water EMPs for the proposals addressed in the EPWRMP

Of the proposals addressed in the EPWRMP, only approved proposals in the Jimblebar Hub have authorisation for surplus water management other than discharge to the Ophthalmia Dam MAR system. The management of surplus water from the Jimblebar Hub to watercourses and aquifers is addressed in the site level *Jimblebar Hub Water Management Plan* (BHP 2023b).

Region

Pilbara Water Resource Management Strategy *(BHP internal)*

This EMP

Part IV EP Act: Eastern Pilbara Water Resource Management Plan

Management for Ethel Gorge TEC, and Fortescue River: Eastern Ridge MS1037 Condition 8, Pilbara Expansion Strategic Proposal MS1105 Conditions 9 and 10 (Orebody 32 Below Water Table and Western Ridge), Jimblebar Hub MSXXXX Conditions B1-2 and B4-2 (*if approved*), Orebody 29/30/35 MSXXXX Conditions B1-2 and B4-2 (*if approved*)

Sub-region

Surplus Water Management Plan: Ophthalmia Dam Surplus Water Scheme *(BHP internal)*

Describes the operation of Ophthalmia Dam surplus scheme, and associated legal obligations and monitoring

Jimblebar Hub	Newman Hub
PFAS management: *N/A - PFAS risk from Jimblebar is low*	PFAS management: Monitoring of water in Ophthalmia Dam and mitigation, if required: • Western Ridge and Orebody 32 Below Water Table: EP Act Part IV MS1105 Condition 9 Water Environmental Management Plan and/or amendment to EP Act Part V Licences L6942/1997/13 and L4503/1975/14 • Orebody 29/30/35: EP Act Part IV MSXXXX Condition B1 Inland Waters and/or amendment to EP Act Part V Licence L4503/1975/14

Site

Jimblebar Hub	Newman Hub
EP Act Part IV Jimblebar Hub MSXXXX • Condition A1 Limitations and extents: Surplus discharge rate from Jimblebar Hub to Ophthalmia Dam	EP Act Part IV Eastern Ridge MS1037 • Schedule 1: Authorised extents (Eastern Ridge dewatering abstraction rate, Surplus discharge rate from Eastern Ridge to Ophthalmia Dam) EP Act Part IV MS1105 and Orebody 32 Derived Proposal Notice No 1 • Authorised extents and Condition 9 Water Environmental Management Plan (Water (PFAS) Management Plan) EP Act Part IV MS1105 and Western Ridge Derived Proposal Notice No 2 • Authorised extents and Condition 9 Water Environmental Management Plan (Water (PFAS) Management Plan) EP Act Part IV Orebody 29/30/35 MSXXXX • Condition A1 Limitations and extents: Surplus discharge rate from Orebody 29/30/35 to Ophthalmia Dam • Condition B1 Inland Waters (Water (PFAS) Management Plan)
EP Act Part V Licence Jimblebar Hub L5415/1988/9 (*amend*) • Limit on the rate of emissions (discharge from Jimblebar Hub to Ophthalmia Dam) • Specifies the location of emissions • Specifies monitoring: flow rate, volume, water quality	EP Act Part V Licence (Eastern Ridge L6942/1997/13, Western Ridge and Orebody 29/30/35 L4503/1975/14 (*amend*) • Limit on the rate of emissions (discharge from Eastern Ridge, Western Ridge and Orebody 29/30/35 to Ophthalmia Dam) • Specifies the location of emissions • Specifies monitoring: flow rate, volume, water quality (including PFAS, if required)
RiWI 5C Licence to take water (and Operating Strategy) *N/A: Dewatering from Jimblebar Hub not a risk to EPWRMP environmental values*	RiWI 5C Licence to take water (and Operating Strategy) Eastern Ridge GWL182237(4) • Limit on rate of groundwater abstraction • Monitoring at the source (dewatering bores) – abstraction rate, volume, groundwater levels and quality • Monitoring along pathway – groundwater levels *N/A: Dewatering from OB32 BWT, Western Ridge and Orebody 29/30/35 not a risk to EPWRMP environmental values*

Figure 2: Water management framework

1.4.1.2 Other regulation related to the EPWRMP

This EPWRMP does not duplicate monitoring and/or controls in other statutory decision-making processes for water-related activities related to managing the potential impacts to the environmental values addressed in this EPWRMP (Table 2). This includes regulation administered by the DWER through the EP Act Part V and the RiWI Act.

Table 2: Other approvals relating to the EPWRMP

Activity	Site/location	Legislation and Approval	Control
Groundwater abstraction (Dewatering)	Dewatering at Eastern Ridge operations authorised under MS1037[1]	RiWI 5C licence to take water (and associated Operating Strategy): • Eastern Ridge: GWL182237(4) • Orebody 23: GWL74556(11)	RiWI licences • Limit on rate of groundwater abstraction • Groundwater monitoring (Operating Strategy) – abstraction rate, volume, groundwater levels and quality
Groundwater abstraction (Water Supply)	Ophthalmia Borefield in the Newman Public Drinking Water Supply Area	RiWI 5C licence to take water (and associated Operating Strategy): • Ophthalmia Borefield: GWL65219(12)	RiWI licence GWL65219(12): • Limit on rate of groundwater abstraction • Groundwater monitoring (Operating Strategy) – abstraction rate, volume, groundwater levels and quality • Monitoring of aquifer water quality adjacent to Ophthalmia Dam
Surplus water management	Discharge to Ophthalmia Dam from Jimblebar Hub (Jimblebar and Orebody 31) authorised under MSXXXX; Eastern Ridge operations (including Orebody 32 Below Water Table) authorised under MS1037 and MS1105; Orebody 29/30/35 authorised under MSXXXX; and Western Ridge authorised under MS1105	EP Act Part V licence: • Jimblebar Hub (includes Jimblebar and Orebody 31): L5415/1988/92[2] • Eastern Ridge operations: L6942/1997/13[3] • Mt Whaleback (includes Orebody 29/30/35): L4503/1975/14 • Western Ridge: amendment to Mt Whaleback licence (L4503/1975/14) or new licence	EP Act Part V licences: • Limit on the rate of emissions (discharge to Ophthalmia Dam) • Specifies the location of point source emissions • Specifies monitoring (flow rate and volume) at the discharge point

1. The EPWRMP addresses the potential impacts of dewatering from Eastern Ridge due to the proximity of OB23 and OB25 which are adjacent to the Ethel Gorge TEC.
2. No amendment to the discharge rate to Ophthalmia Dam from the Jimblebar Hub (currently 32.625 GL/a) is required.
3. Surplus water discharge from OB32 to Ophthalmia Dam will be regulated through an amendment to the existing Part V Eastern Ridge Iron Ore Mine licence.

1.4.2 Rationale

This section provides a concise description (in tabular format) of the rationale for the EMP components in Section 2, including:

- environmental outcome
- survey and study findings
- key assumptions and uncertainties
- rationale for choice of indicators.

Table 3 provides the rationale for the components. Detail on the Ethel Gorge system monitoring program and management controls is provided in Sections 1.4.2.1 and 1.4.2.2.

Table 3: Rationale for EPWRMP components

Surveys and studies	Survey and study findings	Key assumptions and uncertainties	Rationale for choice of indicators
Value: Ethel Gorge TEC **Outcome:** Maintain groundwater levels and salinity within the Ethel Gorge aquifer to support the stygofauna habitat of the Ethel Gorge TEC			
Eastern Pilbara Hub Water Balance - 2024 Forecast Surplus Discharge Assessment (EMM 2024) *BHP Iron Ore Annual Aquifer Review 2024* (BHP 2024b) *Ethel Gorge TEC Stygofauna Monitoring 2022/2023* (Stantec 2024) *Review of Long-Term Trends in the Ethel Gorge Stygobiont TEC* (Stantec 2023) *Orebody 32 below water table: Ophthalmia Dam surplus water impact assessment* (BHP 2022a) *Orebody 32 below water table: groundwater impact assessment* (BHP 2022b) *Eastern Ridge and Jimblebar Stygofauna Monitoring 2021/2022* (Stantec 2022) *Technical review: Salinity Tolerance of Ethel Gorge Stygofauna TEC* (MWH 2016) *Pilbara stygofauna: deep groundwater of an arid landscape contains globally significant radiation of biodiversity. Records of the Western Australian Museum, Supplement 78: 443-483* (Halse et. al. 2014) *Characterisation and Mapping of Ethel Gorge Aquifer Stygobiont Threatened Ecological Community* (Bennelongia 2013)	**Ophthalmia Dam Managed Aquifer Recharge (MAR) system** • Ophthalmia Dam located 5 km upstream of Ethel Gorge, was commissioned in 1981 as a MAR scheme, to maintain groundwater levels within the Ethel Gorge aquifer, to support the Ophthalmia Borefield for the Newman town water supply. The Ophthalmia Dam system comprises the dam, two infiltration basins, three recharge ponds and connecting drainage system (Figure 3). • Ophthalmia Dam has an important influence on the hydrological condition downstream in Ethel Gorge. Recharge to the shallow groundwater system occurs as seepage from Ophthalmia Dam and associated infiltration structures as well as direct infiltration from channel flow events. • Discharge of surplus mine dewater to Ophthalmia Dam from BHP's eastern mines first commenced in 2006 from Eastern Ridge, followed by Orebody 31 and Orebody 29/30/35 in 2016 and Jimblebar in 2019. Discharge to Ophthalmia Dam from Orebody 32 and Western Ridge was authorised under Part IV of the EP Act in September 2023, but has not yet commenced. **Ethel Gorge aquifer** • The Ethel Gorge shallow alluvial and calcrete aquifer supports the Ethel Gorge TEC (Figure 3). Ethel Gorge is an important feature of the Eastern Pilbara hydrological system, as the surface and groundwater flows from the upstream catchment area, converge here. The area is characterised as a receiving environment, comprising channels, flood plains and calcretes of the river and calcrete land systems dissected by ridges of bedrock. Groundwater levels of less than 10 metres below ground level (mbgl). • The hydraulic behaviour of the gorge groundwater system has been dominated by Ophthalmia Dam since its commissioning in 1981. The dam impounds the Fortescue River near Newman to enable infiltration to recharge the Ophthalmia paleochannels. Therefore, the dam has maintained groundwater levels nearer natural conditions, as groundwater levels would have declined without the dam due to the operation of the Ophthalmia Borefield. <u>Groundwater levels</u> • Mining below the water table (and dewatering) occurs close to the Ethel Gorge TEC at BHP's Eastern Ridge mining operations. Localised drawdown reached a maximum of approximately 130 m at OB25 Pit 3 and 100 m at OB23. However, while there was some response to the dewatering in the Ethel Gorge aquifer, the groundwater level data shows that the observed drawdown in the Ethel Gorge aquifer between 2006 and 2012 (peak dewatering years) was limited to a maximum of 5 m (BHP 2022b). Backfilling has now started at OB25 Pit 3 and OB23. Abstraction has decreased at OB25 Pit 3 and has ceased at OB23. Groundwater levels at OB25 Pit 3 have recovered within 30-40 m of pre-mining (dewatering) levels. Groundwater levels at OB23 have recovered close to pre-mining levels (BHP 2024b). <u>Groundwater quality (salinity)</u> • The current hydrogeological conceptualisation divides the Ethel Gorge TEC into a more permeable western portion of the Ethel Gorge aquifer and lower permeability (clayey) eastern portion of the Eastern Ophthalmia aquifer (boundary roughly along the Warrawanda Creek) (Figure 4). Groundwater salinity in the Primary Habitat Monitoring Zone of the Ethel Gorge aquifer is mostly less than 1,100 mg/L, but is naturally elevated in the East Ophthalmia aquifer south of OB42 where up to 4,000 mg/L has been recorded. Groundwater in the Shovelanna Creek Monitoring Zone is also elevated, while it is mostly less than 1,000 mg/L in the Homestead Creek Monitoring Zone. • BHP commissioned an update of the Eastern Pilbara Hub water balance modelling to predict changes to groundwater salinity, including in the Ethel Gorge aquifer, from the 2024 combined forecast surplus discharge from all BHP's eastern approved mines (Eastern Ridge (including OB32 BWT), Jimblebar Hub, Western Ridge) and the forecast discharge from Orebody 29/30/35 including the predicted increase (EMM 2024). • The modelling predicted that the salinity of water in Ophthalmia Dam will range between approximately 50 and 1,500 mg/L (within historical variation). This indicates that the predicted groundwater salinity in the Ethel Gorge aquifer will remain below 2,000 mg/L for the high hydraulic conductivity scenario, which is within the range of observed groundwater salinity and below the Early response indicator of 2,500 mg/L TDS. The extended modelling (to 2065 compared to 2053 for the 2023 assessment) shows that the predicted groundwater salinity stabilises and declines after approximately 2050, coinciding with declining surplus water discharge.	**Assumptions** • The Ethel Gorge TEC has a strong groundwater hydrological dependency provided by shallow saturated pore spaces in which stygofauna live. The community is hosted in shallow alluvial aquifers (notably calcrete) and their habitat is maintained by saturation of these aquifers. Changes to groundwater levels or quality, therefore, may have an impact on the TEC. • Groundwater levels are reflective of the significant recharge events following relatively wet periods during the summer months. The range in water levels maintains a substantial saturated thickness in the upper alluvial aquifer (including the calcretes) and provides a consistent habitat for stygofauna. The area of the Ethel Gorge TEC coincides with both areas of shallow groundwater and the deposit of subsurface calcretes. **Scientific uncertainty** • Inherent limitations of methods used to sample stygofauna (e.g. false absences). • Limited understanding (and ability to understand) of the trophic structure of the stygofauna community and how natural processes contribute to variability in species abundance and richness spatially and temporally. • Understanding of the tolerances of the stygofauna community, specifically the 'core endemic' species, to changes in salinity and other hydrochemistry changes.	**Type of components** BHP has chosen outcomes-based components for the Ethel Gorge aquifer as BHP can control the rate of discharge to Ophthalmia Dam and measure groundwater levels groundwater quality. **Choice of indicators** <u>Groundwater levels and water quality</u> Indicators have been selected in the context of natural variance. The hydrological indicators used in this EPWRMP are based on historical ranges of groundwater levels and water quality (as Total Dissolved Solids (TDS)) observed in the Ethel Gorge aquifer and TEC. The early response indicator, trigger and threshold criteria have been established to manage the potential impacts to the stygofauna community habitat and are set to maintain hydrological conditions (groundwater levels and salinity) in the Ethel Gorge aquifer and TEC within acceptable historical ranges. These hydrological conditions are the basis of maintaining the Ethel Gorge TEC habitat) and are therefore the key indicators that are monitored. Consistent with the EPA's *Environmental outcomes and outcomes-based conditions: Interim Guidance* (EPA 2021b), the groundwater level and groundwater salinity indicators are used by BHP as a surrogate indicator for stygofauna, in particular for the condition of the stygofauna habitat in the Ethel Gorge TEC. The groundwater criteria are lead indicators, as they provide an early measure of potential changes to the stygofauna habitat suitability. If the groundwater criteria are triggered, there are actions that BHP can take to improve the habitat quality, whereas there are no suitable actions to address changes in stygofauna species richness and abundance. The groundwater level criteria have been reviewed and simplified, based on historical groundwater levels (including since discharge to Ophthalmia Dam commenced in 2006) and taking into account the current aquifer conditions and planned surplus operations. With the backfill of Orebody 23 and Orebody 25 Pit 3 and recovery of groundwater levels, and higher water levels in Ophthalmia Dam groundwater levels in the Ethel Gorge aquifer and TEC are expected to remain at higher levels. BHP has revised the groundwater level criteria to relate to groundwater level decline, rather than a range as the risk from groundwater level increase is increased salinity which is captured in the groundwater quality (salinity) criteria. The revised criteria are based on monitoring of groundwater levels in the Ethel Gorge Primary Habitat Monitoring Zone, which shows that groundwater levels have historically usually been above 494 mRL. BHP has based the

Surveys and studies	Survey and study findings	Key assumptions and uncertainties	Rationale for choice of indicators
	Ethel Gorge TEC • The Ethel Gorge TEC is characterised by the co-occurrence of a diverse assemblage of stygofauna species inhabiting the shallow alluvial and calcrete aquifers within Ethel Gorge and downstream of the gorge for approximately five kilometres (Bennelongia 2013). • There are two main threatening processes that may affect stygofauna in the Ethel Gorge TEC: 1. The stygofauna community may be impacted by a decline in groundwater levels associated with groundwater abstraction in the Ethel Gorge aquifer and in aquifers that are hydraulically connected to the Ethel Gorge aquifer. 2. The stygofauna community may be impacted by changes to groundwater quality associated with groundwater abstraction and/or discharge of surplus water into Ophthalmia Dam. • The Ethel Gorge TEC is listed as a Critically Endangered TEC under the *Biodiversity Conservation Act 2016*, due to the diverse assemblage of stygofaunal species present (Government of Western Australia 2023). DBCA reduced the Ethel Gorge TEC buffer from 5 km to 2 km in 2023 (Figure 5). • BHP commissioned a study in 2022 to review the existing long-term data set for the Ethel Gorge TEC to further understand the temporal and spatial trends of stygofauna in response to environmental factors. – Stygofauna species richness and total abundance were investigated in relation to key abiotic parameters (pH, salinity as EC, calcium, nitrogen, phosphorus and sulphate) to further examine the relationships between abiotic parameters and stygofauna. This line of investigation was also extended to the four taxa identified as a potential indicator suite for TEC health, *Diacyclops humphreysi, Archinitocrella newmanensis, Pygolabis humphreysi* and *Chydaekata acuminata* (Stantec 2023). – The results indicated that higher stygofauna abundances and richness were commonly associated with a pH range between 7.2 and 8.2, reflecting broader trends in calcareous groundwater systems. The minimum pH for stygofauna records was 5.5, with *Diacyclops humphreysi, Archinitocrella newmanensis, Pygolabis humphreysi* and *Chydaekata acuminata* mostly collected within the pH range 7 to 8.5. Stygofauna were generally most abundant at salinities (as electrical conductivity, EC) ranging between 1,000 and 2,000 µs/cm (approximately 670 and 1,340 mg/L TDS). However, stygal specimens, including representatives of *Diacyclops humphreysi, Archinitocrella newmanensis, Pygolabis humphreysi* and *Chydaekata acuminata*, were recorded at values above 5,000 µs/cm (approximately 3,350 mg/L TDS). Species richness was largely consistent up to at least 5,000 µs/cm (approximately 3,350 mg/L TDS) (Stantec 2023). – In general, there were no clear trends in stygofauna species richness or abundance relative to nitrogen and phosphorus concentrations. However, moderate to elevated stygofauna abundances, primarily comprising copepods, were noted for several of the samples with higher nitrogen values (~20 mg/L). In relation to calcium, stygofauna abundance and species richness was generally highest at moderate calcium levels. Sulphate concentrations were elevated in some instances however were considered to reflect local geology and did not preclude stygofauna (Stantec 2023). • BHP commissioned a technical review of the salinity tolerance of stygofauna in the Ethel Gorge TEC (MWH 2016) in response to water balance modelling which predicted that groundwater salinity in the Ethel Gorge aquifer may increase as a result evapo-concentration of surplus water discharged into Ophthalmia Dam. From an analysis of groundwater salinity data and stygofauna assemblage data at varying salinity levels, MWH concluded that the Ethel Gorge stygofauna assemblage has been observed to exist in groundwater environments that are predominantly less than 4,000 mg/L TDS. The maximum recorded salinities of most of Ethel Gorge stygofauna groups was below 4,000 mg/L (with many below 2,500 mg/L) (MWH 2016). • An increase in groundwater salinity is likely to be within the tolerance thresholds of the stygofauna community. Available scientific knowledge suggests that many stygofauna species can tolerate a variable salinity regime (Halse et. al. 2014). However, less resilient species may be vulnerable to salinity increases beyond the range of natural variability. Progressive technical studies are required to address these uncertainties within the framework of BHP's adaptive management approach. **Stygofauna monitoring results** • BHP has undertaken annual stygofauna monitoring in the Ethel Gorge TEC since 2009 which includes monitoring of stygofauna species richness. BHP will continue to undertake this monitoring. • The area has experienced substantial changes in groundwater levels, due to groundwater abstraction, dewatering activities, recharge through Ophthalmia Dam, and climatic variation. However, to date, no measurable impacts on the stygofauna community have been observed (Stantec 2022). • Thirty-nine 'core endemic' species have been recognised from the Ethel Gorge area from monitoring programs conducted annually since 2009. Species accumulation modelling estimates that between 75.5 to 94.6 percent of the assemblage predicted to exist within the Ethel Gorge area has been recorded (Stantec 2024).		criteria (early warning, trigger and threshold) if the groundwater declines below this level. While groundwater level decline criteria have been proposed, groundwater decline is unlikely to occur with the operation of the dam, including receiving surplus water. Although groundwater decline in the Ethel Gorge aquifer has only been identified as a risk from dewatering at Eastern Ridge (due to the proximity of OB23 and OB25 which are adjacent to the Ethel Gorge TEC), as a precautionary measure, BHP has applied the criteria to all proposals addressed in the EPWRMP. <u>Stygofauna monitoring</u> To ensure that the groundwater indicators represent the condition of the Ethel Gorge TEC habitat and the community, BHP also undertakes groundwater quality and stygofauna species sampling as part of its regular stygofauna monitoring program. Recent sampling has detected very low levels of PFAS (below the revised 'draft' 99% Species Protection Level of 0.0091 µg/L (ANZG, 2023)) in Ophthalmia Dam and the Ethel Gorge aquifer. As a precautionary measure, BHP has added the sampling of PFAS to the groundwater quality sampling as part of the stygofauna monitoring program. • As the Ethel Gorge is a regional water asset, the water-related components (indicators - triggers and thresholds, monitoring and reporting are the same for each project addressed in the EPWRMP that discharges surplus water to Ophthalmia Dam. This approach enables BHP to pro-actively manage its activities and impacts at the regional level. • BHP has established monitoring and management zones to enable adaptive management of the Ethel Gorge system. Detail and rationale for the monitoring program is in Section 1.4.2.2. • In addition to the groundwater monitoring (Table 5) that relates to the groundwater criteria (triggers and thresholds), BHP will also continue to undertake stygofauna monitoring, including species richness and abundance (Table 5). BHP will use this information to support the groundwater management and refine the management in the EPWRMP, if required. • Based on the updated 2023 groundwater level and salinity predictions, 2016 technical review of salinity tolerance of stygofauna in the Ethel Gorge TEC and 2022 study to investigate Stygofauna species richness and total abundance in relation to key abiotic parameters, BHP considers that the existing criteria (groundwater triggers and thresholds) are appropriate to manage the potential impacts to the habitat of the Ethel Gorge TEC. BHP does not consider that it is appropriate to develop triggers relating to stygofauna species richness and abundance.

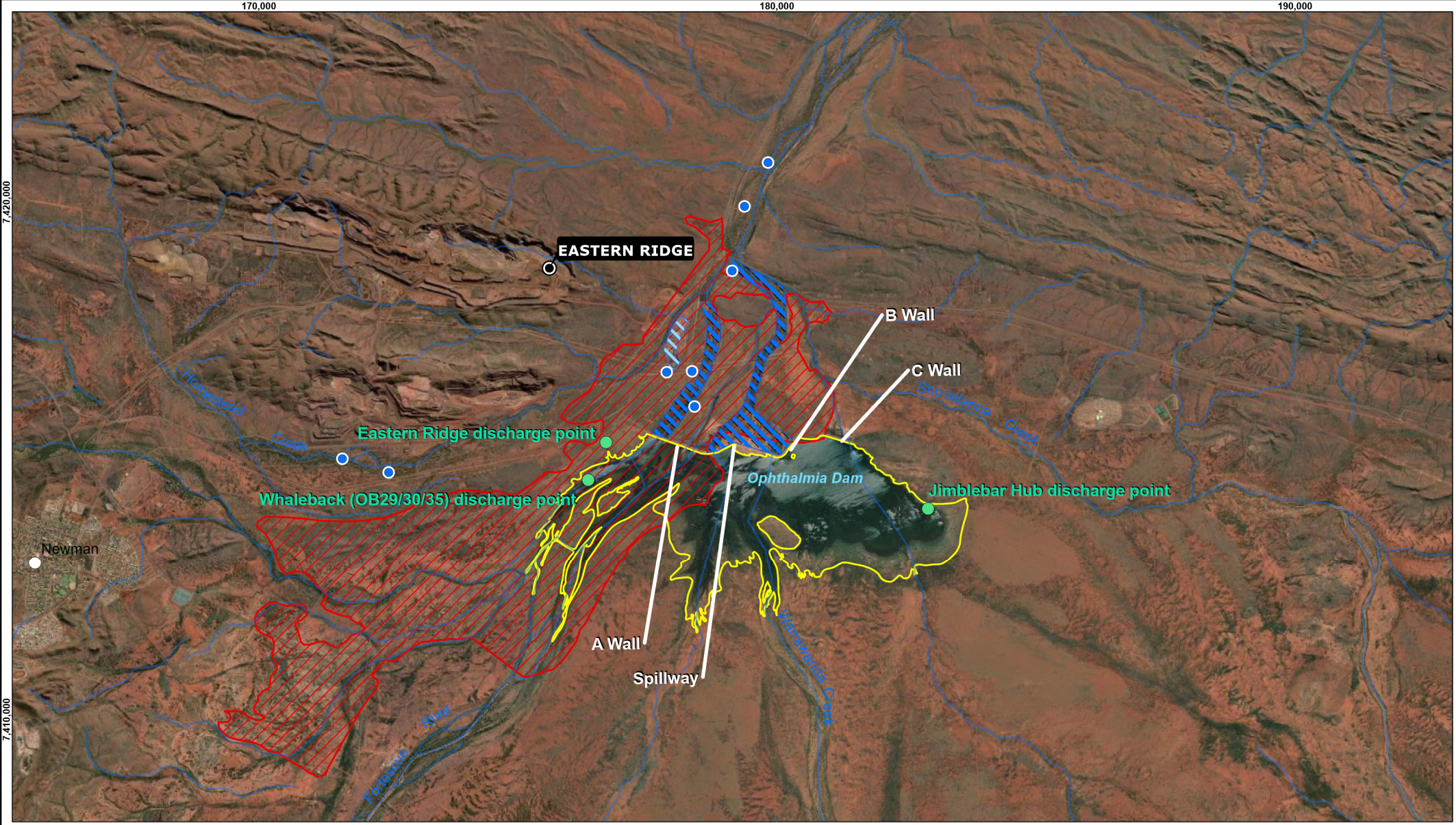
Surveys and studies	Survey and study findings	Key assumptions and uncertainties	Rationale for choice of indicators
	• Recorded concentrations of metals in the Ethel Gorge area were typically less than ten times lower than the published thresholds. There is no perceived metal toxicity risk to the Ethel Gorge Aquifer Stygobiont TEC (Stantec 2024). • Average abundance during the 2022 Dry Season was relatively low compared to historical records, however abundance had increased considerably by the 2023 Wet Season which had the highest average abundance per bore since 2015. All interannual changes observed in the number of species and abundance are within the variability documented for the TEC (Stantec 2024). • The findings of the [2022/2023] Program along with previous surveys indicate that current groundwater management practices have been appropriate to prevent potential impacts to the Ethel Gorge stygofauna TEC from BHP operations. It is also considered that adequate saturation of the core habitat has been maintained, enabling the persistence of stygofauna (Stantec 2024).		
Value: Fortescue River **Outcome:** Maintain the current (altered) ephemeral surface water regime to the Fortescue River downstream of Ophthalmia Dam as a result of releases of water from Ophthalmia Dam			
Orebody 32 below water table: Ophthalmia Dam surplus water impact assessment (BHP 2022a) *Surplus Water Management Plan: Ophthalmia Dam Surplus Water Scheme* (BHP 2022c) *Eastern Pilbara Hub Water Balance: Integrated water balance model review and Ophthalmia Dam water management capacity scenarios* (EMM 2020) *Ophthalmia Dam Discharge Hydrology Study (BHP 2019a)* *Ophthalmia Dam - update on water release trial* (BHP 2019b)	• The Fortescue River is the major river system in the Eastern Pilbara sub-region (Figure 1). The Upper Fortescue River (upstream of Fortescue Marsh) is ephemeral in nature, flowing in direct response to significant rainfall events. Streamflow mainly occurs during the summer (wet season) months of December through April and is associated with the large and more intense rainfall events. Along portions of the river that drain larger catchments (e.g., major tributaries), runoff can persist for several weeks (and possibly months) following major rainfall events such as those resulting from tropical cyclones. • The construction of Ophthalmia Dam has altered the natural flow regime of the Upper Fortescue River and appears to have prevented or reduced medium-sized flows (recurrence interval of one to three years) from reaching the downstream floodplain and natural flows emanating from the upper catchment have been partially attenuated. • Uncontrolled releases of water to the Upper Fortescue River tributaries occur when the dam fills from rainfall events and overtops the spillway. BHP also undertakes controlled releases of water from Ophthalmia Dam from the C wall valve to the Upper Fortescue River tributaries for environmental management or for dam safety, maintenance and water level management purposes. Regular releases from the dam have occurred following filling events that are likely to emulate low-level flow events downstream of the dam. • A 2019 discharge (release) trial investigated the effects of releasing water from Ophthalmia Dam on the Fortescue River system, to understand the extent of the wetting front along the Fortescue River and associated potential impacts to riparian vegetation and aquatic fauna. • A three-month discharge (release) trial was conducted during the 2017 dry season, which released approximately 9.4 GL of water from the dam into the Fortescue River. Seasonal water levels in the dam were not sufficient to warrant a second release as was originally proposed for a pre- and post-wet season trial. • Following three months of discharge (release), the wetting front reached as far as the Jigalong Road crossing, a distance of approximately 68 km along the Fortescue River. Significant infiltration losses occurred across the wetting front, much of this in the first 10 km. Local pools and road crossings also limited the extent of the wetting front. The trial showed water would not reach the Fortescue Marsh during periodic discharges (releases) from the dam with the valve fully open, with dry catchment conditions. • The biological studies undertaken as part of the release trial indicated that discharges (releases) from the dam of up to three months are unlikely to negatively impact on riparian vegetation health and the potential changes in salinity from the dam water are unlikely to have detrimental effects on aquatic fauna.	**Assumptions** • Water from Ophthalmia Dam will not overtop the spillway during natural no-flow conditions. • There is no limit of releases from the dam during and immediately following natural flow conditions in the wet season. • Controlled release of up to 3 months total from Ophthalmia Dam in the dry season (during natural no-flow conditions) is unlikely to negatively impact the ephemeral Fortescue River system.	**Type of components** BHP has chosen outcomes-based components as BHP can control the duration of releases of water from Ophthalmia Dam into the upper Fortescue River tributaries. **Choice of indicators** The criterion (threshold) for releases to the Fortescue River is based on release durations during natural, no-flow conditions. The criteria will only apply during no-flow conditions. There is no restriction when BHP discharges surplus water during natural flow events. Discharge will be managed to allow for periods of no flow to allow the river bed to dry out and maintain the (altered) ephemeral hydrological cycle. Management options to limit releases to the Fortescue River in the dry season include releasing water from the dam during or following wet season (i.e. during natural flow events) or altering the surplus water discharge regime (amount of water discharged) from BHP mines to the Ophthalmia Dam system. BHP will monitor the dates when Ophthalmia Dam valve is opened and closed to track the total release duration. As the Fortescue River is a regional water asset, the water-related components (indicator – threshold) and monitoring are the same for each project addressed in the EPWRMP that discharges surplus water to Ophthalmia Dam. This approach enables BHP to pro-actively manage its activities and impacts at the sub-regional level.

1.4.2.1 Ethel Gorge system monitoring program detail

BHP has considered over 40 years of surveys, data collection and understanding of water in the Eastern Pilbara management area (dating back to 1981 when the Ophthalmia Dam was constructed) to develop this EPWRMP.

The Ethel Gorge monitoring program includes the following detail:

- monitoring and management zones (Table 4 and Figure 4) to enable adaptive management of the Ethel Gorge system
- monitoring program summary (Table 5) with representative groundwater monitoring bore locations in Figure 4 and stygofauna sample locations in Figure 5
- monitoring zone criteria (Table 6):
  - EPWRMP criteria: groundwater level and groundwater salinity criteria for the Ethel Gorge Primary Habitat Monitoring Zone, which represents the core habitat for the Ethel Gorge TEC. In addition to the formal criteria (triggers and thresholds) in the components tables in Table 8, Table 9 and Table 10, BHP has identified early response indicators for groundwater levels and groundwater quality (salinity).
  - Operational criteria: salinity criteria for the other Ethel Gorge monitoring zones to support meeting the environmental outcomes for the Ethel Gorge TEC.



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PUBLIC

EASTERN PILBARA WATER RESOURCE MANAGEMENT PLAN

Ophthalmia Dam system

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:100,000	PREPARED:	GEOMATICS	FIGURE:	3
DATE:	22/08/2024	REQUESTOR:	ENV. APPROVALS	NO:	1021/125C

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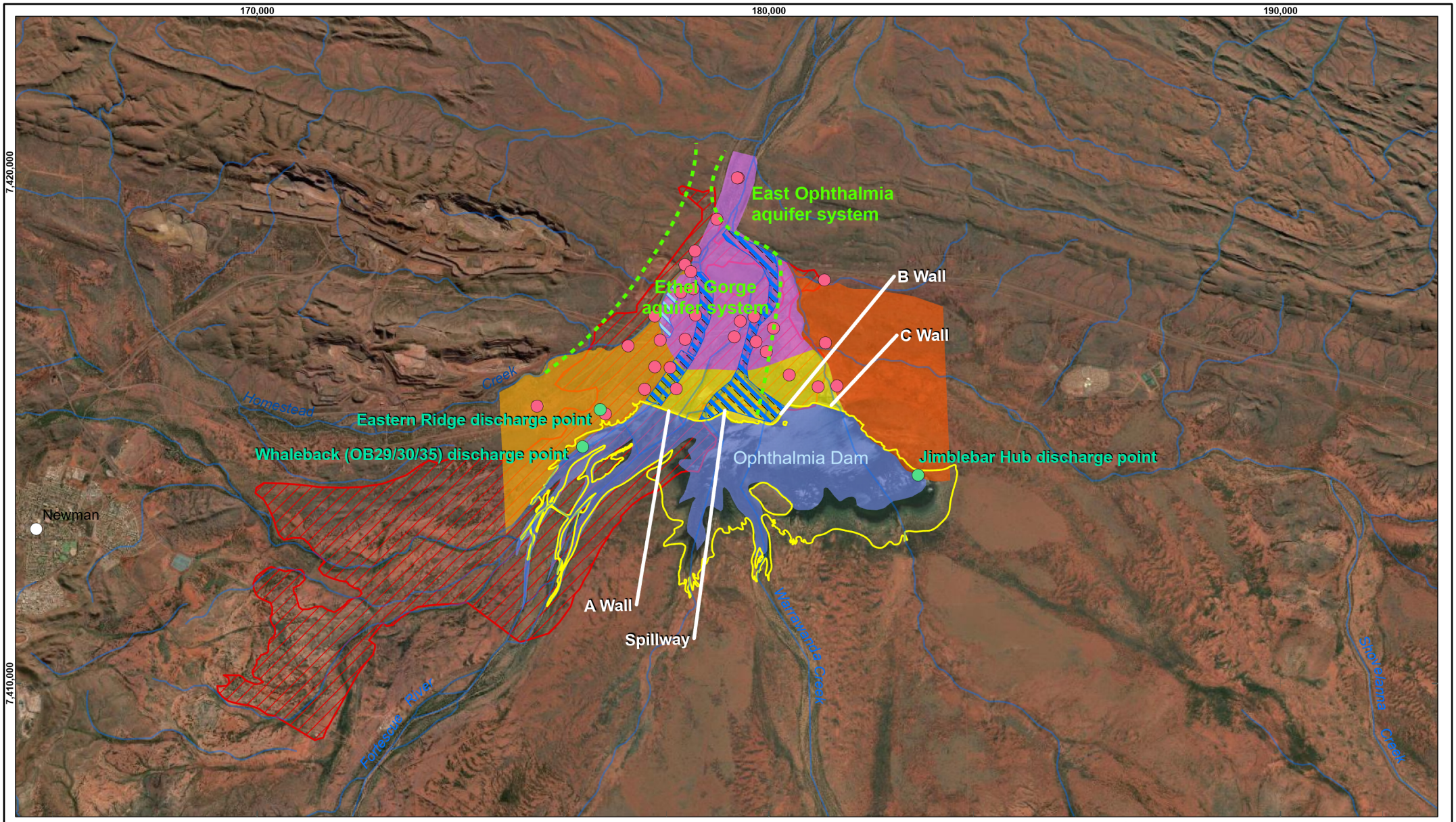
Table 4: Ethel Gorge monitoring and management zones

Monitoring and management zone	Location	Monitoring rationale
Early Warning Monitoring Zone	Immediately downstream of Ophthalmia Dam (Figure 4)	Monitor groundwater levels and quality (salinity) immediately downstream of dam to identify changes the groundwater system resulting from infiltration through Ophthalmia Dam
Ethel Gorge Primary Habitat Monitoring Zone (Monitoring Zone 1)	Downstream of Early Warning Monitoring Zone (Figure 4)	Monitor changes to groundwater levels and quality (salinity) in the area that represents primary Ethel Gorge TEC habitat and supporting aquifer
Shovelanna Creek Monitoring Zone (Monitoring Zone 2)	Shovelanna Creek aquifer, upstream of Ethel Gorge system (Figure 4)	Monitor groundwater water quality (salinity) in the Shovelanna Creek area to identify and characterise natural variance originating to the east
Homestead Creek Monitoring Zone (Monitoring Zone 3)	Homestead Creek aquifer, upstream of Ethel Gorge system (Figure 4)	Monitor potential changes to groundwater levels and quality (salinity as TDS) from Eastern Ridge (OB25) dewatering and changes to natural recharge
Ophthalmia Dam Monitoring Zone (Monitoring Zone 4)	Ophthalmia Dam (Figure 4)	Measurement of dam water levels, water quality (salinity) and outflow
Ophthalmia Dam Management Zone *Same area as Ophthalmia Dam Monitoring Zone (Monitoring Zone 4)*	Ophthalmia Dam MAR system and Ophthalmia Borefield (Figure 4 and Figure 3)	BHP uses the Ophthalmia Dam MAR system (Ophthalmia Dam, infiltration basins and recharge ponds) to infiltrate water (including surplus water from mine dewatering) into the Ethel Gorge aquifer to manage groundwater levels



- Existing discharge points
- Groundwater monitoring bores
- Ethel Gorge TEC
- Ophthalmia Dam full supply level
- Infiltration basins
- Recharge ponds
- Watercourse
- Indicative aquifer system boundary

Management and Monitoring Zones

- Monitoring Zone 1 - Ethel Gorge primary habitat monitoring zone
- Monitoring Zone 2 - Shovelanna Creek monitoring zone
- Monitoring Zone 3 - Homestead Creek monitoring zone
- Early Warning monitoring zone
- Ophthalmia Dam management zone and monitoring zone 4

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KILOMETRES

GDA 1994 MGA ZONE 51

BHP

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EASTERN PILBARA WATER RESOURCE MANAGEMENT PLAN

Ethel Gorge monitoring and management zones

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:100,000	PREPARED:	SPATIAL DATA	FIGURE:	4
DATE:	21/08/2024	REQUESTOR:	ENV. APPROVALS	NO:	1021/126C

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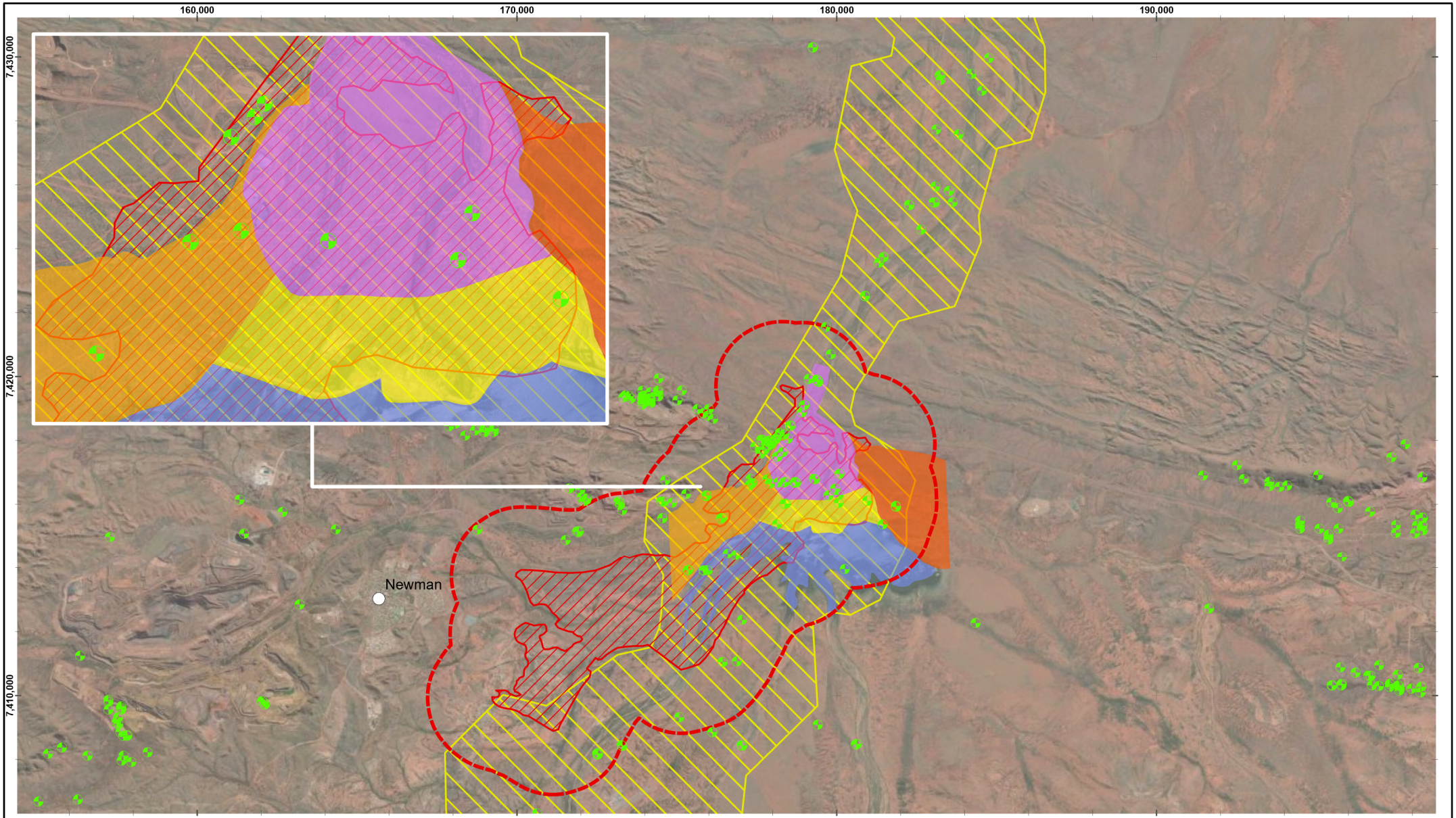

Ethel Gorge TEC
Threatened Ecological Community - buffer
Stygofauna Sample Site
Extent of Saturated Calcrete

Management and Monitoring Zones

Monitoring Zone 1 - Ethel Gorge primary habitat monitoring zone
Monitoring Zone 2 - Shovelanna Creek monitoring zone
Monitoring Zone 3 - Homestead Creek monitoring zone
Early Warning monitoring zone
Ophthalmia Dam management zone and monitoring zone 4

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GDA 1994 MGA ZONE 51

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EASTERN PILBARA WATER RESOURCE MANAGEMENT PLAN

Ethel Gorge stygofauna monitoring

PLANNING & STANDARDS - IRON ORE

SCALE @ A4:	1:160,000	PREPARED:	SPATIAL DATA	FIGURE:	5
DATE:	27/08/2024	REQUESTOR:	ENV. APPROVALS	NO:	1021/127D

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Table 5: Ethel Gorge monitoring summary

Location	Monitoring Bores	Parameters	Minimum frequency	Measurement method
Ophthalmia Dam monitoring program				
As per monitoring outlined in *Surplus Water Management Plan: Ophthalmia Dam Surplus Water Scheme* Includes the following monitoring: • dam water hydrochemistry • relief well (at dam walls) hydrochemistry • dam discharge point (Figure 3) cumulative volume, flow rate and hydrochemistry				
Groundwater monitoring program				
As per EPWRMP monitoring outlined in *GWL Operating Strategy for Ophthalmia Borefield* Includes the following monitoring (see Figure 4 for indicative locations): • groundwater levels • groundwater quality (field and laboratory)				
Stygofauna monitoring program				
Ethel Gorge monitoring and management zones (Figure 4) Within and outside extent of saturated calcrete and Ethel Gorge TEC buffer (Figure 5)	Selection of available bores, including from Groundwater Monitoring Program	**Groundwater** Groundwater levels Groundwater quality: Field EC, TDS, pH, dissolve oxygen (DO), reduction oxidation potential (Redox) and temperature Groundwater quality: Laboratory Standard hydrochemistry suite and PFAS	Biannually – wet season and dry season	Manual dip
		Stygofauna Species records and distributions Stygofauna abundance and species richness analysis	Biannually – wet season and dry season	Haul net sampling

Table 6: Ethel Gorge monitoring zone criteria

Monitoring zone	Criteria (and management stage)			Method to assess monitoring[1] results against criteria
	Early response indicator (Investigate)	Trigger (Act)	Threshold (Mitigate)	
Ethel Gorge Primary Habitat Monitoring Zone	**Groundwater quality (salinity)** Groundwater salinity reaches 2,500 mg/L TDS **Investigate:** Verify that the observed change is not due to measurement error. Investigate the cause of the change, likelihood that it will lead to exceedance of the trigger and/or impact to the Ethel Gorge TEC and undertake suitable management measures and controls (see Table 7)	**Groundwater quality (salinity)** Groundwater salinity reaches 3,000 mg/L TDS **Act:** See response actions in Table 8, Table 9 and Table 10	**Groundwater quality (salinity)** Groundwater salinity reaches 4,000 mg/L TDS **Mitigate:** See response actions in Table 8, Table 9 and Table 10	Exceedance of criteria in any bore in the Ethel Gorge Primary Habitat Monitoring Zone
	Groundwater level Aquifer groundwater level declines below 494 mRL[1] **Investigate:** Verify that the observed change is not due to measurement error. Investigate the cause of the change, likelihood that it will lead to exceedance of the trigger and/or impact to the Ethel Gorge TEC and undertake suitable management measures and controls (see Table 7)	**Groundwater levels** Aquifer groundwater level declines below 492 mRL[1] **Act:** See response actions in Table 8, Table 9 and Table 10	**Groundwater levels** Aquifer groundwater level declines below 490 mRL[1] **Mitigate:** See response actions in Table 8, Table 9 and Table 10	Groundwater level measured across the Ethel Gorge Primary Habitat Zone (excluding bores HEOP0504M and HEOP0574M which are down-gradient to the north)
All other Groundwater Monitoring Zones (Early Warning Monitoring Zone, Shovelanna Creek Monitoring Zone, Homestead Creek Monitoring Zone)	**Groundwater quality (salinity)** Statistically significant annual increase in TDS of 20% from long term average **Investigate:** Investigate possible cause of change to groundwater quality and identify further actions	-	-	Groundwater salinity measurements in any bore is compared to the long term seasonal average at that location, calculated as change in TDS over 12 month period
Ophthalmia Dam Monitoring Zone	**Dam water quality (salinity)** Dam water TDS > 2,500 mg/L **Investigate:** Review dam water quality, dam inputs and update forecasts	**Dam water quality (salinity)** Dam water TDS > 3,500 mg/L **Act:** Action as determined at Investigate Stage	-	Review of dam water salinity measurements

1. Groundwater monitoring is summarised in Table 5.

1.4.2.2 Ethel Gorge system - Management measures and controls

The specific water management options which are used for both operational water management purposes and as the primary controls for mitigating water-related impacts to the Ethel Gorge TEC are summarised below, with the locations presented in Figure 3. The application of the management measures and controls at these locations (to manage particular risks), including the process and limitations, is summarised in Table 7.

Ophthalmia Dam storage and infiltration: Surplus mine dewater is discharged to and stored in Ophthalmia Dam. Ophthalmia Dam is designed to retard the flow of some surface water from the Fortescue River and enable passive infiltration into the Ethel Gorge aquifer. The controlled release of the dam water via three outlets directs water into the Fortescue River and the down gradient infiltration basins, returning water back into the environment when required and as a preventative control to manage the effects of increased salinity, inundation of the rail line and water levels in Ophthalmia Dam.

Recharge Ponds: The ponds are located within Ethel Gorge and receive surplus water directly from the Eastern Ridge mining operations mine dewatering and enable passive but relatively quick infiltration into the underlying alluvial aquifer through the shallow and permeable calcrete formations. The facility manages impacts from changes to groundwater levels in the Ethel Gorge aquifer from mining below the water table at the Eastern Ridge mining operations.

Infiltration Basins: Controlled release of Ophthalmia Dam water into the infiltration basins located immediately down-gradient of the dam. The basins induce vertical leakage and support water levels and water quality (low salinity) in the Ethel Gorge aquifer. The basins have historically been effective as a “fast response” tool to increase groundwater levels and lower salinity.

Ophthalmia Borefield: Ophthalmia Borefield is located within the Ethel Gorge aquifer and provides part of the Newman drinking water supply.

Fortescue River seasonal release: Ophthalmia Dam has been designed to allow for the controlled release of water into the upper Fortescue River tributaries, including Shovelanna Creek via the eastern dam wall valve (C wall). The temporary release of dam water following a wet season allows for additional storage capacity during the dry period. Three months of controlled release into the Upper Fortescue River following the wet season is considered appropriate and unlikely to develop permanent or ponding water downstream in the Fortescue River. The seasonal release is considered unlikely to have an impact on riparian vegetation (BHP 2019b).

Table 7: Ethel Gorge Management measures and controls

Risk	Management measure or control	Process	Limitations
Low groundwater levels in the Ethel Gorge aquifer due to abstraction for water supply from the Ophthalmia Borefield and dewatering at Eastern Ridge mining operations	Capture of rainfall-runoff and surplus dewatering discharge in the Ophthalmia Dam and infiltrate into the Ethel Gorge aquifer	Water captured in the dam passively infiltrates through the floor of the Ophthalmia Dam which effectively recharges the Ethel Gorge aquifer	• Requires sufficient seasonal runoff and/or dewatering discharge to maintain standing water in the Ophthalmia Dam
High salinity water infiltrating into the Ethel Gorge aquifer	Capture of higher salinity water (surplus water that is higher salinity than natural rainfall inflows to the dam, and seasonal higher salinity in the dam due to evaporation) in Ophthalmia Dam and release during rain events	Store surplus water in Ophthalmia Dam outside of natural dam overtopping events and undertake the controlled release of water into Fortescue River, in conjunction with natural flow events	• Requires a rain event which overtops the dam
Low groundwater levels in the Ethel Gorge aquifer	Discharge low salinity water into the Infiltration Basins to increase recharge rates to the Ethel Gorge aquifer	Controlled release of rainfall-runoff and surplus dewatering discharge captured in the dam into the Infiltration Basins	• Requires sufficient water in the Ophthalmia Dam • Requires Ophthalmia Dam water salinity to be below Ethel Gorge aquifer threshold salinity at time of release
Increasing salinity in the Ethel Gorge aquifer	Infiltrate low-salinity dewatering water from Eastern Ridge directly into the Ethel Gorge aquifer	Discharge low-salinity surplus dewater directly into the three Recharge Ponds	• Requires surplus dewater salinity to be below Ethel Gorge aquifer threshold salinity • Limited by capacity of the Recharge Ponds and volume of surplus water available that can be directly discharged to the Recharge Ponds

2 EMP Components

BHP has provided detail on the EMP components in tables, as outlined in the EMP Instructions. BHP has used the 'Schedule' approach (which the EMP Instructions state may be used), as this EMP (EPWRMP) covers multiple operations and Ministerial Statements.

As discussed in Table 3, as the Ethel Gorge TEC and the Fortescue River are a regional water values, the water-related components (indicators - triggers and thresholds and monitoring) are the same for each operation addressed in the EPWRMP that contains Ministerial Statement condition/s relating to the discharge of surplus water to Ophthalmia Dam. Separate schedules (1a, b, c and d) in Table 8 to Table 11 have been developed for compliance purposes against each MS, because the conditions are different for each MS.

Table 8: Schedule 1a - Outcome-based components: Eastern Ridge Revised Proposal (MS1037)

Purpose: To meet the requirements of Conditions 8-1, 8-2 and 8-3 of Ministerial Statement 1037 (Eastern Ridge Revised Proposal)

Rationale: Hydrological conditions (groundwater levels and salinity) are the basis of maintaining the habitat of the Ethel Gorge TEC

EPA Factor and objective:	**Inland Waters** – To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected **Subterranean Fauna** - To protect subterranean fauna so that biological diversity and ecological integrity are maintained
Environmental outcome	Condition 8-1: Maintain the habitat of the Ethel Gorge Aquifer Stygobiont Community
Key environmental values:	Ethel Gorge TEC
Key impacts and risks:	Ethel Gorge TEC has the potential to be impacted from receiving surplus water discharge, resulting in changes to the extent and/or quality of the stygobiont habitat

MS1037 Condition clauses - Outcome-based components			
Indicators: • **Trigger criteria** • **Threshold criteria**	**Response actions:** • **Trigger level actions** • **Threshold contingency actions**	**Monitoring** **(including timing / frequency of monitoring)**	**Reporting**
Condition 8-2 (2) specify trigger criteria that must provide an early warning that the threshold criteria identified in condition 8-2(3) may not be met; (3) specify threshold criteria to demonstrate compliance with the environmental outcome specified in condition 8-1; Exceedance of the threshold criteria represents non-compliance with these conditions;	**Condition 8-2** (5) specify trigger level actions to be implemented in the event that trigger criteria have been exceeded; (6) specify threshold contingency actions to be implemented in the event that threshold criteria are exceeded; **Condition 8-5** In the event that monitoring indicates exceedance of threshold criteria specified in the Condition Environmental Management Plan/s, the proponent shall: (2) implement the threshold contingency actions specified in the Condition Environmental Management Plan/s within 24 hours and continue implementation of those actions until the CEO has confirmed by notice in writing that it has been demonstrated that the threshold criteria are being met and the implementation of the threshold contingency actions is no longer required; (3) investigate to determine the cause of the threshold criteria being exceeded; (4) investigate to provide information for the CEO to determine potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded;	**Condition 8-2** (4) specify monitoring to determine if trigger criteria and threshold criteria are exceeded;	**Condition 3-5** The proponent shall advise the CEO of any potential non-compliance within seven (7) days of that potential non-compliance being known. **Condition 3-6** The proponent shall submit to the CEO a Compliance Assessment Report by 1 October each year addressing compliance in the previous financial year, or as agreed in writing by the CEO. The Compliance Assessment Report shall: (1) be endorsed by the proponent's CEO or a person delegated to sign on the CEO's behalf; (2) include a statement as to whether the proponent has complied with the conditions; (3) identify all potential non-compliances and describe corrective and preventative actions taken; (4) be made publicly available in accordance with the approved Compliance Assessment Plan; and (5) indicate any proposed changes to the Compliance Assessment Plan required by condition 3-1. **Condition 8-2** (7) provide the format and timing for the reporting of monitoring results against trigger criteria and threshold criteria to demonstrate that condition 8-1 has been met over the reporting period in the Compliance Assessment Report required by condition 3. **Condition 8-5** In the event that monitoring indicates exceedance of threshold criteria specified in the Condition Environmental Management Plan/s, the proponent shall: (1) report the exceedance in writing to the CEO within 7 days of the exceedance being identified; (5) provide a report to the CEO within 21 days of the exceedance being reported as required by condition 8-5(1). The report shall include: (a) details of threshold contingency actions implemented; (b) the effectiveness of the threshold contingency actions implemented, against the threshold criteria; (c) the findings of the investigations required by MS 1037 condition 8-5(3) and 8-5(4); (d) measures to prevent the threshold criteria being exceeded in the future; (e) measures to prevent, control or abate the environmental harm which may have occurred; and (f) justification of the threshold remaining, or being adjusted based on better understanding, demonstrating that outcomes will continue to be met.

Outcome-based components			
Indicators: • **Trigger criteria** • **Threshold criteria**	**Response actions:** • **Trigger level actions** • **Threshold contingency actions**	**Monitoring** **(including timing / frequency of monitoring)**	**Reporting**
Groundwater quality (salinity) • **Trigger criteria 1:** Groundwater salinity in the Ethel Gorge Primary Habitat Monitoring Zone reaches3,000 mg/L TDS • **Threshold criteria 1:** Groundwater salinity in the Ethel Gorge Primary Habitat Monitoring Zone 4,000 mg/L TDS	Response actions to trigger/threshold criteria exceedance may include, but are not limited to: • Seasonal controlled release from Ophthalmia Dam to upper Fortescue tributaries (following a wet season - typically December through to April) • Modify surplus discharge regime to Ophthalmia Dam system (Figure 3)	Quarterly monitoring of Total Dissolved Solids (mg/L) within the Ethel Gorge Primary Habitat Monitoring Zone (Figure 4) during operations (i.e. active dewatering / surplus water discharge) (Table 5)	**Annual reporting** • Report against the requirements of Condition 3-6, in the annual Compliance Assessment Report required by Condition 3--6 (included as part of the Annual Environment Report). **Exception reporting** • Notify Superintendent within 72 hours of BHP identifying an exceedance of a trigger criterion. • Notify Superintendent and General Manager within 24 hours of BHP identifying an exceedance of a threshold criterion (potential non-compliance). • As required by condition 3-5, notify CEO of DWER of potential non-compliance within 7 days of that potential non-compliance being known. • As required by condition 8-5: – report the exceedance of the threshold criteria to the CEO of DWER in writing within 7 days of identifying the exceedance – provide a report to the CEO within 21 days of the threshold exceedance being reported as required by Condition 8-5(1).
Groundwater level • **Trigger criteria 2:** Aquifer groundwater level in the Ethel Gorge Primary Habitat Monitoring Zone declines below 492 mRL • **Threshold criteria 2:** Aquifer groundwater level in the Ethel Gorge Primary Habitat Monitoring Zone declines below 490 mRL	Response actions to trigger/threshold criteria exceedance may include, but are not limited to: • Increase discharge to Ophthalmia Dam system (Figure 3) • Reduce releases of water from Ophthalmia Dam to increase infiltration rates	Monthly monitoring of groundwater levels (mbgl) of bores (excluding HEOP504M and HEOP0574M) in the Ethel Gorge Primary Habitat Monitoring Zone (Figure 4) during operations (i.e. active dewatering / surplus water discharge) (Table 5)	
Controlled releases of water from Ophthalmia Dam to Fortescue River tributaries • **Threshold criteria 3:** 3 months total controlled release per year during natural no-flow conditions	Response actions to threshold criteria exceedance may include, but are not limited to: • Cease releases to upper Fortescue River tributaries	Continuous telemetered monitoring of Ophthalmia Dam water levels Monitor dates when Ophthalmia Dam valve is opened and closed to track total release duration	

Table 9: Schedule 1b - Outcome-based components: OB32 BWT and Western Ridge (MS1105)

Purpose: To meet the requirements of Conditions 9-1(d)(i) and 10-1(1)(i) of Ministerial Statement 1105 (Pilbara Expansion Strategic Proposal)

Rationale: Hydrological conditions (groundwater levels and salinity) are the basis of maintaining the habitat of the Ethel Gorge TEC

EPA Factor and objective:	**Inland Waters** – To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected **Subterranean Fauna** - To protect subterranean fauna so that biological diversity and ecological integrity are maintained
Environmental outcome:	Maintain groundwater levels and quality in the Ethel Gorge aquifer within historical variation Maintain the habitat of the Ethel Gorge TEC
Key environmental values:	Ethel Gorge TEC
Key impacts and risks:	Ethel Gorge TEC has the potential to be impacted from receiving surplus water discharge, resulting in changes to the extent and/or quality of the stygobiont habitat

MS1105 Condition clauses - Outcome-based components			
Indicators: • **Trigger criteria** • **Threshold criteria**	**Response actions:** • **Trigger level actions** • **Threshold contingency actions**	**Monitoring** **(including timing / frequency of monitoring)**	**Reporting**
Condition 6-2 (2) specify trigger criteria that will provide early warning for the implementation of trigger level actions if exceeded; (3) specify threshold criteria that provides a limit beyond which the environmental outcome is not achieved;	**Condition 6-2** (5) specify trigger level actions to be implemented in the event that trigger criteria have been exceeded; (6) specify threshold contingency actions to be implemented in the event that threshold criteria are exceeded; **Condition 6-7** In the event that monitoring, tests, surveys or investigations indicates exceedance of trigger criteria and/or threshold criteria specified in a Condition Environmental Management Plan(s), the proponent shall: (2) immediately implement the trigger level actions and/or threshold contingency actions specified in the Condition Environmental Management Plan(s) and continue implementation of those actions until the trigger criteria and/or threshold criteria are being met and implementation of the trigger level actions and/or threshold contingency actions are no longer required; (3) investigate to determine the cause of the trigger criteria and/or threshold criteria being exceeded; (4) identify additional measures required to prevent the trigger criteria and/or threshold criteria being exceeded in the future; (5) investigate to determine potential environmental harm or alteration of the environment that occurred due to threshold criteria being exceeded;	**Condition 6-2** (4) specify monitoring to determine if trigger criteria and threshold criteria are exceeded;	**Condition 4-6** The proponent shall submit to the CEO a Compliance Assessment Report annually by 1 October each year addressing compliance in the previous financial year, or as otherwise agreed in writing by the CEO. **Condition 4-7** The Compliance Assessment Report shall: (1) be endorsed by the proponent's CEO or a person delegated to sign on the CEO's behalf; (2) include a statement as to whether the proponent has complied with the conditions; (3) identify all potential non-compliances and describe corrective and preventative actions taken; (4) be made publicly available in accordance with the approved Compliance Assessment Plan; and (5) indicate any proposed changes to the Compliance Assessment Plan required by condition 4-1. **Condition 6-2** (6) provide the format and timing for the reporting of monitoring results against trigger criteria and threshold criteria to demonstrate that the relevant conditions referred to in the Section 45A[1] Notice for the proposal have been met over the reporting period in the Compliance Assessment Report required by condition 4-6; and (7) provide for reporting of exceedances of the trigger and threshold criteria. **Condition 6-7** In the event that monitoring, tests, surveys or investigations indicates exceedance of trigger criteria and/or threshold criteria specified in a Condition Environmental Management Plan(s), the proponent shall: (1) report the exceedance in writing to the CEO within seven (7) days of the exceedance being identified; (6) provide a report to the CEO within ninety (90) days of the exceedance being reported. The report shall include: (a) details of any trigger level actions or threshold contingency actions implemented; (b) the effectiveness of the trigger level actions or threshold contingency actions implemented, monitored and measured against trigger criteria and threshold criteria; (c) the findings of the investigations required by conditions 6-7(3) and 6-7(5); (d) additional measures to prevent the trigger or threshold criteria being exceeded in the future; and (e) measures to prevent, control or abate the environmental harm or alteration of the environment which may have occurred.

1. Now section 45B in current version of EP Act

Outcome-based components			
Indicators: • **Trigger criteria** • **Threshold criteria**	**Response actions:** • **Trigger level actions** • **Threshold contingency actions**	**Monitoring** **(including timing / frequency of monitoring)**	**Reporting**
Groundwater quality (salinity) • **Trigger criteria 1:** Groundwater salinity in the Ethel Gorge Primary Habitat Monitoring Zone reaches3,000 mg/L TDS • **Threshold criteria 1:** Groundwater salinity in the Ethel Gorge Primary Habitat Monitoring Zone 4,000 mg/L TDS	Response actions to trigger/threshold criteria exceedance may include, but are not limited to: • Seasonal controlled release from Ophthalmia Dam to upper Fortescue tributaries (following a wet season - typically December through to April) • Modify surplus discharge regime to Ophthalmia Dam system (Figure 3)	Quarterly monitoring of Total Dissolved Solids (mg/L) within the Ethel Gorge Primary Habitat Monitoring Zone (Figure 4) during operations (i.e. active dewatering / surplus water discharge) (Table 5)	**Annual reporting** • Report against the requirements of Condition 4-7, in the annual Compliance Assessment Report required by Condition 4-6 (included as part of the Annual Environment Report). **Exception reporting** • Notify Superintendent within 72 hours of BHP identifying an exceedance of a trigger criterion. • Notify Superintendent and General Manager within 24 hours of BHP identifying an exceedance of a threshold criterion (potential non-compliance). • As required by condition 6-7: – report the exceedance of trigger and/or threshold criteria to the CEO of DWER in writing within 7 days of identifying the exceedance – provide a report to the CEO within 90 days of the trigger and/or threshold exceedance being reported as required by Condition 6-7(1).
Groundwater level • **Trigger criteria 2:** Aquifer groundwater level in the Ethel Gorge Primary Habitat Monitoring Zone declines below 492 mRL • **Threshold criteria 2:** Aquifer groundwater level in the Ethel Gorge Primary Habitat Monitoring Zone declines below 490 mRL	Response actions to trigger/threshold criteria exceedance may include, but are not limited to: • Increase discharge to Ophthalmia Dam system (Figure 3) • Reduce releases of water from Ophthalmia Dam to increase infiltration rates	Monthly monitoring of groundwater levels (mbgl) of bores (excluding HEOP504M and HEOP0574M) in the Ethel Gorge Primary Habitat Monitoring Zone (Figure 4) during operations (i.e. active dewatering / surplus water discharge) (Table 5)	
Controlled releases of water from Ophthalmia Dam to Fortescue River tributaries • **Threshold criteria 3:** 3 months total controlled release per year during natural no-flow conditions	Response actions to threshold criteria exceedance may include, but are not limited to: • Cease releases to upper Fortescue River tributaries	Continuous telemetered monitoring of Ophthalmia Dam water levels Monitor dates when Ophthalmia Dam valve is opened and closed to track total release duration	

Table 10: Schedule 1c - Outcome-based components: Jimblebar Hub (MSXXXX)

Purpose: To meet the requirements of proposed Condition B1-1, Condition B1-2, Condition B4-1 and Condition B4-2 of MSXXXX

Rationale: Limit changes to groundwater levels and salinity in the Ethel Gorge aquifer to maintain the habitat of the Ethel Gorge TEC; Limit releases of water from Ophthalmia Dam to maintain the altered surface water regime of the Fortescue River

EPA Factor and objective:	**Inland Waters** – To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected **Subterranean Fauna** – To protect subterranean fauna so that biological diversity and ecological integrity are maintained
Key environmental values:	Ethel Gorge TEC and Fortescue River
EMP outcomes	**Condition B1-1** (1) Maintain groundwater levels and salinity within the Ethel Gorge aquifer to support the stygofauna habitat of the Ethel Gorge TEC (2) Maintain the current (altered) ephemeral surface water regime to the Fortescue River downstream of Ophthalmia Dam as a result of releases of water from Ophthalmia Dam. **Condition B4-1** (1) Maintain the stygofauna habitat of the Ethel Gorge TEC
Key impacts and risks:	Significant changes to the extent and/or quality of the stygobiont habitat in the Ethel Gorge TEC Significant changes to the surface water regime in the Fortescue River

MSXXXX Condition clauses - Outcome-based components[1]			
Indicators: • **Trigger criteria** • **Threshold criteria**	**Response actions:** • **Trigger level actions** • **Threshold contingency actions**	**Monitoring** **(including timing / frequency of monitoring)**	**Reporting**
Condition B1-2 The proponent must implement the Eastern Pilbara Water Resource Management Plan, with the purpose of ensuring the environmental outcomes in condition B1-1 are achieved, monitored and substantiated. **Condition B4-2** The proponent must implement the Eastern Pilbara Water Resource Management Plan, with the purpose of ensuring the environmental outcomes in condition B4-1 are achieved, monitored and substantiated.			
Condition C3-1 The environmental management plan required under condition B1-2 and condition B4-2, must contain provisions[1] which enable the substantiation of whether the relevant outcomes of those conditions are met, and must include: (1) **threshold criteria** that provide a limit beyond which the environmental outcomes are not achieved; (2) **trigger criteria** that will provide an early warning that the environmental outcomes are not likely to be met;	**Condition C3-1** The environmental management plan required under condition B1-2 and condition B4-2, must contain provisions[1] which enable the substantiation of whether the relevant outcomes of those conditions are met, and must include: (7) contingency measures which will be implemented if threshold criteria or trigger criteria are met; and **Condition C3-2** Without limiting condition C1-1, failure to achieve an environmental outcome, or the exceedance of a **threshold criteria**, regardless of whether threshold contingency measures have been or are being implemented, represents a non-compliance with these conditions. **Condition D1-1** If the proponent becomes aware of a potential non-compliance, the proponent must: (2) implement contingency measures; (3) investigate the cause; (4) investigate environmental impacts; (5) advise rectification measures to be implemented; (6) advise any other measures to be implemented to ensure no further impact; (7) advise timeframe in which contingency, rectification and other measures have and/or will be implemented; and	**Condition C3-1** The environmental management plan required under condition B1-2 and condition B4-2, must contain provisions which enable the substantiation of whether the relevant outcomes of those conditions are met, and must include: (3) monitoring parameters, sites, control/reference sites, methodology, timing and frequencies which will be used to measure threshold criteria and trigger criteria. Include methodology for determining alternative monitoring sites as a contingency if proposed sites are not suitable in the future;	**Condition C3-1** The environmental management plan required under condition B1-2 and condition B4-2, must contain provisions which enable the substantiation of whether the relevant outcomes of those conditions are met, and must include: (8) reporting requirements. **Condition D1-1** If the proponent becomes aware of a potential non-compliance, the proponent must: (1) report this to the CEO within seven (7) days; (8) provide a report to the CEO within twenty-one (21) days of being aware of the potential non-compliance, detailing the measures required in conditions D1-1(2) to D1-1(7). **Condition D2-1** The proponent must provide an annual Compliance Assessment Report to the CEO for the purpose of determining whether the implementation conditions are being complied with. **Condition D2-4** Each annual Compliance Assessment Report must: (1) state whether each condition of this Statement has been complied with, including: (b) achievement of environmental outcomes; (d) requirements to implement environmental management plans; (e) monitoring requirements; (f) implement contingency measures; (g) requirements to implement adaptive management; and (h) reporting requirements. (2) include the results of any monitoring (inclusive of any raw data) that has been required under Part C in order to demonstrate that the limits in Part A, and any outcomes or any objectives are being met; (3) provide evidence to substantiate statements of compliance, or details of where there has been a non-compliance; (4) include the corrective, remedial and preventative actions taken in response to any potential non-compliance;

1. EMP 'provisions' were renamed 'components' by the EPA in September 2020 (EPA 2021a), however MS issued since 2021 still refer to 'provisions' in relation to EMPs.

Outcome-based components			
Indicators: • **Trigger criteria** • **Threshold criteria**	**Response actions:** • **Trigger level actions** • **Threshold contingency actions**	**Monitoring** **(including timing / frequency of monitoring)**	**Reporting**
Groundwater quality (salinity) • **Trigger criteria 1:** Groundwater salinity in the Ethel Gorge Primary Habitat Monitoring Zone reaches 3,000 mg/L TDS • **Threshold criteria 1:** Groundwater salinity in the Ethel Gorge Primary Habitat Monitoring Zone 4,000 mg/L TDS	Response actions to trigger/threshold criteria exceedance may include, but are not limited to: • Seasonal controlled release from Ophthalmia Dam to upper Fortescue tributaries (following a wet season - typically December through to April) • Modify surplus discharge regime to Ophthalmia Dam system (Figure 3)	Quarterly monitoring of Total Dissolved Solids (mg/L) within the Ethel Gorge Primary Habitat Monitoring Zone (Figure 4) during operations (i.e. active dewatering / surplus water discharge) (Table 5)	**Annual reporting** Report against the requirements in Condition D2-4, in the annual Compliance Assessment Report required by Condition D2-1 (included as part of the Annual Environment Report), including: • achievement of environmental outcomes against the trigger and threshold criteria and implementation of contingency measures (response actions), if trigger and/or threshold criteria were exceeded • monitoring results to demonstrate environmental outcomes have been met • if the threshold criterion was exceeded during the reporting period (representing a potential non-compliance), include the corrective, remedial and preventative actions taken (including the threshold contingency actions). **Exception reporting** • Notify Superintendent within 72 hours of BHP identifying an exceedance of a trigger criterion. • Notify Superintendent and General Manager within 24 hours of BHP identifying an exceedance of a threshold criterion (potential non-compliance). • As required by Condition D1-1: – notify the CEO of DWER in writing within 7 days of being aware of the potential non-compliance (exceedance of a threshold criterion) – provide a report to the CEO within 21 days of being aware of the potential non-compliance, detailing the measures required in conditions D1-1(2) to D1-1(7).
Groundwater level • **Trigger criteria 2:** Aquifer groundwater level in the Ethel Gorge Primary Habitat Monitoring Zone declines below 492 mRL • **Threshold criteria 2:** Aquifer groundwater level in the Ethel Gorge Primary Habitat Monitoring Zone declines below 490 mRL	Response actions to trigger/threshold criteria exceedance may include, but are not limited to: • Increase discharge to Ophthalmia Dam system (Figure 3) • Reduce releases of water from Ophthalmia Dam to increase infiltration rates	Monthly monitoring of groundwater levels (mbgl) of bores (excluding HEOP504M and HEOP0574M) in the Ethel Gorge Primary Habitat Monitoring Zone (Figure 4) during operations (i.e. active dewatering / surplus water discharge) (Table 5)	
Controlled releases of water from Ophthalmia Dam to Fortescue River tributaries • **Threshold criteria 3:** 3 months total controlled release per year during natural no-flow conditions	Response actions to threshold criteria exceedance may include, but are not limited to: • Cease releases to upper Fortescue River tributaries	Continuous telemetered monitoring of Ophthalmia Dam water levels Monitor dates when Ophthalmia Dam valve is opened and closed to track total release duration	

Table 11: Schedule 1d - Outcome-based components: Orebody 29/30/35 (MSXXXX)

Purpose: To meet the requirements of proposed Condition B1-1, Condition B1-2, Condition B2-1 and Condition B2-2 of MSXXXX

Rationale: Limit changes to groundwater levels and salinity in the Ethel Gorge aquifer to maintain the habitat of the Ethel Gorge TEC; Limit releases of water from Ophthalmia Dam to maintain the altered surface water regime of the Fortescue River

EPA Factor and objective:	**Inland Waters** – To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected **Subterranean Fauna** – To protect subterranean fauna so that biological diversity and ecological integrity are maintained
Key environmental values:	Ethel Gorge TEC and Fortescue River
EMP outcomes	**Condition B1-1** (1) Maintain groundwater levels and salinity within the Ethel Gorge aquifer to support the stygofauna habitat of the Ethel Gorge TEC (2) Maintain the current (altered) ephemeral surface water regime to the Fortescue River downstream of Ophthalmia Dam as a result of the release of water from Ophthalmia Dam **Condition B2-1** (1) Maintain the stygofauna habitat of the Ethel Gorge TEC
Key impacts and risks:	Significant changes to the extent and/or quality of the stygobiont habitat in the Ethel Gorge TEC Significant changes to the surface water regime in the Fortescue River

MSXXXX Condition clauses - Outcome-based components[1]			
Indicators: • **Trigger criteria** • **Threshold criteria**	**Response actions:** • **Trigger level actions** • **Threshold contingency actions**	**Monitoring** **(including timing / frequency of monitoring)**	**Reporting**
Condition B1-2 The proponent must implement the Eastern Pilbara Water Resource Management Plan, with the purpose of ensuring the environmental outcomes in condition B1-1 are achieved, monitored and substantiated. **Condition B2-2** The proponent must implement the Eastern Pilbara Water Resource Management Plan, with the purpose of ensuring the environmental outcomes in condition B2-1 are achieved, monitored and substantiated.			
Condition C3-1 The environmental management plan required under condition B1-2 and condition B2-2, must contain provisions[1] which enable the substantiation of whether the relevant outcomes of those conditions are met, and must include: (1) **threshold** criteria that provide a limit beyond which the environmental outcomes are not achieved; (2) **trigger criteria** that will provide an early warning that the environmental outcomes are not likely to be met;	**Condition C3-1** The environmental management plan required under condition B1-2 and condition B2-2, must contain provisions[1] which enable the substantiation of whether the relevant outcomes of those conditions are met, and must include: (7) contingency measures which will be implemented if threshold criteria or trigger criteria are met; and **Condition C3-2** Without limiting condition C1-1, failure to achieve an environmental outcome, or the exceedance of a threshold criteria, regardless of whether threshold contingency measures have been or are being implemented, represents a non-compliance with these conditions. **Condition D1-1** If the proponent becomes aware of a potential non-compliance, the proponent must: (2) implement contingency measures; (3) investigate the cause; (4) investigate environmental impacts; (5) advise rectification measures to be implemented; (6) advise any other measures to be implemented to ensure no further impact; (7) advise timeframe in which contingency, rectification and other measures have and/or will be implemented; and	**Condition C3-1** The environmental management plan required under condition B1-2 and condition B2-2, must contain provisions which enable the substantiation of whether the relevant outcomes of those conditions are met, and must include: (3) monitoring parameters, sites, control/reference sites, methodology, timing and frequencies which will be used to measure threshold criteria and trigger criteria. Include methodology for determining alternative monitoring sites as a contingency if proposed sites are not suitable in the future;	**Condition C3-1** The environmental management plan required under condition B1-2 and condition B2-2, must contain provisions which enable the substantiation of whether the relevant outcomes of those conditions are met, and must include: (8) reporting requirements. **Condition D1-1** If the proponent becomes aware of a potential non-compliance, the proponent must: (1) report this to the CEO within seven (7) days; (8) provide a report to the CEO within twenty-one (21) days of being aware of the potential non-compliance, detailing the measures required in conditions D1-1(2) to D1-1(7). **Condition D2-1** The proponent must provide an annual Compliance Assessment Report to the CEO for the purpose of determining whether the implementation conditions are being complied with. **Condition D2-4** Each annual Compliance Assessment Report must: (1) state whether each condition of this Statement has been complied with, including: (b) achievement of environmental outcomes; (d) requirements to implement environmental management plans; (e) monitoring requirements; (f) implement contingency measures; (g) requirements to implement adaptive management; and (h) reporting requirements. (2) include the results of any monitoring (inclusive of any raw data) that has been required under Part C in order to demonstrate that the limits in Part A, and any outcomes or any objectives are being met; (3) provide evidence to substantiate statements of compliance, or details of where there has been a non-compliance; (4) include the corrective, remedial and preventative actions taken in response to any potential non-compliance;

1. EMP 'provisions' were renamed 'components' by the EPA in September 2020 (EPA 2021a), however MS issued since 2021 still refer to 'provisions' in relation to EMPs.

Outcome-based components			
Indicators: • **Trigger criteria** • **Threshold criteria**	**Response actions:** • **Trigger level actions** • **Threshold contingency actions**	**Monitoring** **(including timing / frequency of monitoring)**	**Reporting**
Groundwater quality (salinity) • **Trigger criteria 1:** Groundwater salinity in the Ethel Gorge Primary Habitat Monitoring Zone reaches 3,000 mg/L TDS • **Threshold criteria 1:** Groundwater salinity in the Ethel Gorge Primary Habitat Monitoring Zone 4,000 mg/L TDS	Response actions to trigger/threshold criteria exceedance may include, but are not limited to: • Seasonal controlled release from Ophthalmia Dam to upper Fortescue tributaries (following a wet season - typically December through to April) • Modify surplus discharge regime to Ophthalmia Dam system (Figure 3)	Quarterly monitoring of Total Dissolved Solids (mg/L) within the Ethel Gorge Primary Habitat Monitoring Zone (Figure 4) during operations (i.e. active dewatering / surplus water discharge) (Table 5)	**Annual reporting** Report against the requirements in Condition D2-4, in the annual Compliance Assessment Report required by Condition D2-1 (included as part of the Annual Environment Report), including: • achievement of environmental outcomes against the trigger and threshold criteria and implementation of contingency measures (response actions), if trigger and/or threshold criteria were exceeded • monitoring results to demonstrate environmental outcomes have been met • if the threshold criterion was exceeded during the reporting period (representing a potential non-compliance), include the corrective, remedial and preventative actions taken (including the threshold contingency actions). **Exception reporting** • Notify Superintendent within 72 hours of BHP identifying an exceedance of a trigger criterion. • Notify Superintendent and General Manager within 24 hours of BHP identifying an exceedance of a threshold criterion (potential non-compliance). • As required by Condition D1-1: – notify the CEO of DWER in writing within 7 days of being aware of the potential non-compliance (exceedance of a threshold criterion) – provide a report to the CEO within 21 days of being aware of the potential non-compliance, detailing the measures required in conditions D1-1(2) to D1-1(7).
Groundwater level • **Trigger criteria 2:** Aquifer groundwater level in the Ethel Gorge Primary Habitat Monitoring Zone declines below 492 mRL • **Threshold criteria 2:** Aquifer groundwater level in the Ethel Gorge Primary Habitat Monitoring Zone declines below 490 mRL	Response actions to trigger/threshold criteria exceedance may include, but are not limited to: • Increase discharge to Ophthalmia Dam system (Figure 3) • Reduce releases of water from Ophthalmia Dam to increase infiltration rates	Monthly monitoring of groundwater levels (mbgl) of bores (excluding HEOP504M and HEOP0574M) in the Ethel Gorge Primary Habitat Monitoring Zone (Figure 4) during operations (i.e. active dewatering / surplus water discharge) (Table 5)	
Controlled releases of water from Ophthalmia Dam to Fortescue River tributaries • **Threshold criteria 3:** 3 months total controlled release per year during natural no-flow conditions	Response actions to threshold criteria exceedance may include, but are not limited to: • Cease releases to upper Fortescue River tributaries	Continuous telemetered monitoring of Ophthalmia Dam water levels Monitor dates when Ophthalmia Dam valve is opened and closed to track total release duration	

3 Adaptive management and review of the EMP

3.1 Adaptive management approach

BHP applies an adaptive management framework for implementing management measures identified in this EMP (WMP), which is consistent with the Instructions. Adaptive management is a structured, iterative process to decision making. The framework embeds a cycle of monitoring, reporting and implementing change where required. It allows an evaluation of the management and mitigation measures so that they are progressively improved and refined, or alternative solutions adopted, to ensure that environmental objectives and outcomes in the plan are achieved. The key steps of the adaptive management approach are outlined in Figure 6.

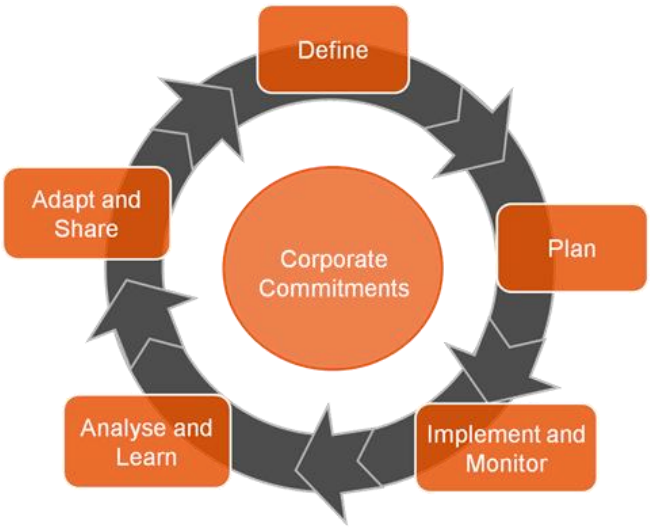

Figure 6: BHP's adaptive management approach

As the EPWRMP is a requirement of MS conditions, BHP will seek formal approval from the DWER to make major revisions to the EPWRMP based on information gained through adaptive management.

3.2 Review and revision of this EMP

BHP will review this EMP (EPWRMP) and revise it if required, to ensure that it achieves the identified environmental outcomes and meets MS conditions. A review may arise from any or all of the following:

- where required by a MS condition
- if initiated by BHP as part of the adaptive management process
- if triggered by a MS condition (e.g. for exceedance of a threshold criteria).

Changes to the endorsed version of the EMP may arise from, but are not limited to the any or all of the following:

- BHP reviews the EMP if the EPA or relevant government agencies develop new or amend existing guidance or policy
- BHP adds components when a new operation (or amendment to an existing operation) is proposed
- BHP adds or amends components when new proposals are approved and conditioned through Part IV of the EP Act or due to a change to MS conditions
- The CEO of DWER directs BHP to revise the EMP

- The CEO of DWER confirms by notice in writing that it has been demonstrated that the relevant requirements for the EMP have been met, or are able to be met under another statutory decision-making process, in which case the implementation of the EMP is no longer required.

As provided for in proposed Condition C1-3 of MSXXXX for the Jimblebar Hub Iron Ore Mining Operations (BHP 2023a) and proposed Condition C1-3 of MSXXXX for Orebody 29/30/35 (BHP 2024a), BHP may make minor revisions to this EMP (i.e. excluding changes to components in Table 8 to Table 11) without seeking endorsement from DWER. If BHP makes minor revisions to this EMP, BHP will provide the revised EMP with an explanation and justification of the minor revisions, according to the requirements in proposed Condition C1-4.

In accordance with Condition 5-7 of MS1037, and Conditions 9-4 and 10-4 of MS1105 BHP shall implement the latest revision of the EMP, which the CEO has confirmed by notice in writing, satisfies the requirements of Condition 5-2 of MS1037, and Conditions 9-2 and 10-2 of MS1105. In accordance with proposed Condition C1-1(1) of MSXXXX and MSXXXX, BHP must implement the implement the most recent version of the confirmed EMP.

4 Stakeholder consultation

BHP provided a draft version (8.1) of this EPWRMP to Karlka Nyiyaparli Aboriginal Corporation (KNAC) with the draft Environmental Review Document for the Orebody 29/30/35 Significant Amendment (BHP 2024a). There were no changes to the EPWRMP following KNAC's review.

BHP will consult with government agencies (including decision-making authorities), local authorities, groups and individuals, where relevant, in relation to the revision of this EPWRMP.

The specific recent consultation (since 2023) relevant to this EPWRMP is summarised in Table 12.

Table 12: Stakeholder consultation

Stakeholder	Date	Topics/issues raised	BHP response and outcome
KNAC	24 October 2024	**Version 8.1 submission for Orebody 29/30/35 Significant Amendment** KNAC raised the following points from its review of the draft referral information: • KNAC considers flora to be a potential factor given that changes in surface water availability can substantially change vegetation types and health • Nyiyaparli has concerns regarding the potential impacts on vegetation in response to changes in natural water flows and reiterated its request that BHP monitor vegetation in the vicinity of the dam and Fortescue River.	BHP clarified in its response to KNAC (November 2024) that the EPWRMP is for regional assets (e.g Ethel Gorge TEC and Fortescue River), not vegetation at the mine scale and that as discussed in the referral documentation, changes to surface water availability from the reduction in catchment will be within the natural variation of seasonal runoff and will not be significant. BHP clarified in its response to KNAC (November 2024) that it acknowledges Nyiyaparli's concerns regarding changes to natural flows from BHP's discharge to Ophthalmia Dam, noting that Ophthalmia Dam has created a modified system. BHP advised that the threshold relating to releases of water from Ophthalmia Dam to the Fortescue River has not changed. BHP also clarified that BHP undertakes biannual (wet and dry season) monitoring of riparian vegetation along the Fortescue River.
KNAC	21 November 2023	**Version 7.0 submission for Jimblebar Hub Iron Ore Mining Operations Significant Amendment** KNAC noted that updates to the EPWRMP are suitable in including new direct impacts to the Fortescue River from changes to surface water regimes.	BHP clarified it its response to KNAC (December 2023), that there are no new direct impacts to the Fortescue River – in Version 7.0 BHP formalised the existing commitment relating to releases of water from Ophthalmia Dam in the endorsed Version 6.0.
EPA / DWER	10 July 2023	**Version 6.3 submission for Western Ridge administrative update (with referral)** Notice requiring further information from EPA. Part 2 comments from DWER included comments relating to the EPWRMP	BHP has considered the comments from DWER to revise the EPWRMP and: • has made changes to the EPWRMP (Version 8.0) where appropriate (see Section 5, Table 13) • has undertaken additional studies and analyses, and discussion in the EPWRMP as recommended • will include a response to DWER following the Jimblebar Hub referral to justify why any of the recommended changes to the EPWRMP and/or studies and analyses are not required.
EPA / DWER	15 May 2023	**Version 6.2 submission for Orebody 32 BWT administrative update (with referral)** Notice requiring further information from EPA. Part 2 comments from DWER included comments relating to the EPWRMP.	
DWER	22 March 2023	**Version 6.1 submission for MS1126 Jimblebar administrative update**	BHP responded on 24 July 2023, that BHP was reviewing relevant data and intended to provide an updated version of the EPWRMP and responses to comments with the referral of the Jimblebar Hub Significant Amendment.

Stakeholder	Date	Topics/issues raised	BHP response and outcome
		Letter from DWER requiring amendments for Version 6.1 for MS1126, MS1037 and 1021. Comments from DWER included technical advice from Department of Biodiversity, Conservation and Attractions (DBCA).	BHP has considered the comments from DWER to revise the EPWRMP and: • has made changes to the EPWRMP (Version 8.0) where appropriate (see Section 5, Table 13) • has undertaken additional studies and analyses, and discussion in the EPWRMP as recommended • will include a response to DWER following the Jimblebar Hub referral to justify why any of the recommended changes to the EPWRMP and/or studies and analyses are not required.

5 Changes to the EMP

Table 13 summarises the key changes in this version of the EMP (EPWRMP) (Version 8.1) compared to Version 8.0 that BHP submitted to the EPA in December 2023 as part of the referral documentation for the Jimblebar Hub Iron Ore Mining Operations Significant Amendment.

Table 13: Changes to the EMP

Complexity of changes		**Minor revisions ☑**	**Moderate revisions**	**Major revisions**
Number of key environmental factors		**One**	**2-3 ☑**	**>3**
Date revision submitted to EPA	December 2024			
Proponent's operational requirement timeframe for approval of revision	**< One month ☑**	**< Six months**	**>Six months**	**None**
Reason for timeframe	The EPWRMP is currently being implemented for approved proposals that are in operations.			

Item no.	EMP Section no.	EMP page no.	Summary of change	Reason for change
Version 8.1 August 2024				
1.	All	All	Add Orebody 20/30/35 Proposal	Administrative update to add the Orebody 29/30/35 Significant Amendment proposal
Version 8.0 December 2023				
1.	All	All	Amalgamate Jimblebar (MS1126) and Orebody 31 (MS1021) requirements into requirements for the Jimblebar Hub	Administrative update for the Jimblebar Hub Iron Ore Mining Operations Significant Amendment proposal
2.	All	All	Administrative update to change status of Orebody 32 and Western Ridge Proposals from proposed to approved	The Orebody 32 Below Water Table and Western Ridge proposals were declared to be derived proposals on 27 September 2023 and are authorised for implementation under EP Act s45B Notice: Statement 1105 – No 1 and EP Act s45B Notice: Statement 1105 – No 2 respectively
3.	Section 1.4.2 (Table 3) Section 2 (Table 8, Table 9, Table 10)	11 23, 25, 27	Add Fortescue River as a value and include criteria (and rationale for criteria) relating to releases of water from Ophthalmia Dam	Formalise existing commitment in EPWRMP to limit releases of water from Ophthalmia Dam in the dry season (during natural no-flow conditions) to three months total

Item no.	EMP Section no.	EMP page no.	Summary of change	Reason for change
4.	Section 1.4.2 (Table 3) Section 1.4.2.1 (Table 5)	10 17	Add text that BHP will continue to undertake monitoring of stygofauna species richness monitoring Add text summarising results of investigations into stygofauna species richness and abundance	Address DWER comments (1, 2 and 3) on Version 6.1, provided to BHP on 22 March 2023 (see Table 12), relating to stygofauna species richness: • clarify that BHP will continue to monitor for stygofauna species richness • summarise outcomes of investigations into stygofauna species richness and total abundance in relation to key abiotic parameters • summarise stygofauna monitoring program (including species richness)
5.	Section 1.4.2 (Table 3)	9	Add text justifying retention of existing groundwater salinity trigger and threshold	Address DWER comment (4) on Version 6.1 and DWER Part 2 comment (4) on Version 6.3, provided to BHP on 10 July 2023 (see Table 12), relating to the groundwater salinity trigger and threshold: • clarify that the EPWRMP also includes a groundwater salinity Early Warning Indicator of 2,500 mg/L TDS • summarise the range of recorded groundwater salinity in the Ethel Gorge area • summarise results of recent water balance modelling which predicts potential changes in groundwater levels and groundwater salinity • summarise outcomes of 2016 technical review of the salinity tolerance of stygofauna in the Ethel Gorge TEC • summarise outcomes of investigations into stygofauna species richness and total abundance in relation to key abiotic parameters
6.	Section 1.4.2.1 (Table 5 and Table 6)	17, 18	Add Table 5 summarising Ethel Gorge monitoring Add column to Table 6 to specify monitoring methodology	Address DWER comment (6) on Version 6.1 relating to monitoring methods against trigger and threshold criteria: • summarise groundwater monitoring program • describe the monitoring methods and how they are used to assess whether criteria have been exceeded Address DWER comment (6) on Version 6.3 relating to PFAS impacts on stygofauna: • add monitoring of PFAS in groundwater to the stygofauna monitoring program
7.	Section 1.3	4	Add reference to condition requirements to make the EPWRMP publicly available	Address DWER comment (7) on Version 6.1 relating to public availability of the EPWRMP
8.	Section 1.4.1 (including Figure 2)	5, 6	Add text to explain the rationale for separate plan water EMPs Update EPWRMP water management framework figure	Address DWER Part 2 comment (8) on Version 6.2, provided to BHP on 15 May 2023 (see Table 12) and Part 2 comment (8) on Version 6.3, relating to linkages between the EPWRMP and the PFAS WMP: • clarify the rationale for developing separate WMPs and clarify what each plan addresses

Item no.	EMP Section no.	EMP page no.	Summary of change	Reason for change
9.	Section 1.4.2 (Table 3) Section 1.4.2.1 (Table 5, Table 6) Section 2 (Table 8, Table 9, Table 10)	9 17, 18 23, 25, 27	Revise groundwater level criteria to remove groundwater level increase and simplify	Groundwater level increase is not considered to be a risk to stygofauna habitat and there is certainty about historical groundwater levels, from groundwater monitoring
Version 6.3 October 2022				
	1.1 (Figure 1), 1.2 (Table 1), 1.4.1 (Table 2 and Figure 2)		Administrative update to include the Western Ridge derived proposal	The Western Ridge proposal was referred to the EPA on 17 January 2023 to be declared a derived proposal. As discussed in the *Newman Hub (Western Ridge) Derived Proposal Request Ministerial Statement 1105* (BHP 2023c), BHP has proposed to manage the potential impacts to the Ethel Gorge aquifer / TEC according to the EPWRMP.
Version 6.2 April 2022				
	All		Administrative update to include the Orebody 32 Below Water Table derived proposal	The Orebody 32 Below Water Table proposal was referred to the EPA on 28 October 2022 to be declared a derived proposal. As discussed in the *Newman Hub (Orebody 32 Below Water Table) Derived Proposal Request Ministerial Statement 1105* (BHP 2022d), BHP has proposed to manage the potential impacts to the Ethel Gorge TEC according to the EPWRMP.
	1.4.2 (Table 3) 2 (Table 9-Table 12)		Add in reference to existing stygofauna monitoring program	Clarify that in addition to monitoring groundwater levels and groundwater quality (salinity) in the Ethel Gorge aquifer, BHP also undertakes a stygofauna monitoring program which currently includes annual seasonal monitoring of groundwater quality (full hydrochemistry suite) and sampling of stygofauna species.
Version 6.1 December 2021				
	All		Administrative update to align with Ministerial Statement 1126 and the EMP Instructions	Restructured/updated to align with EPA's revised October 2021 EMP Instructions and requirements of the current Ministerial Statements. Amended content to reflect current Ministerial Statement 1126 issued March 2020 and remove references and content related to superseded Ministerial Statements 857 (as amended by 1029), 809 and 683.

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